

Book of Abstracts

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PARIS 2010

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Parallel Sessions



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ICHEP2010 Parallel Sessions

01 - Early Experience and Results from LHC

207 track 01

Thu, Jul 22, 2010

09:25 15 mn

Salle Maillot

Determination of the Luminosity by the LHC Experiments

presented by: **Massimiliano Ferro-Luzzi (CERN)**

The high resolution of the LHCb vertex detector allows for precise measurements of vertex positions of beam-gas and beam-beam interactions. From these measurements beam parameters such as width and position can be inferred. A novel method will be presented for determining the absolute luminosity at the LHC using these directly measured beam parameters, in combination with beam intensity information provided by the accelerator. Results will be shown for both the 2009 and 2010 run, and prospects for the ultimate precision of this method will be discussed. A forward look will also be given to alternative methods of luminosity determination which with data samples of $\sim 1 \text{ fb}^{-1}$ will offer the possibility of $\sim 1\%$ level precision. These include measurements of the production rate of elastic two photon dimuon production, and studies based on W and Z production in the forward region.

In addition, luminosity measurements at ATLAS and CMS will also be discussed.

214 track 01

Thu, Jul 22, 2010

14:00 15 mn

Salle Maillot

Particle ID in LHCb

presented by: **Andrew Powell (University of Oxford)**

Particle identification (PID) is a fundamental requirement for LHCb and is provided by CALO, MUON and RICH sub-detectors. The Calorimeters provide identification of electrons, photons and hadrons in addition to the measurement of their energies and positions. As well as being part of the LHCb trigger, the MUON system provides identification of muons to a very high level of purity, essential for many CP-sensitive measurements that have J/Psi's in their final states. Hadron identification, in particular the ability to distinguish kaons and pions, is crucial to many LHCb analyses, particularly where the final states of interest are purely hadronic. The LHCb RICH system provides this, covering a momentum range between 1 and 100 GeV/c.

To maintain the integrity of the LHCb physics performance, it is essential to measure and monitor the particle identification efficiency and misidentification fraction over time. This can be done by using specific decays, such as Kshorts, Phi's, Lambdas, J/psi's and D*'s, for which pure samples can be isolated using only kinematic quantities, due to their unique decay topologies. This allows for clean samples of known particle types to be selected, which can then be used to calibrate and monitor the PID performance from data. The procedures for performing this will be presented, together with preliminary results from the 2009 and 2010 LHC runs.

221 track 01

Thu, Jul 22, 2010

11:36 15 mn

Salle Maillot

Performance of the Tracking System at the LHCb Experiment

presented by: **Silvia Borghi (University of Glasgow)**

The LHCb detector is a forward spectrometer. Its tracking system consists of silicon strip detectors and straw tube drift chambers. The LHCb experiment is dedicated to the reconstruction of B decays into many particle final states. For a high B reconstruction efficiency a high efficient track reconstruction is crucial. We will report on the performance of the individual tracking subdetectors in terms of hit resolution and detector efficiencies as well as on the overall track reconstruction performance.



ICHEP2010 Parallel Sessions

304 track 01 Fri, Jul 23, 2010 09:00 13 mn Salle 251

First Data from the TOTEM experiment at LHC

presented by: Francesco Cafagna (Univ. + INFN Bari)

Totem is the only LHC experiment that will explore the forward region at pseudorapidity larger than 3.1. The main goal is the measurement of the total and elastic cross-section at 14 TeV and the study of diffractive physics in the forward region. The experiment approved and funded in the 2006, was build, largely commissioned and started his data taking in December 2009. The total cross section beyond 1 TeV/c will be measured with the unprecedented precision of 1% using the luminosity independent method based on the simultaneous detection of elastic scattering at low momentum transfer and of the inelastic interactions. Protons scattered at very small angles in elastic or quasi-elastic reactions will be measured in telescopes of silicon detectors enclosed in Roman Pots, placed on both sides of the intersection regions. Inelastically produced secondaries will be measured by a forward inelastic detector covering the region $3 < \eta < 7$ with full azimuthal acceptance. This last detector will measure the overall rate of inelastic reactions. The TOTEM physics program also include for the first time the measurement of the charged multiplicity at the TEV scale important for the understanding of the cosmic ray events. TOTEM will take data under all LHC beam conditions including standard high luminosity runs to maximize its physics goals. This contribution describes the status of the TOTEM experiment. A first set of data at 0.9 and 2.36 TeV was recently collected and some preliminary results will be shown. In addition we will discuss the measurements to be made in the 2010 LHC runs.

342 track 01 Thu, Jul 22, 2010 09:00 20 mn Salle Maillot

Optimisation of LHC beam conditions

presented by: Helmut Burkhardt (CERN)

We report on the monitoring and optimization of the beam conditions in early LHC operation :
luminosity monitoring, optimization and calibration, beam-spot size and position and machine induced backgrounds

364 track 01 Thu, Jul 22, 2010 09:45 13 mn Salle Maillot

Performance of the ATLAS Trigger with Proton Collisions at the LHC

presented by: John Baines (Particle Physics-Rutherford Appleton Laboratory-STFC - Science &)

The ATLAS trigger has been used very successfully to collect collision data during 2009 and 2010 LHC running at centre of mass energies of 900 GeV, 2.36 TeV, and 7 TeV. The trigger system reduces the event rate, from the design bunch-crossing rate of 40 MHz, to an average recording rate of 200Hz. The ATLAS trigger is composed of three levels. The first (Level 1) uses custom electronics to reject most background collisions, in less than $2.5\mu\text{s}$, using information from the calorimeter and muon detectors. The upper two trigger levels, known collectively as the High Level Trigger (HLT), are software-based triggers. As well as triggers using global event features, such as missing transverse energy, there are selections based on identifying candidate muons, electrons, photons, tau mesons or jets. We give an overview of the performance of these trigger selections based on extensive online running during LHC collisions and describe the progress towards fully commissioning these triggers. Distributions of key selection variables based on calorimeter and tracking information are shown calculated at the different trigger levels and are compared with offline reconstruction. We include examples of online triggering of Standard Model physics such as candidate W-boson decays. Comparisons between data and simulations are shown for some important selection variables, already illustrating a very good level of understanding of the detector and trigger performance. We describe how the trigger has evolved with increasing LHC luminosity and give a brief overview of plans for forthcoming LHC running.



ICHEP2010 Parallel Sessions

472 track 01 Thu, Jul 22, 2010 10:15 13 mn Salle Maillot

LHCb trigger system

presented by: Eric Van Herwijnen (CERN)

The Large Hadron Collider beauty experiment (LHCb) is a dedicated heavy flavour physics experiment at the LHC. The trigger system employs the finite lifetime and relative large mass of charm and beauty hadrons to distinguish heavy flavour and background from inelastic pp-scattering. The LHCb trigger is a two level system. The first level is implemented in hardware, it reduces the visible interaction rate to a maximum of 1MHz, at which the whole detector can be readout. The second trigger level is a C++ application running on an Event Filter Farm composed of several thousand CPU nodes. The full trigger is operational in the experiment. In this talk, an overview of the LHCb trigger system will be given. We put special emphasis on the experience obtained with the initial data taking at the LHC, and the commissioning and monitoring of the software trigger. The method to obtain the efficiency of the trigger from real data will be described, and first results will be presented.

814 track 01 Thu, Jul 22, 2010 10:00 13 mn Salle Maillot

Performance of the CMS High-Level Trigger

presented by: Edgar Carrera Jarrin (Boston University)

The CMS trigger system has been designed to cope with unprecedented luminosities and accelerator bunch-crossing rates of up to 40 MHz at LHC. The High-Level-Trigger (HLT) combines in a novel way the traditional L2 and L3 trigger components which are implemented in a commercial Filter Farm with thousands of CPUs. The flexibility of a contiguous software environment allows the coherent tuning of the HLT algorithms to accommodate multiple physics channels and enhance the CMS physics reach. We will report on the trigger commissioning of the HLT with the first LHC pp collisions at 900 GeV, 2.36 TeV and 7 TeV and discuss the first results on the trigger performance.

822 track 01 Thu, Jul 22, 2010 11:00 15 mn Salle Maillot

Operation, calibration and performance of the CMS silicon tracker

presented by: Steven Lowette (UCSB)

The CMS tracker is the largest silicon detector ever built, covering an area close to 200 m² and consisting of 15 148 silicon strip and 1440 silicon pixel modules. The use of tracker data in physics analysis requires fine-grained monitoring and calibration procedures. Results from timing studies, threshold optimization, calibration of gains and Lorentz angle determination are shown and the impact on resolution and dE/dx measurements is discussed. In order to achieve an optimal track-parameter resolution, the position and orientation of its modules need to be determined with a precision of few micrometers and an accurate representation of the distribution of material in the tracker is needed. Results of the alignment of the full tracker are presented, based on the analysis of several million reconstructed tracks recorded during the commissioning of the CMS experiment with cosmic rays and the first proton-proton collisions. They have been validated by several data-driven studies and compared with predictions obtained from a detailed detector simulation. Reconstructed photon conversions and nuclear interactions have been used for a first estimate of the tracker material.

825 track 01 Thu, Jul 22, 2010 17:15 15 mn Salle Maillot

Performance of the particle flow algorithm in CMS

presented by: Florian Beaudette (CERN)

The aim of the CMS particle flow event-reconstruction algorithm is to identify and reconstruct individually each particle arising from the LHC proton-proton collision, by combining the information from all subdetectors. The resulting particle-flow event reconstruction leads to an improved performance for the reconstruction of jets and MET, and for the identification of electrons, muons, and taus. The 7 TeV jet data, as well as leptons from J/Psi, W and Z Boson are used to finalize the commissioning of the particle-flow algorithm. The efficient reconstruction and identification of photons, charged and neutral hadrons, muons and electrons made possible by the versatility of the CMS apparatus, are shown to perform as expected up to a high level of precision. Results on particle-based jets and missing transverse energy, as well as on muons and electrons obtained through the reconstruction of standard candles are shown.



ICHEP2010 Parallel Sessions

826 track 01

Thu, Jul 22, 2010

15:20 15 mn

Salle Maillot

Electron and Photon reconstruction and identification with the CMS detector in pp collisions at $\sqrt{s} = 7$ TeV

presented by: Roberto Salerno (Universita' Milano Bicocca - INFN Milano Bicocca)

The performance of electron and photon reconstruction and identification has been studied at $\sqrt{s} = 7$ TeV. Reconstruction and identification variables as well as isolation and photon conversion rejection variables, in the case of electrons, have been compared between data and Monte Carlo for signal and background. Electron and photon identification efficiency, electron fake rate and photon purity have been determined and compared with Monte Carlo predictions. For electrons the momentum resolution as well as charge identification have also been studied. Level 1 Trigger and High Level Trigger efficiencies have been measured.

828 track 01

Thu, Jul 22, 2010

17:35 20 mn

Salle Maillot

Performance of CMS muon reconstruction in pp collisions at $\sqrt{s} = 7$ TeV

presented by: Giovanni Petrucciani (Univ. of California, San Diego)

The performance of muon reconstruction in CMS has been studied on a sample of muons collected in pp collisions at $\sqrt{s} = 7$ TeV at the LHC. Measured distributions of basic muon-track quantities are well reproduced by the Monte Carlo simulation. Efficiencies of various high-level trigger, identification, and reconstruction algorithms have been measured and compared with the expectations from Monte Carlo simulation. Results for the relative muon momentum resolution and the muon momentum scale will be reported.

860 track 01

Fri, Jul 23, 2010

09:15 13 mn

Salle 251

Early Physics with the LHCf detector at LHC

presented by: Alessia Tricomi (Dipartimento di Fisica)

The LHCf detector is the smallest of the six experiments which are taking data at the CERN LHC accelerator. The whole detector has been installed at the beginning of 2008 on both sides of LHC collision point 1 (IP1). LHCf has been designed to measure with high accuracy energy and transverse momentum spectra of neutral particles in the very forward region ($\eta > 8.4$) of LHC collisions by means of a double arm calorimeter. Thanks to the excellent energy and position resolution of the two sampling calorimeters, LHCf is able to measure the pion production cross section through the measurement of the photons produced in the neutral pion decays. It is also able to identify neutrons and measure their energy spectrum. LHCf data provide a fundamental tool to calibrate the most widely adopted shower models used to estimate the primary energy of Ultra High Energy Cosmic Rays. Many of the experimental procedures used to derive the properties of primary UHECRs depend strongly on the nuclear interaction model used in the Monte Carlo codes of the air showers and several open questions in cosmic ray physics may profit from the accurate knowledge and calibration of Monte Carlo models provided by the LHCf experiment. LHCf experiment successfully took data during 2009 run at 900 GeV and it is now smoothly taking data at 7 TeV collisions. Preliminary results of the ongoing analysis will be presented.



ICHEP2010 Parallel Sessions

1050 track 01

Thu, Jul 22, 2010

16:15 15 mn

Salle Maillot

Material Studies with Photon Conversions and Energy Flow at the ATLAS Experiment

presented by: Anthony Morley (CERN)

With the start of the LHC operations at a center of mass energy of 7 TeV a large sample of low energy photons, mostly coming from the decay of neutral mesons, have been collected with the ATLAS detector. Due to the large amount of material upstream the electromagnetic (EM) calorimeter, about 50% of these photons will convert before reaching it. The converted photons are used as a tool to map the material of the ATLAS tracker in front of the EM calorimeter. The results of the material measurements relative to an accurately measured reference volume inside the tracker, together with an estimate of the most important sources of systematic uncertainties will be shown. The effect of the energy loss due to bremsstrahlung on the conversion vertex reconstruction precision is also discussed. The results from using the extremely pure electron sample provided by the converted photons to study the particle identification capabilities of the ATLAS Transition Radiation Tracker (TRT), are presented.

Furthermore, the measurement of the energy flow in the electromagnetic calorimeter (EM) is typically used to spot early detector problems, but it is also sensitive to the (radially integrated) amount of material in front of the electromagnetic calorimeter. Using the LHC collision data collected at a centre of mass energy of 7 TeV, the two dimensional (η versus ϕ) occupancy maps of the EM calorimeter for each longitudinal layer have been extracted. Such a method provides a cross check of the total amount of material in front of the calorimeter and it is complementary to others only sensitive to the amount of material in the tracker. The measurement accuracy will be dominated by the systematic uncertainties and the ultimate accuracy is expected to be about 5% of the material upstream.

1053 track 01

Fri, Jul 23, 2010

11:00 20 mn

Salle 251

First Results from ATLAS on QCD, Quarkonia, and Heavy-Flavour Physics in proton-proton Collisions at $\sqrt{s}=7$ TeV

merged from abstracts: 534 537 538 539 554 555

presented by: Julie Kirk (RAL)

This talk will give an overview on first results on QCD, quarkonia, and heavy-flavour physics in proton-proton collisions at $\sqrt{s}=7$ TeV, recorded with the ATLAS experiment at the LHC. The QCD measurements address properties of both soft and hard collisions, such as the underlying event, particle production in minimum bias events and jet production. First results from quarkonia and heavy flavour production will be highlighted.

1054 track 01

Fri, Jul 23, 2010

11:25 20 mn

Salle 251

First Results from CMS on QCD, Quarkonia, and Heavy-Flavour Physics in proton-proton Collisions at $\sqrt{s}=7$ TeV

presented by: Sara Bolognesi (CERN)

This talk will give an overview on first results on QCD, quarkonia, and heavy-flavour physics in proton-proton collisions at $\sqrt{s}=7$ TeV, recorded with the CMS experiment at the LHC. The QCD measurements address properties of both soft and hard collisions, such as the underlying event, particle production in minimum bias events and jet production. First results from quarkonia and heavy flavour production will be highlighted.

1055 track 01

Fri, Jul 23, 2010

10:00 25 mn

Salle 251

First Physics Results from LHCb

presented by: Sheldon STONE (Syracuse)

The LHCb experiment is primarily designed to study charm and bottom hadron decays at the LHC. The first exclusively reconstructed charm and bottom hadrons signals have been observed shortly after the start of the first LHC physics run at $\sqrt{s} = 7$ TeV, in events collected with a minimum bias trigger. Charm cross-sections for D_0 , D^+ , D_s and Λ_{cb} are measured in the forward region covered by LHCb ($2 < \eta < 5$). We also use the semi-inclusive decay $B \rightarrow D_0 \ell \nu$ to ascertain the b anti- b production cross section. Preliminary results will be shown. Also reported are studies of W and Z boson, as well as low mass Drell-Yan production.



ICHEP2010 Parallel Sessions

1056 track 01

Fri, Jul 23, 2010

09:30 25 mn

Salle 251

First Physics Results from ALICE

presented by: Iouri BELIKOV (IPHC, CNRS-IN2P3)

ALICE is the LHC experiment dedicated to the study of heavy-ion collisions. The main purpose of ALICE is to investigate the properties of a state of deconfined nuclear matter, the Quark Gluon Plasma. Heavy flavour measurements will play a crucial role in this investigation. The physics programme of ALICE has started by studying proton-proton collisions at unprecedented high energies. We will present the first results on open heavy flavour and quarkonia in proton-proton collisions at $\sqrt{s} = 7$ TeV measured by the ALICE experiment at both mid- and forward-rapidities. We will conclude with the prospects for heavy flavour and quarkonium measurements in both proton-proton and nucleus-nucleus collisions. Also presented are first results of neutral meson reconstruction and its perspectives, as well as further physics studies.

1057 track 01

Fri, Jul 23, 2010

12:10 15 mn

Salle 251

First Results from ATLAS on W and Z Boson Production in proton-proton Collisions at $\sqrt{s}=7$ TeV

presented by: Jan Kretschmar (University of Liverpool)

This talk will give an overview on first results on W and Z production in proton-proton collisions at $\sqrt{s}=7$ TeV, recorded with the ATLAS experiment at the LHC. The selection of W and Z events will be described, together with data-driven methods used to estimate the trigger and reconstruction efficiencies, as well as the main backgrounds. The W and Z signal yields and the extracted cross sections at $\sqrt{s}=7$ TeV will be presented, as well as preliminary distributions of kinematic variables and first measurements of the W charge and polarization asymmetry.

1117 track 01

Thu, Jul 22, 2010

14:40 15 mn

Salle Maillot

Commissioning and Performance of the ATLAS Calorimeter Systems with proton-proton Collisions at the LHC

presented by: Pascal Pralavorio (Faculte des Sciences de Luminy-Centre de Physique des Particules)

The commissioning, operation and general performance of the electromagnetic and hadronic calorimeters of ATLAS will be presented, as achieved using random triggers, calibration data, cosmic muons, and LHC proton-proton collisions. Methods will be presented for verifying the precision of inter-channel synchronization and calibration, and their improvement with in-situ data.

1118 track 01

Thu, Jul 22, 2010

15:00 15 mn

Salle Maillot

Electron and Photon Performance and Electron p_T Spectrum Measurement with ATLAS in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Scott Snyder (Brookhaven National Laboratory (BNL))

The understanding of the reconstruction of electrons in the ATLAS experiment at LHC is one of the key issues for the 2010 run at a center of mass energy of 7 TeV. Two aspects are of interest: the energy calibration and the reconstruction efficiency. The energy measurement of electrons is based on the electromagnetic calorimeter over most of the relevant energy range (5 GeV to a few TeV). The electromagnetic calorimeter clusters are formed from electronically calibrated calorimeter cells and are corrected for local position and energy variations. A refined calibration procedure, developed and validated over years of test-beam strives to identify all sources of energy losses upstream of the outside the cluster and corrects for them one by one (using Monte Carlo). The present study is aiming at a first validation of this calibration strategy on prompt electrons from known physics processes. The electron reconstruction efficiency can be measured with data using a tag-and-probe approach with $J/\psi \rightarrow ee$ and $Z \rightarrow ee$ decays. An initial measurement will be shown with the first pb-1 and compared to MC. The talk also presents a first measurement of the inclusive electron transverse momentum (p_T) spectrum in proton proton collisions at a center of mass energy of 7 TeV using a data sample of a few pb-1.



ICHEP2010 Parallel Sessions

1119 track 01

Thu, Jul 22, 2010

11:54 15 mn

Salle Maillot

Performance of Track and Vertex Reconstruction and b-Tagging Studies with ATLAS in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Johanna Fleckner (CERN / University of Mainz)

First 7 TeV proton-proton collisions produced by the Large Hadron Collider at CERN have been recorded by the ATLAS experiments in 2010. The ability to accurately and efficiently reconstruct the trajectories of charged particles produced in these collisions is a critical component in the measurements that will be presented at this conference. This talk will present results on the performance of tracking and vertex-reconstruction using the ATLAS tracking systems. Various methods are employed by the two experiments for determining the efficiency of track reconstruction using the first data collected by the detectors. Furthermore, the methods to control the track momentum scale and related systematic uncertainties will be discussed. Finally, the reconstruction of known particle decays is presented as important tool to understand the tracking and vertexing performance, as well as the particle identification capabilities.

The identification of b-quark jets is an important tool for the physics programs of the ATLAS experiment. So-called b-tagging algorithms take advantage of either the decay to a soft lepton or a displaced vertex caused by the long-lived decay of a b hadron via the weak force. As a result key ingredients to b-tagging algorithms are the precise trajectory measurement of charged particle tracks and detection of low pT leptons. The distributions of the corresponding observables - track impact parameters, secondary vertices and lepton momenta - were measured in pp collisions at $\sqrt{s}=7$ TeV, and compared to the predictions from Monte Carlo simulation. First results on efficiencies and mis-identification rates are shown. The calibration strategies that will be used for early data and initial studies that will lead to a fully data-driven calibration for the b-tagging algorithms are also presented.

1120 track 01

Thu, Jul 22, 2010

11:18 15 mn

Salle Maillot

Commissioning and Performance of the ATLAS Inner Detector with proton-proton Collisions at the LHC

presented by: Antonio Limosani (University of Melbourne)

ATLAS is a multipurpose experiment which records the products of the LHC collisions. To reconstruct trajectories of charged particles produced in these collisions, the experiment is equipped with large-scale tracking systems built of silicon planar sensors (pixel and strip-based), as well as a drift-tube based detector system. This talk will cover the first experience gained with these tracking systems, such as the commissioning and first operational experience, including monitoring and calibration procedures. The talk will further address the alignment procedures and the results obtained. Finally, the performance of the tracking systems with the LHC in collision mode will be presented and compared with the expected parameters and with the Monte Carlo simulations, also covering their particle identification capabilities.

1121 track 01

Thu, Jul 22, 2010

16:35 15 mn

Salle Maillot

Performance of Jet, Missing Transverse Energy and Tau Reconstruction with ATLAS in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Ariel Schwartzman (SLAC National Accelerator Laboratory)

This talk presents the first results on jet, missing transverse energy (MET) and tau reconstruction performance, as obtained with the ATLAS detector in 7 TeV proton-proton collisions at the LHC. Jets are reconstructed with the anti-kt jet algorithm using calorimeter clusters, or as so called 'track jets' using the Inner Detector only. The performance of the jet reconstruction will be compared to the Monte Carlo expectation. Methods to determine the jet energy scale and resolution will also be discussed. The MET performance has been studied in randomly-triggered events, soft proton proton collisions and collisions with jets at high transverse momentum where MET is expected to be zero. First MET measurements are also presented for events where a W-boson is produced. Finally, a status of tau reconstruction, identification and triggering in ATLAS will be given.



ICHEP2010 Parallel Sessions

1122 track 01

Thu, Jul 22, 2010

12:12 15 mn

Salle Maillot

Performance of Track and Vertex Reconstruction and B-Tagging Studies with CMS in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Boris Mangano (UCSD)

First 7 TeV proton-proton collisions produced by the Large Hadron Collider at CERN have been recorded by the CMS experiment in 2010. The ability to accurately and efficiently reconstruct the trajectories of charged particles produced in these collisions is a critical component for most measurements at the LHC. We present several methods for determining the efficiency and measuring the resolution and the momentum scale of track reconstruction in CMS using the first data collected by the detector. The trajectories of charged particles are the key elements for the reconstruction of the primary interaction vertex and for the identification of jets containing the products of a B-hadron weak decay. The distributions of the key observables, such as track impact parameters and vertex properties, are compared with the prediction of Monte Carlo simulation. Finally the performance of vertex reconstruction and B identification algorithms as directly derived from data are shown.

1123 track 01

Thu, Jul 22, 2010

14:20 15 mn

Salle Maillot

Commissioning and Performance of the CMS Calorimeter Systems with proton-proton Collisions at the LHC

presented by: Philippe Gras (DAPNIA)

We present results on the commissioning and performance of the CMS electromagnetic and hadron calorimeters in pp collisions at a centre of mass energy of 7 TeV at the LHC. The first LHC beams have been used to finalize the commissioning of the readouts and triggers. The calibrations and synchronisations of the calorimeters using cosmic muons, beam splash events (where the LHC beam is targeted on upstream collimators), and collision data including reconstructed physics objects are presented. The quality of the offline data reconstruction, from low level quantities to showers, has been investigated and optimised using known physics processes. In-situ data and thorough data/MC comparisons have been used to measure and tune the detector performance. First performance results are given.

1124 track 01

Thu, Jul 22, 2010

16:55 15 mn

Salle Maillot

Performance of Jet and Missing Transverse Energy Reconstruction with CMS in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Joanna Weng (CERN)

Data from pp collisions have been used to study jets and missing transverse energy (MET) in the CMS experiment at the Large Hadron Collider. Results are presented for four different approaches to reconstruct jets and three different approaches to reconstruct MET in the CMS detector: calorimeter-only based jet and MET reconstruction; an algorithm which improves the measurement of calorimeter jets and MET by exploiting the associated tracks; the "Particle Flow" method, which reconstructs each particle in the event based on information from all sub-detectors, prior to the clustering of jets or the calculation of MET; and jets reconstructed from tracks only. The results are compared to those from fully simulated Pythia events. For MET the performance is studied using inclusive pp interactions and also exclusive states such as events containing two high transverse momentum jets, W bosons, Z bosons or isolated, high transverse momentum photons in 7-TeV proton-proton collisions. For jets, pT balance in dijet and photon+jet events is used to measure the jet response as function of pseudorapidity, absolute jet response in the central pseudorapidity region, and jet resolution in multiple regions. Further, we present measurements of the offset energy from noise and pile-up in a jet.



ICHEP2010 Parallel Sessions

1158 track 01

Fri, Jul 23, 2010

11:50 15 mn

Salle 251

W and Z boson production at CMS in pp collisions at $\sqrt{s}=7$ TeV

presented by: Maria Cepeda (CIEMAT (Madrid))

The production of W and Z bosons has been observed in pp collisions at a center-of-mass energy of 7 TeV using data collected in the CMS experiment. W events were selected containing an isolated, energetic electron or muon. The presence of an energetic neutrino is demonstrated using the distribution of missing transverse energy (MET), which is calculated from calorimetric and tracking information in three ways. Z events were selected containing a pair of isolated, energetic electrons or muons. Data-driven methods are used to estimate reconstruction and triggering efficiencies, and well as the main backgrounds. We present the W and Z signal yields and the extracted cross-sections at $\sqrt{s}=7$ TeV, as well as preliminary distributions of kinematic variables. Emphasis is put on the weak boson reconstruction performance.

1199 track 01

Thu, Jul 22, 2010

17:55 20 mn

Salle Maillot

Performance of the ATLAS Muon Spectrometer and of Muon Identification at the LHC

presented by: Martin Woudstra (University of Massachusetts)

The large cosmic data samples collected in fall 2009 by the ATLAS experiment have been used to study the performance of the Muon Spectrometer. Detailed studies of the basic Muon spectrometer performance in terms of sagitta resolution, tracking efficiency and momentum resolution are presented and provide an update with respect to the results recently published. The results are also compared with a cosmic data simulation recently improved with a more realistic drift chamber response. The recent collision data collected at a CM of 7 TeV have also been analyzed to determine basic Muon Spectrometer performance.

The performance of the ATLAS muon identification was studied with 1 inverse nanobarn of LHC proton-proton collision data at a centre of mass energy of 7 TeV. Measured detector efficiencies, hit multiplicities, and residual distributions of reconstructed muon tracks are well reproduced by the Monte Carlo simulation. Exploiting the redundancy in the muon identification at detector and reconstruction level the performance of the identification steps could be checked with data. 4.5 muons per microbarn with $p_T > 6$ GeV and $|\eta| < 2.5$ were identified as predicted by Pythia minimum bias Monte Carlo. The pseudorapidity, η , and p_T distributions of the reconstructed muons are in reasonable agreement with the Monte Carlo prediction.



ICHEP2010 Parallel Sessions

02 - The Standard Model and Electroweak Symmetry Breaking

128 track 02 Thu, Jul 22, 2010 12:08 20 mn Salle 252B

Top quark pair and single top production at Tevatron and LHC energies

presented by: Nikolaos Kidonakis (Kennesaw State University)

I present the latest theoretical developments in the calculation of the cross section for top-antitop pair production and single top quark production via all main partonic channels. Higher-order corrections from resummation of soft gluons are added through NNLL accuracy. Detailed numerical results are presented for the cross section and transverse momentum distributions at the Tevatron and LHC colliders.

187 track 02 Thu, Jul 22, 2010 11:00 20 mn Salle 252B

Top-quark production at the Tevatron and LHC

presented by: Peter Uwer (Humboldt-Universität zu Berlin)

We review recent theoretical progress concerning top-quark pair production at the Tevatron and LHC. In particular we present updated theoretical predictions taken into account the newest pdf's. Furthermore we comment on the possibility of a direct measurement of the running top-quark mass.

313 track 02 Fri, Jul 23, 2010 16:15 18 mn Salle 252B

Status of the global fit to electroweak precision data, and constraints on the Higgs boson

presented by: Martin Goebel (DESY - University of Hamburg)

Gitter results from the global Standard Model (SM) fit to electroweak precision data, including newest Tevatron measurements, are reviewed and discussed. Constraints on the Higgs and top-quark masses, as well as on $\alpha_s(M_Z)$, are studied in some detail, and outlooks to the LHC and ILC eras are presented. Information from the electroweak fit on loop contributions from beyond-SM models is obtained through an analysis of the so-called oblique parameters.

340 track 02 Thu, Jul 22, 2010 16:15 22 mn Salle 252B

Higgs production at the Tevatron: theoretical predictions and uncertainties

presented by: Julien Baglio (Theoretical Physics Laboratory, Orsay)

I will present an update of the theoretical predictions for the production cross sections of the Standard Model Higgs boson at the Tevatron collider. The two main search channels will be discussed, the gluon-gluon fusion mechanism $gg \rightarrow H$ and the Higgs-strahlung process $q \bar{q} \rightarrow V H$ with $V=W/Z$, including all relevant higher order QCD and electroweak corrections in perturbation theory. A thorough analysis of the various uncertainties affecting these predictions will then follow.

360 track 02 Fri, Jul 23, 2010 15:25 18 mn Salle 252B

Associated b Quark-Higgs Boson Production at the LHC

presented by: Sally Dawson (BNL)

We present the one-loop electroweak effects for the process of semi-inclusive b-Higgs production at the LHC. The electroweak effects are significant for heavy Higgs bosons and can be obtained using an effective theory approach. We also discuss new results for the merging of the 4 flavor number parton distribution scheme and the 5-flavor number parton distribution scheme for the calculation of b-Higgs production at NLO. The merged scheme captures the relevant kinematic features at all scales.



ICHEP2010 Parallel Sessions

492 track 02 Fri, Jul 23, 2010 17:19 18 mn Salle 252B

ATLAS Higgs Sensitivity for 1/fb of data at the LHC running at 7 TeV

presented by: Tatsuya Masubuchi (University of Tokyo)

The search for Higgs bosons at the Large Hadron Collider (LHC) is based on the analysis of independent final states, such as photon, tau, W and Z pairs. The Higgs discovery potential of ATLAS for each independent final state, as well as for combined channels, is reviewed and discussed. Results are presented for an integrated luminosity for 1/fb at 7 TeV center of mass energy at the LHC. Practical methods to estimate the backgrounds using control samples in real data are discussed. Validation of some of the data driven background estimation methods using the early 7 TeV ATLAS data at the LHC is also presented.

493 track 02 Thu, Jul 22, 2010 09:50 17 mn Salle 252B

Measurement of W and Z boson production in pp at sqrt(s) = 7 TeV with the ATLAS detector

presented by: Laurent Serin (Laboratoire de l'Accelérateur Lineaire (LAL) (IN2P3) (LAL))

The first measurement of the production cross-sections for W and Z bosons in proton-proton interactions at sqrt(s) = 7 TeV are reported from the ATLAS experiment. Based on its excellent capability for reconstructing both high pT electrons and muons, the electron and the muon decay modes of the W/Z bosons are compared. First results for the ratio of W/Z production and of W+/W- production will also be described.

622 track 02 Thu, Jul 22, 2010 14:00 20 mn Salle 252B

V+jet production at the LHC: Electroweak radiative corrections

presented by: Tobias Kasprzik (KIT, Karlsruhe)

The investigation of weak bosons ($W^+/W^-, Z$) produced with associated hard QCD jets will be of great phenomenological interest at the LHC, since such processes constitute an important background to a large variety of BSM-physics signatures. At the same time - owing to their large production cross sections and the clear decay signatures of the vector bosons - they can be used to monitor and calibrate the luminosity of the collider, constrain the PDFs, or for detector calibration.

To match the excellent experimental accuracy that is expected at the LHC, we have worked out a theoretical NLO analysis of V+jet production at hadron colliders. The focus of this talk will be on new results on the electroweak corrections to Z+jet production at the LHC. We present some details of the calculation, and discuss the phenomenological implications of our results.

832 track 02 Thu, Jul 22, 2010 10:10 17 mn Salle 252B

W and Z boson production at CMS in pp collisions at sqrt(s)=7 TeV

presented by: Jeremiah Mans (University of Minnesota/CMS)

The production of W and Z bosons has been observed in pp collisions at a center-of-mass energy of 7 TeV using data collected in the CMS experiment. W events were selected containing an isolated, energetic electron or muon. The presence of an energetic neutrino is demonstrated using the distribution of missing transverse energy (MET), which is calculated from calorimetric and tracking information in three ways. Z events were selected containing a pair of isolated, energetic electrons or muons. Data-driven methods are used to estimate reconstruction and triggering efficiencies, and well as the main backgrounds. We present the W and Z signal yields and the extracted cross-sections at sqrt(s)=7 TeV, as well as preliminary distributions of kinematic variables.

857 track 02 Fri, Jul 23, 2010 17:39 18 mn Salle 252B

Propects for Higgs boson searches with CMS

presented by: Marat Gataullin (Caltech)

We overview the prospects for Higgs boson searches with a data sample of 1 fb⁻¹ to be collected in pp-collisions at 7 TeV. We present sensitivity projections for SM-like decay modes $H \rightarrow WW \rightarrow 2l2\nu$, $H \rightarrow ZZ \rightarrow 4l$, $H \rightarrow \gamma\gamma$ (including their combination), the MSSM-like signature $pp \rightarrow bb\Phi \rightarrow bb(\tau\tau)$, and, also discuss a few other possible models/searches. Preliminary results of data analyses validating a number of the key aspects of these Higgs searches are also reported.



ICHEP2010 Parallel Sessions

869 track 02

Fri, Jul 23, 2010

10:10 18 mn

Salle Maillot

Electroweak non-resonant corrections to $e^+ e^- \rightarrow W^+ W^- b \bar{b}$ in the $t \bar{t}$ resonance region

presented by: Pedro Ruiz-Femenia (RWTH Aachen University)

We analyse subleading electroweak effects in the top anti-top resonance production region in $e^+ e^-$ collisions which arise due to the decay of the top and anti-top quarks into the $W^+ W^- b \bar{b}$ final state. These are NLO corrections adopting the non-relativistic power counting $v \sim \alpha_s \sim \sqrt{\alpha_{EW}}$. In contrast to the QCD corrections which have been calculated (almost) up to N³NLO, the parametrically larger NLO electroweak contributions have not been completely known so far, but are mandatory for the required accuracy at a future linear collider. The missing parts of these NLO contributions arise from off-shell top production and decay and other non-resonant irreducible background processes to $t \bar{t}$ production. We consider the total cross section of the $e^+ e^- \rightarrow W^+ W^- b \bar{b}$ process and additionally implement cuts on the invariant masses of the $W^+ b$ and $W^- \bar{b}$ pairs.

927 track 02

Fri, Jul 23, 2010

14:00 22 mn

Salle 252B

Higgs production at the Tevatron and LHC

presented by: Giampiero Passarino (Torino University)

Higgs production cross sections, including electroweak NLO corrections will be discussed

1068 track 02

Fri, Jul 23, 2010

09:00 18 mn

Salle Maillot

Precision Predictions for Higgs and Top-Quark Pair Production at Hadron Colliders

merged from abstracts: 924 923

presented by: Matthias Neubert (Mainz University)

Precision Predictions for Top-Quark Pair Production at Hadron Colliders

Content

Precision predictions for phenomenologically interesting observables such as the $t \bar{t}$ invariant mass distribution and forward-backward asymmetry in top-quark pair production at hadron colliders require control over the differential cross section in perturbative QCD. We improve existing calculations of the doubly differential cross section in the invariant mass and scattering angle by using techniques from soft-collinear effective theory to perform an NNLL resummation of threshold logarithms, which become large when the invariant mass M of the top-quark pair approaches the partonic center-of-mass energy \sqrt{s} . We match our results in the threshold region with the exact results at NLO in fixed-order perturbation theory, and perform a numerical analysis of the invariant mass distribution, the total cross section, and the forward-backward asymmetry. Using MSTW2008NNLO parton distribution functions (PDFs), we obtain for the inclusive production cross sections at the Tevatron and LHC the values $\sigma_{t \bar{t}} = (6.30 +0.19 -0.23+0.31)$ pb at the Tevatron and $\sigma_{t \bar{t}} = (149 +7 +8)$ pb at the LHC, where the first error results from scale variations while the second reflects PDF uncertainties.

Precision Predictions for Higgs Production at Hadron Colliders

Content

We use renormalization-group methods in effective field theory to improve the theoretical prediction for the cross section for Higgs-boson production at hadron colliders. In addition to soft-gluon resummation at N³LL, we also resum enhanced contributions of the form $(C_A \times \pi \times \alpha_s)^n$, which arise in the analytic continuation of the gluon form factor to time-like momentum transfer. This resummation is achieved by evaluating the matching corrections arising at the Higgs-boson mass scale at a time-like renormalization point $\mu^2 < 0$, followed by renormalization-group evolution to $\mu^2 > 0$. We match our resummed result to NNLO fixed-order perturbation theory and give numerical predictions for the total production cross section as a function of the Higgs-boson mass. Resummation effects are significant even at NNLO, where our improved predictions for the cross sections at the Tevatron and the LHC exceed the fixed-order predictions by about 13% and 8%, respectively, for $m_H = 120$ GeV. We also discuss the application of our technique to other time-like processes such as Drell-Yan production, $e^+ e^- \rightarrow$ hadrons, and hadronic decays of the Higgs boson.



ICHEP2010 Parallel Sessions

1129 track 02 Fri, Jul 23, 2010 11:00 22 mn Salle Maillot

Measurement of the top quark mass and width with CDF detector

merged from abstracts: 285 286 287 289 288

presented by: **Hyunsu Lee (University of Chicago)**

We report a measurement of the top quark mass obtained from proton-antiproton collisions at a center-of-mass energy of 1.96 TeV at the Fermilab Tevatron using the CDF II detector using different decay modes and analysis methods. We present measurements of the top quark width, and mass difference between the top and anti-top quark in the lepton+jets channel as well.

1130 track 02 Fri, Jul 23, 2010 11:25 22 mn Salle Maillot

Precision measurement of the top quark mass and width with the DZero detector

merged from abstracts: 594 599 600 613

presented by: **Alexander Grohsjean (Ludwig-Maximilians-Univ. Muenchen)**

We report a set of measurements of the top quark mass obtained from proton-antiproton collisions at a center-of-mass energy of 1.96 TeV at the Fermilab Tevatron with the DZero detector using different decay modes and analysis methods. We present measurements of the top quark width, and mass difference between the top and anti-top quark as well.

1132 track 02 Thu, Jul 22, 2010 11:22 20 mn Salle 252B

Studies of single top quark production at the Tevatron

merged from abstracts: 603 604 605 292

presented by: **Breese Quinn (University of Mississippi)**

Using events containing an isolated lepton and missing transverse energy, together with jets originating from the fragmentation of b quarks, we measure the cross section of single top quark production. Measurements of the t-channel and s-channel, matrix element Vtb and search for Flavor Changing Neutral Currents are also performed.

1133 track 02 Thu, Jul 22, 2010 11:45 20 mn Salle 252B

Measurement of the top quark pairs production cross sections and differential distributions of top quarks at the Tevatron

merged from abstracts: 601 602 290 291

presented by: **Fabrizio Margaroli (Purdue)**

We present precision measurements of the top quark pair production cross sections in ppbar collisions at a center of mass energy of $\sqrt{s}=1.96$ TeV in up to 5 fb⁻¹ of data as well as results of study of kinematics distributions of top quark pairs produced.

1134 track 02 Fri, Jul 23, 2010 09:45 22 mn Salle Maillot

Studies of top quark properties at CDF

merged from abstracts: 293 294 295 300

presented by: **Andrew Eppig (Harrison M. Randall Laboratory)**

Studies of top quark properties, including spin correlations, W polarization and forward backward asymmetry at the Tevatron's CDF detector will be presented as well as results of searches for light Higgs boson in top quark decays.



ICHEP2010 Parallel Sessions

1135 track 02 Fri, Jul 23, 2010 09:20 22 mn Salle Maillot

Studies of top quark properties at the DZero experiment

merged from abstracts: 606 610 614 617

presented by: Viatcheslav Sharyy (CEA-Saclay)

Studies of top quark properties, including spin correlations, W boson helicity, forward backward asymmetry, Wtb coupling as well as search for anomalous top quark couplings with the D0 detector will be presented.

1137 track 02 Thu, Jul 22, 2010 14:42 18 mn Salle 252B

Studies of WW and WZ production at CDF

merged from abstracts: 514 516 680 684

presented by: viviana cavaliere (INFN Pisa)

We present studies of the WW and WZ production cross sections with CDF II detector from p-pbar collisions at $\sqrt{s} = 1.96$ TeV in different final states.

1138 track 02 Thu, Jul 22, 2010 14:22 18 mn Salle 252B

WZ cross section and W mass measurement at DZero

merged from abstracts: 570 709

presented by: Joseph Haley (FNAL)

We present results of the WZ production cross section measurement and W mass measurement in electron channel with the DZero detector at $\sqrt{s} = 1.96$ TeV.

1139 track 02 Thu, Jul 22, 2010 09:30 17 mn Salle 252B

W and Z boson production and properties at the Tevatron

merged from abstracts: 686 703 704 711

presented by: Terry Wyatt (University of Manchester)

We present results of W and Z boson studies at the Tevatron including Drell-Yan cross sections measurement, W boson charge asymmetry, Z/gamma forward-backward asymmetry as well as transverse momentum distribution.

1140 track 02 Thu, Jul 22, 2010 15:02 20 mn Salle 252B

Di-boson production and limits on triple gauge boson couplings at the Tevatron

merged from abstracts: 678 682 706 707

presented by: Thomas Phillips (Duke University)

Studies of di-boson production including production of ZZ and Zg production and updated stringent limits on triple gauge boson couplings will be presented. The ZZ sample is used also to search for $gg \rightarrow H \rightarrow ZZ$ to constrain fourth generation fermion models.

1141 track 02 Thu, Jul 22, 2010 16:40 18 mn Salle 252B

Standard Model low mass Higgs search at CDF

merged from abstracts: 450 452 511 512

presented by: Yoshikazu Nagai (FNAL)

We have searched for the Standard Model Higgs boson in the low mass region using CDF detector at the Tevatron. Results with over 5 fb⁻¹ of integrated luminosity will be presented.



ICHEP2010 Parallel Sessions

1142 track 02

Thu, Jul 22, 2010

17:00 18 mn

Salle 252B

Standard Model low mass Higgs search at DZero

merged from abstracts: 347 562 563 608

presented by: Yuji Enari (LPNHE Paris Universtat VI&VII)

We have searched for the Standard Model Higgs boson in the low mass region using DZero detector at the Tevatron. Results with over 6 fb⁻¹ of integrated luminosity will be presented.

1143 track 02

Thu, Jul 22, 2010

17:20 18 mn

Salle 252B

Standard Model high mass Higgs search at CDF

merged from abstracts: 520 521 524

presented by: Donatella Lucchesi (INFN Padova)

We have searched for the Standard Model Higgs boson in the high mass region using CDF detector at the Tevatron. Results with over 5 fb⁻¹ of integrated luminosity will be presented.

1144 track 02

Thu, Jul 22, 2010

17:40 18 mn

Salle 252B

Standard Model high mass Higgs search at DZero

merged from abstracts: 565 566 568

presented by: Boris Tuchming (CEA Saclay)

We have searched for the Standard Model Higgs boson in the high mass region using DZero detector at the Tevatron. Results with up to 7 fb⁻¹ of integrated luminosity will be presented.

1145 track 02

Fri, Jul 23, 2010

14:25 18 mn

Salle 252B

Search for Standard Model Higgs boson in gamma gamma final state at the Tevatron

merged from abstracts: 513 567

presented by: Krisztian Peters (FNAL)

We present a search for Higgs bosons decaying to the di-photon final state using 5 fb⁻¹ of data at a center-of-mass energy of $\sqrt{s} = 1.96$ TeV at the Fermilab Tevatron collider. Whilst the branching ratio to the di-photon final state is small in the Standard Model, this channel contributes appreciably to the overall Higgs sensitivity at Tevatron. In parallel, the limit is re-interpreted in fermiophobic models where the di-photon branching ratio is considerably larger. This decay channel will be of major importance in the light mass Standard Model Higgs search at the LHC.

1146 track 02

Fri, Jul 23, 2010

14:45 18 mn

Salle 252B

Search for Standard Model Higgs boson in di-tau final state at the Tevatron

merged from abstracts: 453 564

presented by: Pierluigi Totaro (INFN-Sezione di Trieste)

We present a search for a Standard Model Higgs boson in events with a final state containing two taus and two jets at a center-of-mass energy of $\sqrt{s} = 1.96$ TeV at the Fermilab Tevatron collider. The final states are sensitive to a combination of associated production of a W/Z boson with a Higgs boson, vector boson fusion and gluon-gluon fusion production processes. Inclusion of the data set up to 5.4 fb⁻¹, and recent improvements to the sensitivity will be discussed.



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1147 track 02 Fri, Jul 23, 2010 15:05 18 mn Salle 252B

Beyond Standard Model Higgs bosons searches at the Tevatron

merged from abstracts: 571 572 573 575 611 448

presented by: **Abid Patwa** (Brookhaven National Laboratory (BNL))

We present a search for non-Standard Model Higgs bosons at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 6 fb⁻¹ of Tevatron data. Searches for charged and neutral Higgs bosons predicted in MSSM and NMSSM models will be discussed.

1148 track 02 Fri, Jul 23, 2010 16:57 20 mn Salle 252B

Combination of Standard Model and beyond Standard model Higgs searches at CDF

merged from abstracts: 449 523 519

presented by: **Karolos Potamianos** (Purdue University)

A combination of searches for Standard Model and beyond Standard Model Higgs boson production at CDF using a data sample up to 6.0 fb⁻¹ of integrated luminosity is performed. For Standard Model searches we determine combined upper 95% C.L. limits on the ratio of the Higgs boson cross section times the branching ratio to its Standard Model prediction for Higgs boson masses between 100 and 200 GeV/c².

1149 track 02 Fri, Jul 23, 2010 16:35 20 mn Salle 252B

Combination of Standard Model and beyond Standard model Higgs searches at DZero

merged from abstracts: 569 574 576 577

presented by: **Michael Mulhearn** (University of Virginia)

A combination of searches for Standard Model and beyond Standard Model Higgs boson production at DZero using a data sample up to 7 fb⁻¹ of integrated luminosity is performed. For Standard Model searches we determine combined upper 95% C.L. limits on the ratio of the Higgs boson cross section times the branching ratio to its Standard Model prediction for Higgs boson masses between 100 and 200 GeV/c².

1150 track 02 Fri, Jul 23, 2010 12:10 18 mn Salle Maillot

Top quark studies with ATLAS

merged from abstracts: 535 536

presented by: **Arnaud Lucotte** (LPSC Laboratoire de Physique Subatomique et de Cosmologie)

First results from the ATLAS experiment at the LHC at center of mass energy of 7 TeV on top quark studies will be presented. In addition prospects on top quark studies at ATLAS including the top quark mass, top quark decay properties, spin correlations and anomalous couplings, rare decays and single top quark production will be discussed.

1151 track 02

Fri, Jul 23, 2010

11:50 18 mn

Salle Maillot

Top quark study at CMS

presented by: **Tim Christiansen (CERN)**

The top quark is a fundamental building block of the standard model. Due to the large cross section, top-antitop pairs will be copiously produced in high energy proton-proton collisions at the Large Hadron Collider (LHC). We present the first results of a selection of top-quark pair production events in the dilepton channel, where both W-bosons from the top quarks decay leptonically into either an electron or a muon, plus a neutrino. We use LHC collision data at 7 TeV centre-of-mass energy collected with the CMS experiment during the period of April to July 2010. Events with two isolated, prompt leptons with high energy, at least two jets with high transverse momentum, and significant missing transverse energy are selected. Several background contributions from other standard model processes, most importantly Drell-Yan and W+jets, are estimated in a data-driven way. Results obtained from data are compared with the simulation, indicating the status of the analysis towards a first cross section measurement in this channel at $\sqrt{s} = 7$ TeV. Similarly, first results are reported for the lepton+jets channel, where one W-boson from the top decays leptonically into a muon (or electron) and a neutrino, while the other one decays into a quark-antiquark pair.

1152 track 02

Thu, Jul 22, 2010

09:00 13 mn

Salle 252B

W/Z production at HERA

merged from abstracts: 892 805

presented by: **Amita Raval (DESY)**

A search for events containing an isolated electron or muon and missing transverse momentum produced in $e+p$ collisions is performed with the H1 and ZEUS detectors at HERA. The data were taken in the period 1994-2007 and correspond to an integrated luminosity of 0.98 fb⁻¹. The total single W boson production cross section is measured as 1.06 ± 0.16 (stat.) ± 0.07 (sys.) pb, in agreement with a SM expectation of 1.26 ± 0.19 pb. The production of Z0 bosons in ep collisions at HERA has been searched for and the resulting di-jet invariant mass distribution is presented for the selected event topologies.

1153 track 02

Thu, Jul 22, 2010

09:15 13 mn

Salle 252B

Studies of polarized ep collisions and combined EW and QCD fits at HERA

merged from abstracts: 417 420 422 797 799

presented by: **Vladimir Chekelian (MPI fuer Physik)**

Using the deep inelastic $e+p$ and $e-p$ neutral and charged current scattering cross sections, including data with polarised electron beams, a combined electroweak and QCD analysis is performed. The inclusive single differential cross section $d(\sigma)/d(Q^2)$ and the reduced double differential cross section $\sigma_{\tilde{}}(x, Q^2)$ are presented for the charged current process, $e^{\pm} p \rightarrow \nu X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set. The inclusive single differential cross section $d(\sigma)/d(Q^2)$ and the reduced double differential cross section $\sigma_{\tilde{}}(x, Q^2)$ are presented for the neutral current process, $e^{\pm} p \rightarrow e^{\pm} X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set.

1154 track 02

Thu, Jul 22, 2010

15:25 18 mn

Salle 252B

Study of multi-lepton events at HERA

merged from abstracts: 808 807 806

presented by: **David South (DESY)**

Events with at least two high transverse momentum leptons (electrons or muons) are studied using the H1 and ZEUS detectors at HERA. Seven di- and tri-lepton events are observed in $e+p$ collision data with a scalar sum of the lepton transverse momenta above 100 GeV, while 1.94 ± 0.17 events are expected. Such events are not observed in $e-p$ collisions for which 1.19 ± 0.12 are predicted. A search for events containing two high-transverse-momentum tau leptons has been performed and observed results will be presented.



ICHEP2010 Parallel Sessions

03 - Perturbative QCD, Jets and Diffractive Physics

66 track 03 Fri, Jul 23, 2010 10:10 17 mn Salle 252B

HERWIRI1.031: New Approach to Parton Shower MC's in Precision QCD Theory

presented by: Bennie Ward (Baylor University)

By implementing the new IR-improved Dokshitzer-Gribov-Lipatov-Altarelli-Parisi-Callan-Symanzik (DGLAP-CS) kernels recently developed by one of us in the HERWIG6.5 environment we generate a new MC, HERWIRI1.0(31), for hadron-hadron scattering at high energies. We use MC data to illustrate the comparison between the parton shower generated by the standard DGLAP-CS kernels and that generated by the new IR-improved DGLAP-CS kernels. The interface to MC@NLO, MC@NLO/HERWIRI, is illustrated. Comparisons with FNAL data and some discussion of possible implications for LHC phenomenology are also presented.

129 track 03 Fri, Jul 23, 2010 17:26 15 mn Salle 242B

NNLL resummation for QCD cross sections

presented by: Nikolaos Kidonakis (Kennesaw State University)

I present results for the resummation of soft-gluon contributions to QCD hard-scattering cross sections at next-to-next-to-leading logarithm accuracy. A key ingredient is the calculation of two-loop soft anomalous dimensions for the partonic processes. Explicit expressions and applications are provided for processes that involve massless partons and/or massive quarks.

136 track 03 Fri, Jul 23, 2010 14:00 15 mn Salle 242B

High-energy amplitudes in the next-to-leading order

presented by: Ian Balitsky (JLab/ODU)

I review the calculation of the next-to-leading order behavior of high-energy amplitudes in N=4 SYM and QCD using the operator expansion in Wilson lines.

146 track 03 Fri, Jul 23, 2010 09:30 17 mn Salle 252B

Multi-jet merging with NLO matrix elements

presented by: Frank Siegert (IPPP Durham and UC London)

Multi-jet merging of matrix elements and parton showers in Monte-Carlo event generators has become a crucial tool for LHC predictions. An existing algorithm for tree-level matrix elements is extended to full NLO accuracy.

168 track 03 Fri, Jul 23, 2010 16:52 15 mn Salle 242B

NLO QCD corrections to $pp \rightarrow t \text{ anti-}t b \text{ anti-}b$

presented by: Stefan Dittmaier (Universitaet Freiburg)

The production of $t \text{ anti-}t b \text{ anti-}b$ final states represents one of the most important background processes for Higgs production in association with top-quark pairs at the LHC. A good background control is indispensable for an analysis of the $t\bar{t}H(\rightarrow b\bar{b})$ signal, requiring next-to-leading order (NLO) predictions for both signal and background. The talk describes a recently completed NLO QCD calculation for $pp \rightarrow t\bar{t}b\bar{b}$ at the LHC, a calculation that is at the calculational frontier of NLO predictions for so-called multi-leg processes. Moreover, results from a phenomenologically driven analysis are discussed.

181 track 03 Fri, Jul 23, 2010 11:00 17 mn Salle 252B

Probing the theoretical description of central exclusive production

presented by: tim coughlin (university college london)

We investigate the theoretical description of the central exclusive production process. Taking Higgs production as an example, we sum logarithmically enhanced corrections appearing in the perturbation series to all orders in the strong coupling. In addition, we perform a fixed order calculation of the corrections relevant for the Sudakov factor appearing in the process. Both approaches agree with those originally presented by Khoze, Martin and Ryskin, except that the scale, μ , appearing in the Sudakov factor must be changed from $\mu = 0.62 \sqrt{s}$ to $\mu = \sqrt{s}$, where s is the invariant mass squared of the central system. We discuss the effects of this modification on predictions for the LHC and the Tevatron.

185 track 03 Fri, Jul 23, 2010 16:35 15 mn Salle 242B

Higgs boson production at LHC to NNLO accuracy and finite top quark mass effects

presented by: Matthias Steinhauser (KIT)

In this talk we consider the production of the Standard Model Higgs boson in the gluon fusion process to NNLO. An approach is presented which allows the calculation of the cross section beyond the heavy-top quark approximation thus leading to results which include the effects of a finite top quark mass. Numerical results are shown for the CERN Large Hadron Collider (LHC).

189 track 03 Fri, Jul 23, 2010 12:10 17 mn Salle 252B

Exclusive Higgs production at the LHC

presented by: Christophe Royon (SPP CEA Saclay)

After a brief description of the models of exclusive diffractive Higgs production, we first evaluate the theoretical uncertainties that affect the calculation of exclusive cross section (jets, Higgs...). In addition, in view of the recent measurement of exclusive dijet at CDF and the new implementation of the corresponding cross section in FPMC (Forward Physics Monte-Carlo), we developed an analysis strategy that can be used to narrow down these uncertainties with the help of early LHC measurement.

195 track 03 Fri, Jul 23, 2010 09:50 17 mn Salle 252B

Monte Carlo modelling of NLO DGLAP QCD Evolution in the fully unintegrated form

presented by: Aleksander Kusina (Institute of Nuclear Physics PAN)

We would like to present recent work, which is going to change three-decades old paradigm of perturbative QCD calculations, in which hard process matrix element calculated to LO+NLO(+NNLO) level is combined with: either the collinear PDF at LO+NLO (+NNLO) or with the Monte Carlo parton shower, but the MC PS restricted to LO only! For many years upgrading Monte Carlo parton shower to NLO level was regarded as unfeasible in practice or in principle, or both. In a series of the recent works we demonstrate that for NLO non-singlet subset of diagrams we are able to implement in the Monte Carlo PS the exact DGLAP evolution, without any approximation. This seminal work, after extending to complete NLO DGLAP, will lead to a new class of powerful techniques of combining resummed and finite order pQCD calculations in a form of Monte Carlo event generators for W/Z production at hadron collider experiments.



ICHEP2010 Parallel Sessions

266 track 03 Fri, Jul 23, 2010 16:15 17 mn Salle 242B

Status of Higher Order QCD calculations

presented by: Aude Gehrmann-De Ridder (ETH Zurich)

All physics reactions at the LHC are initiated by partonic processes, which are determined by QCD. To interpret potential signals and their backgrounds, one thus requires a solid understanding of the QCD dynamics, which is achieved by including higher order perturbative corrections. We review the recent progress on higher order calculations in QCD, focusing on the calculation of multi-leg processes at next-to-leading order (NLO) and on precision observables at next-to-next-to-leading order (NNLO). We summarize recent results and important physics implications, and discuss technical developments for the systematic calculation of QCD corrections.

267 track 03 Fri, Jul 23, 2010 11:50 17 mn Salle 252B

Exclusive processes beyond leading twist: $\gamma^*T \rightarrow \rho T$ impact factor with twist three accuracy

presented by: Lech Szymanowski (Soltan INS, Warsaw)

We describe a consistent approach to factorization of scattering amplitudes for exclusive processes beyond the leading twist approximation. The method is based on the Taylor expansion of the scattering amplitude in the momentum space around the dominant light-cone direction and thus naturally introduces an appropriate set of non-perturbative correlators which encode effects not only of the lowest but also of the higher Fock states of the produced particle. The reduction of original set of correlators to a set of independent ones is achieved with the help of equations of motion and invariance of the scattering amplitude under rotation on the light-cone. As a concrete application, we compute the expressions of the impact factor for the transition of virtual photon to transversally polarised rho-meson up to the twist 3 accuracy. (Phys.Lett.B682:413-418,2010 and Nucl.Phys.B828:1-68,2010.)

280 track 03 Fri, Jul 23, 2010 15:11 15 mn Salle 242B

Characteristics and Estimates of Double Parton Scattering at the Large Hadron Collider

presented by: Edmond Berger (ANL)

We evaluate the kinematic distributions in phase space of 4-parton final-state subprocesses produced by double parton scattering, and we contrast these with the final-state distributions that originate from conventional single parton scattering. Our goal is to establish the distinct topologies of events that arise from these two sources and to provide a methodology for experimental determination of the relative magnitude of the double parton and single parton contributions at Large Hadron Collider energies. We examine two cases in detail, the $b\text{-}\bar{b}\text{-jet}\text{-jet}$ and the 4 jet final states. After full parton-level simulations, we identify a few variables that separate the two contributions remarkably well, and we suggest their use experimentally for an empirical measurement of the relative cross section. We show that the double parton contribution falls off significantly more rapidly with the transverse momentum of the leading jet, but, up to issues of the relative normalization, may be dominant at modest values of this transverse momentum.

307 track 03 Fri, Jul 23, 2010 14:37 15 mn Salle 242B

First complete NLL BFKL calculation of Mueller Navelet jets at LHC

presented by: Samuel Wallon (LPT, Université Paris-Sud, CNRS, Orsay and UPMC Univ. Paris 06)

We calculate cross section and azimuthal decorrelation of Mueller Navelet jets at the LHC in the complete next-to-leading order BFKL framework, i.e. including next-to-leading corrections to the Green's function as well as next-to-leading corrections to the Mueller Navelet vertices.

The obtained results for standard observables proposed for studies of Mueller Navelet jets show that both sources of corrections are of equal, big importance for final magnitude and final behavior of observables. The astonishing conclusion of our analysis is that the observables obtained within the complete next-to-leading order BFKL framework of the present work are quite similar to the same observables obtained within next-to-leading logarithm DGLAP type treatment.

This fact sheds doubts on general belief that the studies of Mueller Navelet jets at the LHC will lead to clear discrimination between the BFKL and the DGLAP dynamics.



ICHEP2010 Parallel Sessions

330 track 03 Fri, Jul 23, 2010 15:28 15 mn Salle 242B

Hard diffractive scattering from soft color screening effects

presented by: Roman Pasechnik (Uppsala University)

We present a simple QCD-based model where the soft gluon rescattering between final state partons in deep inelastic scattering leads to events with large rapidity gaps and a leading proton. In the framework of this model the amplitude of the soft gluon exchanges is calculated in the eikonal approximation to all orders in perturbation theory. Both large and small invariant mass M_X limits are considered. The model successfully describes the precise HERA data on the diffractive deep inelastic cross section in the whole available kinematical range and give new insights on the density of gluons at very small momentum fractions in the proton.

377 track 03 Fri, Jul 23, 2010 17:09 15 mn Salle 242B

Top-Antitop Production at Hadron Colliders

presented by: Roberto Bonciani (LPSC, Grenoble)

We review the status of the theoretical predictions for the top-anti top production in hadronic collisions, paying particular attention to the pair production at the LHC. We stress the need for a complete theoretical analysis that includes higher-order quantum corrections and we discuss recent theoretical calculations at the level of NNLO.

382 track 03 Fri, Jul 23, 2010 17:43 15 mn Salle 242B

Adler Function, DIS sum rules and the Crewther Relation in order α_s^4

presented by: Konstantin Chetyrkin (Karlsruhe Institute of Technology (KIT))

We report on the first analytical, valid for a generic gauge group, calculations of the $O(\alpha_s^4)$ corrections to the Adler function and to DIS sum rules, in particular to the Gross-Llewellyn Smith and to the Bjorken ones. We discuss a decisive check of correctness of our previous calculations of $R(s)$ in QCD and the quenched QED beta-function at five loops, which was carried out with the help of the newly computed contributions to the DIS sum rules and the Crewther relation.

503 track 03 Sat, Jul 24, 2010 10:15 13 mn Salle 252B

Evidence of prompt isolated photons with the ATLAS detector

presented by: Junji Tojo (KEK)

Photon identification is important for many physics signatures at the LHC, as well as for detector calibration purposes. Prompt photon identification in ATLAS relies on the fine granularity of the electromagnetic calorimeter, which provides event by event rejection of the dominant background from photons from π^0 decays, and on the inner detector, which allows us to reconstruct photon conversions to electron-positron pairs. The cross-section of prompt photon production at LHC is large enough that only a small integrated luminosity is required to produce a significant number of signal events. This contribution describes the extraction of the prompt photon signal above the background in the early LHC data with the ATLAS detector collected at a center of mass energy of 7 TeV.



ICHEP2010 Parallel Sessions

836 track 03

Sat, Jul 24, 2010

15:20 20 mn

Salle 252B

Studies of QCD jet production with the CMS detector in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Mikko Voutilainen (CERN)

We report on an extensive list of analyses in order to test QCD predictions for jet production in pp collisions at $\sqrt{s}=7$ TeV, recorded by the CMS experiment. The list includes a measurement of the inclusive jet spectra, obtained with different jet reconstruction methods, the ratio of the inclusive three-jet over two-jet cross sections as a function of the total jet transverse momentum HT, hadronic event shapes as determined from jet momenta, azimuthal decorrelations between the two leading jets, dijet invariant mass spectra and the production ratio for events with two leading jets in two regions of pseudorapidity. Finally, we also present a study of the jet transverse structure, the charged hadrons multiplicity in jets and the longitudinal and transverse momentum distribution of charged hadrons relative to the jet axis. Many of these analyses are based on ratio quantities, where important experimental systematic uncertainties and most notably the luminosity uncertainty cancel.

837 track 03

Sat, Jul 24, 2010

10:00 13 mn

Salle 252B

Isolated Photons at CMS

presented by: Rong-Shyang Lu (Physics Department - National Taiwan University (NTU))

We present preliminary results on the measurement of isolated photon production cross section in proton-proton collisions at $\sqrt{s} = 7$ TeV, using data collected with the CMS detector. We estimate contribution of background from hadron decays (such as π^0 to two photons) with several variables, including the ratio of momentum measured in the tracker to the energy measured in the electromagnetic calorimeter (ECAL) for converted photons, the shower shape measured in ECAL, and isolation measured in tracker and calorimeter. We obtain the acceptance and efficiency of signal photons from Monte Carlo simulation. The differential photon cross section will be presented as a function of photon transverse energy in three eta bins. Furthermore, preliminary results are reported on the measurement of the photon + jet + X cross section. The decay of hadrons and the fragmentation of the photons inside a jet are the main source of background for this measurement. Photon shower shape variables and energy deposited (in the isolation region) are used discriminants to obtain the purity of the sample. Ratio of cross-sections between the central and forward regions will be presented.

1017 track 03

Fri, Jul 23, 2010

14:54 15 mn

Salle 242B

Forward jets and energy flow in hadron-hadron collisions

presented by: Francesco Hautmann (University of Oxford)

At the Large Hadron Collider (LHC) it will become possible for the first time to investigate experimentally the forward region in hadron-hadron collisions via high- p_T processes. In the LHC forward kinematics QCD logarithmic corrections in the hard transverse momentum and in the large rapidity interval may both be quantitatively significant. The theoretical framework to resum consistently both kinds of logarithmic corrections to higher orders in QCD perturbation theory is based on QCD high-energy factorization. We present predictions in this framework for forward jet production, focusing on correlations between one forward and one central jet. Next we compute energy flow observables in the rapidity region between the jets and in the outside region. We finally analyze the role of parton-showering effects in the forward region arising from large-angle multi-gluon radiation, and discuss the potential impact of such studies on the modeling of multi-parton interactions.

1030 track 03

Fri, Jul 23, 2010

09:00 25 mn

Salle 252B

Monte Carlo tools for the LHC

presented by: Frank Krauss (University of Durham)

The status of the standard multi-purpose Monte Carlo tools for LHC physics is reviewed, with a special emphasis on recent developments. These include the systematic inclusion of higher-order corrections and the modelling of soft QCD.



ICHEP2010 Parallel Sessions

1034 track 03

Sat, Jul 24, 2010

09:00 17 mn

Salle 252B

Direct photon production with effective field theory

presented by: **Thomas Becher (University of Bern)**

The production of hard photons in hadronic collisions is studied using Soft-Collinear Effective Theory (SCET). This is the first application of SCET to a physical, observable cross section involving energetic partons in more than two directions. The final resummed inclusive direct photon distribution is valid to next-to-next-to-leading logarithmic order (NNLL), one order beyond previous work. The result is improved by including non-logarithmic terms and photon isolation cuts through matching, and compared to Tevatron data and to fixed order results at the Tevatron and the LHC. The resummed cross section has a significantly smaller theoretical uncertainty than the next-to-leading fixed-order result, particularly at high transverse momentum.

1038 track 03

Sat, Jul 24, 2010

16:15 20 mn

Salle 252B

W/Z + Multi-Jet Production at the LHC

presented by: **David Kosower**

We compute the NLO QCD corrections for the production of a weak vector boson (W or Z) in association with up to three jets at the LHC, using the programs BlackHat and SHERPA. We study total cross sections as well as distributions. We discuss W polarization phenomena. We also present a study of ratios between related processes, which could enable data-driven background estimations, especially with early data sets.

1164 track 03

Sat, Jul 24, 2010

14:00 25 mn

Salle 252B

Jet physics at HERA

merged from abstracts: 397 440 505 395 398 745 747 748 750 752 753 754 429 506

presented by: **Claudia Glasman (DESY)**

Jet Production in ep collisions is presented over the 3 orders of magnitude in Q^2 and a subsequent determination of α_s . A first measurement is presented of the charge asymmetry in the hadronic final state from the hard interaction in DIS neutral current scattering. The production of energetic photons produced at low scattering angles is studied in the DIS case. For the first time, differential inclusive-jet cross sections have been measured in neutral current deep DIS using the anti-kt and SIScone algorithms. New measurements of the Dijet cross sections in neutral current and photoproduction are shown. Scaled momentum distributions of charged particles in dijet photoproduction and DIS are also presented. Other measurements discussed: the Azimuthal Correlation between the Scattered Electron and the most Forward Jet and subjet distributions in DIS.

1165 track 03

Sat, Jul 24, 2010

09:20 17 mn

Salle 252B

Direct Photons at HERA

merged from abstracts: 396 410 413 765 863

presented by: **Juan Terron (DESY)**

The production of prompt photons is measured in the photoproduction regime of electron-proton scattering at HERA. Cross sections are measured for photons with transverse momentum and pseudorapidity in the range $6 < E_t < 15$ GeV and $-1.0 < \eta < 2.4$, respectively. The results are compared with QCD predictions based on the collinear and on the k_T factorisation approaches. The first measurement of diffractive scattering of quasi-real photons with large momentum transfer $\gamma p \rightarrow \gamma Y$, where Y is the proton dissociative system, is made using the H1 detector at HERA. The measurement is performed for initial photon virtualities $Q^2 < 0.01$ GeV². The W dependence is well described by a model based on perturbative QCD using a leading logarithmic approximation of the BFKL evolution. New measurements of elastic deeply virtual Compton scattering $\gamma^* p \rightarrow \gamma p$ using e^+p and e^-p collision data recorded with the H1 and ZEUS detectors at HERA (full stat) are also presented.

Exclusive Processes at HERA

merged from abstracts: 411 426 774 775 778 504

presented by: Armen Bunyatyan (DESY)

Diffraction cross sections of electroproduction of rho and phi mesons is measured at HERA with the H1 detector in the elastic and proton dissociative channels. The data correspond to an integrated luminosity of 51 pb^{-1} . Based on data collected with the H1 detector at HERA in 2005, cross sections of elastic rho photoproduction have been measured at momentum transfer $|t| < 0.58 \text{ GeV}^2$ and photon-proton center-of-mass energies $20 < W < 90 \text{ GeV}$. This data has been combined with cross sections published previously by the Omega and ZEUS collaborations in a global fit to determine the pomeron trajectory $\alpha(t)$ in 13 bins of t by from the W -dependence of the elastic rho production cross section. Exclusive diffractive photoproduction of J/ψ mesons is measured with the H1 detector at the electron-proton collider HERA. At the end of the HERA operation in 2007 the nominal proton beam energy was reduced from 920 GeV to 575 and 460 GeV, respectively. The reduced proton beam energy allows diffractive J/ψ measurements in an extended phase space towards lower photon-proton centre of mass energies $W_{\text{gamma}p}$. Differential cross sections are presented as a function of t , the squared four-momentum transfer at the proton vertex, and of $W_{\text{gamma}p}$ in the kinematical range of low photon virtualities of $Q^2 < 2.5 \text{ GeV}^2$. The exclusive photoproduction reaction $\gamma p \rightarrow \text{Upsilon} p$ has been studied with the ZEUS detector in ep collisions at HERA using an integrated luminosity of 468 pb^{-1} . The measurement covers the kinematic range $60 < W < 220 \text{ GeV}$ and $Q^2 < 1 \text{ GeV}^2$, where W is the photon-proton centre-of-mass energy and Q^2 is the photon virtuality. The γ - p cross section for Upsilon photoproduction is presented as a function of W and $|t|$, where t is negative transverse momentum square at the proton vertex. These results, which represent the analysis of the full ZEUS data sample for dimuon decay channel, are compared to predictions based on perturbative QCD. The proton-dissociative diffractive photoproduction of J/ψ mesons has been studied in ep collisions with the ZEUS detector at HERA using an integrated luminosity of 112 pb^{-1} . The cross section is presented as a function of the photon-proton centre-of-mass energy and of the squared four-momentum transfer at the proton vertex. The results are compared to perturbative QCD calculations. The J/ψ decay angular distributions have been measured in inelastic photoproduction in ep collisions with the ZEUS detector at HERA, using an integrated luminosity of 468 pb^{-1} . The range in photon-proton centre-of-mass energy, W , was $50 < W < 180 \text{ GeV}$. The J/ψ mesons were identified through their decays into muon pairs. The polar and azimuthal angles of the muon+ were measured in the J/ψ rest frame and compared to theoretical predictions at leading and next-to-leading order in QCD.

Precision DIS Measurements at HERA

merged from abstracts: 412 415 424 768 801 811 815

presented by: **Burkard Reiser** (Max-Planck-Institute for Physics, Munich)

A measurement of the inclusive deep inelastic neutral current $e^+ p$ scattering cross section is reported in the region of four-momentum transfer squared, $12 \text{ GeV}^2 < Q^2 < 150 \text{ GeV}^2$, and Bjorken x , $2 \times 10^{-4} < x < 0.1$. The results are based on data collected by the H1 Collaboration at the ep collider HERA at positron and proton beam energies of $E_e = 27.6 \text{ GeV}$ and $E_p = 920 \text{ GeV}$, respectively. The data are combined with previously published data, taken at $E_p = 820 \text{ GeV}$. The accuracy of the combined measurement is typically in the range of 1.3-2%. A QCD analysis at next-to-leading order is performed to determine the parton distributions in the proton based on H1 data.

A measurement of the inclusive ep scattering cross section is presented in the region of low momentum transfers, $0.2 < Q^2 < 12 \text{ GeV}^2$, and low Bjorken x , $5 \times 10^{-6} < x < 0.02$. The result is based on two data sets collected in dedicated runs by the H1 Collaboration at HERA at beam energies of 27.6 GeV and 920 GeV for positrons and protons, respectively. A combination with data previously published by H1 leads to a cross section measurement of a few percent accuracy. A kinematic reconstruction method exploiting radiative ep events extends the measurement to lower Q^2 and larger x . The data are compared with theoretical models which apply to the transition region from photoproduction to deep inelastic scattering.

The inclusive single differential cross section $d\sigma/dQ^2$ and the reduced double differential cross section $\sigma^{\sim}(x, Q^2)$ are presented for the charged current process, $e^{\pm} p \rightarrow \nu X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set. The cross sections are measured in the region of large negative four-momentum transfer squared $Q^2 \geq 200 \text{ GeV}^2$ and inelasticity $y < 0.9$. In addition the total cross section for $Q^2 > 400 \text{ GeV}^2$ and inelasticity $y < 0.9$ is measured. Together with the corresponding cross section obtained from the previously published unpolarised data, the polarisation dependence of the charged current cross section is measured and found to be in agreement with the Standard Model prediction.

The inclusive single differential cross section $d\sigma/dQ^2$ and the reduced double differential cross section $\sigma^{\sim}(x, Q^2)$ are presented for the neutral current process, $e^{\pm} p \rightarrow e^{\pm} X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set. The cross sections are measured in the region of large negative four-momentum transfer squared $Q^2 \geq 200 \text{ GeV}^2$ and inelasticity $y < 0.9$. The data are consistent with the expected Q^2 dependence of polarised cross sections. The data are compared to predictions of the Standard Model which is able to provide a good description of the data.

A measurement is presented of the longitudinal proton structure function $F_{L}(x, Q^2)$ derived from inclusive deep inelastic $\$ep\$ scattering cross section measurements with the H1 detector at HERA. The data were taken in the year 2007 at a positron beam energy of $E_e = 27.5 \text{ GeV}$ and proton beam energies E_p of 920 GeV, 575 GeV and 460 GeV. The measurements of F_L use different parts of the H1 detector covering when combined a range of four-momentum transfers squared $5 \leq Q^2 \leq 800 \text{ GeV}^2$ and Bjorken x between 0.0001 and 0.035. The data are compared with higher order QCD predictions.$

The energy dependence of the total photon-proton cross-section is determined using data of three different proton beam energies collected with the ZEUS detector at HERA. These measurements correspond to centre-of-mass energies of 225 GeV, 250 GeV and 320 GeV.

The charm contribution F_2^{cc} to the proton structure function F_2 is determined. The results of D meson production cross section measurements are combined with the measurements using semi-leptonic decays into muons as well as inclusive track measurements. The correlations of the systematic uncertainties between different measurements are taken into account. The data cover the kinematic range of photon virtuality $2 < Q^2 < 1000 \text{ GeV}^2$ and Bjorken scaling variable $10^{-5} < x < 10^{-1}$.

A combination of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations for ep scattering with nominal and reduced proton-beam energies, $E_p = 920 \text{ GeV}$, $E_p = 460 \text{ GeV}$ and 575 GeV , is presented. The combination method used takes the correlations of systematic uncertainties into account, resulting in improved accuracy. From the combined data the proton structure function, F_L , is extracted in the region of $2.5 < Q^2 < 800 \text{ GeV}^2$.

Measurements of the neutral current cross sections for deep inelastic scattering in e-p collisions at HERA with a longitudinally polarised electron beam are presented. The single-differential cross-sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ and the double-differential cross sections in Q^2 and x are measured in the kinematic region $y < 0.9$ and $Q^2 > 185 \text{ GeV}^2$ for both positively and negatively polarised electron beams and for each polarisation state separately. The measurements are based on an integrated luminosity of 169.9 pb^{-1} taken with the ZEUS detector in 2005 and 2006 at a centre-of-mass energy of 318 GeV. The structure functions xF_3 and $xF_3^{\gamma Z}$ are determined by combining the e-p results presented in this paper with previously measured e^+p neutral current data. The asymmetry parameter A_- is used to demonstrate the parity violating effects of electroweak interactions at large spacelike photon virtuality. The measurements agree well with the predictions of the Standard Model.

A combination is presented of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current unpolarised ep scattering at HERA during the period 1994-2000. The data span six orders of magnitude in negative four-momentum-transfer squared, Q^2 , and in Bjorken x . The combination method used takes the correlations of systematic uncertainties into account, resulting in an improved accuracy. The combined data are the sole input in a NLO QCD analysis which

determines a new set of parton distributions, HERAPDF1.0, with small experimental uncertainties. This set includes an estimate of the model and parametrisation uncertainties of the fit result.

Measurements of the cross sections for charged current deep inelastic scattering in e-p collisions with longitudinally polarised electron beams are presented. The measurements are based on a data sample with an integrated luminosity of 175 pb⁻¹ collected with the ZEUS detector at HERA at a centre-of-mass energy of 318 GeV. The total cross section is given for positively and negatively polarised electron beams. The differential cross-sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ are presented for $Q^2 > 200$ GeV². The double-differential cross-section $d^2\sigma/dxdQ^2$ is presented in the kinematic range $280 < Q^2 < 30000$ GeV² and $0.015 < x < 0.65$. The measured cross sections are compared with the predictions of the Standard Model.

Measurements of the cross sections for charged current deep inelastic scattering in e+p collisions with a longitudinally polarised positron beam are presented. The measurements are based on a data sample with an integrated luminosity of 132 pb⁻¹ collected with the ZEUS detector at HERA in 2006 and 2007 at a centre-of-mass energy of 318 GeV. The total cross section is presented at positive and negative values of the longitudinal polarisation of the positron beams. The single-differential cross sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ are presented for $Q^2 > 200$ GeV². The reduced double-differential cross section is presented in the kinematic range $280 < Q^2 < 30\,000$ GeV² and $0.0078 < x < 0.42$. The cross section measurements agree well with the predictions of the Standard Model. In addition, a linear fit is applied to the total cross section as a function of polarisation. The fit is extrapolated to determine the upper limit on the cross section for a fully left-handed positron beam. The lower limit on the mass of a hypothetical W boson which couples to right-handed particles is then extracted.

A new method is employed to measure the neutral current cross section up to Bjorken-x values of one with the ZEUS detector at HERA using an integrated luminosity of 187 pb⁻¹ of e-p collisions at $\sqrt{s} = 318$ GeV. Cross sections have been extracted for $Q^2 \geq 575$ GeV². A much improved precision with respect to the previous ZEUS publication, which only used 16.7 pb⁻¹ of e-p collisions, is achieved, owing to the larger data sample and improved kinematic reconstruction methods. The measurement is well described by predictions based on the CTEQ6D PDFs.

The reduced cross sections for ep deep inelastic scattering have been measured with the ZEUS detector at HERA at three different centre-of-mass energies, 318, 251 and 225 GeV. From the cross sections, measured double differentially in Bjorken x and the virtuality, Q², the proton structure functions F_{1L} and F₂ have been extracted in the region $0.0005 < x < 0.007$ and $20 < Q^2 < 130$ GeV².

The measurements of the reduced cross sections for e+p deep inelastic scattering at high inelasticities y for three different centre-of-mass energies, 318, 251 and 225 GeV have been extended to lower momentum transferred squared, Q². The analysis of satellite vertex events allows to extend the cross section measurement at high y down to $Q^2 = 5$ GeV², substantially lower than the previously published cross section measurements from which the longitudinal structure function, FL, was extracted.

Inclusive Diffraction at HERA

merged from abstracts: 414 416 418 419 421 755 423 425 427 762 764 766 771 773 776

presented by: Paul Richard Newman (School of Physics and Astronomy-University of Birmingham)

The production of highly energetic forward neutrons has been studied in deep-inelastic positron-proton scattering. The data were taken with the H1 detector at HERA in the years 2006-2007 and correspond to an integrated luminosity of 122 pb^{-1} . Semi-inclusive cross sections have been measured in the range of four momentum transfer squared $6 < Q^2 < 100 \text{ GeV}^2$, Bjorken scaling variable $1.5 \cdot 10^{-4} < x < 3 \cdot 10^{-2}$ and the fractional momentum of the neutron $0.32 < x_L < 0.95$. Monte Carlo simulation using the one pion exchange model describes the measurements well at low transverse momenta of the neutrons. The data are used to estimate the structure function of the pion.

Measurements are presented of single and double-differential dijet cross sections in diffractive photoproduction based on a data sample with an integrated luminosity of 47 pb^{-1} . The events are of the type $ep \rightarrow eXY$, where the hadronic system X contains at least two jets and is separated by a large rapidity gap from the system Y, which consists of a leading proton or low-mass proton excitation. The dijet cross sections are compared with QCD calculations at next-to-leading order and with a Monte Carlo model based on leading order matrix elements with parton showers. The measured cross sections are smaller than those obtained from the next-to-leading order calculations by a factor of about 0.6. This suppression factor has no significant dependence on the fraction x_γ of the photon four-momentum entering the hard subprocess. Ratios of the diffractive to the inclusive dijet cross sections are measured for the first time and are compared with Monte Carlo models.

The cross section for the diffractive deep-inelastic scattering process $ep \rightarrow eXp$ is measured, with a leading final state proton with a fractional longitudinal momentum loss x_{IP} satisfying $x_{IP} < 0.1$ detected in the H1 Forward Proton Spectrometer. Using a high statistics data sample for which the squared four-momentum transfer at the proton vertex is in the interval $0.1 < |t| < 0.7 \text{ GeV}^2$ and for photon virtualities in the range $4 < Q^2 < 700 \text{ GeV}^2$ the cross section is measured differentially in t , x_{IP} , Q^2 and β , $0.001 < \beta = x/x_{IP} < 1$, where x is the Bjorken scaling variable. The t and x_{IP} dependences are interpreted in terms of an effective pomeron trajectory and a sub-leading exchange. The data are compared with QCD predictions at next-to-leading order based on diffractive parton distribution functions previously extracted from complementary measurements of inclusive diffractive deep-inelastic scattering. The ratio of the diffractive to the inclusive ep cross section is studied as a function of Q^2 , β and x_{IP} .

A first measurement of the longitudinal diffractive structure function F_L^D using the H1 detector at HERA is presented. The structure function is extracted from first measurements of the diffractive cross section at centre of mass energies \sqrt{s} of 225 and 252 GeV, together with a new measurement at \sqrt{s} of 319 GeV, using data taken in 2007 at high values of inelasticity y . The measured F_L^D is compared to predictions from NLO QCD fits to previous measurements of the inclusive diffractive DIS cross section.

Measurements of the cross section for the diffractive process $ep \rightarrow eXY$ are presented, where Y is a proton or a low mass proton excitation carrying a fraction $1-x_{IP} > 0.95$ of the incident proton longitudinal momentum and the squared four-momentum transfer at the proton vertex satisfies $|t| < 1.0 \text{ GeV}^2$. Using data taken by the H1 experiment, the cross section is measured for photon virtuality in the range $3.5 < Q^2 < 90 \text{ GeV}^2$, triple differentially in x_{IP} , Q^2 and $\beta = x/x_{IP}$, where x is the Bjorken scaling variable. These measurements are done after selecting diffractive events showing a large rapidity interval between the hadronic systems X and Y. They cover the periods of data taking 1999-2000 and 2003-2007. Combinations with previous results obtained by H1 with data collected in 1996-1997 are realized to provide a single set of diffractive cross sections using the large rapidity gap selection from the H1 experiment. Comparisons of measurements with predictions from resolved Pomeron and dipole models are shown and discussed.

In 2004, the H1 Collaboration at HERA installed the Very Forward Proton Spectrometer (VFPS) located at 220m from the interaction point, in the cold section of the proton ring. The spectrometer consists of two Roman Pot stations equipped with scintillating fiber detectors. The device allows the measurement of diffractive proton momentum in the range $0.009 < x_{pom} < 0.025$, where x_{pom} is the energy fraction lost by the proton in the interaction, with a very high acceptance (above 90%). The inclusive diffractive deep inelastic scattering, $ep \rightarrow e \gamma^* p \rightarrow e X p$, has been measured with the H1 detector at HERA using VFPS to measure the scattered proton momentum. The data correspond to an integrated luminosity of 95 pb^{-1} .

The cross section has been measured for virtualities of the exchanged boson, $5 < Q^2 < 100 \text{ GeV}^2$ and in the range $0.005 < \beta < 0.8$, where $\beta = x/x_{pom}$. The cross section is measured differentially in Q^2 , x_{pom} and β and compared to previously measured cross section at HERA. In this measurement, the cross section for inclusive jet production in diffractive deep-inelastic scattering is presented. The leading final state proton is detected in the H1 Forward Proton Spectrometer. The data have been collected during the HERA-2 period. The data cover the range $x_{IP} < 0.1$ in fractional proton longitudinal momentum loss, $0.1 < |t| < 0.7 \text{ GeV}^2$ in squared four-momentum transfer at the proton vertex and $4 < Q^2 < 110 \text{ GeV}^2$ in photon virtuality. The dijet topology is defined by two inclusive jets in the central region, found by the k_T cluster algorithm in the hadronic centre-of-mass. The data are compared to parton shower and to NLO predictions.

The production of dijets in diffractive deep inelastic scattering, $ep \rightarrow e \gamma^* p \rightarrow e p \text{ jet1 jet2 X}$, has been measured with the H1

detector at HERA using Very Forward Proton Spectrometer to measure the scattered proton momentum. The data correspond to an integrated luminosity of 95 pb^{-1} . This process is sensitive to the partonic structure of the diffractive exchange between the proton and the virtual photon. The scattered proton is measured using the VFPS with an acceptance of about 90% in the range $0.009 < x_{\text{pom}} < 0.025$, where x_{pom} is the energy fraction lost by the proton in the interaction. The dijet cross section has been measured for virtualities of the exchanged boson, $5 < Q^2 < 80 \text{ GeV}^2$ and photon-proton centre-of-mass energies, $100 < W < 250 \text{ GeV}$ and $|t| < 1 \text{ GeV}^2$. The jets were identified using the inclusive k_T algorithm in the $\gamma^* p$ frame. The two highest transverse energy jets identified in each event were required to satisfy $E_{T, \text{jet}}^* > 5.5$ and 4 GeV , respectively in the pseudorapidity range $-2.0 < \eta_{\text{jet}} < 2$. The cross sections are compared to the predictions from leading-logarithm parton-shower RapGap Monte Carlo and next-to-leading-order QCD calculations based on recent diffractive parton densities extracted from inclusive diffractive deep inelastic scattering data.

The dissociation of virtual photons, $\gamma^* p \rightarrow X p$, in events with a large rapidity gap between X and the outgoing proton, as well as in events in which the leading proton was directly measured, has been studied with the ZEUS detector at HERA. The data cover photon virtualities $Q^2 > 2 \text{ GeV}^2$ and $\gamma^* p$ centre-of-mass energies $40 < W < 240 \text{ GeV}$, with $M_X > 2 \text{ GeV}$, where M_X is the mass of the hadronic final state, X . Leading protons were detected in the ZEUS leading proton spectrometer. The cross section is presented as a function of t , the squared four-momentum transfer at the proton vertex and Φ , the azimuthal angle between the positron scattering plane and the proton scattering plane. It is also shown as a function of Q^2 and x_{IP} , the fraction of the proton's momentum carried by the diffractive exchange, as well as β , the Bjorken variable defined with respect to the diffractive exchange.

ZEUS inclusive diffractive cross-section measurements have been used in a DGLAP next-to-leading-order QCD analysis to extract the diffractive parton distribution functions. Data on diffractive dijet production in deep inelastic scattering have also been included to constrain the gluon density. Predictions based on the extracted parton densities are compared to diffractive charm and dijet photoproduction data.

The reduced cross section in diffractive deep inelastic scattering events, $ep \rightarrow eXp$, was measured with the ZEUS detector at HERA, using three different centre-of-mass energies, 318, 252 and 225 GeV. The diffractive sample was selected by requiring a large rapidity gap between the hadronic system X and the outgoing proton. The longitudinal component of the diffractive structure function of the proton was extracted.

The semi-inclusive reaction $e+p \rightarrow e+Xp$ was studied with the ZEUS detector at HERA using an integrated luminosity of 12.8 pb^{-1} . The final state proton, which was detected with the ZEUS leading proton spectrometer, carried a large fraction of the incoming proton energy, $x_L > 0.32$, and its transverse momentum squared satisfied $p_{T2} < 0.5 \text{ GeV}^2$; the exchanged photon virtuality, Q^2 , was greater than 3 GeV^2 and the range of the masses of the photon-proton system was $45 < W < 225 \text{ GeV}$. The leading-proton production cross section and rates are presented as a function of x_L , p_{T2} , Q^2 and the Bjorken scaling variable, x .

Differential cross sections for dijet photoproduction in association with a leading neutron, $e+p \rightarrow e+ \text{jet} + \text{jet} + X (+n)$, have been measured with the ZEUS detector at HERA using an integrated luminosity of 40 pb^{-1} . The fraction of dijet events with a leading neutron was studied as a function of different jet and event variables. Single- and double-differential cross sections are presented as a function of the longitudinal fraction of the proton momentum carried by the leading neutron, x_L , and of its transverse momentum squared, p_{T2} . The dijet data are compared to inclusive DIS and photoproduction results; they are all consistent with a simple pion exchange model. The neutron yield as a function of x_L was found to depend only on the fraction of the proton beam energy going into the forward region, independent of the hard process. No firm conclusion can be drawn on the presence of rescattering effects.

Diffractive electroproduction of pion pairs at HERA has been studied with the ZEUS detector. The analysis was carried out in the kinematic range of photon virtuality $2 < Q^2 < 80 \text{ GeV}^2$, $\gamma^* p$ center-of-mass energy $40 < W < 180 \text{ GeV}$ and two-pion invariant mass $0.28 < M(\text{pipi}) < 2.3 \text{ GeV}$. The pi^+pi^- invariant-mass distribution was analyzed in terms of three isovector resonances: ρ , ρ' and ρ'' . Masses and widths as well as relative amplitudes were obtained using a fit to the pion electromagnetic form factor. The Q^2 dependence of the pion form factor was studied.



ICHEP2010 Parallel Sessions

1186 track 03

Sat, Jul 24, 2010

15:00 17 mn

Salle 252B

Inclusive jet production cross-section and kinematics in proton-proton collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector

merged from abstracts: 499 500 501 502

presented by: **Tancredi Carli (CERN)**

Making use of the excellent calorimetry of the ATLAS experiment, the first measurement of the cross-section for inclusive single-jet and di-jet production in proton-proton interactions at $\sqrt{s} = 7$ TeV will be presented. The corrected and unfolded spectrum for high- p_T jets in pp collision at a center-of-mass energy of 7 TeV will be described. Special emphasis will be given to the discussion of the initial understanding of the jet energy scale. For the di-jet system, additional corrected distributions will be shown, including the delta phi distribution between the two leading jets in the transverse plane. Comparisons will be made between jets reconstructed using charged tracks and calorimeter jets to study fragmentation effects.

1188 track 03

Sat, Jul 24, 2010

12:05 20 mn

Salle 252B

Underlying Event studies and Monte Carlo tunes for inelastic pp events with the ATLAS detector

merged from abstracts: 526 532

presented by: **Emily Nurse (FNAL)**

Studies of the momentum flow in inelastic collisions at 900 GeV and 7 TeV recorded with a minimum bias trigger strategy are reported. A single high p_T track is selected, and the distribution of other tracks in the event is evaluated relative to this reference track. The evolution of the charged momentum flow in the rest of the event, as a function of the p_T of the reference track, gives important information about the transition from minimum bias event structure to the full underlying event observed in high- p_T collision events. Results are presented after correction and unfolding of detector effects to allow simpler comparison to Monte Carlo models. In addition, the PYTHIA Monte Carlo generator has been tuned to ATLAS measurements at 900 GeV and 7 TeV. Standard distributions from Minimum Bias events, as well as the Underlying Event studies are included in the first tunes to ATLAS measurements at the LHC. The tunes aim for one consistent description of the new measurements as well as data from the Tevatron and LEP.

1190 track 03

Sat, Jul 24, 2010

17:05 20 mn

Salle 252B

W/Z+Jets Results from CDF

merged from abstracts: 688 690 691 692

presented by: **Stefano Camarda (IFAE Barcelona)**

The CDF Collaboration has a comprehensive program of studying the production of vector bosons, W and Z, in association with energetic jets. Excellent understanding of the standard model W/Z+jets and W/Z+c,b-jets processes is of paramount importance for the top quark physics and for the Higgs boson and many new physics searches.

We review the latest CDF results on Z-boson production in association with inclusive and b-quark jets, study of the PT balance in Z +jet events, and a measurement of the W+charm production cross section. The results are based on 4-5 fb⁻¹ of data and compared to various Monte Carlo and next-to-leading order perturbative QCD predictions.



ICHEP2010 Parallel Sessions

1191 track 03

Sat, Jul 24, 2010

11:20 17 mn

Salle 252B

Soft QCD Results from CDF

merged from abstracts: 694 695

presented by: **Christina Mesropian (Rockefeller University)**

The CDF Collaboration is working on a systematic study of the underlying event, Minimum Bias events, diffractive processes, and other non-perturbative observables. Such measurements have a two-fold goal of increasing our understanding of soft QCD - mainly through comparison with MC generators - and of reducing the uncertainties on backgrounds for many high-pt analyses. We review the latest underlying event and min bias results and discuss the associated problematics with the idea of establishing a solid baseline for the LHC experiments. These measurements include study of the underlying event in Drell-Yan and dijet events, study of particle multiplicity and inclusive differential cross sections in minimum bias events, and inclusive differential (in PT) cross sections of centrally ($|\eta| < 1$) produced lambdas, cascades and omegas. We also present recent results on diffraction obtained by the CDF collaboration. The single-diffractive dijet and W/Z production are discussed. The first experimental observation of exclusive dijets, exclusive χ_{c0} mesons, and search for exclusive diphotons are discussed. We also present results from a study of central rapidity gap production in soft and hard diffractive events.

1212 track 03

Sat, Jul 24, 2010

11:00 17 mn

Salle 252B

Soft QCD results from the D0 experiment

merged from abstracts: 685 671 681 683 687

presented by: **Gilvan Augusto Alves (Centro Bras. de Pesquisas Fisicas (CBPF))**

We review several measurements using data collected by the D0 experiment at the Fermilab Tevatron ppbar collider at $\sqrt{s}=1.96$ TeV and corresponding to an integrated luminosity of 1 fb⁻¹. A sample of photon+3-jet events is used to determine the fraction of events with double parton scattering as a function of the transverse momentum of the second jet. We also report measurements of the angular correlations between charged tracks in minimum bias events, evidence for the exclusive dijet production in the region of high invariant dijet masses ($M_{jj} > 100$ GeV) and a measurement of the elastic differential cross section in the range $0.25 < |t| < 1.2$ GeV.

1213 track 03

Sat, Jul 24, 2010

16:40 20 mn

Salle 252B

W/Z+jets Results from D0

merged from abstracts: 666 667 668 677 679

presented by: **Avto Kharchilava (SUNY at Buffalo)**

We present several measurements of the differential cross sections for W and Z bosons produced in association with jet(s), using data samples corresponding to integrated luminosities between 1 and 5.4/fb of ppbar collisions collected with the D0 detector. We present differential cross section measurements for $Z/\gamma^* + \text{jet} + X$ relative to the Z/γ^* transverse momentum, relative to the leading jet transverse momentum and rapidity, relative to the transverse momenta of the second and third jets in the event, and relative to angular difference between the Z/γ^* and the leading jet. We also present differential cross sections for $\$W\$$ production in associations with up to 4 jets and a measurement of the ratio of the inclusive cross sections for the Z+b and Z+jets final states. Measurements are compared to next-to-leading order theoretical predictions and to various event generators.

1214 track 03

Sat, Jul 24, 2010

09:40 17 mn

Salle 252B

Direct Photon Results from Tevatron

merged from abstracts: 665 672 693

presented by: **Konstantinos Vellidis (Fermilab)**

We report measurements of the direct photon pair production cross section in ppbar collisions at the Fermilab Tevatron Collider using data collected by the CDF and D0 experiments and corresponding to integrated luminosities of 5.3 and 4.2/fb, respectively. Differential cross section measurements are compared with different perturbative QCD predictions, indicating significant disagreements between data and theory in regions of the phase space, suggesting the need for further theoretical studies of the di-photon production process. We also report measurement of the inclusive direct photon production cross section using data from the CDF experiment corresponding to an integrated luminosity of 2.5/fb and measurements of the $\gamma + b + X$ and $\gamma + c + X$ differential cross sections using data from the D0 experiment corresponding to an integrated luminosity of 1/fb. Results are compared to next-to-leading order perturbative QCD predictions.



ICHEP2010 Parallel Sessions

1215 track 03

Sat, Jul 24, 2010

14:30 25 mn

Salle 252B

Jet Physics at Tevatron

merged from abstracts: 296 664 669 670 673 674 675 676 696

presented by: **Christophe Royon (CEA Saclay)**

We report on different measurements of jet differential cross section and properties obtained from the analysis of ppbar collisions at the Fermilab Tevatron Collider using data collected by the CDF and D0 experiments. The inclusive jet production cross section is measured with two different jet clustering algorithms, compared with next-to-leading order perturbative predictions using the most recent parton distribution function sets, and used to extract the strong coupling constant $\alpha_s(M_Z)$. Various two and three jets differential cross section measurements are also presented. Finally we report preliminary result from a study of the properties of highly boosted massive jets, including a study of quantities which can be used to discriminate between massive jets produced via QCD radiation and those arising from the decay of massive particles.

1216 track 03

Sat, Jul 24, 2010

11:40 20 mn

Salle 252B

Underlying Event Studies and Forward Physics at CMS

merged from abstracts: 838 835

presented by: **Paolo Bartalini (NTU)**

Studies of the underlying event and forward processes are important tests of the standard model and inputs for Monte Carlo tuning. By selecting regions transverse and parallel to the hard parton-parton scatter, different aspects of non-perturbative QCD are enhanced and allow fine tuning of different Monte Carlo models. The underlying event in pp interactions, recorded by the CMS detector, is studied measuring the charged multiplicity density and the charged energy density in a region perpendicular to the plane of the hard 2-to-2 scattering. Two different methodologies are adopted to identify the direction and the energy scale of the hard scattering in Minimum Bias events that rely on the leading charged track and on the leading charged jet. The study allows to discriminate between various QCD Monte Carlo models with different multiple parton interaction schemes.

In addition, we present the measurement of the underlying event using the jet-area/median approach. We demonstrate its sensitivity to different underlying event scenarios and tunes on generator level after applying detector specific cuts and thresholds.

In the forward direction, the first measurement of forward energy flow in $3 < \eta < 5$ in pp collisions up to highest energies of $\sqrt{s} = 7$ TeV will be presented. The energy flow is measured for minimum bias events and event having a dijet system in the central region. The energy flow is compared to various Monte Carlo models with different multiparton interaction schemes. We also present a measurement of forward jets with $p_t > 35$ GeV and compare to model with different multiparton interaction schemes. In addition, the absence of energy deposition in the forward region is used to observe diffractive events. We compare our results with predictions from Monte Carlo event generators including a simulation of multiparton scattering. All four measurements can be used to determine the parameters of multiparton interaction models in an extended region of phase space.

04 - Hadronic Structure, Parton Distributions, soft QCD, Spectroscopy

45 track 04

Thu, Jul 22, 2010

14:00 13 mn

Salle 251

Two-photon exchange and elastic scattering of positrons/electrons on the proton

presented by: **Dmitri Nikolenko** (Budker Institute for Nuclear Physics)

We report the experiment on a precise comparison of $(e^+ p)$ and $(e^- p)$ scattering cross sections, which gives a direct experimental evidence for the two-photon exchange (TPE) contribution in this reaction. Such data are in demand now, because they, most likely, may explain the dramatic disagreement of proton electromagnetic form factors measurements in the polarization transfer (PT) experiments at Jefferson Lab with previous unpolarized measurements using a Rosenbluth separation (RS) technique.

Common practice of the analysis of RS experiments was in approximate taking into account of TPE contribution, believing this contribution to be small. Currently there are no accurate calculations of the TPE contribution, what is related to difficulties in accounting of the intermediate states of proton. But recent calculations, which takes particular account of proton structure, shows importance of TPE contribution for RS analysis. As far as the experimental situation, only old (in 1960th) measurements exist, where the TPE contribution were found with low precision and limited kinematics coverage.

Reported experiment was performed recently at VEPP-3 storage ring at the energy of positron/electron beams 1.6 GeV and three regions of electron/positron scattering angle - around 10, 18 and 64 degrees. The smallest angle region was used for luminosity monitoring. Electron and positron beams were replaced each other regularly, one cycle with two beams required 1.5 hours. Internal hydrogen gas target had a thickness $5 \cdot 10^{14}$ at/cm². Experiment duration was 1500 hours with a mean luminosity of $5 \cdot 10^{31}$ 1/(s cm²). The preliminary results on $(e^+ p)/(e^- p)$ cross sections ratio will be presented.

48 track 04

Thu, Jul 22, 2010

14:35 13 mn

Salle 251

Dynamical Parton Distributions and Weak Gauge and Higgs Boson Production at Hadron Colliders at NNLO of QCD

presented by: **Pedro Jimenez-Delgado** (University of Zürich)

Utilizing recent DIS measurements ($\sigma_r, F_{\{2,3,L\}}$) and data on hadronic dilepton production we determine at NNLO (3-loop) of QCD the dynamical parton distributions of the nucleon generated radiatively from valence-like positive input distributions at an optimally chosen low resolution scale ($Q_0^2 < 1 \text{ GeV}^2$) by employing the "fixed flavor number factorization scheme" (FFNS). These are compared with "standard" NNLO distributions at some fixed and higher resolution scale ($Q_0^2 > 1 \text{ GeV}^2$). The NNLO corrections imply in both approaches an improved value of χ^2 , typically $\chi^2_{\text{NNLO}} \sim 0.9 \chi^2_{\text{NLO}}$. The dynamical NNLO uncertainties are somewhat smaller than the NLO ones and both are, as expected, smaller than those of their "standard" counterparts. The dynamical predictions for $F_L(x, Q^2)$ become perturbatively stable already at $Q^2 = 2 - 3 \text{ GeV}^2$ where precision measurements could even delineate NNLO effects in the very small- x region. We obtain $\alpha_s(M_Z^2) = 0.1124 \pm 0.0020$ to be compared with 0.1145 ± 0.0018 at NLO.

Using these NNLO dynamical parton distributions in the FFNS as input, we generate radiatively parton distributions in the "variable flavor number factorization scheme" (VFNS) as well, where also the heavy quark flavors (c,b,t) become massless partons within the nucleon. Only within the VFNS are NNLO calculations feasible at present, since the required partonic subprocesses are available only in the approximation of massless initial-state partons. The NNLO predictions for gauge boson production are typically larger (by more than 1σ) than the NLO ones, and rates at LHC energies can be predicted with an accuracy of about 5%, whereas at Tevatron they are more than 2σ above the NLO ones. The NNLO predictions for SM Higgs boson production via the dominant gluon fusion process have a total (pdf and scale) uncertainty of about 10% at LHC which almost doubles at the lower Tevatron energies; these predictions are typically about 20% larger than the ones at NLO but the total uncertainty bands overlap.



ICHEP2010 Parallel Sessions

68 track 04 Thu, Jul 22, 2010 17:45 13 mn Salle 251

Non-linear QCD dynamics and exclusive production in ep collisions

presented by: Magno Machado (Universidade Federal do Rio Grande do Sul)

The exclusive processes in electron-proton (ep) interactions are an important tool to investigate the QCD dynamics at high energies as they are in general driven by the gluon content of proton which is strongly subject to parton saturation effects. In this paper we compute the cross sections for the exclusive vector meson production as well as the deeply virtual Compton scattering (DVCS) relying on the color dipole approach and considering the numerical solution of the Balitsky-Kovchegov equation including running coupling corrections. We show that the small-x evolution given by this evolution equation is able to describe the DESY-HERA data and is relevant for the physics of the exclusive observables in future electron-proton colliders and in photoproduction processes to be measured in coherent interactions at the LHC.

134 track 04 Fri, Jul 23, 2010 12:15 13 mn Salle 253

Study light scalar mesons from heavy quark decays

presented by: Cai-Dian Lu (IHEP, Beijing)

It is a difficult task to probe internal structures of the scalar mesons below or near 1GeV. In the SU(3) symmetry limit, the semileptonic $D^+ \rightarrow S^{*+} \nu$ and $B^+ \rightarrow S^{*+} \nu$ decays, with $S^* = a_0, f_0$ and σ , are found to obey very different sum rules in the two scenarios for scalar mesons. Thus it can uniquely distinguish the qqbar and the tetraquark descriptions for light scalar mesons model-independently. This also applies to the $B^0 \rightarrow J/\psi(\eta_c) S$ decays. The SU(3) symmetry breaking effect is found to be under control, which will not spoil our method. The branching fractions of the $D^+ \rightarrow S^{*+} \nu$, $B^+ \rightarrow S^{*+} \nu$ and $B^0 \rightarrow J/\psi(\eta_c) S$ decays roughly have the order 10^{-4} , 10^{-5} and 10^{-6} , respectively. The ongoing BES-III and the forthcoming Super B experiments are able to measure these channels and accordingly to provide the detailed information of scalar meson inner structure.

183 track 04 Thu, Jul 22, 2010 15:20 13 mn Salle 251

Consistency of neutrino DIS and the present parton distribution functions.

presented by: Hannu Paukkunen (University of Santiago de Compostela)

We study the nuclear effects in the neutrino-antineutrino-nucleon deep inelastic scattering (DIS) by comparing the NuTeV, CDHSW, and CHORUS cross-sections from Iron and Lead targets to the predictions derived from the latest parton distribution functions (PDFs). The nuclear modifications found seem to display agreement with those in charged lepton DIS. Our study thus lends support to the consistency of employing neutrino data in global fits of PDFs.

201 track 04 Thu, Jul 22, 2010 15:05 13 mn Salle 251

PDF sensitivity studies using electroweak processes at LHCb

presented by: Ronan McNulty (UNIVERSITY COLLEGE DUBLIN)

We summarise the results from early LHCb data for muon final states produced through the Drell-Yan process via W, Z and γ^* down to a Q^2 of 10 GeV². Extrapolating these results up to the sample sizes expected in the remainder of the 2010 run gives exciting prospects for parton density function studies, which will benefit from LHCb's unique ability to trigger on low momentum objects. Due to the forward acceptance of LHCb x values down to 2×10^{-6} can be probed, where with just 100 pb⁻¹ of data the gluon PDF can be constrained down to 10%.



ICHEP2010 Parallel Sessions

228 track 04

Thu, Jul 22, 2010

09:00 18 mn

Salle 251

Extraction of Compton Form Factors from DVCS data

presented by: Michel Guidal (CNRS/IPN Orsay)

Generalized Parton Distributions (GPDs) allow to describe the structure of the nucleon in a very rich and unprecedented way: they contain the correlations between the (transverse) position and (longitudinal) momentum distributions of the partons in the nucleon, they allow to derive the orbital momentum contribution of partons to the nucleon's spin, they provide an access to the nucleon's (q - q bar) content, etc... GPDs can be accessed experimentally through the exclusive lepton production of a photon ("Deep Virtual Compton Scattering", DVCS) -and possibly of a meson-. In this presentation, we will present the result of our fitter code which aims at extracting, in a largely model-independent way, the GPD information (Compton Form Factors -CFF-) from experimental data. We will show the results of this code applied to the JLab and HERMES DVCS data. In particular, we have extracted some first important constraints on the Htilde CFF, from the HERMES and CLAS DVCS data obtained with a longitudinally polarized proton target. The kinematical dependence (x_B, t) of these CFFs provides some new insights on nucleon structure.

231 track 04

Fri, Jul 23, 2010

14:55 08 mn

Salle 253

Axial Anomaly and Transition Formfactors

presented by: Oleg Teryaev (Joint Inst. for Nuclear Research (JINR))

The earlier derived sum rule for the axial current formfactors with one real and one virtual photon is applied for the analysis of meson transition formfactors. The exactness of sum rule at all virtual photon momenta due to t'Hooft principle requires the existence of at least one axial meson which assumes the role of pion in the anomaly description at large momenta squared. The relation between pion and A1 meson formfactors is obtained and applied to the analysis of BABAR data. The possible manifestations of axial anomaly in heavy ions collisions are briefly discussed,

235 track 04

Fri, Jul 23, 2010

14:00 08 mn

Salle 253

Study of $a_0(980)$ - $f_0(980)$ mixing at BESIII and study of charged kappa at BESII

presented by: Beijiang Liu (Institute of High Energy Phsics (CAS) and Hong Kong University)

There has been much arguments on whether sigma and kappa exist, due to the facts that the total phase shifts in the lower mass region are much less than 180 degrees and they do not fit into ordinary meson nonets; also whether $f_0(980)$ and $a_0(980)$ are part of the ground-state quark-antiquark family or whether they are 4-quark states, hybrids or K Kbar molecules. The study of their nature has been one of the important topics in the light hadron spectroscopy.

The mixing intensity of $f_0(980)$ and $a_0(980)$ is expected to shed light on the nature of these two resonances. The a_0 - f_0 mixing intensity has been predicted to be in the range of 0.01 to 0.2 by various theoretical models, but no any experimental results are available yet. The transition of $f_0(980)$ to $a_0(980)$ or $a_0(980)$ to $f_0(980)$ will provide complementary constraints to the parameters of a_0 and f_0 mesons. Using the samples of 2.26×10^8 J/ψ events and 1.06×10^8 ψ' events collected with the BESIII detector, we perform direct measurements of a_0 - f_0 mixing via the isospin breaking processes $J/\psi \rightarrow \phi f_0 \rightarrow \phi a_0$ and $\chi_{c1} \rightarrow \pi_0 a_0 \rightarrow \pi_0 f_0$. The preliminary results on the $a_0(980)$ - $f_0(980)$ mixing intensity are presented.

Evidence for neutral kappa firstly comes from re-analysis of the old $K\pi$ scattering data and then the production decay processes including $D \rightarrow K \pi \pi$, $J/\psi \rightarrow K^* K \pi$, etc.. Because of the isospin symmetry, a charged kappa is expected. We report the charged kappa in $J/\psi \rightarrow K K_s \pi \pi$ decays, based on 5.8×10^7 J/ψ events collected by BESII. The charged kappa particle is found as a low mass enhancement in the invariant mass spectrum of $K \pi$. If a Breit-Wigner function of constant width is used to parameterize the kappa, its pole locates at $(849 \pm 18 - 14 - i(256 \pm 40 + 46 - 22) \text{ MeV}/c^2)$, which is consistent with that for neutral kappa.



ICHEP2010 Parallel Sessions

268 track 04

Thu, Jul 22, 2010

09:30 08 mn

Salle 251

The nucleon's transversity and the photon's distribution amplitude probed in lepton pair photoproduction

presented by: Lech Szymanowski (Soltan INS, Warsaw)

We describe a new way to access the chiral odd transversity parton distribution in the proton through the photoproduction of lepton pairs. The basic ingredient is the interference of the usual Bethe Heitler or Drell-Yan amplitudes with the amplitude of a process, where the photon couples to quarks through its chiral-odd distribution amplitude, which is normalized to the magnetic susceptibility of the QCD vacuum. A phenomenology of single and double spin observables emerges from the unusual features of this amplitude (Phys.Rev.Lett.103:072002,2009).

271 track 04

Thu, Jul 22, 2010

11:00 13 mn

Salle 251

Hard exclusive processes in the backward region

presented by: Jean-Philippe Lansberg (Ecole polytechnique)

We discuss the potentialities offered by the study of backward exclusive processes in the scaling regime, i.e. involving a large Q^2 photon and a baryonic exchange in the t -channel. We introduce the concept of Transition Distribution Amplitudes (TDAs) containing unique information on the hadron structure, then discuss how they enter the description of processes such as backward electroproduction of a pion, antiproton-proton annihilations into a dilepton + meson as well as into J/Ψ + meson. We discuss first estimates of cross sections that are being measured at JLAB along with predictions for processes for Panda at GSI-FAIR. Finally we present outlooks for their theoretical studies based on approaches such as the pion cloud model.

277 track 04

Thu, Jul 22, 2010

10:15 13 mn

Salle 251

Medium Modification of Vector Mesons

presented by: Chaden Djalali (University of South Carolina)

The theory of the strong interaction, Quantum Chromodynamics (QCD), has been remarkably successful in describing high-energy and short-distance-scale experiments involving quarks and gluons. However, applying QCD to low energy and large-distance scale experiments has been a major challenge. Chiral symmetry is one of the most fundamental symmetries in QCD and provides guiding principles to deal with strong interaction phenomena in the non-perturbative domain. Various QCD-inspired models predict a partial restoration of chiral symmetry in nuclear matter with modifications of the properties of hadrons from their free-space values. Measurable changes such as a shift in mass and/or a change of width are predicted at normal nuclear density. Photoproduction of vector mesons off nuclei were performed at Jefferson Lab using the CEBAF Large Acceptance Spectrometer (CLAS). The properties of the ρ , ω and ϕ mesons were investigated via their rare leptonic decay to e^+e^- . The latest results regarding medium modifications of the vector mesons in the nuclear medium will be discussed and a brief summary of the next round of experiments at different laboratories will be given.

283 track 04

Thu, Jul 22, 2010

10:00 13 mn

Salle 251

Deeply Virtual Compton Scattering off deuteron and twist three contributions

presented by: Igor Anikin (Joint Inst. for Nuclear Research)

We study a deeply virtual Compton scattering off a spin-one particle, as the case for coherent scattering on a deuteron target. We discuss the role of twist three contributions for restoring the gauge invariance of the amplitude corresponding to this process. We consider both kinematical and dynamical sources of twist three generalized parton distributions. The role of the QCD equations of motion is discussed in detail. We derive a new kind of the Wandzura-Wilczek relations between the twist-2 and twist-3 generalized parton distributions.



ICHEP2010 Parallel Sessions

318 track 04

Thu, Jul 22, 2010

14:50 13 mn

Salle 251

A first unbiased global NLO determination of parton distributions and their uncertainties

presented by: Juan Rojo (INFN)

Over the last several years, we have developed a novel approach to the determination of parton distribution functions (PDFs), the NNPDF approach, which combines a Monte Carlo representation of the probability measure in the space of PDFs with the use of neural networks as a set of unbiased basis functions. It has been shown that PDFs determined using the NNPDF methodology enjoy several desirable features: the Monte Carlo behaves in a statistically consistent way; results are demonstrably independent of the parton parametrization; PDFs behave as expected upon the addition of new data; and results are even stable upon the addition of new independent PDF parametrizations.

In this contribution we present a PDF determination using NNPDF methodology based on a global fit, NNPDF2.0. The data used for fitting include DIS data, "dimuon" charm neutrino production data, Drell-Yan (DY), W and Z production and Tevatron inclusive jets, as well as the recently published HERA-I combined dataset. The most striking feature of the NNPDF2.0 parton determination is the fact that it is free of tension between different datasets and NLO QCD. Specifically, any combination or subset of the data included in the global analysis can be fitted using the same methodology, and results obtained fitting to various subsets of data are all compatible with each other. In this contribution we present the NNPDF2.0 PDF analysis, discuss its results and compare to other recent global PDF determinations. We finally discuss the phenomenological implications of NNPDF2.0 for precision LHC physics.

354 track 04

Fri, Jul 23, 2010

17:40 18 mn

Salle 253

Charm baryon spectroscopy at CDF

presented by: Felix Wick (Karlsruhe)

We present a study of the first orbital excitations of the Λ_c baryon, the resonances $\Lambda_c(2595)$ and $\Lambda_c(2625)$, in the decay channel $\Lambda_c^+ \pi^+ \pi^-$ as well as the Λ_c spin excitations $\Sigma_c(2455)$ and $\Sigma_c(2520)$ in its decays to $\Lambda_c^+ \pi^-$ and $\Lambda_c^+ \pi^+$ reconstructed in a sample corresponding to 5.3 fb^{-1} of data collected by the CDF experiment. Exploiting the excellent CDF mass resolution we present measurements of the mass differences with respect to the Λ_c and the decay widths of these states using significantly higher statistics than previous experiments. The lineshape modification of $\Lambda_c(2595)$ due to its dominant threshold decay to $\Sigma_c(2455) \pi$ is properly taken into account.

509 track 04

Thu, Jul 22, 2010

14:15 18 mn

Salle 251

Parton Distributions at the dawn of the LHC

presented by: Stefano Forte (Milan University)

I review the current status of knowledge of the parton distributions (PDF) of the nucleon, with particular emphasis on recent progress on the determination of PDF uncertainties and on theoretical and phenomenological issues which limit the current PDF accuracy. I then discuss the implications of PDF uncertainties on LHC processes, with specific references to standard candles and Higgs production.

636 track 04

Fri, Jul 23, 2010

10:00 13 mn

Salle 253

Recent STAR results and future prospects of $W^{-(+)}$ boson production in polarized p+p collisions at RHIC

presented by: Bernd Surrow (MIT)

The RHIC spin physics program has in 2009 completed the first data taking period of polarized p+p collisions at $\sqrt{s}=500$ GeV. This opens a new era in the study of the spin-flavor structure of the proton based on the production of $W^{-(+)}$ bosons. $W^{-(+)}$ bosons are produced in $u\bar{d}, (d\bar{u})$ collisions and can be detected through their leptonic decays, $e^- + \bar{\nu}_e; (e^+ + \nu_e)$, where only the respective charged lepton is measured.

The discrimination of $u\bar{d}$ and $d\bar{u}$ quark combinations requires distinguishing the charge sign of high p_T electrons and positrons, which in turn requires precise tracking information. At mid rapidity, STAR relies on the existing Time Projection Chamber. At forward rapidity, new tracking capabilities will be provided by the Forward GEM Tracker, consisting of six triple-GEM detectors which are under construction. The suppression of QCD background over W boson signal events by several orders of magnitude is accomplished by using the highly segmented STAR Electromagnetic Calorimeters to impose isolation criteria suppressing jet events, and vetoing di-jet events based on the measured away side energy.

Recent STAR results on the first measurement of $W^{-(+)}$ boson production in polarized p+p collisions will be shown along with a discussion of future prospects involving the STAR Forward GEM Tracker.

887 track 04

Fri, Jul 23, 2010

11:00 18 mn

Salle 253

Recent Developments in Hadron Spectroscopy

presented by: Ted Barnes (ORNL)

In this introductory overview I will discuss recent developments in hadron spectroscopy that are of particular relevance to this meeting, including the spectroscopy of heavy quark hadrons, exotic and multiquark systems, and new theoretical results such as developments in LQCD.

993 track 04

Fri, Jul 23, 2010

15:35 10 mn

Salle 253

Hadronic Molecules

presented by: Pablo G Ortega (University of Salamanca)

In the last years, a number of exciting discoveries of new hadron states have challenged our description of the hadron spectroscopy. Among these so called XYZ states, one of the most mysterious states is the well established $X(3872)$.

In Ref.[1] we performed a coupled channel calculation of the 1^{++} $c\bar{c}$ sector including $q\bar{q}$ and DD^* molecular configurations; in the framework of a constituent quark model which successfully describes the meson spectrum, in particular the $c\bar{c}$ 1^{+-} sector. The elusive $X(3872)$ meson appears as a new state with a high probability for the DD^* molecular component.

The branching $(X(3872) \rightarrow \pi^+\pi^-\pi^0 J/\psi) / (X(3872) \rightarrow \pi^+\pi^- J/\psi) = 1.0 \pm 0.4 \pm 0.3$ measured by Belle [2] suggest an important isospin violation, while the branching between the radiative and the strong decays $(X(3872) \rightarrow J/\psi \gamma) / (X(3872) \rightarrow \pi^+\pi^- J/\psi)$ with values measured by Belle 0.14 ± 0.05 [2] and by BaBar 0.33 ± 0.12 [3] suggests a sizable $c\bar{c}$ component.

In this contribution we analyze the line shapes and the different branching ratios for the decay of the $X(3872)$ measured by the Belle and BaBar Collaborations, finding a good agreement with the experimental data.

Besides the $X(3872)$, the discovery of new states at the B-factories that don't fit in the conventional $q\bar{q}$ assignment motivates the study of such structures in other sectors. Using the same framework as in Ref. [1], we search new molecules in the hidden charm and charm strange sectors. In the hidden charm sector we only find the controversial 1^{+-} $Y(4008)$ charmonium state as a D^*D^* molecule. The $D_{s1}(2460)$ appears as a D^*K molecule in the charm strange sector.

We also explore the hidden bottom sector in the same framework. The reduction of the kinetic energy due to the mass of the b quark favors the creation of new clusters. Our constituent quark model allows to study all the sectors in an unified vision. One of expected new particles is the partner of the $X(3872)$ meson, found as a $B B^*$. Other possible molecular candidates are studied.

[1] P. G. Ortega, J. Segovia, D. R. Entem, F. Fernandez, Phys. Rev. D81, 054023 (2010)

[2] K. Abe et al. (Belle Collaboration), arXiv:hep-ex/0505037.

[3] B. Aubert et al. (BABAR Collaboration), Phys. Rev. Lett. 102, 132001 (2009).



ICHEP2010 Parallel Sessions

1013 track 04

Fri, Jul 23, 2010

10:15 13 mn

Salle 253

Parity violating single spin asymmetry in W production from longitudinally polarized p+p collisions at 500 GeV

presented by: John Haggerty (Brookhaven National Laboratory)

Electrons from W^{\pm} decays have been observed in longitudinally polarized p+p collisions at $\sqrt{s} = 500$ GeV in the PHENIX detector at RHIC. The electron energy spectrum from W decays measured with an integrated luminosity of approximately 10 pb^{-1} will be shown. A measurement of the electron single spin asymmetry which measures the spin structure of flavor identified quarks and antiquarks in the proton will be reported.

1022 track 04

Fri, Jul 23, 2010

12:00 13 mn

Salle 253

Hadron Spectroscopy at COMPASS

presented by: Frank Nerling (Fakultaet fuer Physik)

The COMPASS experiment focused its physics program on hadron spectroscopy in the last two years. As a fixed target experiment at the CERN SPS accelerator, COMPASS features large acceptance and high momentum resolution and thus qualifies well for studies of diffractive dissociation and central production. Hadron formation with both 190 GeV π^-/K^- and 190 GeV p/π^+ beams on liquid hydrogen, copper and nickel was observed through the years 2004, 2008 and 2009 to search for exotic mesons and glueballs. We present an overview of the spectroscopy program which includes studies of diffractively produced 3 and 5 charged pionic final states, studies of neutral modes, kaonic final states and first results from central production analyses.

1024 track 04

Thu, Jul 22, 2010

11:35 13 mn

Salle 251

Transverse momentum dependent splitting functions and parton distributions.

presented by: Francesco Hautmann (Institute of Theoretical Physics)

This talk gives an introduction to transverse momentum dependent (unintegrated) parton distributions and presents the results of a recent study of quark splitting functions defined at fixed longitudinal and transverse momenta. We discuss the treatment of endpoint divergences, emphasizing the physical picture that underlies the need for infrared subtraction factors in the operator matrix elements that appear in the factorization formulas. We present results of a recent calculation for gluon-to-quark splitting kernel at fixed transverse momentum, and show that this kernel naturally emerges from renormalization of ultraviolet divergences in the operator matrix elements. We discuss prospects for phenomenological applications of the unintegrated formulation of QCD factorization.

1059 track 04

Thu, Jul 22, 2010

11:15 18 mn

Salle 251

Spin structure of the proton and Transverse Momentum Dependent distributions

presented by: Alexei Prokudin (JLab-Newport News, Virginia, USA)

The structure of the proton is described from the point of view of transverse momentum dependent distributions of partons. Complete set of functions describing the structure of the proton at leading twist is defined. TMDs can be studied experimentally in polarised inclusive processes such as Semi Inclusive Deep Inelastic Scattering. Factorization of Semi Inclusive Deep Inelastic Scattering and the properties of the distribution and fragmentation functions with presence of so-called gauge links will be discussed.

Tetraquark interpretation of $e^+ e^- \rightarrow \text{Upsilon} \pi^+ \pi^-$ Belle data and $e^+ e^- \rightarrow b \bar{b}$ Babar data

merged from abstracts: 164 165

presented by: **Ahmed Ali (DESY)**

We study the spectroscopy and dominant decays of the bottomonium-like tetraquarks (bound diquarks-antidiquarks), focusing on the lowest lying P-wave $[bq][\bar{b}q]$ states $Y_{[bq]}$ (with $q=u,d$), having $J^{PC}=1^{--}$. To search for them, we analyse the recent BaBar data obtained during an energy scan of the $e^+ e^- \rightarrow b \bar{b}$ cross section in the range of $\sqrt{s}=10.54$ to 11.20 GeV. We find that these data are consistent with the presence of an additional $b \bar{b}$ state $Y_{[bq]}$ with a mass of 10.90 GeV and a width of about 30 MeV apart from the $\text{Upsilon}(5S)$ and $\text{Upsilon}(6S)$ resonances. A closeup of the energy region around the $Y_{[bq]}$ -mass may resolve this state in terms of the two mass eigenstates, $Y_{[b,l]}$ and $Y_{[b,h]}$, with a mass difference, estimated as about 6 MeV. We tentatively identify the state $Y_{[bq]}(10900)$ from the R_b -scan with the state $Y_b(10890)$ observed by Belle in the process $e^+ e^- \rightarrow Y_b(10890) \rightarrow \text{Upsilon}(1S, 2S) \pi^+ \pi^-$ due to their proximity in masses and decay widths. We also analyze the Belle data [K.F. Chen, et al. (Belle Collaboration), Phys. Rev. Lett. 100, 112001 (2008); I.Adachi et al. (Belle Collaboration), arXiv:0808.2445] on the processes $e^+ e^- \rightarrow \text{Upsilon}(1S) \pi^+ \pi^-$, $\text{Upsilon}(2S) \pi^+ \pi^-$ near the peak of the $\text{Upsilon}(5S)$ resonance, which are found to be anomalously large in rates compared to similar dipion transitions between the lower Upsilon resonances. Assuming these final states arise from the production and decays of the $J^{PC}=1^{--}$ state $Y_b(10890)$, which we interpret as a bound (diquark-antidiquark) tetraquark state $[bq][\bar{b}q]$, a dynamical model for the decays $Y_b \rightarrow \text{Upsilon}(1S) \pi^+ \pi^-$, $\text{Upsilon}(2S) \pi^+ \pi^-$ is presented. Depending on the phase space, these decays receive significant contributions from the scalar 0^{++} states, $f_0(600)$ and $f_0(980)$, and from the 2^{++} qqbar-meson $f_2(1270)$. Our model provides excellent fits for the decay distributions, supporting Y_b as a tetraquark state.

Deeply Virtual Exclusive Reactions with CLAS

merged from abstracts: 141 217 1001

presented by: **Valery Kubarovsky (Jefferson Lab)**

Deeply Virtual Exclusive Reactions with CLAS

Deeply virtual exclusive reactions offer a unique opportunity to study the structure of the nucleon at the parton level as one varies both the size of the probe, i.e. the photon virtuality Q^2 , and the momentum transfer to the nucleon t . Such processes can reveal much more information about the structure of the nucleon than either inclusive electroproduction (Q^2 only) or elastic form factors ($t=Q^2$). A dedicated experiment to study Deeply Virtual Compton Scattering (DVCS) and Deeply Virtual Meson Production (DVMP) has been carried out in Hall B at Jefferson Lab. DVCS helicity-dependent and helicity-independent cross sections, as well as beam spin asymmetry, and cross sections and asymmetries for the π^0 and η exclusive electroproduction in a very wide kinematic range of Q^2 , x_B and t have been measured with CLAS. The preliminary data will be presented for the wide kinematic range in $Q^2=1-4.5$ GeV^2 , $x_B=0.1-0.5$ and t up to 2 GeV^2 . We view the work presented in this report as leading into the program of the Jefferson Lab 12 GeV upgrade. The increased energy and luminosity will allow us to make the analysis at much higher Q^2 and x_B and perform Rosenbluth L/T separations of the cross sections.

Exclusive electroproduction of the ρ^+ meson on the proton at CLAS

We will present our latest results on ρ^+ exclusive electroproduction on the proton measured with the CLAS detector of Jefferson Lab. We have measured for the first time ever for this process the longitudinal and transverse parts of the cross sections in the kinematic domain $0.15 < x_B < 0.70$ and $1.5 < Q^2 < 5$ GeV^2 . We will discuss the interpretation of these data in terms of traditional t -channel Reggeon exchanges as well as in the latest Generalized Parton Distributions formalism. We will compare our results to the other exclusive vector meson channels measured at CLAS and in other facilities: ρ , ω and ϕ .

DVCS Beam Spin Asymmetries with CLAS

The nucleon structure remains a fundamental question in hadronic

physics despite more than 50 years of experimental scrutiny. Its first descriptions were based on Form Factors (FFs) and Parton Distribution Functions (PDFs) accessible through elastic and deep inelastic scattering respectively. Over the past decade there has been an intense theoretical and experimental activity to unify these two approaches which ensued from the development of the Generalized Parton Distributions (GPDs). GPDs parameterize the non-perturbative content of the nucleon. Linked to both FFs and PDFs, they correlate the information in position and momentum spaces, allowing for the first time to have access to a 3-dimensional picture of the nucleon. The simplest way to measure the GPDs is through the measurement of the Virtual Compton Scattering process in the Deeply Virtual region (DVCS). This presentation will focus on the DVCS Beam Spin Asymmetry measurement performed by using data collected with the CLAS spectrometer housed in the Hall B of Jefferson Lab. The corresponding experiment was the first one dedicated to DVCS in Hall B. It took place in two separate runs, the first one in 2005 and the last in 2008-2009 with a slightly modified setup with respect to the first part. Results obtained from the 2005 experiment will be shown. A description of the recently completed second part of the experiment and corresponding preliminary results will be given as well.

Rare and Radiative Kaon Decays from the NA48 Experiment

merged from abstracts: 56 57 58 59

presented by: **Vladimir Kekelidze** (Joint Institute for Nuclear Research (JINR))

Precision Measurement of $\pi\pi$ Scattering Lengths in K_4 Decays at NA48

The measurement of the S-wave $\pi\pi$ scattering lengths is a fundamental test of the validity of Chiral Perturbation Theory. We report on the final NA48/2 result, which uses the complete NA48/2 data set with more than a million reconstructed K_4 decays. From these events we have determined the decay form factors and $\pi\pi$ scattering lengths $a_{0,0}$ and $a_{2,0}$. The result is the most precise measurement of the scattering lengths and in excellent agreement with the prediction of Chiral Perturbation Theory.

Precision Measurement of Photon Emission in $K^+ \rightarrow \pi^+ \pi^0 \gamma$ Decays at NA48

We report our final result on the measurement of direct photon emission (DE) in the decay $K^+ \rightarrow \pi^+ \pi^0 \gamma$ and its interference (INT) with the inner bremsstrahlung amplitude. For this measurement the full NA48/2 data set with about 600k reconstructed $K^+ \rightarrow \pi^+ \pi^0 \gamma$ decays was analyzed, which is factor of 30 larger than for previous experiments and a factor of three w.r.t. our preliminary result. From this, the sizes of both the DE and the INT amplitudes have been measured with high precision, with the INT amplitude being observed for the first time. In addition, a measurement of the CP violating asymmetry between K^+ and K^- has been obtained.

Measurement of the rare Decay $K^+ \rightarrow \pi^+ \gamma \gamma$ at NA48

We report on the measurement of the branching fraction of the rare decay $K^+ \rightarrow \pi^+ \gamma \gamma$ using the full NA48/2 dataset of more than 5000 reconstructed decays from the full NA48/2 data set. From the spectrum of the invariant $\gamma\gamma$ mass, the decay parameter c^+ can be extracted with unprecedented precision.

Measurement of the radiative Decay $K^+ \rightarrow \pi^0 e^+ \nu_e \gamma$ at NA48

We report on the measurement of more than 200000 events of the decay $K^+ \rightarrow \pi^0 e^+ \nu_e \gamma$, recorded with the NA48/2 detector at CERN. These statistics, about two orders of magnitude more than previous experiments, allow measurements of the decay rate and of possible CP violation in this decay with per cent precision.

Studies with Initial State Radiation at BABAR

merged from abstracts: 650 900

presented by: **Evgeniy Solodov** (BudkerINP)

* Initial State Radiation Physics Studies at BABAR

We present recent results obtained at BABAR from low energy e^+e^- annihilations, produced via initial state radiation. Low energy hadronic cross sections provide essential experimental input for calculating hadronic corrections to the muon anomalous magnetic moment, while studies of final states and intermediate structures with unprecedented accuracy can reveal new bound states and help elucidate their properties.

We present new measurements of $e^+e^- \rightarrow K^+K^-\pi^+\pi^-$, $K^+K^-\pi^0\pi^0$, $2(K^+K^-)$ based on the full data set including investigations of signals from $\phi(1020)2\pi$ and $\phi(1020)f_0(980)$ intermediate states. The evaluation of $Y(2175) \rightarrow \phi f_0(980)$ parameters are presented along with measurements of the J/ψ and $\psi(2S)$ BF's to these final states. The BaBar measurement of $\pi^+\pi^-$ and other channels important for calculating the hadronic contribution to the muon magnetic moment anomaly will be discussed.

* Associated charm baryon production in Initial State Radiation events and measurements of the $Y(4260)$ state produced in $e^+e^- \rightarrow \gamma_{ISR} J/\psi \pi^+\pi^-$

We present an analysis of a threshold enhancement observed in $(\Lambda_c^+ \text{ anti-}\Lambda_c^-)$ pairs produced in the reaction $e^+e^- \rightarrow \gamma_{ISR} \Lambda_c^+ \text{ anti-}\Lambda_c^-$. This study uses data collected with the BABAR detector operating at the SLAC PEP-II B-factory. We also report on updated mass and width measurements for the $Y(4260) \rightarrow J/\psi \pi^+\pi^-$ produced in initial state radiation events using 454 fb^{-1} of BaBar data.



ICHEP2010 Parallel Sessions

1127 track 04

Fri, Jul 23, 2010

14:40 13 mn

Salle 253

Recent Results on Two-photon Physics at BABAR

merged from abstracts: 698 901

presented by: Vladimir Druzhinin (SLAC)

* Recent results on two-photon physics at BABAR

Two-photon processes, studied at e^+e^- colliders via the reaction $e^+e^- \rightarrow e^+e^- \gamma \gamma^* \rightarrow e^+e^- \text{Pseudoscalar}$, provide an approach to a number of important QCD tests. We discuss the recent BABAR measurements of $\gamma \gamma^* \rightarrow \pi^0$ transition and $\gamma \gamma^* \rightarrow \eta_c$ transition form factors. We also report on a new measurement of the $\gamma \gamma^* \rightarrow \eta$ and $\gamma \gamma^* \rightarrow \eta'$ transition form factors for the momentum transfer range $Q^2=4-40 \text{ GeV}^2$.

* A study of charmonium produced in two-photon collisions at BaBar

We describe a detailed study of charmonium states produced in two-photon collisions and decaying to $K_S K \pi$ and $K K \pi \pi \pi^0$. We present a high statistics measurement of the mass and width of the $\eta_c(2S)$ state.

1128 track 04

Fri, Jul 23, 2010

16:15 13 mn

Salle 253

Studies of Radiative Decays and Search for X(3872) at BABAR

merged from abstracts: 699 880 894

presented by: Arafat Gabareen Mokhtar (SLAC / Stanford University)

* A study of radiative Upsilon(2S) and Upsilon(3S) transitions using converted photons

We present a study of the radiative transitions from decays of the Upsilon(2S) and Upsilon(3S) resonances using photons that have converted into an e^+e^- pair. This study uses data collected with the BABAR detector operating at the SLAC PEP-II B-factory on the Upsilon(2S) and Upsilon(3S) resonances.

* Search for $f_J(2220)$ Production in Radiative J/ψ Decays

We present a search for $f_J(2220)$ production in radiative $J/\psi \rightarrow \gamma f_J(2220)$ decays using 460 fb⁻¹ of data collected with the BaBar detector at the PEP-II storage rings. The $f_J(2220)$ is reconstructed in the decays $f_J(2220) \rightarrow K^+K^-$ and $f_J(2220) \rightarrow K^0_S K^0_S$. No evidence of this resonance is observed and 90% confidence level upper limits on the $J/\psi \rightarrow \gamma f_J(2220)$, $f_J(2220) \rightarrow K^+K^-$ and $J/\psi \rightarrow \gamma f_J(2220)$, $f_J(2220) \rightarrow K^0_S K^0_S$ branching fractions are set at the level of 10^{-5} .

* The search for new X(3872) decay modes and for the Z1 and Z2 states in $\chi_{c1} \pi$

We present a search for the X(3872) produced in $B \rightarrow \psi \pi^+ \pi^- K$ and $B \rightarrow \psi \pi^+ \pi^- \pi^0 K$ ($\psi = J/\psi$ or $\psi(2S)$) using 427 fb⁻¹ of BaBar data. We also report on a search for the Z1 and Z2 states in the $\chi_{c1} \pi$ invariant-mass distribution at BaBar. We perform a study of charged and neutral B decays to $\chi_{c1} K \pi$. The aim is to search for the two resonance-like structures, the Z1 and Z2, first observed by the Belle experiment in the $\chi_{c1} \pi^+$ invariant-mass distribution near 4.1 GeV in exclusive $B^0 \rightarrow \chi_{c1} K \pi^+$.

Particle Production Studies at LHCb

merged from abstracts: 202 203 204

presented by: **Chris Blanks (Imperial College)**

Prompt K^0_S production in pp collisions at the LHCb experiment

The inclusive production of prompt K^0_S mesons, which are either produced directly in the fragmentation process or in the decay chain of prompt resonances decaying strongly or electromagnetically, has been studied with the very first data collected in pp collisions at $\sqrt{s} = 0.9$ TeV using the LHCb detector in December 2009. K^0_S decays are identified kinematically using the information recorded by the LHCb tracking detectors, in events passing a minimum bias trigger. The absolute differential production cross section is measured as a function of the K^0_S transverse-momentum (p_T) and rapidity y in the region $0.2 < p_T < 1.6$ GeV/c and $2.5 < y < 4.0$. The p_T spectra, which are a sensitive probe of the hadronization mechanism, are compared with predictions from specific tunings of the PYTHIA generator. Preliminary results obtained at $\sqrt{s} = 7$ TeV may be shown as well.

Baryon/anti-baryon production studies at LHCb

Baryon number and strangeness can be used to probe the fragmentation field. Predictions for the inclusive production of baryons and anti-baryons at LHC energies differ significantly between models tuned on the same lower-energy data, especially at large pseudo-rapidities (η). The LHCb experiment, with its forward coverage ($2 < \eta < 5$), is in a unique position at LHC to study how well the quantum numbers of the beam particles are transported to the central region. Preliminary results on the inclusive production of protons and anti-protons, as well as Λ and anti- Λ hyperons, will be presented, with a specific emphasis on the baryon/anti-baryon production ratios as a function of rapidity, transverse momentum, and center-of-mass energy. Measurement will be compared with predictions from Monte Carlo generators tuned on experimental results.

First studies with J/ψ signals at LHCb

An important part of the LHCb physics programme relies on the ability to efficiently trigger and cleanly reconstruct $J/\psi \rightarrow \mu^+\mu^-$ decays. The first heavy flavour measurement at LHCb will concern J/ψ production, and open the road for further quarkonium and B physics studies. Experience on the triggering and reconstruction of J/ψ decays acquired by LHCb during the initial phase of the LHC startup at $\sqrt{s} = 7$ TeV will be reported. Contributions of J/ψ from b-hadron decays will be separated from prompt J/ψ produced directly in the pp collisions or in the decays of heavier prompt states. Preliminary results on the prompt and non-prompt J/ψ production cross section will be presented as a function of the J/ψ transverse-momentum (p_T) and rapidity (y) in the range $3 < y < 5$ and $p_T < 7$ GeV/c.

Combination and QCD Analysis of the HERA Inclusive Cross Sections

merged from abstracts: 790 796 793 798 817

presented by: **Voica Ana Maria Radescu (Deutsches Elektronen Synchrotron (DESY))**

Combined Measurement of Neutral and Charged Current Cross Sections at HERA

A combination is presented of the inclusive cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current deep-inelastic ep scattering at HERA. The combination uses data from unpolarised ep scattering taken during the HERA-I phase as well as measurements with longitudinally polarised electron or positron beams from the HERA-II running period. The combination method takes the correlations of systematic uncertainties into account. The inclusion of the large HERA-II data set leads to an improved uncertainty especially at large four momentum transfer squared Q^2 .

Combined measurement of the Inclusive e+p Scattering Cross Sections at HERA for Reduced Proton Beam Energy Runs and Determination of the Structure Function F_L

A combination of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations for ep scattering with nominal and reduced proton-beam energies, $E_p=920$ GeV, $E_p=460$ GeV and 575 GeV, is presented. The combination method used takes the correlations of systematic uncertainties into account, resulting in improved accuracy. From the combined data the proton structure function, F_L , is extracted in the region of $2.5 < Q^2 < 800$ GeV².

Combined Measurement and QCD Analysis of the Inclusive ep Scattering Cross Sections at HERA

A combination is presented of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current unpolarised ep scattering at HERA during the period 1994-2000. The data span six orders of magnitude in negative four-momentum-transfer squared, Q^2 , and in Bjorken x . The combination method used takes the correlations of systematic uncertainties into account, resulting in an improved accuracy. The combined data are the sole input in a NLO QCD analysis which determines a new set of parton distributions, HERAPDF1.0, with small experimental uncertainties. This set includes an estimate of the model and parametrisation uncertainties of the fit result.

PDF fits including HERA data with reduced proton beam energy

A QCD fit analysis to the combined HERA-I inclusive deep inelastic cross sections measured by the H1 and ZEUS collaborations for ep scattering, including the HERA-II measurements with reduced proton-beam energies, $E_p = 460$ GeV and $E_p = 575$ GeV, is presented. The effect of including the new data on the determination of HERA parton distribution functions is analysed, using fits similar to those performed for HERAPDF1.0. Some tension of the QCD fit with respect to the data is identified in the kinematic region of low Q^2 and low x . Furthermore, the data show sensitivity to various schemes of treating heavy flavours.

PDF fits including HERA-II high Q^2 data

The QCD fit analysis of the combined HERA-I inclusive deep inelastic cross sections has been extended to include combined HERA II measurements at high Q^2 . The effect of including these data on the determination of parton distribution functions is analysed, using fits similar to those performed for HERAPDF1.0. The precision of the PDFs at high- x is considerably improved- particularly in the valence sector.

On chiral-odd Generalized Parton Distributions

merged from abstracts: 264 324

presented by: **Samuel Wallon (LPT, Université Paris-Sud, CNRS, Orsay and UPMC Univ. Paris 06)**

The chiral-odd transversity generalized parton distributions of the nucleon can be accessed experimentally through the exclusive photoproduction process $\gamma + N \rightarrow \pi + \rho + N'$, in the kinematics where the meson pair has a large invariant mass and the final nucleon has a small transverse momentum, provided the vector meson is produced in a transversally polarized state. Estimated counting rates show that the experiment is feasible with real or quasi real photon beams expected at JLab@12 GeV and in the COMPASS experiment. (Phys Letters B688,154,2010)

In addition, a consistent classification of the chiral-odd pion GPDs beyond the leading twist 2 is presented. Based on QCD equations of motion and on the invariance under rotation on the light-cone of any scattering amplitude involving such GPDs, we reduce the basis of these chiral-odd GPDs to a minimal set.

1159 track 04

Thu, Jul 22, 2010

15:35 10 mn

Salle 251

Combination and QCD Analysis of the HERA F_2^{cc} Results

merged from abstracts: 792 791

presented by: Massimo Corradi (INFN, Sezione di Bologna)

Combination of F_2^{cc} from DIS measurements at HERA

The charm contribution F_2^{cc} to the proton structure function F_2 is determined. The results of D meson production cross section measurements are combined with the measurements using semi-leptonic decays into muons as well as inclusive track measurements. The correlations of the systematic uncertainties between different measurements are taken into account. The data cover the kinematic range of photon virtuality $2 < Q^2 < 1000 \text{ GeV}^2$ and Bjorken scaling variable $10^{-5} < x < 10^{-1}$.

PDF fits including F_2^{cc} data

The combined H1 and ZEUS data on inclusive ep cross-sections together with the combined data on the semi-inclusive structure function $F_2(\text{charm})$ are used to extract the parton densities of the proton at NLO. The inclusion of the $F_2(\text{charm})$ data allows detailed tests of the heavy flavour treatment in various QCD calculations.

1160 track 04

Thu, Jul 22, 2010

17:15 13 mn

Salle 251

D^* (+jets) in Deep Inelastic Scattering and Photoproduction

merged from abstracts: 433 436 437 783

presented by: Andreas Werner Jung (DESY)

Measurement of the D^* Meson Production Cross Section and F_2^{ccbar} , at High Q^2 , in ep Scattering at HERA

The inclusive production of $D^*(2010)$ mesons in deep-inelastic ep scattering is measured in the kinematic region of photon virtuality $100 < Q^2 < 1000 \text{ GeV}^2$ and inelasticity $0.02 < y < 0.7$. Single and double differential cross sections for inclusive D^* meson production are measured in the visible range defined by $|\eta(D^*)| < 1.5$ and $p_T(D^*) > 1.5 \text{ GeV}$. The data were collected by the H1 experiment during the period from 2004 to 2007 and correspond to an integrated luminosity of 351 pb^{-1} . The charm contribution, F_2^{ccbar} , to the proton structure function F_2 is determined. The measurements are compared with QCD predictions.

Combination of F_2^{ccbar} from $D^{*\{+-\}}$ Measurement in DIS and inclusive measurement of displaced tracks at H1

Recent measurements by the H1 experiment of the inclusive charm and beauty cross sections in deep inelastic ep scattering at HERA are presented. The data were collected in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The numbers of charm and beauty events are determined using variables reconstructed by the H1 vertex detector. The measurement of the inclusive charm cross section is combined with the result obtained using the reconstruction of $D^{*\{+-\}}$ mesons in order to obtain a more precise measurement of the charm contribution F_2^{ccbar} to the proton structure function F_2 . The measurements are compared with QCD predictions.

D^* with jets in photoproduction

Photoproduction of events containing a D^* meson and two jets are investigated with the H1 detector using the HERA-II data sample. The D^* mesons are reconstructed in the golden decay channel $D^* \rightarrow K \pi \pi_s$. Photoproduction events are selected in the kinematic range $Q^2 < 2 \text{ GeV}^2$ and $0.1 < y < 0.8$ corresponding to $100 < W_{\text{gamma}} < 285 \text{ GeV}$. The jets are reconstructed with the inclusive k_T algorithm in the laboratory frame and are selected if they have $p_T > 3.5 \text{ GeV}$. Differential cross section sensitive to the kinematics of the incoming gluon are measured and compared to QCD calculations.

D^* production in deep inelastic ep scattering at HERA

Inclusive production of $D^*(2010)$ mesons in deep inelastic ep scattering was studied in the $D^0 \pi_s$ decay channel with the ZEUS detector at HERA using an integrated luminosity of 360 pb^{-1} . Differential D^* cross sections are presented as functions of the D^* transverse momentum, $P_t(D^*)$, and pseudorapidity, $\eta(D^*)$, for $1.5 < P_t(D^*) < 15 \text{ GeV}$ and $|\eta(D^*)| < 1.5$ in the kinematic region of photon virtuality $5 < Q^2 < 1000 \text{ GeV}^2$ and inelasticity $0.02 < y < 0.7$. In addition, differential cross sections for D^* production as functions of Q^2 and Bjorken x are presented. Next-to-leading-order (NLO) QCD predictions give an adequate description of the data. The measured cross section was extrapolated using these predictions to the full kinematic region in y , $P_t(D^*)$ and $\eta(D^*)$ to determine the open charm contribution to the proton structure function, F_2^{cc} . Predictions from NLO QCD fits to inclusive data describe well the extracted F_2^{cc} from D^* production.

D^{\pm} , D^0 and Λ_c^+ Production in Deep Inelastic Scattering at HERA

merged from abstracts: 779 781 782

presented by: Philipp Roloff (Deutsches Elektronen-Synchrotron (DESY))

Measurement of D^+ and D^0 Production in Deep Inelastic Scattering Using a Lifetime Tag at HERA

The production of D^+ and D^0 mesons has been measured with the ZEUS detector at HERA using an integrated luminosity of 133.6 pb⁻¹. The measurements cover the kinematic range $5 < Q^2 < 1000 \text{ GeV}^2$, $0.02 < \gamma < 0.7$, $1.5 < p_T(D) < 15 \text{ GeV}$ and $|\eta(D)| < 1.6$. Combinatorial background to the D meson signals is reduced by using the ZEUS microvertex detector to reconstruct displaced secondary vertices. Production cross sections are compared with the predictions of next-to-leading-order QCD which is found to describe the data well. Measurements are extrapolated to the full kinematic phase space in order to obtain the open-charm contribution, $F_2(c\bar{c})$, to the proton structure function, F_2 .

Measurement of D^+ and Λ_c^+ production in deep inelastic scattering at HERA

Charm production in deep inelastic scattering has been measured with the ZEUS detector at HERA using an integrated luminosity of 120 pb⁻¹. The hadronic decay channels $D^+ \rightarrow K^0 \pi^+$, $\Lambda_c^+ \rightarrow p K^0$ and $\Lambda_c^+ \rightarrow \Lambda \pi^+$, and their charge conjugates, were reconstructed. The presence of a neutral strange hadron in the final state reduces the combinatorial background and extends the measured sensitivity into the low transverse momentum region. The kinematic range is $0 < p_T(D, \Lambda_c^+) < 10 \text{ GeV}$, $|\eta(D, \Lambda_c^+)| < 1.6$, $1.5 < Q^2 < 1000 \text{ GeV}^2$ and $0.02 < \gamma < 0.7$. Inclusive and differential cross sections for the production of D^+ mesons are compared to next-to-leading-order QCD predictions. The fraction of c quarks hadronising into Λ_c^+ baryons is extracted.

Measurement of D^+ production production and F_2c extraction in deep inelastic scattering at ZEUS

The production of charm quarks in deep inelastic ep scattering has been measured with the ZEUS detector at HERA using an integrated luminosity of 323 pb⁻¹. Charm events were identified through the $D^+ \rightarrow K^- \pi^+ \pi^+ (+cc)$ decay channel. A lifetime tag based on decay length significance was applied to improve the signal to background ratio. The kinematic region was $1.5 < p_T(D^+) < 15 \text{ GeV}$, $|\eta(D^+)| < 1.6$, $5 < Q^2 < 1000 \text{ GeV}^2$ and $0.02 < \gamma < 0.7$. Total and differential cross sections for D^+ production were measured and compared to next-to-leading-order QCD calculations and published ZEUS results. The charm contribution to the proton structure function, F_2c , was extracted. The results agree with previous measurements and are well described by QCD predictions.

Charm and Beauty Production from Semileptonic Decays at HERA

merged from abstracts: 439 780 785 786 788

presented by: Markus Juengst (Universitaet Bonn)

Measurement of the photoproduction of b-quarks at threshold at HERA

The cross section of $b\bar{b}$ photoproduction in ep collisions is measured with the H1 detector at HERA. Events containing b-quarks are identified through detection of two low momentum electrons in the final state. Semileptonic decays $b\bar{b} \rightarrow ee X$ are exploited in the kinematic range of the photon virtuality $Q^2 < 1 \text{ GeV}^2$, the inelasticity $0.2 < y < 0.8$ and the pseudorapidity of the b-quarks $|\eta(b), \eta(\bar{b})| < 2$. The differential b-quark production cross section is measured as a function of the transverse b-quark momentum and extends the previously experimentally accessible phase space towards the b-quark production threshold. The results are compared to other b-quark cross section measurements, as well as to QCD predictions.

Measurement of charm and beauty production in deep inelastic ep scattering from decays into muons at HERA

The production of charm and beauty quarks in ep interactions has been measured with the ZEUS detector at HERA for squared four-momentum exchange $Q^2 > 20 \text{ GeV}^2$, using an integrated luminosity of 126 pb^{-1} . Charm and beauty quarks were identified through their decays into muons. Differential cross sections were measured for muon transverse momenta $p_{T\mu} > 1.5 \text{ GeV}$ and pseudorapidities $-1.6 < \eta^\mu < 2.3$, as a function of $p_{T\mu}$, η^μ , Q^2 and Bjorken x . The charm and beauty contributions to the proton structure function F_2 were also extracted. The results agree with previous measurements based on independent techniques and are well described by QCD predictions.

Measurement of beauty production in DIS and F2b $b\bar{b}$ extraction at ZEUS

Beauty production in deep inelastic scattering with events in which a muon and a jet are observed in the final state has been measured with the ZEUS detector at HERA using an integrated luminosity of 114 pb^{-1} . The fraction of events with beauty quarks in the data was determined using the distribution of the transverse momentum of the muon relative to the jet. The cross section for beauty production was measured in the kinematic range of photon virtuality, $Q^2 > 2 \text{ GeV}^2$, and inelasticity, $0.05 < y < 0.7$, with the requirement of a muon and a jet. Total and differential cross sections are presented and compared to QCD predictions. The beauty contribution to the structure function F_2 was extracted and is compared to theoretical predictions.

Measurement of beauty production from dimuon events at HERA

Beauty production in events containing two muons in the final state has been measured with the ZEUS detector at HERA using an integrated luminosity of 114 pb^{-1} . A low transverse-momentum threshold for muon identification, in combination with the large rapidity coverage of the ZEUS muon system, gives access to a very large fraction of the phase space for beauty production. The total cross section for beauty production in ep collisions at $\sqrt{s} = 318 \text{ GeV}$ has been measured to be $\sigma_{\text{tot}}(\text{ep} \rightarrow b\bar{b} X) = 13.9 \pm 1.5$ (stat.) ± 4.0 – 4.3 (syst.) nb. Differential cross sections and a measurement of $b\bar{b}$ correlations are also obtained, and compared to other beauty cross-section measurements, Monte Carlo models and next-to-leading-order QCD predictions.

Charm and beauty production with semi-leptonic decay into electrons in DIS and PHP at ZEUS

The production of heavy quarks in ep interactions has been studied with the ZEUS detector at HERA in the photoproduction and DIS regimes using an integrated luminosity of 360 pb^{-1} . The heavy flavour events were identified using electrons with a transverse momentum of at least $p_T(e) > 0.9 \text{ GeV}$ in the range $\eta(e) < 1.5$. The fractions of events containing the heavy quarks were extracted from a likelihood fit using variables sensitive to electron identification as well as to semileptonic decays. Total and differential cross sections for beauty, and in the case of photoproduction also for charm, were measured and compared with next-to-leading-order QCD calculations and Monte Carlo models. For squared four-momentum exchange of $10 < Q^2 < 1000 \text{ GeV}^2$ the beauty contribution to the proton structure function, F_2b , was extracted from the double differential cross section as a function of x and Q^2 .

Charm and Beauty Production from Secondary Vertexing at HERA

merged from abstracts: 431 435 784 787

presented by: Paul Thompson (University of Birmingham)

Measurement of the Charm and Beauty Structure Functions using the H1 Vertex Detector at HERA

Inclusive charm and beauty cross sections are measured in e^-p and e^+p neutral current collisions at HERA in the kinematic region of photon virtuality $5 < Q^2 < 2000 \text{ GeV}^2$ and Bjorken scaling variable $0.0002 < x < 0.05$. The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The numbers of charm and beauty events are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are combined with previous data and compared to QCD predictions.

Measurement of Charm and Beauty Jets in Deep Inelastic Scattering at HERA

Measurements of the charm and beauty jet cross sections have been made in deep inelastic scattering at HERA for the kinematic region of photon virtuality $Q^2 > 6 \text{ GeV}^2$ and elasticity variable $0.07 < y < 0.625$ for jets in the laboratory frame with transverse energy $E_{T^{\text{jet}}} > 6 \text{ GeV}$ and pseudorapidity $-1.0 < \eta^{\text{jet}} < 1.5$. Measurements are also made requiring a jet in the Breit frame with $E_{T^{\text{jet}}} > 6 \text{ GeV}$. The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The number of charm and beauty jets are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are compared with QCD predictions and with previous measurements obtained using muon tagging.

Charm and beauty production in deep inelastic scattering from inclusive secondary vertexing at ZEUS

Charm and beauty production in deep inelastic scattering has been measured with the ZEUS detector using the full HERA II data set. The charm and beauty contents in events with a jet have been extracted using the decay length significance and invariant mass of secondary decay vertices. Differential cross sections as a function of Q^2 , Bjorken x , $p_T(\text{jet})$ and $\eta(\text{jet})$ were measured and compared to theoretical predictions. The open charm and beauty contributions to the proton structure function F_2 are extracted.

Measurement of charm and beauty photoproduction from inclusive secondary vertexing at HERA-II

Photoproduction of beauty and charm quarks in events with two jets has been measured with the ZEUS detector at HERA using an integrated luminosity of 130 pb^{-1} . The beauty and charm content was extracted using the decay-length significance of the b and c hadrons and the invariant mass of the decay vertices. Differential cross sections as functions of $p_T(\text{Jet})$ and $\eta(\text{Jet})$ are compared with the Pythia leading order plus parton shower (LO+PS) Monte Carlo and QCD predictions calculated at next-to-leading order.

Charged Particle Distributions in Deep Inelastic Scattering and Photoproduction

merged from abstracts: 405 759 760

presented by: Daniel Traynor (Queen Mary, Univ. of London)

Transverse Momentum of Charged Particles at low Q^2 at HERA

The electron-proton collider HERA allows deep-inelastic scattering (DIS) at very small Bjorken- x of about 10^{-5} . At such small x new parton dynamics beyond DGLAP are expected to become important. Charged particle spectra are measured in DIS ($Q^2 > 5 \text{ GeV}^2$), in different regions of pseudorapidity, using the increased statistics of HERA-2. The measurements are compared to simulations based on different Monte Carlo generators. It is shown that the region of small transverse momenta is primarily sensitive to hadronisation, whereas the region of large transverse momenta is mainly driven by perturbative parton radiation. The observed hardness of the transverse momentum spectra, when compared to different model predictions, can be interpreted as supporting the idea of parton dynamics beyond DGLAP.

Scaled momentum distributions of charged particles in dijet photoproduction at HERA

The scaled momentum distributions of charged particles in jets have been measured for dijet photoproduction with the ZEUS detector at HERA using an integrated luminosity of 359 pb^{-1} . The distributions are compared to predictions based on perturbative QCD carried out in the framework of the modified leading-logarithmic approximation (MLLA) and assuming local parton-hadron duality (LPHD). The universal MLLA scale, Λ_{eff} , and the LPHD parameter, κ^{ch} , are extracted.

Scaled Momentum Spectra in deep inelastic Scattering at HERA

Charged particle production has been studied in neutral current deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 0.44 fb^{-1} . Distributions of scaled momenta in the Breit frame are presented for particles in the current fragmentation region. The evolution of these spectra with the photon virtuality, Q^2 , is described in the kinematic region $10 < Q^2 < 41000 \text{ GeV}^2$. Next-to-leading-order and modified leading-log-approximation QCD calculations as well as predictions from Monte Carlo models are compared to the data. The results are also compared to e^+e^- annihilation data. The dependences of the pseudorapidity distribution of the particles on Q^2 and on the energy in the p system, W , are presented and interpreted in the context of the hypothesis of limiting fragmentation.

Light Mesons and Strange Particle Production at HERA

merged from abstracts: 402 407 761 1222

presented by: Leszek Zawiejski (Institute of Nuclear Physics PAN)

Inclusive Photoproduction of ρ^0 , K^{*0} and ϕ Mesons at HERA

Inclusive non-diffractive photoproduction of $\rho(770)^0$, $K^{*(892)^0}$ and $\phi(1020)$ mesons is investigated with the H1 detector in ep collisions at HERA. The corresponding average gamma p centre-of-mass energy is 210 GeV. The mesons are measured in the transverse momentum range $0.5 < p_T < 7$ GeV and the rapidity range $|y_{\text{lab}}| < 1$. Differential cross sections are presented as a function of transverse momentum and rapidity, and are compared to the predictions of hadroproduction models.

Strangeness Production at low Q^2 in Deep-Inelastic ep Scattering at HERA

The production of neutral strange hadrons is investigated using deep-inelastic scattering events measured with the H1 detector at HERA. The measurements are made in the phase space defined by the negative four-momentum transfer squared of the photon $2 < Q^2 < 100$ GeV² and the inelasticity $0.1 < y < 0.6$. The K^0_s and Λ production cross sections and their ratios are determined. K^0_s production is compared to the production of charged particles in the same region of phase space. The Λ - anti- Λ asymmetry is also measured and found to be consistent with zero. Predictions of leading order Monte Carlo programs are compared to the data.

K^0_s Production at high Q^2 at HERA

The production of K^0_s mesons is studied at high Q^2 , using DIS events recorded with the H1 Detector. Using the full HERA-2 statistics, the production cross sections of K^0_s are presented, differentially as a function of several kinematical variables. Moreover, the K^0_s production rate is compared to the equivalent charged particles in a similar phase space. The H1 data are compared to theoretical predictions, based on leading order Monte Carlo programs with matched parton showers.

Scaled momentum spectra of identified particles in the Breit frame at HERA

Scaled momentum distributions of identified particles, K^0_s and Λ , have been measured in deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 290 pb⁻¹. The evolution of these distributions with the photon virtuality, Q^2 , are studied in the kinematic region $10 < Q^2 < 40000$ GeV². The distributions have been measured in the current fragmentation region of the Breit frame. Next-to-leading-order QCD calculations including hadron-mass effects are compared to the data. The calculations reproduce the trends of the measured distributions as functions of Q^2 and the scaled momentum variable reasonably well.



ICHEP2010 Parallel Sessions

1184 track 04

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09:30 13 mn

Salle 253

Charm Fragmentation and Excited Charm Meson Production at HERA

merged from abstracts: 430 794 795

presented by: **Olaf Behnke (DESY)**

Study of Charm Fragmentation into $D^{*\pm}$ Mesons in Deep-Inelastic Scattering at HERA

The process of charm quark fragmentation is studied using $D^{*\pm}$ meson production in deep-inelastic scattering as measured by the H1 detector at HERA. Two different regions of phase space are investigated defined by the presence or absence of a jet containing the $D^{*\pm}$ meson in the event. The parameters of fragmentation functions are extracted for QCD models based on leading order matrix elements and DGLAP or CCFM evolution of partons together with string fragmentation and particle decays. Additionally, they are determined for a next-to-leading order QCD calculation in the fixed flavour number scheme using the independent fragmentation of charm quarks to $D^{*\pm}$ mesons.

Measurement of the charm fragmentation function in D^* photoproduction at HERA

The charm fragmentation function has been measured in D^* photoproduction with the ZEUS detector at HERA using an integrated luminosity of 120 pb⁻¹. The fragmentation function is measured versus z , the ratio of $E+p_{\parallel}$ for the D^* meson and that for the associated jet, where E is the energy and p_{\parallel} the longitudinal momentum relative to the jet axis. Jets were reconstructed using the k_T clustering algorithm and required to have transverse energy greater than 9 GeV. The D^* meson associated with the jet was required to have a transverse momentum greater than 2 GeV. The measured function is compared to different fragmentation models incorporated in leading-logarithm Monte Carlo simulations and a next-to-leading-order calculation. The results are similar to those from e^+e^- experiments.

Excited charm meson production at HERA

The production of the excited charm mesons $D_1(2420)0$ and $D_2^*(2460)0$ in inelastic ep scattering was studied with the ZEUS detector at HERA using an integrated luminosity of 372 pb⁻¹. Masses and widths were determined and a helicity analysis was performed. The results are compared with previous measurements and with theoretical expectations.

1185 track 04

Fri, Jul 23, 2010

15:05 13 mn

Salle 253

Particle Production in Two-Photon Collisions at Belle

merged from abstracts: 938 941

presented by: **Hideyuki Nakazawa (National Central University)**

* Experimental study of η η production in two-photon collisions

The differential cross section for the process $\gamma\gamma \rightarrow \eta\eta$ has been measured in the kinematic range above the $\eta\eta$ threshold, $1.096 \text{ GeV} < W < 3.8 \text{ GeV}$, in almost the whole solid angle, $|\cos\theta^*| < 0.9$ or < 1.0 depending on W , where W and θ^* are the energy and η scattering angle, respectively, in the $\gamma\gamma$ center-of-mass system. This is the first measurement of the cross section for this process. The results are based on a $393 \sim \text{fb}^{-1}$ data sample collected with the Belle detector at the KEKB e^+e^- collider. In the W range 1.1-2.0 GeV/c² we perform an analysis of resonance amplitudes for various partial waves; at higher energy we extract the contributions of χ_{cJ} charmonia and compare the energy and angular dependence of the cross section with the predictions of theoretical models.

* Observation of $\eta_c(2S)$ in six-prong final states produced in two-photon collisions

We report the observation of $\eta_c(2S)$, produced in two-photon collisions, and decaying to the six-prong final states $3(\pi^+\pi^-)$, $K^+K^-2(\pi^+\pi^-)$, and $K_0^*K^+\pi^-\pi^+$ (including the charge-conjugate state). This analysis is based on a large data sample accumulated by the Belle experiment at the KEKB asymmetric-energy electron-positron collider. This is the first observation of decay modes of the $\eta_c(2S)$ other than $K_0^*K^+\pi^-$.



ICHEP2010 Parallel Sessions

1187 track 04

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16:45 18 mn

Salle 253

Studies of Radiative Decays and $X(3872)$ production at Belle

merged from abstracts: 958 959 960 972

presented by: Ian Watson (University of Sydney)

* Search for $1P \rightarrow 1S$ radiative transitions of D mesons

We present a search for $B^- \rightarrow \pi^- D^{*0}$, $D^{*0} \rightarrow \gamma D^0$ with a data sample from the Belle detector at the KEKB e+e- collider containing 771×10^6 $B\bar{B}$ pairs. In preliminary studies, we found that the corresponding pionic decays, $D^{*0} \rightarrow \pi^0 D^0$ are important backgrounds. These modes have not previously been studied; we measure them in the same data sample, in order to constrain the background component in the final fit to the γD^0 mass distribution.

* Study of radiative decays of $\chi_{(c1,c2)}$ and $X(3872)$ at Belle

We present a study of the radiative decays of the $\chi_{(c1,c2)}$ and $X(3872)$, produced in B decays. The results are based on a large data sample collected at the Upsilon(4S) resonance with the Belle detector operating at the KEKB asymmetric-energy e+e- collider.

* Search for charmonium and charmonium-like states in Upsilon(1S) radiative decays

Using a large sample (10^8) Upsilon(1S) events collected with the Belle detector, we present the results of a first search for charge parity even charmonium and charmonium-like states in Upsilon(1S) radiative decays. No significant $\chi_{(c)}$, $\eta_{(c)}$, $X(3872)$, $X(3915)$, or $Y(4140)$ signal is observed, and upper limits on the production rates are determined. Furthermore, no significant evidence for excited charmonium states below 4.8 GeV/c² is observed.

* Study of $X(3872)$ production in B meson decays

We present a study of the $X(3872)$ meson produced in decays of neutral and charged B mesons. The results are based on a large data sample collected at the Upsilon(4S) resonance with the Belle detector operating at the KEKB asymmetric-energy e+e- collider.

1192 track 04

Fri, Jul 23, 2010

17:25 13 mn

Salle 253

Exotic J/psi Phi Structures and Search for the $Z(4430)^+$ State at CDF

merged from abstracts: 351 352

presented by: Kai Yi (Physics and Astronomy Department-University of Iowa)

* Updated studies of exotic J/psi phi structures at CDF

We report updated studies of the J/psi phi mass spectrum in exclusive $B^+ \rightarrow J/\psi \phi K^+$ decays collected by the CDF experiment. Using an increased data sample of 5 fb^{-1} and by adding new triggers we establish observation of the $Y(4140)$ state in its J/Psi Phi decay and provide more precise measurements of its properties.

* Search for multiquark $Z(4430)^+$ state in hadron collisions

The observation of the $Z(4430)^+$ resonance, the first solid candidate exotic multiquark state, has been reported by the Belle experiment but not confirmed by Babar. Any information from the Tevatron could be discriminating in establishing or excluding its existence. We report the first search for exotic $Z(4430)^+$ state in hadron collisions, using 5.7 fb^{-1} of data collected by the CDF detector at the Tevatron collider.

DVCS, TMDs and Spin Physics at COMPASS

merged from abstracts: 476 1011 1021

presented by: Fabienne Kunne (CEA Saclay)

Recent results on the nucleon spin structure from COMPASS

COMPASS is a multi-purpose fixed target experiment at the CERN Super Proton Synchrotron, dedicated to the study of the spin and the structure of the nucleon. From 2002 to 2011, high statistics data for polarized inclusive and semi-inclusive deep inelastic scattering were collected using 160 GeV/c polarized muons on polarized deuteron and proton targets. The data are used to derive the gluon contribution to the nucleon spin, and to determine the up, down and strange quark and anti-quark polarized distributions. They also constrain the g_1 longitudinal spin structure function, and thus the Björken sum rule, with greater accuracy. The implications of these results to our present understanding of the nucleon spin puzzle will be discussed. The COMPASS plans for the future will be presented.

Prospects for a DVCS measurement at COMPASS

The high energy polarised muon beam available at CERN with the option of using positive or negative muons with opposite polarisation gives COMPASS an excellent possibility to study generalised parton distributions via deeply virtual Compton scattering.

In a first step we propose to use an unpolarised proton target to study the slope of the momentum transfer distribution as a function of x_{bj} . Furthermore, the beam charge and spin difference will be measured over a wide kinematical range to determine the Compton form factor related to the GPD H. As a second step we consider to use a transversely polarised proton target to collect data to constrain the GPD E.

In preparation of the future measurements two DVCS test runs were performed in 2008 and 2009.

Measurements of TMDs at COMPASS

COMPASS is a fixed target experiment at CERN SPS, dedicated to the study of the nucleon spin structure with muon probe and on a variety of issues in the hadron spectroscopy sector. The transverse spin structure of the nucleon is investigated by measuring semi-inclusive deep inelastic scattering of a 160 GeV/c longitudinally polarized muon beam on transversely polarized targets.

A review of new and old COMPASS results on transverse spin effects will be given i.e. the measurement of the Collins and Sivers effects, the two hadron asymmetries and the lambda baryons polarisation, both on a deuteron and on a proton target. Transverse momentum effects, like the Cahn and the Boer-Mulders effects were measured on an un-polarized deuteron target, and will also be presented.

This year COMPASS is taking data on a transversely polarized proton target, to increase the precision of the measurements done in so far. But there are many other plans for the near future of COMPASS: successful test-beams were done to study the feasibility of both a polarized Drell-Yann measurement and a campaign dedicated to the study of the generalized parton distributions (GPD).

DVCS and TMDs Studies at HERMES

merged from abstracts: 951 998

presented by: Klaus Rith (University of Erlangen)

Recent Results on Deeply Virtual Compton Scattering at HERMES

Deeply Virtual Compton Scattering is an elegant tool to investigate the angular momenta of partons inside the nucleon. Using longitudinally polarized electron and positron beams, HERMES has studied this process using various gaseous targets, in either unpolarized or longitudinal as well as transverse polarization states. This variety of experimental setups enable the extraction of a wealth of asymmetry amplitudes, which in turn are related to Generalized Parton Distributions (GPDs). This presentation will focus on the results obtained from a hydrogen and a deuterium target. In summary, the leading-twist asymmetry amplitudes are sizeable, while the suppressed higher twist contributions are compatible with zero.

HERMES measurements of azimuthal asymmetries related to transverse-momentum dependent quark distributions

The structure of the nucleon can be parametrised in terms of eight leading-twist quark distribution functions when including the transverse momentum of quarks in the description. They embody the correlations between the spin of the nucleon, the spin of the quarks and their longitudinal and transverse momentum. Only two of them, the momentum distribution f_{1q} and the helicity distribution g_{1q} can be measured in inclusive deep-inelastic lepton-nucleon scattering, all others can only be accessed in semi-inclusive measurements where in addition to the scattered lepton also a leading hadron is detected. Examples for such transverse-momentum dependent distribution functions are the 'transversity' distribution, the 'Sivers' and the 'Boer-Mulders' function. Each of these distributions causes distinctive signatures in the hadron's azimuthal angular distribution around the direction of the exchanged virtual photon. The HERMES experiment at HERA has performed such measurements with polarized lepton beams of both helicities and unpolarized as well as longitudinally and transversely polarised targets and has determined the amplitudes of the azimuthal modulations for all leading-twist and several higher-twist contributions to the cross section. The results of these measurements will be reported.

KLOE Results and Hadron Physics with KLOE-2

merged from abstracts: 742 743 878

presented by: Paolo Gauzzi (Universita di Roma I "La Sapienza")

KLOE results on light meson spectroscopy

The KLOE experiment has collected 2.5 fb⁻¹ at the peak of the phi resonance at the e⁺e⁻ collider DAPHNE in Frascati. The whole data set includes 100 million eta's produced through the radiative decay $\phi \rightarrow \eta \gamma$ and tagged by means of the monochromatic recoil photon. With this sample, we are studying eta rare decays. We have a final result for the BR measurement

of the $\eta \rightarrow \pi^+\pi^-e^+e^-$ decay, with a sample of 1600 signal events, 100 times larger than today best measurement. These events are also used to measure the asymmetry between the $\pi^+\pi^-$ and the e^+e^- decay planes in the eta rest frame, whose observation could test unexpected mechanism of CP violation, thus providing an hint of new physics beyond the Standard Model. The same data set has been also used to extract the BR for the never observed before $\eta \rightarrow e^+e^-e^+e^-$ decay channel. We have studied the dynamics of the $\eta \rightarrow \pi^0\pi^0\pi^0$ decay using the Dalitz plot technique, obtaining a new determination of the quadratic slope. The result is consistent with the present world data and with current chiral perturbation theory calculations within the unitary approach. In the $\eta \rightarrow \pi^+\pi^-\gamma$ decay a significant contribution from chiral anomaly is expected. The distribution of the invariant mass of the pions allows to disentangle this contribution from resonant intermediate processes. Old measurements from the '70s with data samples of the order of 10⁴ events provided contradicting results. KLOE data contains about 3.5 x 10⁶ $\eta \rightarrow \pi^+\pi^-\gamma$ decays. With this statistics it is possible to investigate in detail the pion invariant mass distribution and to search for C violation signature in the left-right charge asymmetry. Currently we have used 1.2 fb⁻¹ to perform a preliminary measurement of the branching ratio and to tune the analysis for the study of the $\pi^+\pi^-$ invariant mass. From a sample of 240 pb⁻¹ taken off the phi resonance, a preliminary analysis of the $e^+e^- \rightarrow e^+e^-\eta$ process, without tagging e⁺e⁻ in the final state and identified through the $\eta \rightarrow \pi^+\pi^-\pi^0$ channel, is presented. The same data set has been used to search for the f₀(600) that can be produced in gamma-gamma interactions and observed in the reaction $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$.

The preliminary $\pi^0\pi^0$ mass spectrum show an excess of events with respect to the expected background in the f₀(600) mass region. From the process $e^+e^- \rightarrow \pi^+\pi^-\gamma$ it is possible to test scalar meson contribution using the interference among final state radiation, scalar and vector meson exchanges. This interference produces a forward backward asymmetry as a function of the $\pi^+\pi^-$ invariant mass. Preliminary results are presented both for on-peak and off-peak data, showing a good agreement with MC expectations containing scalar and VMD contributions extracted from KLOE data.

KLOE Measurement of $\sigma_{\pi^+\pi^-(\gamma)}$ with ISR and $\pi^+\pi^-$ contribution to the muon anomaly

The KLOE experiment, operating at the Frascati ϕ -factory DAΦNE, has measured the differential cross section for the process $e^+e^- \rightarrow \pi^+\pi^-\gamma$ as a function of the $\pi^+\pi^-$ invariant mass, $M_{\pi^+\pi^-}$, using two different configurations: (a) a non-observed photon, emitted at small angle (SA), whose energy is obtained by kinematics; (b) a photon emitted at large angle and detected in the calorimeter (LA) where its energy is measured. With the two samples the $M_{\pi^+\pi^-}^2$ range $0.1 < M_{\pi^+\pi^-}^2 < 0.95$ GeV² is covered. The measurement of the $\pi^+\pi^-$ cross section at SA, normalized to the integrated luminosity has been published recently. We present the final results of a new independent measurement at LA using data taken in 2006 at a collision energy of 1 GeV, 20 MeV below the ϕ -peak. We will discuss also the impact of these measurement on the evaluation of the hadronic contribution to the muon anomaly, and the results on the extraction of the pion form factor from the ratio of $\sigma(e^+e^- \rightarrow \pi^+\pi^-\gamma)$ to $\sigma(e^+e^- \rightarrow \mu^+\mu^-\gamma)$.

Hadron Physics with KLOE-2

Experiments at the Phi-factory can shed light on many aspects of hadron physics. A new beam crossing scheme allowing for a reduced beam size and increased luminosity is operating at DAΦNE. The KLOE-2 detector is successfully rolled in this new interaction region and is ready to acquire collision data. At the moment, the detector is being upgraded with small angle tagging devices, to detect both high and low e⁺e⁻ energy in $e^+e^- \rightarrow e^+e^-X$ events, namely gamma-gamma processes. The following perspectives are presented: gamma-gamma $\rightarrow \pi^0\pi^0\pi^0$ for probing light scalar meson dynamics, and gamma-gamma $\rightarrow \eta$, gamma-gamma $\rightarrow \pi^0$ for the determination of transition form factors. The inner tracker and small angle calorimeters are scheduled to be installed in a subsequent step, providing with larger acceptance for both charged particles and photons. We present perspectives derived using these upgrades together with increased statistics: rare eta decays, accurate study of the dominant eta' decays (e.g. eta' $\rightarrow \eta \pi \pi$, to constrain scalar meson exchange) and the limit on the $\phi \rightarrow K_S K_S \gamma$ branching ratio, relevant for the scalar meson structure. One possible solution to the Dark Matter problem, allowing also to interpret the positron excess measured by the satellite Payload experiment PAMELA, suggests a Hidden Sector that can be constrained by KLOE-2 at DAΦNE: possible channels and impacts on the parameters space are discussed. Improvements on hadronic cross section at an energy-upgraded DAΦNE are addressed, needed to understand the 3-sigma effect on $(g-2)_\mu$ and for precision determination of α_{em} at the TeV scale.

1210 track 04

Fri, Jul 23, 2010

14:10 13 mn

Salle 253

New Observations on Light Hadron Spectroscopy at BESIII

merged from abstracts: 232 233 234

presented by: **huang yanping (IHEP)**

The decays of $\psi' \rightarrow \pi \pi J/\psi$ ($J/\psi \rightarrow \gamma p \bar{p}$), $\psi' \rightarrow \gamma p \bar{p}$, $J/\psi \rightarrow \gamma p \bar{p}$, $J/\psi \rightarrow \gamma \pi \pi \eta'$ and $J/\psi \rightarrow \omega \pi \pi \eta'$ are analyzed using the samples of 2.26×10^8 J/ψ events and 1.06×10^8 ψ' events collected with the BESIII detector. In $\psi' \rightarrow \pi \pi J/\psi$ ($J/\psi \rightarrow \gamma p \bar{p}$) decay, an enhancement at $p \bar{p}$ threshold is observed. The enhancement can be fit with an S-wave Breit-wigner resonances function with a mass of $M=1861+6-13(\text{stat})+7-26(\text{syst})$ MeV/c² and a narrow width $\Gamma < 38$ MeV/c² at the 90% confidence level. A similar structure is also observed in $J/\psi \rightarrow \gamma p \bar{p}$. These results are consistent with published BESII results. The mass and width of this structure do not match with any well established mesons. No similar narrow structure is seen in $\psi' \rightarrow \gamma p \bar{p}$.

For the decays of $J/\psi \rightarrow \gamma \pi \pi \eta'$, the resonance X(1835), which was observed at BESII in the same decays, is confirmed in both of the two decay modes of η' ($\eta' \rightarrow \gamma \rho$ and $\eta' \rightarrow \pi \pi \eta$). Besides, the hint for two new additional structures is revealed. The search for possible new structure in $J/\psi \rightarrow \omega \pi \pi \eta'$ has also been performed.

1211 track 04

Fri, Jul 23, 2010

17:05 18 mn

Salle 253

Studies of Upsilon Decays at Belle

merged from abstracts: 950 954 974

presented by: **Mauro Verzetti (Università e INFN Torino)**

* Measurement of Upsilon(5S) decays to B0 and B+ mesons

Decays of the Upsilon(5S) resonance to channels with B+ and B0 mesons are studied using a 23.6 fb^{-1} data sample collected with the Belle detector at the KEKB asymmetric-energy e+e- collider.

Fully reconstructed $B^+ \rightarrow J/\psi K^+$, $B^0 \rightarrow J/\psi K^0$, $B^+ \rightarrow D \bar{p} \pi^+$ and $B^0 \rightarrow D^- \pi^+$ decays are used to obtain the charged and neutral B production rates per b-bbar event, $f(B^+) = (72.1^{+3.9}_{-3.8}) \pm 5.0\%$ and $f(B^0) = (77.0^{+5.8}_{-5.6}) \pm 6.1\%$. Assuming equal rates to B+ and B0 mesons in all channels produced at the Upsilon(5S) energy, we measure the fractions for transitions to two-body and three-body

channels with B meson pairs, $f(B \bar{B}) = (5.5^{+1.0}_{-0.9}) \pm 0.4\%$, $f(B \bar{B}^* + B^* \bar{B}) = (13.7 \pm 1.3 \pm 1.1)\%$, $f(B^* \bar{B}^*) = (37.5^{+2.1}_{-1.9}) \pm 3.0\%$, $f(B \bar{B} \pi) = (0.0 \pm 1.2 \pm 0.3)\%$, $f(B \bar{B}^* \pi + B^* \bar{B} \pi) = (7.3^{+2.3}_{-2.1}) \pm 0.8\%$, and $f(B^* \bar{B}^* \pi) = (1.0^{+1.4}_{-1.3}) \pm 0.4\%$. The latter three fractions are obtained assuming isospin conservation.

* Observation of an enhancement in e+e- \rightarrow Upsilon(1S) $\pi^+ \pi^-$, Upsilon(2S) $\pi^+ \pi^-$, and Upsilon(3S) $\pi^+ \pi^-$ production around $\sqrt{s} = 10.89$ GeV at Belle

We measure the production cross sections for e+e- \rightarrow Upsilon(1S) $\pi^+ \pi^-$, Upsilon(2S) $\pi^+ \pi^-$, and Upsilon(3S) $\pi^+ \pi^-$ as a function of \sqrt{s} between 10.83 GeV and 11.02 GeV. The data consists of 8.1 fb^{-1} collected with the Belle detector at the KEKB e+e- collider. We observe enhanced production in all three final states that does not conform well with the conventional Upsilon(10860) lineshape.

* Search for Upsilon(2S) $\rightarrow \eta \gamma$ and Upsilon(2S) $\rightarrow \eta$

The Belle experiment has integrated a record sample of 160M Upsilon(2S) decays on the resonant peak. First results of searches for rare radiative transitions (Upsilon(2S) $\rightarrow \eta \gamma$ and $\chi_{b0}(1P) \rightarrow \text{Upsilon}(1S) \gamma$), and the hadronic transition Upsilon(2S) $\rightarrow \eta$ will be presented.

Charmed Hadron Physics at Babar

merged from abstracts: 645 646

presented by: Jose Benitez (SLAC)

* Study of the inclusive production of the D pi and D* pi final states

We present a study of the mass spectra of the $D^+ \pi^-$, $D^{*+} \pi^-$, and $D_0 \pi^+$ final states in search for unobserved excited states of the D mesons. We use a dataset corresponding to $\sim 454 \text{ fb}^{-1}$ of e^+e^- collisions collected by the BABAR detector at center-of-mass energies near 10.58 GeV. The final states are reconstructed inclusively in reactions of the kind $e^+e^- \rightarrow c\bar{c} \rightarrow D^{(*)} \pi X$ where X is any additional system. The $c\bar{c}$ events are selected through a cut on the center-of-mass momentum of the $D^{(*)} \pi$ system.

* Precision Measurements of the Angular Momentum Excited Charmed Baryon $\Lambda_c(2880)^+$ decaying to the $\Lambda_c^+ \pi^+ \pi^-$ state

We report results on the measurements of the charmed baryon $\Lambda_c(2880)^+$ decaying to the $\Lambda_c^+ \pi^+ \pi^-$ state using approximately 354 fb^{-1} of BaBar data. We reconstruct the Λ_c^+ candidates in the decay mode $p K \pi$ with a goal of measuring the mass, intrinsic width, cross section and momentum spectra of the resonances decaying into $\Lambda_c^+ \pi^+ \pi^-$ final states. We also report the first measurements on the relative branching fractions of the $\Lambda_c(2880)^+$ decaying to the states $\Sigma_c^0(2455) \pi^+$, $\Sigma_c^{++}(2455) \pi^-$, $\Sigma_c^{++}(2520) \pi^-$, $\Sigma_c^0(2520) \pi^+$ and the non resonant $\Lambda_c^+ \pi^+ \pi^-$ mode.



ICHEP2010 Parallel Sessions

05 - Heavy Quarks Properties (experiment and theory)

50 track 05 Sat, Jul 24, 2010 09:00 15 mn Salle 253

Charm mixing in the Standard Model

presented by: Markus Bobrowski (University of Regensburg)

We investigate the mixing of neutral charmed mesons within the Standard Model (SM), using the framework of Heavy Quark Expansion (HQE). In a recent study, we have argued that a CP phase of the order of 1 per mille to 1 per cent could be present in charm mixing in the SM. Our arguments rely on the enhancement of higher-dimensional terms in the HQE due to a lifting of the severe GIM suppression inherent to the dimension-six result. We propose a factorisation approach to quantify the amount of SU(3) symmetry breaking in dimension 10 and 12 on more solid grounds and report on first numerical results of this study.

157 track 05 Thu, Jul 22, 2010 12:15 15 mn Salle 242

Perspectives for quarkonium production at the LHC

presented by: Jean-Philippe Lansberg (Ecole polytechnique)

I will discuss the impact of QCD corrections (up to α_s^5) to quarkonium production at high energies and the introduction of new observables meant to better discriminate between the different mechanisms at work in quarkonium production at the LHC.

186 track 05 Thu, Jul 22, 2010 11:00 15 mn Salle 242

Three-loop heavy quark potential

presented by: Matthias Steinhauser (KIT)

The three-loop corrections to the static potential between a quark and its anti-quark are considered. It constitutes a building block for a number of physical observables connected to heavy quarks. We describe the evaluation of the occurring integrals and discuss the phenomenological implications.

205 track 05 Thu, Jul 22, 2010 09:30 15 mn Salle 242

Prompt J/psi and b \rightarrow J/psi X production in pp collisions at $\sqrt{s} = 7$ TeV

presented by: Giovanni Passaleva (Istituto Nazionale di Fisica Nucleare (INFN) - Florence)

Despite large experimental and theoretical efforts, the production rate and polarization of quarkonia states in hadronic collisions is not yet satisfactorily understood. With its first ~ 10 pb $^{-1}$ of data, LHCb will be able to provide fresh measurements of the prompt and non-prompt J/psi production cross sections, at the new center-of-mass energy of 7 TeV and in a unique range of rapidity ($3 < y < 5$) and transverse momentum ($p_T < 7$ GeV/c). The statistical separation between the prompt component and the contribution from b-hadron decays will be achieved using the distance between the pp collision point and J/psi decay vertex. Preliminary measurements will be compared with predictions, and prospects for the extraction of the prompt J/psi polarization, and prospects for the measurement of other quarkonia states will be discussed in the light of the first available signals.

237 track 05 Thu, Jul 22, 2010 11:15 15 mn Salle 242

Recent results of charmonium transitions at BESIII

presented by: LI Gang (IHEP)

We present the measurements of charmonium P-wave spin-singlet state h_c made with 106M ψ' events collected by BESIII at BEPCII. Clear signals are observed for $\psi' \rightarrow \pi^0 h_c$ with and without the subsequent radiative decay $h_c \rightarrow \gamma \eta_c$. First measurements of the absolute branching ratios $Br(\psi' \rightarrow \pi^0 h_c) = (8.4 \pm 1.3 \pm 1.0) \cdot 10^{-4}$ and $Br(h_c \rightarrow \gamma \eta_c) = (54.3 \pm 6.7 \pm 5.2)\%$ are also presented. A statistics-limited determination of the previously unmeasured h_c width leads to an upper limit $\Gamma(h_c) < 1.44$ MeV (90% confidence). Measurements of $M(h_c) = 3525.40 \pm 0.13 \pm 0.18$ MeV/c 2 and the branching ratios are consistent with previous results.

Also the observation of two-photon transition of ψ' to J/psi based on the same data sample is reported. The measurement of the branching fraction is explicitly determined as $Br(\psi' \rightarrow \gamma \gamma J/\psi) = (1.02 \pm 0.05(\text{stat.}) + 0.19 - 0.20(\text{syst.})) \cdot 10^{-3}$ with combination of the studies of two different J/psi decay channels: J/psi $\rightarrow e^+e^-$ and J/psi $\rightarrow \mu^+\mu^-$.



ICHEP2010 Parallel Sessions

254 track 05 Thu, Jul 22, 2010 16:15 15 mn Salle 242

Decay constants of heavy mesons from QCD sum rules

presented by: Dmitri Melikhov (HEPHY & SINP)

We study the decay constants of D, Ds, B, Bs mesons with Borel QCD sum rules, making use of the recent modifications related to the Borel-parameter-dependent effective continuum threshold. For the fixed values of the QCD parameters, our modifications are shown to lead to a visible shift of the extracted value of the decay constant compared to the standard analysis based on a Borel-parameter-independent threshold. We argue that our modifications allow one to probe the systematic errors of the extracted decay constants. We provide rather accurate results for f_D and f_{D_s} . We demonstrate that an accurate extraction of f_B and f_{B_s} is only possible if a very precise value of $m_b(m_b)$ is known.

335 track 05 Thu, Jul 22, 2010 11:45 15 mn Salle 242

Measurement $\psi(3770)$ resonance parameters with KEDR detector at VEPP-4M

presented by: Korneliy Todyshev (BINP)

We present a measurement of the mass, total width and leptonic width of the $\psi(3770)$ meson. Results were obtained using data collected at the $\psi(3770)$ resonance with the KEDR detector at the electron-positron accelerator complex VEPP-4M. The commonly used fitting procedure does not contain interference $\psi(3770)$ resonance and non-resonant $D\bar{D}$ cross section. In our analysis we used a description of the $\psi(3770)$ resonance shape including interference.

348 track 05 Thu, Jul 22, 2010 14:00 15 mn Salle 242

New measurement of b-hadron lifetimes at CDF

presented by: Juan Pablo Fernandez (CIEMAT)

We report new, world-leading measurements of b-hadron lifetimes and their ratios using $B^+ \rightarrow J/\psi K^+$, $B^0 \rightarrow J/\psi K^0$, $B^0 \rightarrow J/\psi K^0_S$ and $\Lambda_b \rightarrow J/\psi \Lambda$, decays reconstructed in a data sample corresponding to 4.3 fb⁻¹ collected by the CDF experiment. A detailed resolution model provides improved systematic uncertainties on the lifetimes, and determination of the b hadron decay-length using only the J/ψ decay-vertex, common to all modes, allow cancellation of the major systematic uncertainties in their ratios.

349 track 05 Thu, Jul 22, 2010 17:00 15 mn Salle 242

New results on bottom baryons with the CDF II detector

presented by: Igor Gorelov (Univ. of New Mexico, USA.)

We present a high statistics study of Σ_b bottom baryon states based on a sample corresponding to 5.3 fb⁻¹ of fully reconstructed Λ_b decays collected by the CDF experiment. The first independent mass and widths measurements of all four states Σ_b^{*+} and Σ_b^{*-} are reported.

357 track 05 Thu, Jul 22, 2010 14:15 15 mn Salle 242

New suppressed decays of B_{0_s} mesons

presented by: Olga Norriella (UIUC)

We present new measurements of suppressed decays of the B_{0_s} meson to J/ψ final states at CDF. Using a data sample corresponding to an integrated luminosity of 5 fb⁻¹ of proton-antiproton collisions at $\sqrt{s}=1.96$ TeV, we utilize a low transverse-momentum dimuon trigger to acquire a large sample of $J/\psi \rightarrow \mu^+ \mu^-$ decays. We form fully reconstructed B_{0_s} candidates using information from the central tracking system and present results on the following decay modes: $B_{0_s} \rightarrow J/\psi K^*(892)$, $B_{0_s} \rightarrow J/\psi f_0(980)$ and $B_{0_s} \rightarrow J/\psi K_0$ s. All of these modes have the possibility of providing further information on lifetime difference and CP asymmetries in B_{0_s} decays.

393 track 05 Thu, Jul 22, 2010 16:30 15 mn Salle 242

The b-quark mass and the heavy-strange decay constant from lattice HQET

presented by: Nicolas Garron (University of Edinburgh)

We present our strategy to compute the b-quark mass and the heavy-strange decay constant, in heavy quark effective theory including $1/m$ corrections. By matching the effective theory and QCD in a small volume, one can determine non-perturbatively the bare parameters of the HQET Lagrangian and those of the heavy-light currents. The static, kinetic and magnetic energy of the heavy-light meson are obtained from large volume simulations. Using the GEVP method applied to all-to-all propagators allows us to isolate the ground state and the first excited state. I will show how the b-quark mass and the heavy-strange decay constant can be computed in this way, and I will present our preliminary results for the case of $n_f=2$ flavors of dynamical quarks.

557 track 05 Thu, Jul 22, 2010 15:15 15 mn Salle 242

Observation and study of Λ_c decays of neutral B mesons

presented by: Thomas Hartmann (University of Rostock)

In a sample of 467 million $B\bar{B}$ pairs collected with the BaBar detector at the PEP-II collider at SLAC we have observed the decay $B_0 \rightarrow \Lambda_c^+ \bar{p} \pi^0$ and measured its branching fraction. We determine an upper limit for the branching fraction of the decay $B_0 \rightarrow \Lambda_c^+ (2455) \bar{p}$ and observe an enhancement at the threshold of the invariant mass of the baryon-antibaryon pair. We also report the observation of the baryonic decay $B_0 \rightarrow \Lambda_c^+ \bar{\Lambda} K^-$.

558 track 05 Thu, Jul 22, 2010 09:15 15 mn Salle 242

Double quarkonium production at the LHC

presented by: Chaehyun Yu (KIAS)

We study the production of two S-wave heavy quarkonia at the LHC in the framework of nonrelativistic QCD. We consider the double quarkonium production of same flavour, $J/\psi+J/\psi$ or $Y+Y$ as well as that of different flavour, $J/\psi+Y$. We calculate the short-distance coefficients in the colour-octet model completely for the first time. Our results for the differential cross section for the $J/\psi+J/\psi$ or $Y+Y$ production imply that the previous results carried out under the gluon fragmentation approximation greatly overestimated the cross section. This confirms that the gluon fragmentation approximation is valid only at large transverse momentum. Nevertheless we conclude that the colour-octet mechanism can be tested at the LHC in these channels. We also suggested the double quarkonium production of different flavour, $J/\psi+Y$. We show that the tree-level and one-loop level contribution to this channel in the colour-octet model is much suppressed compared to that in the colour-singlet model. Thus the $J/\psi+Y$ production at the LHC will provide probes of the colour-octet mechanisms with less backgrounds and without the colour-singlet contamination. If we can not observe the events at a expected level, it would imply that the current values of the colour-octet matrix elements are overestimated.

802 track 05

Thu, Jul 22, 2010

16:45 15 mn

Salle 242

Are scalar mesons visible in $B^{\pm} \rightarrow \pi^+ \pi^- \pi^{\pm}$ decays?

presented by: Leonard Lesniak (H. Niewodniczanski Institute of Nuclear Physics PAN, Krakow,

The two-pion effective mass and helicity angle distributions in the charged B-meson decays into three charged pions are studied. The weak decay amplitudes are calculated in the QCD factorization framework. The final state interactions between the produced pairs of pions are described using strong pion-pion scalar and vector form factors. The scalar form factors are constrained by pion-pion, kaon-antikaon and four pion production data incorporated into a multichannel model of the corresponding coupled amplitudes. The pion-pion vector form factor is parametrized as in the Belle Collaboration analysis of their high statistics data on $\tau^{\pm} \rightarrow \pi^0 \nu_{\tau}$ decays [Phys. Rev. D78 (2008) 072006].

The theoretical distributions of the dipion effective masses are compared with the corresponding results of the recent Dalitz plot analysis of $B^{\pm} \rightarrow \pi^+ \pi^- \pi^{\pm}$ decays done by the BaBar Collaboration [Phys. Rev. D79 (2009) 072006].

We show that the S-wave dipion amplitude, although much smaller than the P-wave amplitude corresponding to the $\rho(770)$ resonance, plays, nevertheless, an important role in the $\rho(770)$ mass range. As a matter of fact, the interference term between the S and P dipion amplitudes can reach a value as high as 30% of the dominating $\rho(770)$ contribution. This effect can be attributed to the broad $f_0(600)$ (σ) meson. The S-wave is also sizeable above 1 GeV where higher scalar resonances exist.

The signal of the $B^{\pm} \rightarrow f_0(980) \pi^{\pm}$ decay has not been seen in the experimental analysis, but this can be easily explained in the present model since the relevant B decay amplitude is proportional to the scalar form factor which has a characteristic dip at the $f_0(980)$ mass. We show that the helicity angle (θ) distribution is strongly asymmetric in the $\rho(770)$ meson range. This effect is confirmed by the comparison of our results with the BaBar data integrated over $\cos(\theta) > 0$ or over $\cos(\theta) < 0$.

It would be quite interesting to compare our model with the high statistics data already obtained by the Belle Collaboration and with future data from super B-factories.

841 track 05

Thu, Jul 22, 2010

09:45 15 mn

Salle 242

Measurement of J/psi, Upsilon and b-hadron production in proton-proton collisions at $\sqrt{s} = 7$ TeV with the CMS experiment

presented by: David Lopes-Pegna (Princeton University)

We present the first measurements of the J/ψ and Y production cross sections in proton-proton collisions at 7 TeV, as measured by the CMS experiment using the dimuon decay channel. For the J/ψ we give the inclusive and the prompt differential cross sections, versus transverse momentum, as well as the beauty fraction, statistically separating the two contributions through a fit to the lifetime distribution, using the distance between the dimuon vertex and the interaction point. For the Y , we present the 1S cross section and the $(2S+3S)/1S$ cross-section ratio, both versus transverse momentum.

845 track 05

Thu, Jul 22, 2010

17:15 15 mn

Salle 242

Measurement of the inclusive b production cross section in pp collisions at $\sqrt{s} = 7$ TeV

presented by: Lea Michaela Caminada (Institut fuer Teilchenphysik - ETHZ)

Measurements by the CMS experiment of the cross section for inclusive b production in proton-proton collisions at $\sqrt{s} = 7$ TeV are presented. The measurements are based on different methods, such as inclusive jet measurements with secondary vertex tagging or selecting a sample of events containing jets and at least one muon, where the transverse momentum of the muon with respect to the closest jet axis discriminates b events from the background. The data are compared with QCD Monte Carlo predictions at LO and NLO accuracy.



ICHEP2010 Parallel Sessions

864 track 05

Thu, Jul 22, 2010

17:30 15 mn

Salle 242

Measurement of beauty photoproduction using decays into muons in dijet events at HERA

presented by: Achim Geiser (DESY)

Beauty photoproduction in dijet events has been measured at HERA with the ZEUS detector using an integrated luminosity of 126 pb⁻¹. Beauty was identified in events with a muon in the final state by using the transverse momentum of the muon relative to the closest jet. Lifetime information from the silicon vertex detector was also used; the impact parameter of the muon with respect to the primary vertex was exploited to discriminate between signal and background. Cross sections for beauty production as a function of the muon and the jet variables as well as dijet correlations are compared to QCD predictions and to previous measurements. The data are well described by predictions from next-to-leading-order QCD.

984 track 05

Sat, Jul 24, 2010

09:15 15 mn

Salle 253

Semileptonic D Meson Decays from CLEO-c

presented by: David Cassel (Cornell University)

Using the full CLEO-c $D\bar{D}0$, D^+D^- , and $D_s\bar{D}_s^*$ data samples, we have made precision measurements of many D meson semileptonic branching fractions and form factors. The results for the form factors of exclusive D^+ and D^0 semileptonic decays to K and π mesons agree well with recent Lattice QCD calculations. Using a non-parametric technique, we measure the form factor for $D^+ \rightarrow K^0\bar{e} \nu_e$ decay and also the mass-suppressed form factor in $D^+ \rightarrow K^0\bar{\mu} \nu_\mu$ decay. We report new results for the Cabibbo-suppressed semileptonic decays to the vector mesons, $D^0 \rightarrow \rho^- e^+ \nu_e$, $D^+ \rightarrow \rho^0 e^+ \nu_e$, and $D^+ \rightarrow \omega e^+ \nu_e$, as well as to the scalars η and η' . We also report measurements of exclusive D_s semileptonic decays to a variety of final states. Finally, we report precision measurements of inclusive D^0 , D^+ , and D_s semileptonic decays.

1009 track 05

Thu, Jul 22, 2010

09:00 15 mn

Salle 242

Quarkonium production at the Tevatron and the LHC

presented by: Pierre Artoisenet (The Ohio State University)

In this talk, I will present recent progress on quarkonium production within NonRelativistic QCD. I will first give a brief introduction of the framework, and discuss the still open questions. I will emphasize the impact of the QCD corrections to several observables, including the p_T spectrum and the polarization of J/ψ and Y states produced in hadron collisions. After comparing up-to-date predictions with the Tevatron data, I will finally present some benchmark expectations for the production rate at the LHC.

1064 track 05

Sat, Jul 24, 2010

10:00 15 mn

Salle 253

Open charm via D mesons using the ALICE detector at CERN-LHC

presented by: Grelli Alessandro (Utrecht)

Charm and bottom quarks have been proposed as probes to study hot quark matter produced in high-energy heavy-ion collisions. The detailed understanding of the charm cross-section in proton-proton collisions as well as the production mechanisms is of considerable interest as QCD test tool and as reference calibration for heavy-ion studies. Measurements of D mesons yield in minimum bias proton-proton collisions can be used to extract the charm cross-section. In this contribution we present latest results on performance studies of the reconstruction of D^0 , D^* and D^+ mesons in proton-proton collisions at $\sqrt{s} = 7$ TeV using the ALICE central detector. The D^0 meson is reconstructed through the hadronic channel $D^0 \rightarrow K^-\pi^+$ while the D^* meson is reconstructed through the hadronic decay sequence $D^{*+} \rightarrow D^0\pi^+$ and $D^0 \rightarrow K^-\pi^+$ (and their charge conjugate channels). The D^+ is reconstructed through the channel $D^+ \rightarrow K^-\pi^+\pi^+$. A preliminary discussion on possible sources of systematic is done.

1066 track 05

Thu, Jul 22, 2010

10:00 15 mn

Salle 242

Study of J/ψ production at central rapidity with the ALICE experiment at LHC.

presented by: Giuseppe Bruno (University and INFN, Bari, Italy)

In this Conference contribution, we summarize the status of the ongoing analysis on J/ψ production at central rapidity in pp collisions at $\sqrt{s}=7$ TeV and show the first results. We also give perspectives on the first quarkonium measurements at central rapidity in Pb-Pb collisions which are scheduled by the end of this year.

1203 track 05

Thu, Jul 22, 2010

14:45 15 mn

Salle 242

Observation of $B_s \rightarrow D_s^{*-} \pi^+$, $B_s \rightarrow D_s^{(*)-} \rho^+$ and $B_s \rightarrow D_s^{(*)-} + D_s^{(*)-}$ and Estimate of $\Delta\Gamma_{CP}$ at Belle

merged from abstracts: 947 948

presented by: Sevda Esen (University of Cincinnati)

The large data sample being recorded with the Belle detector at the $Y(5S)$ energy provides a unique opportunity to study the poorly-known B_s meson decays. Following our recent measurement of $B_s \rightarrow D_s \pi$ in a sample of 23.6 fb^{-1} , we extend the analysis to include decays with photons in the final state. Using the same sample, we report the first observation of three other dominant exclusive B_s decays, in the modes $B_s \rightarrow D_s^{*-} \pi^+$, $B_s \rightarrow D_s^- \rho^+$ and $B_s \rightarrow D_s^{*-} \rho^+$. We measure their respective branching fractions and, using helicity-angle distributions, the longitudinal polarization fraction of the $B_s \rightarrow D_s^{*-} \rho^+$ decay. We also present a measurement of the branching fractions for the decays $B_s \rightarrow D_s^{*+} D_s^{*-}$. In the heavy quark limit, this branching fraction is directly related to the width difference between the CP-odd and CP-even B_s states.

1204 track 05

Thu, Jul 22, 2010

14:30 15 mn

Salle 242

Measurement of Branching Fraction for $B_s \rightarrow J/\psi f_0(980)$ and Search for $B_s \rightarrow hh$ decays

merged from abstracts: 949 953

presented by: Jean Wicht (KEK)

We present a measurement of the branching fraction for the CP eigenstate decay $B_s \rightarrow J/\psi f_0(980)$. The result is based on 23.6 fb^{-1} of data collected at the $Y(5S)$ resonance with the Belle detector at the KEKB asymmetric e^+e^- collider. We have also searched for $B_s \rightarrow hh$ decays, where h stands for a charged or neutral kaon, or a charged pion. We observe the decay $B_s \rightarrow K^+K^-$ and measure its branching fraction, $\text{Br}(B_s \rightarrow K^+K^-) = (3.8 - 0.9 / +1.0 \text{ (stat.)} \pm 0.5 \text{ (syst.)} \pm 0.5 \text{ (fs)}) \times 10^{-5}$. No significant signals are seen in other decay modes, and we set upper limits at the 90% confidence level: $\text{Br}(B_s \rightarrow K^- \pi^+) < 1.2 \times 10^{-5}$, $\text{Br}(B_s \rightarrow \pi^+ \pi^-) < 2.6 \times 10^{-5}$ and $\text{Br}(B_s \rightarrow K^0 \bar{K}^0) < 6.6 \times 10^{-5}$.

1227 track 05

Thu, Jul 22, 2010

12:00 15 mn

Salle 242

Recent Quarkonium Results from BaBar

merged from abstracts: 879 881

presented by: Bryan Fulsom (SLAC National Accelerator Laboratory)

We present recent results on quarkonium states from the Babar experiment. We have observed the $Y(\chi_{c1} D_J)$ state of bottomonium in the reaction $Y(3S) \rightarrow \gamma \gamma Y(\chi_{c1} D_J)$, $Y(\chi_{c1} D_J) \rightarrow \pi \pi Y(1S)$ with a significance of 6.2 standard deviations.

We present a study of the decay $Y(1S) \rightarrow D^{*+} + X$ produced in the decay $Y(2S) \rightarrow \pi^+ \pi^- Y(1S)$ using a sample of 98.6 million $Y(2S)$ events. We measure the $Y(1S) \rightarrow D^{*+} + X$ branching fraction and the momentum distribution of the D^* in the $Y(1S)$ rest-frame. We find evidence for an excess of D^* production over the expected rate from the virtual photon annihilation process $Y(1S) \rightarrow \gamma^* \rightarrow c\bar{c} \rightarrow D^{*+} X$. We also present a search for the spin singlet h_b partner of the $\chi_b(1P)$ triplet, the $h_b(1P)$ state of bottomonium in the transition $Y(1S) \rightarrow \pi^0 h_b$ and $Y(3S) \rightarrow \pi^+ \pi^- h_b$ using a sample of 122 million $Y(3S)$ events.



ICHEP2010 Parallel Sessions

1230 track 05

Sat, Jul 24, 2010

10:15 15 mn

Salle 253

Studies of D_s decays at Babar

merged from abstracts: 641 639

presented by: Marco Pappagallo (Universita & INFN, Bari)

We present a measurement of the absolute branching fraction $Br(D_s \rightarrow \mu \nu_\mu)$ and $Br(D_s \rightarrow \tau \nu_\tau)$ and of the D_s decay constant, f_{D_s} , using 521 fb⁻¹ of data collected by the BABAR detector at the PEP-II storage rings at SLAC. We also obtained an upper limit on $Br(D_s \rightarrow e \nu_e)$. D_s events are detected by reconstructing the recoiling system, $D K X \gamma$, in events of the type $e^+e^- \rightarrow D K X D_s^*$, where $D_s^* \rightarrow D_s \gamma$ and X represents additional pions from fragmentation. We also perform a Dalitz plot analysis of $\sim 10^5$ $D_s^+ \rightarrow K^+ K^- \pi^+$ decays. Events are selected from continuum e^+e^- annihilations using 384 fb⁻¹ of data collected with the BaBar detector at PEP-II. A model-independent partial wave analysis is performed in the low K^+K^- mass region which allows to extract the S and P-wave amplitudes and their relative phase. We also measure relative branching fractions of $D_s^+ \rightarrow K^+ K^- K^+$ and $D_s^+ \rightarrow K^+ K^+ \pi^-$.

1231 track 05

Thu, Jul 22, 2010

10:15 15 mn

Salle 242

Initial-state-radiation production of D_s Mesons and high precision measurements of $D_{s1}(2536)$ at Babar

merged from abstracts: 642 644

presented by: Joseph Michael Izen (University of Texas at Dallas)

A search for charmonium and other new states is performed in a study of exclusive initial-state-radiation production of $D_s^+D_s^-$, $D_s^*+D_s^-$, and $D_s^*+D_s^{*-}$ events from electron-positron annihilations at a center-of-mass energy of 10.58 GeV. The data sample corresponds to an integrated luminosity of 525 fb⁻¹ recorded by the BaBar experiment at the PEP-II storage ring. We also study the decay width and the mass of the $D_{s1}(2536)$ meson with high precision via the decay channel $D_{s1}(2536) \rightarrow D^{*+} K^0$ using 384 fb⁻¹ of data recorded by the BABAR experiment.

1233 track 05

Thu, Jul 22, 2010

11:30 15 mn

Salle 242

Recent results of charmonium radiative decay from BESIII

merged from abstracts: 236 238

presented by: Ronggang Ping (IHEP)

With the high luminosity of electron-positron storage ring at BEPCII and excellent performance of the BESIII spectrometer, BESIII accumulated about 100 million $\psi(2S)$ data. With the help of these high statistics and high quality data, the radiative decays of $\psi(2S)$ into light meson P ($P = \pi^0, \eta, \eta'$), and χ_{cJ} radiative decays to vector meson V ($V = \rho, \omega, \phi$), together with χ_{cJ} decays into pseudoscalar pairs PP ($P = \pi^0, \eta$) are studied at BESIII. The progress of these analyses will be reported in the conference.

1237 track 05

Sat, Jul 24, 2010

09:30 15 mn

Salle 253

Charm Physics at SuperB

presented by: Brian Meadows (University of Cincinnati)

The study of Charm Decays at SuperB provide unique opportunities to understand the Standard Model and constrain new physics, both at the $Y(4S)$, and at charm threshold. We discuss the physics potential of such measurements from the proposed SuperB experiment with 75 ab⁻¹ of data at the $Y(4S)$ and a subsequent run dedicated to exploiting quantum correlations at the charm threshold.



ICHEP2010 Parallel Sessions

1246 track 05

Thu, Jul 22, 2010

15:00 15 mn

Salle 242

Measurement of the Branching Fractions of the Decays $B \rightarrow \bar{D}^{(*)} D^{(*)} K$

presented by: Vincent Poireau (Laboratoire d'Annecy-le-Vieux de Physique des Particules (LAPP))

We present a measurement of the branching fractions of the 22 decay channels B^0 and B^+ to $\bar{D}^{(*)} D^{(*)} K$, where $\bar{D}^{(*)}$ and $D^{(*)}$ are fully reconstructed. The B^0 and B^+ mesons are reconstructed in a sample of hadronic events for all the possible $\bar{D} D K$ modes, namely $B^0 \rightarrow D^{(*)-} D^{(*)0} K^+$, $D^{(*)-} D^{(*)+} K^0$, $\bar{D}^{(*)0} D^{(*)0} K^0$ and $B^+ \rightarrow \bar{D}^{(*)0} D^{(*)+} K^0$, $\bar{D}^{(*)0} D^{(*)0} K^+$, $D^{(*)-} D^{(*)+} K^+$. The results are based on 423 fb⁻¹ of data that contained 465 10⁶ BBbar pairs collected at the Upsilon(4S) resonance with the BaBar detector at the PEP-II B factory.

1247 track 05

Sat, Jul 24, 2010

09:45 15 mn

Salle 253

Search for the decays $B^+ \rightarrow D^+ K^{*0}$

presented by: Xavier Prudent (Inst. fuer Kern- und Teilchenphysik (IKTP)-Technische Universitaet)

We report on the search for the rare decays $B^+ \rightarrow D^+ K^0$ and $B^+ \rightarrow D^+ K^{*0}$ decays using 426 fb⁻¹ of data (468 10⁶ BBbar pairs) collected at the Upsilon(4S) resonance with the BaBar detector at the PEP-II B factory at SLAC.



ICHEP2010 Parallel Sessions

06 - CP violation, CKM and Rare Decays

53 track 06 Fri, Jul 23, 2010 09:15 13 mn Salle 242A

Measurement of $BR(K \rightarrow e \nu)/BR(K \rightarrow \mu \nu)$ at NA62

presented by: Andreas Winhart (Institut fur Physik)

Measurement of the helicity suppressed ratio of charged kaon leptonic decay rates $BR(K \rightarrow e \nu)/BR(K \rightarrow \mu \nu)$ has long been considered as an excellent test of lepton universality and the Standard Model (SM) description of weak interactions. It was realised recently that the suppression of the SM contribution might enhance the sensitivity to SUSY-induced effects to an experimentally accessible level. The NA62 experiment at the CERN SPS has collected a record number of over 10^5 $K \rightarrow e \nu$ decays during a dedicated run in 2007, aiming at achieving 0.5% precision. Experimental strategy, details of the analysis and preliminary results will be discussed.

135 track 06 Sat, Jul 24, 2010 09:15 13 mn Salle 242A

Power suppressed effects in $B\bar{b} \rightarrow X_s \gamma$ at $O(\alpha_s)$

presented by: Soumitra Nandi (University of Torino)

We compute the $O(\alpha_s)$ corrections to the Wilson coefficients of the dimension five operators emerging from the Operator Product Expansion of inclusive radiative B decays. We employ an off-shell matching procedure and discuss the impact of the resulting $O(\alpha_s \Lambda_{\text{QCD}}^2/m_b^2)$ corrections on the extraction of m_b and μ_{π^2} from the moments of the photon spectrum.

142 track 06 Fri, Jul 23, 2010 17:45 13 mn Salle 242A

Extracting CP violation and strong phase in D decays by using quantum correlations in $\psi(3770) \rightarrow D^0 D^0\bar{b} \rightarrow (V_{1V_2})(V_{3V_4})$ and $\psi(3770) \rightarrow D^0 D^0\bar{b} \rightarrow (V_{1V_2})(K\pi)$

presented by: Xian-Wei Kang (IHEP,China)

The charm quark offers interesting opportunities to cross-check the mechanism of CP violation precisely tested in the strange and beauty sectors. In this paper, we exploit the angular and quantum correlations in the $D D\bar{b}$ pairs produced through the decay of the $\psi(3770)$ resonance in a charm factory to investigate CP-violation in two different ways. We build CP-violating observables in $\psi(3770) \rightarrow D D\bar{b} \rightarrow (V_{1V_2})(V_{3V_4})$ to isolate specific New Physics effects in the charm sector. We also consider the case of $\psi(3770) \rightarrow D D\bar{b} \rightarrow (V_{1V_2})(K\pi)$ decays, which provide a new way to measure the strong phase difference δ between Cabibbo-favoured and doubly-Cabibbo suppressed D decays required in the determination of the CKM angle γ . Neglecting the systematics, we give a first rough estimate of the sensitivities of these measurements at BES-III with an integrated luminosity of 20 fb^{-1} at $\psi(3770)$ peak and at a future Super tau-charm factory with a luminosity of $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$.

190 track 06 Sat, Jul 24, 2010 17:30 13 mn Salle 242A

CKMfitter Summer 2010 collection: The CKM Matrix Status and sensitivity to New Physics

presented by: Stéphane T'Jampens (LAPP (Université de Savoie et CNRS/IN2P3))

An up-to-date profile of the Cabibbo-Kobayashi-Maskawa matrix is given with emphasis on the interpretation of recent results on CP violation. A review of all relevant experimental and theoretical inputs from the contributing domains of electroweak interaction are provided together with numerical and graphical constraints on the CKM parameters and predictions of related physical observables. We discuss the impact of what the data actually say on studies of new physics and constraints on its parameters are derived.

191 track 06

Sat, Jul 24, 2010

15:00 13 mn

Salle 242A

S-waves and the measurement of β_s in Bs decays

presented by: Sheldon Stone (Syracuse University)

The CP Violating asymmetry in Bs mixing (β_s) is one of the most promising measurements where physics beyond the Standard Model could be revealed. Currently, such measurements are only a 5% likely to be consistent with SM expectations [1]. While this is not yet a significant deviation it does imply that such measurements should be subject to great scrutiny. The mode $B_s \rightarrow J/\psi \phi$ has been used, and the mode $B_s \rightarrow \phi \phi$ proposed for future measurements. These modes both have two vector particles in the final state and thus angular analyses must be used to disentangle the contributions from CP+ and CP- configurations. All publications of β_s results thus far have not considered the possibility of a substantial S-waves masquerading as low mass K^+K^- pairs. These could well be the result of a final state formed from an s-quark-anti-s-quark pair in a 0+ spin-parity state, such as the $f_0(980)$ meson. I will show estimates of the S-wave contribution to the $J/\psi \phi$ final state based on D_s decays into $K^+K^-\pi^+\pi^-\pi^+\pi^-$ [2], and $K^+K^-\pi^+\pi^-\pi^+\pi^-$ final states [3]. This S-wave contribution needs to be taken into account in determining β_s by including an S-wave amplitude in the fit. This may change the central value of current results and will also increase the statistical uncertainty [2,4]. I will also show estimates of the relative Bs decay rate into $J/\psi f_0(980)$, where $f_0 \rightarrow \pi^+\pi^-$. Comparisons will be made with theoretical models [5,6]. The $J/\psi f_0(980)$ mode has been suggested as a CP eigenstate that could yield an independent value of β_s . I will show an estimate of the sensitivity relative to $J/\psi \phi$ [7]. Specific strategies are proposed for the $B_s \rightarrow \phi \phi$ mode where two S-waves are possible.

[1] CDF and D0 Combined Working Group, "Combination of $D\phi$ and CDF Results on $\Delta\Gamma_s$ and the CP-Violating Phase β_s " CDF/PHYS/BOTTOM/CDFR/9787, D0 Note 5928-CONF (2009).

[2] S. Stone and L. Zhang, "S-waves and the Measurement of CP Violating Phases in Bs Decays," Phys. Rev. D79, 074024 (2009) arXiv:0812.2832.

[3] K. M. Ecklund et. al (CLEO), "Study of the semileptonic decay $D_s^+ \rightarrow f_0(980) e^+ \nu$ and implications for $B_s \rightarrow J/\psi f_0$," Phys. Rev. D80, 052009 (2009) arXiv:0907.3201.

[4] Y. Xie, P. Clarke, G. Cowan, and F. Muheim, "Determination of $2\beta_s$ in $B_s \rightarrow J/\psi K^+ K^-$ Decays in the Presence of a K^+K^- S-Wave Contribution," JHEP 0909, 074 (2009)

[5] P. Colangelo, F. De Fazio, and W. Wang, " $B_s \rightarrow f_0(980)$ form factors and Bs decays into $f_0(980)$ " arXiv:1002.2880.

[6] O. Leitner, J.-P. Dedonder, B. Loiseau, B. El-Bennich, "Scalar resonance effects on the B_s - anti- B_s mixing angle," arXiv:1003.5980.

[7] S. Stone and L. Zhang, "Measuring the CP Violating Phase in Bs Mixing Using $B_s \rightarrow J/\psi f_0(980)$ ".

196 track 06

Fri, Jul 23, 2010

09:30 13 mn

Salle 242A

Analysis of the MEG experiment to search for $\mu^+ \rightarrow e^+ \gamma$ decays

presented by: Ryu Sawada (The University of Tokyo)

A lepton flavor violating rare muon decay $\mu \rightarrow e \gamma$ is forbidden in the standard model. On the other hand, new theories, such as supersymmetric grand-unification theory etc, predict the branching ratio in the range of 10^{-14} - 10^{-12} , which is just below the current experimental upper bound (1.2×10^{-11}) set by a previous experiment. MEG experiment is designed to search for the decay with a sensitivity of 10^{-13} . The physics run was started in 2008. Sensitivity from the initial three months of data is 1.3×10^{-13} , and 90% confidence level limit was set to be 2.8×10^{-11} . In 2009, more than twice the data with respect to 2008 was acquired, hence it is promising the sensitivity will be better than the current limit. In this talk, details of analyses of each sub-detectors (900 liter liquid xenon calorimeter, ultra-light drift chambers and high resolution timing counters) and physics analysis for 2009 data are described.

208 track 06

Fri, Jul 23, 2010

17:30 13 mn

Salle 242A

Results and prospects for Charm Physics at LHCb

presented by: Ivan Belyaev (Institute for Theoretical and Experimental Physics (ITEP))

Precision measurements in charm physics offer a window into a unique sector of potential New Physics interactions. LHCb is poised to become a world leading experiment for charm studies, recording enormous statistics with a detector tailored for flavour physics. The conditions of the 2010-11 run of LHC are especially conducive to the collection of charm events, with a very large data set already attainable this year. First charm results will be shown using data collected at LHCb in pp collisions at 7 TeV center-of-mass energy. The prospects for measurements of CP violation, mixing, and rare decays of charm mesons at LHCb will also be presented.



ICHEP2010 Parallel Sessions

209 track 06 Sat, Jul 24, 2010 15:30 13 mn Salle 242A

Prospects for CP violation in $B_{0_s} \rightarrow J/\psi \phi$ from first LHCb data

presented by: Gerhard Raven (NIKHEF)

The determination of the CP-violating phase in $B_{0_s} \rightarrow J/\psi \phi$ decays is one of the key goals of the LHCb experiment. Its value is predicted to be very small in the Standard Model but can be significantly enhanced in many models of New Physics. The steps towards a precise determination of this phase with a flavour-tagged, time-dependent, angular analysis of the decay $B_{0_s} \rightarrow J/\psi \phi$ will be reviewed and first studies performed with data collected at LHC in pp collisions at 7 TeV center-of-mass energy will be presented.

210 track 06 Fri, Jul 23, 2010 15:13 11 mn Salle 242A

Studies of charmed hadronic B decays with early LHCb data and prospects for gamma measurements

presented by: Susan Haines (University of Cambridge)

We present the first studies of decays of the type $B \rightarrow DX$, where D represents a charmed meson (D_0 , $D^{(*)+}$ or D_s) from the LHCb experiment at CERN. Our studies use data accumulated during the 2010 run of the LHC. This work represents the first steps on a programme towards a precision measurement of the angle γ of the CKM Unitarity Triangle. The prospects for this gamma measurement will be reviewed.

211 track 06 Fri, Jul 23, 2010 15:00 11 mn Salle 242A

Prospects for CP violation measurements with charmless hadronic B meson decays at LHCb gamma measurements

presented by: Ignacio De Bediaga Hickman (Centro Bras. de Pesquisas Fisicas (CBPF))

Studies of two- and tree-body charmless hadronic decays of B mesons have high sensitivity to possible contributions from New Physics. Precision measurements involving these decays will be performed at LHCb, notably those of CP-violating asymmetries. These measurements benefit from a trigger system which is very efficient for hadronic final states and excellent particle identification capabilities. The full programme will be reviewed and first studies with 2010 data will be presented.

350 track 06 Sat, Jul 24, 2010 14:30 13 mn Salle 242A

New measurement of the B_{0_s} mixing phase at CDF

presented by: Gavril Giurgiu (Johns Hopkins)

CDF presents improved bounds on the CP-violating phase β_{0_s} and on the decay-width difference $\Delta\Gamma_{0_s}$ of the neutral B_{0_s} meson system. We use 6500 $B_{0_s} \rightarrow J/\psi \phi$ decays collected by the dimuon trigger and reconstructed in a sample corresponding to 5.2 fb^{-1} of data. Besides exploiting a two-fold increase in statistics with respect to the previous measurement, several improvements have been introduced in the analysis including a fully data-driven flavor-tagging calibration and proper treatment of possible S-wave contributions.

358 track 06 Sat, Jul 24, 2010 15:15 13 mn Salle 242A

Search for non-standard model physics in rare decays at CDF

presented by: Marco Rescigno (Istituto Nazionale di Fisica Nucleare Sezione di Roma 1)

Quantities related to B decays that are strongly suppressed in the standard model may provide early indications of non-SM physics. CDF has the world's largest heavy flavor samples and can explore rare decays with unprecedented sensitivity. We present the first observation of $B_{0_s} \rightarrow \phi \mu^+ \mu^-$ decays (the rarest B_{0_s} decays observed), a measurement of forward-backward asymmetry in $B_{0_s} \rightarrow K^* \mu^+ \mu^-$ competitive with world-leading results, and the first measurement of polarization amplitudes in $B_{0_s} \rightarrow \phi \phi$ decays.



ICHEP2010 Parallel Sessions

444 track 06 Sat, Jul 24, 2010 16:20 12 mn Salle 242A

Status of flavor constraints on beyond the Standard Model scenarios

presented by: Nazila Mahmoudi (LPC Clermont-Ferrand)

The interplay of flavor and collider physics is entering a new era with the start-up of the LHC. During the past few years rare B decays and in particular $b \rightarrow s \gamma$ transitions have been extensively used and provided exciting opportunities for mapping possible routes beyond the SM. Flavor constraints play in this manner a complementary role to the direct searches. In this talk, I will present an overview of the existing flavor constraints on various models and show examples of comparison with the LHC discovery potentials. I will also describe very briefly the SuperIso program which is dedicated to flavor physics observable calculations.

559 track 06 Fri, Jul 23, 2010 14:00 13 mn Salle 242A

Dalitz-plot analysis of $B^0 \rightarrow \text{anti-}D^0 \pi^+ \pi^-$

presented by: Thomas Latham (University of Warwick)

Constraints on the CKM Unitarity Triangle angle β can be obtained from a time-dependent Dalitz-plot analysis of the decay $B^0 \rightarrow D \pi^+ \pi^-$. We present preliminary results of an analysis of the $B^0 \rightarrow D \pi^+ \pi^-$ Dalitz plot using the final BaBar dataset, consisting of around 471 million $B\bar{B}$ pairs.

581 track 06 Fri, Jul 23, 2010 11:15 11 mn Salle 242A

Search for $B \rightarrow \tau \nu$

presented by: De Nardo Guglielmo (Napoli University and INFN)

We present a search for the fully leptonic B decay $B^+ \rightarrow \tau^+ \nu_{\tau}$ in 459M $B/\text{anti-}B$ pairs collected at the Upsilon(4S) resonance using the BaBar detector. We select a sample of events with a reconstructed hadronic B decay, $B^- \rightarrow D^0 X^-$, where X represents a combination of charged and neutral light mesons; in the remainder of each event we search for the $B^+ \rightarrow \tau^+ \nu_{\tau}$ signal.

702 track 06 Fri, Jul 23, 2010 15:26 17 mn Salle 242A

Quantum-correlated D-decays at CLEO-c

presented by: Guy Wilkinson (Nuclear Physics Laboratory)

The 818 fb⁻¹ dataset collected at the $\psi(3770)$ resonance at CLEO-c offers unique possibilities for measuring strong phase differences in neutral D decays. The measurements require that both D mesons in the event are fully reconstructed, usually with one decaying to the signal mode of interest, and the other to a CP-eigenstate. The strong phase differences extracted from these decays are important inputs to measurements of D-mixing parameters and the determination of the CKM angle γ in $B \rightarrow D K$ decays. Results will be presented from a variety of D decays including $KS \pi \pi$, $KS K K$ and other 3- and 4-body modes. The impact of these results on γ measurements will be discussed.

732 track 06 Sat, Jul 24, 2010 10:00 13 mn Salle 242A

Measurements of Partial Branching Fractions for $B \rightarrow X_u \ell \text{ anti-}\nu$ and Determination of $|V_{ub}|$

presented by: Michael Sigamani (Queen Mary College)

We present partial branching fractions for inclusive charmless semi-leptonic B decays $\text{anti-}B \rightarrow X_u \ell \text{ anti-}\nu$, and the determination of the CKM matrix element $|V_{ub}|$. The analysis is based on a sample of Upsilon(4S) decays into B anti-B pairs collected with the BABAR detector at the PEP-II e⁺ e⁻ storage rings. We select events using either the invariant mass M_X of the hadronic system, the invariant mass squared, q^2 of the lepton and neutrino pair, the kinematic variable P_+ , the lepton energy E_ℓ , or one of their combinations. We determine partial branching fractions in limited regions of phase space. Corresponding values of $|V_{ub}|$ are extracted using several theoretical calculations.

772 track 06

Sat, Jul 24, 2010

17:00 13 mn

Salle 242A

A brief (p)review on a possible fourth generation world to come

presented by: George Wei-Shu Hou (National Taiwan University (NTU))

From a thread in the "Direct CPV difference" in charged vs neutral $B \rightarrow K \pi$ decays observed at the B factories, a possible large and negative mixing-dependent CPV in $B_s \rightarrow J/\psi \phi$ is predicted, if the former arises at least partially from 4th generation t' effect in the Z-penguin. Surprisingly, there is some standing hint at the Tevatron. Whether or not these flavor and CPV effects bear up, a 4th generation would help us soar to the heavens: there seems to be enough CPV for the baryon asymmetry of the Universe. A separate thread is the ever increasing bounds on t' and b' at the Tevatron, implying large Yukawa coupling. Direct search can only be settled at the LHC, and the partial wace unitarity bound is only a glass ceiling. What is intriguing is the possibility of EW symmetry breaking due to the NJL-type condensation of very heavy 4th generation quarks, where we outline two scenarios that can be pursued on the lattice: Higgs-Yukawa Lagrangian, and the electroweak theory as we know it, without ever mentioning the Higgs boson. If the pursuit of 4th generation quark search at the LHC bears fruit, we may simultaneously touch upon two of the greatest problems in particle physics, and even cosmology: source of EW symmetry breaking (raison d'etre for LHC); and source of CPV for BAU (raison d'etre for ourselves). Implications for flavor and other physics would be further discussed.

870 track 06

Sat, Jul 24, 2010

10:15 13 mn

Salle 242A

Towards a global fit to extract the $B \rightarrow X_s \gamma$ rate and $|V_{ub}|$

presented by: Florian Bernlochner (Humboldt University of Berlin)

The total $B \rightarrow X_s \gamma$ rate and the CKM-matrix element $|V_{ub}|$ determined from semileptonic B-meson decays play an important role in finding indirect evidence of new physics in the flavor sector of the Standard Model, complementary to the direct searches at LHC and Tevatron. Their determination requires the precise knowledge of the parton distribution function for the b quark in the B-meson (called the shape function). We implement a new model-independent framework for the shape function with reliable theoretical uncertainties based on an expansion in a suitable set of basis functions. This is a significant improvement over using model functions. We present the current status of a global fit to BaBar and Belle data to extract the shape function, the $B \rightarrow X_s \gamma$ rate and $|V_{ub}|$.

884 track 06

Fri, Jul 23, 2010

12:00 11 mn

Salle 242A

New upper limit on the decay $B_s \rightarrow \mu \mu$ from D0

presented by: Brendan Casey (Fermilab)

We present the results of a search for the flavor-changing neutral current decay $B_{0,s} \rightarrow \mu^+ \mu^-$ using approximately 6.1 fb^{-1} of p anti-p collisions at $\sqrt{s}=1.96 \text{ TeV}$ collected by the D0 experiment at the Fermilab Tevatron Collider. Compared to the previous published D0 result we have increase the amount of data analysed by a factor of 4 and improved the background rejection using a multivariate discrimination technique.

886 track 06

Sat, Jul 24, 2010

13:50 17 mn

Salle 242A

Evidence for an anomalous like-sign dimuon charge asymmetry

presented by: Bruce Hoeneisen (Universidad San Francisco de Quito)

We measure the charge asymmetry A of like-sign dimuon events in 6.1 fb^{-1} of p anti-p collisions recorded with the D0 detector at a center-of-mass energy $\sqrt{s} = 1.96 \text{ TeV}$ at the Fermilab Tevatron collider. From A , we extract the like-sign dimuon charge asymmetry in semileptonic b-hadron decays:

$$A^{b \rightarrow s} = -0.00957 \pm 0.00251(\text{stat}) \pm 0.00146(\text{syst}).$$

This result differs by 3.2 standard deviations from the standard model prediction

$$A^{b \rightarrow s}(\text{SM}) = (-2.3^{+0.5}_{-0.6}) \times 10^{-4} \text{ and provides first evidence of anomalous CP-violation in the mixing of neutral B mesons.}$$



ICHEP2010 Parallel Sessions

907 track 06 Fri, Jul 23, 2010 09:00 13 mn Salle 242A

The new KL- \rightarrow π^0 nu Experiment (KOTO) at J-PARC

presented by: Hiroaki Watanabe (KEK)

J-PARC-E14 KOTO experiment aims at first observation of the rare decay KL \rightarrow π^0 nu using an intense KL beam in the Hadron experimental hall at J-PARC. The new dedicated KL beamline for KOTO experiment has been constructed in 2009. First KL beam was successfully extracted and surveyed from Oct. in 2009 to Feb. in 2010. Assembling of main detector part, which is composed of 2716 CsI crystals, was just started in May, 2010. Whole detector system will be completed in 2011 and total engineering run and first physics run will be started. In this contribution, the preparation status of the beamline and the detector will be reported.

922 track 06 Sat, Jul 24, 2010 16:05 13 mn Salle 242A

Flavor Physics in a Warped Extra Dimension

presented by: Matthias Neubert (Johannes Gutenberg University Mainz)

A comprehensive analysis of tree-level weak interaction processes at low energy is presented for different implementations of the Randall-Sundrum model with gauge and matter fields in the bulk and brane-localized Higgs sector. The complete form of the effective weak Hamiltonian is obtained, which results from tree-level exchange of Kaluza-Klein (KK) gluons and photons, the W and Z bosons and their KK excitations, as well as the Higgs boson. A detailed phenomenological analysis is performed for potential new-physics effects in neutral-meson mixing and in rare decays of kaons and B mesons, including both inclusive and exclusive processes.

930 track 06 Fri, Jul 23, 2010 11:00 13 mn Salle 242A

Quark and Lepton Evolution Invariants in the Standard Model

presented by: Paul Harrison (University of Warwick)

We construct a new set of Standard Model evolution invariants which link quark masses and mixing parameters. We examine their phenomenological implications and infer a simple combination of Yukawa coupling matrices which appears to play a unique role in the Standard Model. This suggests a possible new insight into the observed spectrum of quark masses. Similar evolution invariants are obtained for the leptons in the case of Dirac neutrinos.

943 track 06 Sat, Jul 24, 2010 11:00 13 mn Salle 242A

Measurement of the decay B \rightarrow D^{*} l⁺ nu and determination of $|V_{cb}|$ at Belle

presented by: Wolfgang Dungen (Austrian Academy of Sciences)

We present measurements of the branching fraction and the HQET form factors ρ^2 , R_1 and R_2 for the decay B⁰ \rightarrow D^{*} l⁺ nu using untagged Upsilon(4S) \rightarrow B anti-B events. The Cabibbo-Kobayashi-Maskawa matrix element $|V_{cb}|$ is extracted and a test of the form factor parametrization is presented. The results are based on a large data sample recorded by the Belle detector at the KEKB e⁺ e⁻ collider.

The measurement of the decay B⁺ \rightarrow anti-D^{*} 0 l⁺ nu does not rely on charged slow pion reconstruction, and thus allows us to cross-check measurements of B⁰ \rightarrow D^{*} l⁺ nu. We also present measurements of the branching fraction and of the HQET form factors ρ^2 , R_1 and R_2 obtained with this decay.

944 track 06 Sat, Jul 24, 2010 09:30 13 mn Salle 242A

Measurement of the decay B⁰ \rightarrow pi⁻ l⁺ nu in untagged events and determination of $|V_{ub}|$ at Belle

presented by: Hyuncheong Ha (Korea University)

We present a measurement of the charmless semileptonic decay B⁰ \rightarrow pi⁻ l⁺ nu using a large sample of untagged Upsilon(4S) \rightarrow B anti-B events collected with the Belle detector at the KEKB e⁺ e⁻ asymmetric collider. From the results, we determine the branching fraction of the decay and extract the Cabibbo-Kobayashi-Maskawa matrix element $|V_{ub}|$ using various approaches.

969 track 06 Sat, Jul 24, 2010 12:15 13 mn Salle 242A

Observation of Radiative $B^0 \rightarrow \phi K^0 \gamma$ Decays and Measurements of time-dependent CP violation

presented by: Himansu Sahoo (University of Hawaii)

We report the first observation of the radiative decay $B^0 \rightarrow \phi K^0 \gamma$ and new measurements of time-dependent CP-violation using a large data sample collected at the Upsilon(4S) resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. These measurements are sensitive to right-handed currents from new physics. We also report an updated measurement of the branching fraction of $B^+ \rightarrow \phi K^+ \gamma$ decays.

983 track 06 Sat, Jul 24, 2010 11:30 13 mn Salle 242A

Improved Measurement of the Electroweak Penguin Process $B \rightarrow X_s |^+ |^-$

presented by: Cheng-Chin Chiang (National Taiwan University)

We have performed a search for the decay $B \rightarrow X_s |^+ |^-$ using a pseudo-inclusive reconstruction technique. Using a data sample of 657×10^6 BB pairs, we observe a clear signal, including $238.3 \pm 26.4 \pm 2.3$ events in the mass region $M(X_s) < 2.0 \text{ GeV}/c^2$. The measured branching fraction is $BR(B \rightarrow X_s |^+ |^-) = (3.33 \pm 0.80(\text{stat})^{+0.19}_{-0.24}(\text{syst})) \times 10^{-6}$; this result is restricted to the region $M(|^+ |^-) > 0.2 \text{ GeV}/c^2$.

1007 track 06 Sat, Jul 24, 2010 17:15 13 mn Salle 242A

Status and Prospects of SuperKEKB and Belle II

presented by: Yutaka Ushiroda (KEK)

We report on the plan and current status of the upgrade of the KEK B-factory accelerator to a super B factory (SuperKEKB), and the upgrade of the Belle detector to Belle II. The upgraded accelerator should reach an instantaneous luminosity of $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$, which is about 40 times higher than that of the current KEKB accelerator. The upgraded Belle II detector will be significantly improved to increase background rejection and improve physics performance. The expected sensitivity to new physics of the Belle II experiment will be presented. Many of the physics measurements are unique to e^+e^- collider experiments and complementary to new physics searches that will be carried out at the LHC.

1020 track 06 Sat, Jul 24, 2010 12:00 13 mn Salle 242A

New Physics Sensitivity of the Rare Decay $B \rightarrow K^* |^+ |^-$

presented by: Tobias Hurth (CERN/Mainz Univ.)

We present a complete method to construct QCD-protected observables based on the exclusive 4-body B-meson decay $B \rightarrow K^* |^+ |^-$ in the low dilepton mass region. The core of the method is the requirement that the constructed quantities should fulfil the symmetries of the angular distribution. We have identified all symmetries of the angular distribution in the limit of massless leptons and explore: a new non-trivial relation between the coefficients of the angular distribution, the possibility to fully solve the system for the K^* amplitudes, and the construction of non-trivial observables. We also present a phenomenological analysis of the new physics sensitivity of angular observables in the decay based on QCD factorisation. We further analyse the CP-conserving observables, AT2, AT3 and AT4. They are practically free of theoretical uncertainties due to the soft form factors for the full range of dilepton masses rather than just at a single point as for AFB. They also have a higher sensitivity to specific new physics scenarios compared to observables such as AFB. Moreover, we critically examine the new physics reach of CP-violating observables via a complete error analysis due to scale dependences, form factors and Λ/m_b corrections. We have developed an ensemble method to evaluate the error on observables from Λ/m_b corrections. Finally, we explore the experimental prospects of CP-violating observables and find that they are rather limited. Indeed, the CP-conserving (averaged) observables will offer a better sensitivity to large CP phases and may be more suitable for experimental analysis.



ICHEP2010 Parallel Sessions

1081 track 06

Sat, Jul 24, 2010

17:45 13 mn

Salle 242A

Unitarity Triangle Analysis within and beyond the SM

merged from abstracts: 769 770

presented by: Cecilia Tarantino (Technical University Munich)

We present the update of the Unitarity Triangle (UT) analysis performed by the UTfit Collaboration within the Standard Model (SM) and beyond. Within the SM, combining the direct measurements on sides and angles, the UT turns out to be over-constrained in a consistent way, with some tension due to recently included contributions to the theoretical prediction of ϵ_K and the updated lattice average for B_K . Generalizing the UT analysis to investigate NP effects, constraints on $b \rightarrow s$ transitions are also included and both CKM and NP parameters are fitted simultaneously. The most interesting result in this analysis is the hint of NP found in the $B_{s-}\bar{B}_s$ mixing at the level of more than 2 sigma.

1082 track 06

Fri, Jul 23, 2010

16:45 13 mn

Salle 242A

Precision measurements of Direct CP violation and D^0 - D^0 bar mixing at CDF

merged from abstracts: 355 356

presented by: Mark Edward Mattson (Dept of Physics and Astronomy-Wayne State U.)

The CDF experiment has previously reported evidence for D^0 - D^0 bar mixing with a significance equivalent to 3.8 standard deviations based on the time-dependent ratio of the decay rates for $D^0 \rightarrow K^+\pi^-$ and $D^0 \rightarrow K^-\pi^+$, and charge-conjugates. That measurement was based on an integrated luminosity of 1.5 fb⁻¹ and achieved sensitivities of $+0.35 \cdot 10^{-3}$ and $+7.6 \cdot 10^{-3}$ on the mixing parameters x'^2 and y' , respectively. Here we report an updated measurement using the same technique. In addition, we present an analysis that measures CP-violating asymmetries in D^* -tagged $D^0 \rightarrow \pi^+\pi^-$ decays, where any enhancement from the standard model prediction (of the order of 10^{-3}) would be unambiguous evidence for New Physics. A technique combining asymmetries of $\pi^+\pi^-$, and $K^-\pi^+$ D^0 decays highly suppresses systematic uncertainties due to detector charge-asymmetric efficiencies allowing a measurement limited only by statistical uncertainties. Both measurements are based on a sample corresponding to an integrated luminosity of 5.2 fb⁻¹.

1083 track 06

Sat, Jul 24, 2010

14:45 13 mn

Salle 242A

CP violation studies in the B^0 s system at D^0

merged from abstracts: 882 885 888

presented by: Rick Van Kooten (Physics Department-Indiana University)

We have performed searches for CP violation in the B^0_s system using data samples with 5-6.8 fb⁻¹ of proton-antiproton collisions collected with the D^0 detector in Run II at the Fermilab Tevatron. We discuss results from a search in a sample of $B^0_s \rightarrow \mu^+D^-\pi$ decays, where CP violation effects appear as a difference in the decay-time distribution for $B^0_s \rightarrow \text{anti-}B^0_s$ oscillated states versus that for $\text{anti-}B^0_s \rightarrow B^0_s$. We also report an improved measurement of the CP-violating phase ϕ_s , of the decay width difference for the two mass eigenstates $\Delta\Gamma_s$, of the mean B^0_s lifetime $\overline{\tau}_s$, and of magnitudes of the decay amplitudes, from the flavor-tagged decay $B^0_s \rightarrow J/\psi \pi$. Finally we combine these results with the measurement of the branching ratio for the decay $B^0_s \rightarrow D^{(*)+}_s D^{(*)-}_s$ and the measurement of the like-sign asymmetry for semileptonic b decays.

1084 track 06

Fri, Jul 23, 2010

12:13 15 mn

Salle 242A

Search for New Physics with Rare Heavy Flavour Decays at LHCb

merged from abstracts: 212 213

presented by: Giampiero Mancinelli (Centre de Physique des Particules de Marseille (CPPM))-

The LHCb experiment has the potential, during the 2010-11 run, to observe, or improve significantly the exclusion bounds on, the rare decays $B_s \rightarrow \mu^+\mu^-$ and $D^0 \rightarrow \mu^+\mu^-$. These studies will provide very sensitive probes of New Physics effects. High sensitivity to New Physics contributions is also achieved by searching for direct CP violation in $B^0 \rightarrow K^* \gamma$, performing a time dependent analysis of $B_s \rightarrow \phi \gamma$, and making an angular study of the decay $B^0 \rightarrow K^* \mu^+ \mu^-$. Here also significant results are expected from the present run. Preparations for these analyses will be presented, and studies shown of how existing data, for example prompt J/ψ events, can be used to validate the analysis strategy.



ICHEP2010 Parallel Sessions

1091 track 06

Fri, Jul 23, 2010

09:45 13 mn

Salle 242A

Search for lepton flavour violating tau decay and lepton-number violation B decay at Belle

merged from abstracts: 934 935 981

presented by: Kiyoshi Hayasaka (Nagoya Univ.)

We present the results of a search for lepton flavor violation (LFV) in $\tau \rightarrow \text{lepton (e or } \mu) + \text{pseudoscalar (}\pi^0, \text{eta or } \eta')$ and $\tau \rightarrow \text{lepton (e or } \mu) + \text{a vector meson (}\rho, \omega, \phi, K^{*0}, \text{anti-}\{K\}^{*0}\}$) decays using a large data sample accumulated with the Belle detector at the KEKB symmetric-energy e^+e^- collider. The sensitivity to these modes is significantly improved compared to previous experiments. In the Standard Model, lepton-number-violating decays such as $B^+ \rightarrow D^- l^+ l^+$ are strictly forbidden, but they are allowed if Majorana-type neutrinos exist. We present the results of a search for $B^+ \rightarrow D^- l^+ l^+$ decays with a high-statistics B anti-B event sample.

1092 track 06

Fri, Jul 23, 2010

17:15 13 mn

Salle 242A

CP violation and mixing in charm decays at Belle

merged from abstracts: 961 962 966

presented by: Byeong Rok Ko

We have searched for CP violation of charmed mesons in the decays $D \rightarrow K^0_S P$, where D denotes D^0, D^{*+} and D^{*+}_s , and P denotes the pseudo-scalar mesons π^+, K^+, π^0, η and η' . No evidence of CP violation in these decays is observed. We have measured the CP asymmetry difference between the Cabibbo suppressed decay $D^{*+} \rightarrow \phi \pi^+$ and the Cabibbo favored $D^{*+}_s \rightarrow \phi \pi^+$ decays. The measured asymmetry is corrected for the residual asymmetry due to detector effects, and the contributions of both CP and forward-backward asymmetries are determined. We also present a measurement of D^0 -anti- D^0 mixing parameters in three-body D^0 decays using a time-dependent Dalitz plot analysis. These results are obtained on a large data sample collected at and near the Upsilon(4S) resonance with the Belle detector operating at the KEKB asymmetric-energy e^+e^- collider.

1093 track 06

Fri, Jul 23, 2010

10:00 13 mn

Salle 242A

Tau lifetime and CP violation in tau decay at Belle

merged from abstracts: 936 937

presented by: Mikhail Shapkin (IHEP)

The tau lepton lifetime is measured using the process $e^+e^- \rightarrow \tau^+\tau^-$, where both tau leptons decay to $3\pi\nu$. An upper limit on the relative lifetime difference between positive and negative tau-leptons is given. The obtained results are based on a large data sample collected on the Upsilon(4S) resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. We also present the results of a search for CP violation in $\tau \rightarrow \nu K_S \pi$. CP violation in semileptonic tau decays is generally forbidden in the Standard Model but can be induced by the exchange of an exotic scalar such as a charged Higgs in supersymmetric models. Exploiting the large statistics of the Belle data set, we report a model-independent limit for CP violation as well as a significantly improved measurement of the CP violation parameters for specific parameterizations of the hadronic structure functions.

1094 track 06

Fri, Jul 23, 2010

14:15 15 mn

Salle 242A

CP and CPT Violation in B decays at Belle

merged from abstracts: 963 967 968 971

presented by: Takeo Higuchi (KEK)

We present a search for direct CP violation in $B^+ \rightarrow J/\psi K^+$ decays using a large data sample collected at the Upsilon(4S) resonance with the Belle detector operating at the KEKB asymmetric-energy e^+e^- collider. The Standard Model predicts a small direct CP asymmetry, and the experimental precision is of the same level as the expected deviation predicted by some extensions of the Standard Model. We also present measurements of time-dependent CP asymmetries in neutral B decays to charmonium final states, and a measurement of CP-violating parameters in B^0 decays to the $K_{S0} K^+ K^-$ final state, including $B^0 \rightarrow \phi K_{S0}$, using a time-dependent Dalitz plot analysis. CPT is expected to be a fundamental symmetry with no significant deviations. Nonetheless we can introduce an artificial perturbation parameter to the B^0 -anti- B^0 mixing system that violates CPT symmetry. The CPT violating parameter, which is a complex number but expected to be zero, can be probed through proper time difference distributions in correlated B meson pair decays. We present a measurement of the CPT violating parameter using the large Belle data sample.

1095 track 06

Fri, Jul 23, 2010

14:32 13 mn

Salle 242A

Measurements of Charmless B Decays at Belle

merged from abstracts: 970 977 978 979 980 982

presented by: **Min-Zu Wang** (Physics Department-National Taiwan University (NTU))

We report the first observation of inclusive $B \rightarrow X_s \eta$ decays using a large sample of B -anti B pairs accumulated at the Upsilon(4S) resonance with the Belle detector at the KEKB asymmetric e^+e^- collider. The X_s system is a charmless inclusive state with unit strangeness, and is reconstructed using a pseudo-inclusive technique from a kaon and up to four pions, of which at most one pion is neutral. We measure a partial branching fraction for $M_{X_s} < 2.6$ GeV/c² to be $(25.5 \pm 2.7$ (stat) ± 1.6 (syst) $^{+3.8}_{-14.1}$ (model)) $\times 10^{-5}$. A significant fraction of this signal occurs in the region $M_{X_s} > 1.8$ GeV/c², which is beyond the range of all previously measured exclusive contributions to $B \rightarrow X_s \eta$. We also present measurements of the branching fraction and time-dependent CP violation parameters of $B^0 \rightarrow a_1(1260) \pi^{\pm}$ decays, an updated measurement of the branching fraction and direct CP asymmetry for $B \rightarrow \pi^0 \pi^0$ and the results of a search for the charmless decays $B^+ \rightarrow \rho^+ \omega$, $B^+ \rightarrow \phi \pi^+$ and $B^0 \rightarrow \phi \pi^0$. We present improved measurements of the charmless decay $B \rightarrow \phi \phi K$. We update the branching fractions of $B^{\pm} \rightarrow \phi \phi K^{\pm}$ and $B^0 \rightarrow \phi \phi K^0$ decays, and the measurement of related decays such as $B^{\pm} \rightarrow \phi (K^+ K^-) K^{\pm,0}$ and $B^{\pm,0} \rightarrow (K^+ K^-) (K^+ K^-) K^{\pm,0}$. In addition, we also study the charmonium decays related to the $B \rightarrow \phi \phi K$ such as $J/\psi \rightarrow \phi (K^+ K^-)$ and $\eta_c \rightarrow \phi \phi$.

1096 track 06

Fri, Jul 23, 2010

16:30 13 mn

Salle 242A

Hadronic $b \rightarrow c$ decays at Belle

merged from abstracts: 955 956 957 975 985

presented by: **Nikhil Jayant Joshi** (Tata Institute of Fundamental Research, Mumbai)

We present a measurement of the unitarity triangle angle ϕ_3 using Dalitz plot analysis of three-body neutral D decays from the $B^+ \rightarrow D^{(*)} K^{(*)+}$ process. The results are based on a large sample of B anti- B pairs recorded at the Upsilon(4S) resonance with the Belle detector at the KEKB e^+e^- collider. The decay $B \rightarrow D^{(*)} K^{(*)}$ ($D = D^0$ or anti- D^0) includes the $b \rightarrow u$ transition and plays a crucial role in the measurement of the CP-violating angle ϕ_3 . We present the result of a study of the decay $B \rightarrow D^{(*)} K^{(*)}$ where the D meson is reconstructed from $K^+ \pi^-$. We also report improved measurements of the branching fractions for the decays $B^0 \rightarrow D_s^{(*)+} \pi^-$ and anti- $B^0 \rightarrow D_s^{(*)+} K^-$. Based on these results, we determine the ratio between the amplitudes of the doubly Cabibbo suppressed decay $B^0 \rightarrow D^{(*)+} \pi^-$ and the Cabibbo favored decay $B^0 \rightarrow D^{(*)-} \pi^+$. We studied the three-body baryonic B^+ decays, $B^+ \rightarrow p \text{ anti-Lambda } D^{(*)0}$. The branching fractions as well as the differential branching fractions as a function of the mass of the p anti-Lambda system are presented. These results are compared with theoretical predictions based on the generalized factorization approach. We present a study of the exclusive decays $B^0 \rightarrow D_s^- K^0_S \pi^+$ and $B^- \rightarrow D_s^+ K^- K^0_S$. We use the $D_s^- \rightarrow \phi \pi^-$, anti- $K^0(892) K^-$ and $K^0_S K^-$ decay modes for D_s reconstruction.

1097 track 06

Fri, Jul 23, 2010

11:28 15 mn

Salle 242A

$B \rightarrow \tau \nu$ & $B \rightarrow D^{(*)} \tau \nu$ decays at Belle

merged from abstracts: 940 945

presented by: **Jacek Stypuła** (H. Niewodniczański Institute of Nuclear Physics Kraków)

We present a measurement of the decay $B \rightarrow \tau \nu$ in a large data sample recorded with the Belle detector at the KEKB asymmetric energy e^+e^- collider. We obtain the branching fraction for $B \rightarrow \tau \nu$ and present a direct determination of the product of the B meson decay constant f_B and the magnitude of the Cabibbo-Kobayashi-Maskawa matrix element $|V_{ub}|$. The resulting constraints on a charged Higgs boson are also discussed. We also present studies of $B^+ \rightarrow \bar{D}^0 \tau^+ \nu$ and $B^+ \rightarrow \bar{D}^0 \tau^+ \nu$ decays. The events are tagged by inclusively reconstructing the accompanying B meson. Measurements of branching fractions and distributions characterizing signal decays are presented.

1098 track 06

Fri, Jul 23, 2010

11:45 13 mn

Salle 242A

Search for D and B leptonic decays at Belle

merged from abstracts: 946 964 976

presented by: marko staric (J. Stefan Institute, Ljubljana, Slovenia)

We search for the flavor-changing neutral current decays $D^0 \rightarrow \mu^+ \mu^-$ and $D^0 \rightarrow e^+ e^-$, and for the lepton-flavor violating decays $D^0 \rightarrow e^{(+)} \mu^{(-)}$ using a large data sample collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. We find no evidence for any of these decays. We obtain significantly improved upper limits on the branching fractions: $BR(D^0 \rightarrow \mu^+ \mu^-) < 1.4 \times 10^{-7}$,

$BR(D^0 \rightarrow e^+ e^-) < 7.9 \times 10^{-8}$ and $BR(D^0 \rightarrow e^+ \mu^-) + BR(D^0 \rightarrow \mu^+ e^-) < 2.6 \times 10^{-7}$ at the 90% confidence level. The purely leptonic decay $B^+ \rightarrow l^+ \nu$ ($l = e, \mu$) is highly suppressed in the Standard Model due to lepton helicity mismatch but can be strongly enhanced in New Physics scenarios. We present the results of a search for the decays $B^+ \rightarrow e^+ \nu$ and $B^+ \rightarrow \mu^+ \nu$. We also present a search for B decays into invisible final states. The ν anti- ν signal is identified by fully reconstructing the accompanying B mesons and requiring no other charged particles and no extra energy deposited in the calorimeter.

1172 track 06

Fri, Jul 23, 2010

17:00 13 mn

Salle 242A

D0-D0bar Mixing and CP Asymmetry Measurements at BABAR

merged from abstracts: 638 640 643

presented by: Matthew Bellis (Stanford University)

We report on D^0 mixing and searches for CP violation in charm meson decays using the large sample of charm anti-charm produced in e^+e^- annihilation data collected with the BaBar detector at the PEP-II asymmetric-energy B Factory near a center-of-mass energy of 10.58 GeV. A direct measurement of D^0 - D^0 bar mixing parameters through a time-dependent amplitude analysis of the Dalitz plots of $D^0 \rightarrow K^0_S \pi^+ \pi^-$ and, for the first time, $D^0 \rightarrow K^0_S K^+ K^-$ decays is reported. We measure the mixing parameters x and y and provide the best measurement to date of x . We also report on a search for CP violation in the decay $D^+ \rightarrow K^0_S \pi^+$. In the Standard Model, direct CP violation in charm meson decays is predicted to occur at the level of 10^{-3} or below. In the decay $D^+ \rightarrow K^0_S \pi^+$, a direct CP asymmetry, at the level of 0.33%, is expected from K^0 /anti- K^0 mixing in the final state with any asymmetry significantly different than that being a signature for new physics. In addition, we report on a search for CP violation in Cabibbo suppressed $D^+ \rightarrow K^0s K^+ \pi^+ \pi^-$ decays and allowed $D_s^+ \rightarrow K^0s K^+ \pi^+ \pi^-$ decays which is signaled by the difference between the T-odd asymmetries, obtained using triple product correlations, measured for $D(s)^+$ and $D(s)^-$ decays.

1173 track 06

Fri, Jul 23, 2010

10:15 13 mn

Salle 242A

Measurements of $|V_{us}|$ and Second Class Currents and Searches for Violation of Lepton Universality and CPT in Tau Decays at BABAR

merged from abstracts: 710 701 705

presented by: Alberto Lusiani (INFN)

We report on a variety of results involving decays of the tau lepton using the very large sample of $\tau^+\tau^-$ pairs produced in e^+e^- annihilation data collected with the BaBar detector at the PEP-II asymmetric-energy B Factory near a center-of-mass energy of 10.58 GeV. From measurements of the ratios of branching fractions: $B(\tau \rightarrow \mu \nu \bar{\nu}) / B(\tau \rightarrow e \nu \bar{\nu})$, $B(\tau \rightarrow \pi \nu) / B(\tau \rightarrow e \nu \bar{\nu})$, and $B(\tau \rightarrow K \nu) / B(\tau \rightarrow e \nu \bar{\nu})$ we test with high precision the Standard Model assumption of μ - e and τ - μ charged current lepton universality and provide a determination of the Cabibbo-Kobayashi-Maskawa matrix element $|V_{us}|$. Furthermore, we report on preliminary measurements of $\tau^- \rightarrow K^- n \pi^0 \nu_{\tau}$ with $n = 0, 1, 2, 3$ and $\tau^- \rightarrow \pi^- n \pi^0 \nu_{\tau}$ with $n = 3, 4$ as well as on the measurements of the branching fractions and hadronic mass distributions of $\tau^- \rightarrow K^0_S \pi^- \nu_{\tau}$, $\tau^- \rightarrow K^0_S \pi^- \pi^0 \nu_{\tau}$, $\tau^- \rightarrow K^0_S \pi^- K^0_L \nu_{\tau}$. Data from the inclusive strange τ^- decay results are used in a different determination of $|V_{us}|$. We also report on our search for second class currents in $\tau^- \rightarrow \pi^- \eta \nu_{\tau}$, where the η decays into $\pi^+\pi^-\pi^0$ and our measurement of the tau mass. We obtain a test of CPT by measuring the difference between the masses of the τ^+ and τ^- .

1174 track 06

Fri, Jul 23, 2010

14:45 13 mn

Salle 242A

Studies of Charmless Hadronic B-meson Decays at BABAR

merged from abstracts: 462 464 465 463 578 579

presented by: **Alessandro Gaz (Department of Physics-University of Colorado)**

We report a number of recent measurements of B-meson decays to purely hadronic final states that do not contain charm mesons. These studies are based on the very large sample of \overline{B} events collected by the BABAR detector at SLAC's e+e- asymmetric collider B-factory when it operated on the Upsilon(4S). We include in this paper the results of: a Dalitz plot analysis of $B^0 \rightarrow K^+ K^- K^0$ which provides a determination of the total branching fraction and those of intermediate states; a Dalitz plot analysis of $B^0 \rightarrow K^+ \pi^- \pi^0$ which involves the measurements of rates, differences and direct CP violation parameters of all intermediate states and with which we place constraints on the apex of the CKM unitarity triangle; inclusive branching fraction measurements of $B^0 \rightarrow \pi^+ K^- K^0$ and of $B^+ \rightarrow K^+ \pi^0 \pi^0$; a search for B-meson decays to the axial-vector vector final state $a_1^+ K^0$ and the search for the vector vector final state $B^+ \rightarrow \rho^0 K^{*+}$ and, for cases where a signal is present, we include studies of longitudinal polarization fractions; and measurements of B-meson decays to η' , ρ , η' , f_0 and η' K^* where K^* stands for a vector, scalar, or tensor strange meson and in which we also measure, where applicable, the charge asymmetries.

1175 track 06

Fri, Jul 23, 2010

16:15 13 mn

Salle 242A

Measurements of the CKM angle gamma at BABAR

merged from abstracts: 548 527 528 529

presented by: **Fernando Martinez-Vidal (Universidad de Valencia)**

Using data from approximately 470 million B-Bbar pair events collected with the BaBar detector at SLAC's PEP-II e+e- B-factory running on the Upsilon(4S), we have made a number of measurements that are sensitive to the Cabibbo-Kobayashi-Maskawa CP-violating angle gamma. These include a measurement of gamma from a Dalitz Plot analysis of neutral D meson decays to $K^0_S \pi^+ \pi^-$ and $K^0_{SK^+ K^-}$ produced in the processes $B^+ \rightarrow D K^+$, $B^+ \rightarrow D^* K^+$ with $D^* \rightarrow D \pi^0, D \gamma$, and $B^+ \rightarrow DK^*$ with $K^* \rightarrow K_S \pi^+$. We also search for b \rightarrow u transitions in $B^+ \rightarrow D^0 K^+$ and $B^+ \rightarrow D^{*0} K^+$ decays which are sensitive gamma due to interference between the b \rightarrow c transition $B^+ \rightarrow D^{*0} K^+$ followed by the doubly Cabibbo-suppressed decay $D^0 \rightarrow K^+ \pi^-$, and the b \rightarrow u transition $B^+ \rightarrow D^{*0} K^+$ followed by the Cabibbo-favored decay $\text{anti-}D^0 \rightarrow K^+ \pi^-$. We also analyze the decay $B^+ \rightarrow D^{*0} \pi^+$ with the D decaying into the doubly Cabibbo-suppressed mode $D \rightarrow K^+ \pi^-$. In addition we report on a measurement of the gamma in $B^+ \rightarrow D_{CP} K^+$ decays: from reconstructed $B^+ \rightarrow D K^+$ decays, where the neutral D meson is reconstructed in both CP-eigenstate and non-CP-eigenstate final states, we measure the partial rate charge asymmetries for CP-even and CP-odd D final states and the ratios between the charge-averaged $B^+ \rightarrow D K^+$ decay partial rates, where the D meson decays to CP and non-CP eigenstates. We infer frequentist confidence intervals for gamma, for the strong phase δ_B , and for the amplitude ratio r_B , which are related to the $B^+ \rightarrow DK^+$ decay amplitudes by $r_B e^{i(\delta_B - \gamma)} = A(B^+ \rightarrow \overline{D^0} K^+) / A(B^+ \rightarrow D^0 K^+)$. We also report on the study of the decay $B^+ \rightarrow D^0 K^+$ ($\overline{D^0} K^+$), where the D^0 or $\overline{D^0}$ decay to $K^+ \pi^-$ or π^0 . We measure the ratios of the suppressed to favored branching fractions as well as the CP asymmetries of those modes. Since the amplitudes for the processes $B^+ \rightarrow \overline{D^0} K^+$ and $B^+ \rightarrow D^0 K^+$ are proportional to V_{cb} and V_{ub} , respectively, these decays are sensitive to the weak phase gamma as well as to the magnitude r_B of the ratio between the two amplitudes. Finally, we report on the results of a search for the decays $B^+ \rightarrow D^+ K^*$.

1177 track 06

Sat, Jul 24, 2010

09:00 13 mn

Salle 242A

Measuring b \rightarrow s gamma, b \rightarrow d gamma and $|V_{td}/V_{ts}|$ at BaBar

presented by: **Deborah Bard (SLAC)**

We use the Upsilon(4S) dataset collected with the Babar detector at the PEP-II asymmetric e+e- storage ring to study the penguin decay modes. Here we report on a study of the radiative penguin decay $B \rightarrow X_s \gamma$ at BABAR using lepton-tagging to identify BBbar events. We present new results on the $B \rightarrow X_s \gamma$ branching fraction and direct CP asymmetry, based on a sample of 380 million BBbar pairs. We also present new results of a search for $B \rightarrow X_d \gamma$ decays. We consider seven final states with up to four charged pions and one neutral pion or η , which correspond to about 50% of the total X_d fragmentation in the mass range investigated. We observe for the first time a significant b \rightarrow d gamma transition in the hadronic mass range $M(X_d) > 1$ GeV, resulting in a significant improvement in the determination of $|V_{td}/V_{ts}|$ via the ratio of inclusive widths.



ICHEP2010 Parallel Sessions

1178 track 06

Sat, Jul 24, 2010

11:45 13 mn

Salle 242A

Studies of Flavour Changing Neutral Currents at BABAR

presented by: Kevin Flood (University of Wisconsin)

We use the full Upsilon(4S) dataset collected with the Babar detector at the PEP-II asymmetric e+e- storage ring to study the flavor-changing neutral current decays. In particular, we present new results on $B \rightarrow K^* l^+ l^-$, where $l^+ l^-$ is either e+e- or $\mu^+ \mu^-$ the lepton forward-backward asymmetry AFB and K^* longitudinal polarization fraction FL are measured, along with other angular observables. We also report on a search for $B^+ \rightarrow K^+ \tau^+ \tau^-$ in which one of the B-mesons is fully reconstructed in a hadronic decay in order to reduce the background and constrain the kinematics of the signal decay. Also presented is a search for the double-radiative rare decay $B^0 \rightarrow \gamma \gamma$ which has a clean experimental signature and proceeds through effective FCNC transitions involving vertical or annihilation penguin diagrams. Since the two-photon system can be in a CP-even or CP-odd state, this decay permits non-standard searches for CP-violating effects, while the non-hadronic final state with its two-body kinematics allows sensitive probes of QCD dynamics in B decay. The expected SM branching fraction is $O(10^{-8})$. Observation of a significant signal at the existing B Factories would be indicative of physics beyond the SM.

1179 track 06

Sat, Jul 24, 2010

11:15 13 mn

Salle 242A

Measurements of Semileptonic B mesons decays to Charm and the Determination of the CKM element $|V_{cb}|$ at BABAR

merged from abstracts: 729 737 891 728

presented by: Antonio Petrella (INFN, Sezione di Ferrara-Universita di Ferrara)

We present a set of measurements of semileptonic B meson decays to charm using the BABAR data set collected at the SLAC e+e- B-factory operating on the Upsilon(4S) resonance. This paper includes: a report on the observation of the $B \rightarrow D_s K l \nu$ decay mode the knowledge of which provides input to the "1/2 vs 3/2 puzzle" of semileptonic B decays into broad D^{**} states, where there is disagreement between theoretical predictions and experimental results; a search for $B \rightarrow \Lambda_c X l \nu$ decays in events tagged by a fully reconstructed B Meson; a measurement of the Cabibbo-Kobayashi-Maskawa matrix element $|V_{cb}|$ and the form-factor slope ρ^2 in $B \rightarrow D l \nu$ decays in events tagged by a fully reconstructed B meson; and measurements of the moments of observed spectra in inclusive semileptonic B-meson decays to charm hadrons $B \rightarrow X c l \nu$ which are used for the extraction of the total decay fraction, $|V_{cb}|$, the b- and c-quark masses, and four heavy-quark QCD parameters in the framework of a Heavy Quark Expansion.

1180 track 06

Sat, Jul 24, 2010

09:45 13 mn

Salle 242A

Measurements of Semileptonic Light Quark B-meson Decays and the Determination of the CKM element $|V_{ub}|$ at BABAR

merged from abstracts: 730 731 738

presented by: H. Wells Wulsin (SLAC)

We present a set of measurements of semileptonic B meson charmless decays using the BABAR data set collected at the SLAC e+e- B-factory operating on the Upsilon(4S) resonance. This paper includes: the measurement of the branching fraction of the exclusive charmless semileptonic decay $B \rightarrow \omega l \nu$, where l is either an electron or a muon, with the charged B meson recoiling against a tag B meson decaying in the charmed semileptonic modes $B \rightarrow D X l \nu$; and studies of $B \rightarrow \rho l \nu$, $\pi l \nu$ and $\eta(') l \nu$ decays in which branching fractions and distributions in the momentum transfer squared are measured and used to determine the CKM matrix element $|V_{ub}|$.



ICHEP2010 Parallel Sessions

1182 track 06

Sat, Jul 24, 2010

14:10 17 mn

Salle 242A

Implications of the dimuon CP asymmetry in $B_{\{d,s\}}$ decays

presented by: Gilad Perez (Weizmann Institute)

The D0 Collaboration reported a 3.2σ deviation from the standard model prediction in the like-sign dimuon asymmetry. Assuming that new physics contributes only to $B_{\{d,s\}}$ mixing, we show that the data can be analyzed without using the theoretical calculation of $\Delta\Gamma_s$, allowing for robust interpretations. We find that this framework gives a good fit to all measurements, including the recent CDF $S_{\{\psi\phi\}}$ result. The data allow universal new physics with similar contributions relative to the SM in the B_d and B_s systems, but favors a larger deviation in B_s than in B_d mixing. The general minimal flavor violation framework with flavor diagonal CP violating phases can account for the former and remarkably even for the latter case. This observation makes it simpler to speculate about which extensions with general flavor structure may also fit the data.

1218 track 06

Sat, Jul 24, 2010

16:47 11 mn

Salle 242A

J/ ψ ->mumu from 7 TeV pp collisions in ATLAS: physics with the first data

presented by: Andy Nelson (Iowa State University)

ATLAS has a rich charmonium and beauty physics programme. After a few pb⁻¹ of 7 TeV collision data have been taken at the LHC, ATLAS will be able to start probing the new energy regime with decays of the ψ and Upsilon families of mesons into pairs of muons. The very first physics measurement, possible with less than 1 pb⁻¹ of data, is the fraction of J/ ψ mesons produced in B-hadron decays. We present preliminary results for this measurement, and discuss issues surrounding the measurement of the differential cross section and J/ ψ polarization.

1219 track 06

Sat, Jul 24, 2010

16:34 11 mn

Salle 242A

J/ ψ ->mumu from 7 TeV pp collisions in ATLAS: performance with the first data

presented by: Andreas Korn (Lawrence Berkeley National Laboratory (LBNL))

ATLAS has a rich charmonium and beauty physics programme. After a few pb⁻¹ of 7 TeV collision data have been taken at the LHC, ATLAS will be able to start probing the new energy regime with decays of the ψ and Upsilon families of mesons into pairs of muons. In addition to the physics aspects of the charm resonances, they are also an important tool for understanding the performance of the detector. We present studies of the ATLAS Inner Detector performance using the early ATLAS J/ ψ sample. In particular, the measured J/ ψ mass and width are presented together with the vertexing performance. The consequences of these Inner Detector performance issues in the early ATLAS beauty and charmonium measurements are discussed.



ICHEP2010 Parallel Sessions

07 - Neutrinos

118 track 07

Sat, Jul 24, 2010

15:15 12 mn

Salle Maillot

The ArgoNeuT Experiment

presented by: Joshua Spitz (Yale University)

Liquid Argon Time Projection Chamber (LArTPC) technology offers exceptional position resolution, total-absorption calorimetry, scalability, and efficient particle identification for neutrino detection. ArgoNeuT, a 170 liter LArTPC neutrino detector set in the NuMI beamline at Fermilab, has collected thousands of low energy ($E_{\nu} \approx 3$ GeV) neutrino and anti-neutrino events in a wide variety of channels. (Anti-)Neutrino events in ArgoNeuT and preliminary kinematic distributions will be presented along with a description of the physics analysis, detector design, and future prospects. Emphasis will be placed on the ongoing neutrino-argon charged current quasi-elastic cross section analysis, relevant for long baseline neutrino oscillation experiments.

132 track 07

Fri, Jul 23, 2010

17:45 12 mn

Salle 251

Leptogenesis constraints from flavour symmetry induced Lepton Mixing

presented by: Ivo de Medeiros Varzielas (CFTP, Instituto Superior Técnico)

In models with flavour symmetries added to the gauge group of the Standard Model the CP-violating asymmetry necessary for leptogenesis may be related with low-energy parameters. A particular case of interest is when the flavour symmetry produces an exact mass independent lepton mixing scheme, leading to a vanishing CP-violating asymmetry. We present a model-independent discussion that confirms this always occurs for unflavoured leptogenesis in type I see-saw scenarios.

139 track 07

Sat, Jul 24, 2010

12:15 12 mn

Salle 251

New mechanism for neutrino mass generation and triply charged Higgs bosons at the LHC

presented by: Satyanarayan Nandi (Oklahoma State University)

We propose a new mechanism for generating small neutrino masses which predicts the relation $m_{\nu} \sim v^4/M^3$, where v is the electroweak scale, rather than the conventional seesaw formula $m_{\nu} \sim v^2/M$. Such a mass relation is obtained via effective dimension seven operators $LLHH(H^\dagger H)/M^3$, which arise when an isospin 3/2 Higgs multiplet Φ is introduced along with iso-triplet leptons. The masses of these particles are naturally in the TeV scale. The neutral member of Φ acquires an induced vacuum expectation value and generates neutrino masses, while its triply charged partner provides the smoking gun signal of this scenario. These triply charged bosons can be pair produced at the LHC and the Tevatron, with Φ^{+++} decaying into $W+\ell+\ell+$ or $W+W+W+$, possibly with displaced vertices. The leptonic decays of Φ^{+++} will help discriminate between normal and inverted hierarchies of neutrino masses. This scenario also allows for raising the standard Higgs boson mass to values in excess of 500 GeV. I will also briefly review the other mechanisms for generating neutrino masses.

161 track 07

Fri, Jul 23, 2010

17:15 12 mn

Salle 251

Status of the EXO double beta decay search

presented by: Carter Hall (University of Maryland)

The standard model has difficulty accommodating the tiny neutrino masses which are observed in nature, but light neutrinos arise naturally in many standard model extensions, including many grand unified theories. Many of these models also predict that neutrinos should be Majorana-type fermions, which would violate the conservation of lepton number. The EXO collaboration is carrying out a series of experiments to search for the golden signature of Majorana neutrinos: the double beta decay of the Xenon-136 nucleus. The construction and installation of the first experiment, known as EXO-200, is now complete, and first data is expected in the summer of 2010. This experiment is the largest double beta decay search ever performed, exceeding previous experiments by one order of magnitude in mass. The collaboration is also performing R&D to realize an ideal double beta decay search by positively identifying the daughter nucleus produced by the decay. We report here on the status of both of these efforts.



ICHEP2010 Parallel Sessions

180 track 07

Sat, Jul 24, 2010

10:00 12 mn

Salle 251

Self interactions of Supernova neutrinos

presented by: Antonio Marrone (Univ. of Bari & INFN Bari)

Neutrino self interactions can play a substantial role during neutrino propagation near the Supernova core. In fact, self-induced transitions can alter neutrino spectra, depending on the mass hierarchy, producing splits and/or swaps of the spectra. We study how these effects depends on the neutrino luminosities and on the mixing parameters in two and three generations.

242 track 07

Sat, Jul 24, 2010

09:20 15 mn

Salle 251

Solar neutrino and terrestrial antineutrino fluxes measured with Borexino at LNGS

presented by: sandra zavatarelli (INFN Genova Italy)

Borexino is a real time liquid scintillator detector for low energy neutrino and antineutrino spectroscopy located at the Gran Sasso National Laboratories (Italy). Thanks to the unprecedented radiopurity of the target mass it is providing the first direct and simultaneous measurement of the solar neutrino survival probability in both vacuum-dominated (${}^7\text{Be } \nu$) and matter-enhanced regions (${}^8\text{B } \nu$) by a single experiment. The measured interaction rates are in fair agreement with the SSM predictions in case of the LMA-MSW oscillation solution and a further confirmations of the LMA scenario is provided by the absence of a day-night asymmetry in the ${}^7\text{Be}$ signal.

Very recently the signal of geoneutrinos, electron antineutrinos produced in β decays of radioactive isotopes in the Earth has been clearly observed (at 4.2 s C.L.) and it gives an important contribution to the understanding of our planet composition and heat balance.

The antineutrino signal coming from European nuclear reactors has been detected too and it allows to probe for the first time antineutrino propagation properties on a baseline of about 1000 km. Our measurement excludes the non-oscillation hypothesis at 99.60% C.L. and it rejects the hypothesis of an active geo-reactor in the Earth's core with a power above 3 TW at 95% C.L.

In the presentation all the recent results will be reviewed and the future science goals discussed.

246 track 07

Sat, Jul 24, 2010

11:30 12 mn

Salle 251

Status of the Daya Bay Reactor Neutrino Oscillation Experiment

presented by: Cheng-Ju Lin (Lawrence Berkeley National Lab)

The last unknown neutrino mixing angle θ_{13} is one of the fundamental parameters of nature; it is also a crucial parameter for determining the sensitivity of future long-baseline experiments aimed to study CP violation in the neutrino sector. Daya Bay is a reactor neutrino oscillation experiment designed to achieve a sensitivity on the value of $\sin^2(2\theta_{13})$ to better than 0.01 at 90% CL. The experiment consists of multiple identical detectors placed underground at different baselines to minimize systematic errors and suppress cosmogenic backgrounds. With the baseline design, the expected anti-neutrino signal at the far site is about 360 events/day and at each of the near site is about 1500 events/day. An overview and current status of the experiment will be presented.



ICHEP2010 Parallel Sessions

250 track 07

Sat, Jul 24, 2010

11:15 12 mn

Salle 251

Current Status of RENO Experiment

presented by: Soo-Bong Kim (Seoul National University)

The RENO (Reactor Experiment for Neutrino Oscillation) is under construction to measure the value of the smallest and unknown neutrino mixing angle θ_{13} . The experiment will compare the measured fluxes of electron antineutrinos at two detectors located at 290 m and 1.4 km distances from the center of the Yonggwang nuclear reactors in Korea, with world-second largest thermal power output of 16.4 GW.

Construction of experimental halls and access tunnels for both near and far detector sites was completed in early 2009. The detectors are near completion, and data-taking is planned to start in mid 2010. An expected number of observed antineutrino is roughly 510 and 80 per day in the near detector and far detector, respectively. An estimated systematic uncertainty associated with the measurement is less than 0.6%, and an expected statistical error is about 0.3%. With three years of data, the experiment will search for the mixing angle values of $\sin^2(2\theta_{13})$ down to 0.02 in 90% C.L. limit. In this talk, the construction status will be presented.

258 track 07

Sat, Jul 24, 2010

11:45 12 mn

Salle 251

Sensitivity Enhancement for the Searches of Neutrino Magnetic Moments through Atomic Ionization

presented by: Hau-Bin Li (Academia Sinica)

A new detection channel on atomic ionization for possible neutrino electromagnetic interactions was identified and studied. Orders of magnitude enhancement in sensitivities can be expected when the energy transfer to the target is of the atomic-transition scale.

Interaction cross-section induced by neutrino magnetic moments (μ_{ν}) was evaluated. New upper limit of $\mu_{\nu} < 1.3 \times 10^{-11} \mu_B$ at 90% confidence level was derived using current data with reactor neutrinos. Potential reaches of future experiments are discussed. Experiments with sub-keV sensitivities can probe μ_{ν} to $10^{-13} \mu_B$.

Positive observations of μ_{ν} in this range would imply that neutrinos are Majorana particles. Analysis with new data will be presented.

Reference :

H.T. Wong, H.B. Li and S.T. Lin, arXiv:1001.2074 (2010).

306 track 07

Sat, Jul 24, 2010

17:00 15 mn

Salle Maillot

New Observations by the MiniBooNE Experiment

presented by: Geoffrey Mills (LANL)

The MiniBooNE neutrino oscillation search experiment at Fermilab has recently completed the analysis of anti-neutrino data it has collected in Fermilab's booster neutrino beam. With 5.66×10^{20} protons on target in anti-neutrino mode the experiment is now becoming sensitive to the excess $\bar{\nu}_\mu$ signal observed by LSND. This presentation will discuss the MiniBooNE data, its interpretation, and its implications to the neutrino community.

310 track 07

Sat, Jul 24, 2010

09:00 15 mn

Salle 251

Recent results on atmospheric neutrino oscillation from Super-Kamiokande

presented by: Yoshihisa Obayashi (Kamioka Observatory, ICRR, Univ. of Tokyo)

A large water Cherenkov detector Super-Kamiokande (SK) started data taking in April 1996 and has been continuously accumulating neutrino data.

Electronics system for SK data taking is fully upgraded on September 2008 to ensure stable observation for next 10 - 20 years and to improve sensitivity of the detector.

Recent results on atmospheric neutrino oscillation study from SK before and after the electronics upgrade will be presented.



ICHEP2010 Parallel Sessions

334 track 07 Sat, Jul 24, 2010 11:00 12 mn Salle 251

The Double Chooz reactor neutrino experiment

presented by: Masaki Ishitsuka (Tokyo Institute of Technology)

Double Chooz is a reactor neutrino oscillation experiment which aims at the discovery of the last neutrino mixing angle, θ_{13} . The expected sensitivity to $\sin^2(2\theta_{13})$ reaches 0.03 (90% C.L.) which is approximately a factor 5 better than the current limit. Double Chooz will use two identical detectors with different baselines to suppress the systematic uncertainties down to 1% or better. The far detector is currently (as of May 2010) under construction and the detector commissioning is expected shortly. An overview of the Double Chooz experiment including the status of the detector construction will be presented.

384 track 07 Sat, Jul 24, 2010 14:00 15 mn Salle Maillot

Results from the first T2K physics run

presented by: Eric D. Zimmerman (University of Colorado)

T2K is a long-baseline neutrino oscillation experiment searching for oscillation of muon neutrinos into electron neutrinos and measurement of the mixing angle θ_{13} , a key unknown mixing parameter in the lepton sector. The experiment will also make precise measurements of the oscillation parameters Δm^2_{23} and θ_{23} via muon neutrino disappearance.

The major components of T2K include a neutrino beam line, muon monitors, a near detector complex located at 280 m from the proton interaction target, and the far detector Super-Kamiokande, which is 295 km from the neutrino source. The beam uses a 30 GeV primary proton beam, a graphite target, and a three-horn system with a helium decay region. T2K is the first experiment to exploit the narrow-band off-axis flux from a pion decay-in-flight neutrino source. The near detector uses multiple technologies to measure the flux both on the beam axis and at the 2.5 degree off-axis angle that the far detector observes. The unoscillated event rate and spectrum will be predicted using the observed neutrino interactions in the near detectors, measurements of the primary proton beam and tertiary muons, and hadron production data from CERN experiment NA61. The oscillation analysis will compare the rates of observed and predicted muon and electron neutrino candidates in the far detector.

The T2K beam line and the near and far neutrino detectors, including an upgrade of Super-Kamiokande, were successfully commissioned in 2009. The design and performance of the beam and neutrino detectors will be presented, along with some results from the first physics run completed in June 2010.

428 track 07 Sat, Jul 24, 2010 14:20 15 mn Salle Maillot

An Update of Neutrino Interactions in the OPERA Long Baseline Experiment in the CERN-LNGS Beam

presented by: Pasquale Migliozi (Istituto Nazionale di Fisica Nucleare (INFN))

The OPERA long-baseline neutrino experiment is a hybrid electronic-emulsion experiment located in the underground INFN-LNGS Laboratory in central Italy. Its main goal is to observe $\nu_\mu \rightarrow \nu_\tau$ oscillations in appearance mode in the CNGS ν_μ beam from CERN to Gran Sasso. The electronic detectors yielded information on the neutrino beam and localized where an interaction took place. Runs with CNGS neutrinos were successfully carried out in 2008 and 2009.

After a brief description of the beam and of the experimental setup, an updated report on the beam, on the performance of the electronic detectors and on the collection, reconstruction and analysis of neutrino interaction events in the emulsions will be presented.

595 track 07 Sat, Jul 24, 2010 10:15 12 mn Salle 251

Status Update for the MINERvA Experiment

presented by: Gabriel Perdue (The University of Rochester)

MINERvA (Main INjectOR nu-A) is a new few-GeV neutrino cross section experiment that recently began operations in the FNAL NuMI beam-line. MINERvA employs a fine-grained detector capable of complete kinematic characterization of neutrino interactions. We employ a three ton active target region composed of plastic scintillator as well as a selection of nuclear targets. The experiment will provide important inputs for neutrino oscillation searches as well as offer a pure weak probe of nuclear structure. We will offer a set of initial kinematic distributions for our anti-neutrino run during this conference.



ICHEP2010 Parallel Sessions

596 track 07

Sat, Jul 24, 2010

12:00 12 mn

Salle 251

Experiment GEMMA: Search for the Neutrino Magnetic Moment

presented by: Viacheslav Egorov (JINR)

The laboratory neutrino magnetic moment (NMM) measurement is based on its contribution to the neutrino scattering on free electron (FE) or on an atom [1] via its ionization (AI). In both cases the observable is the recoil electron energy, the sensitivity increases with lowering the detection threshold.

In our experiment GEMMA[2] we use HPGe detector of 1.5 kg placed under the standard 3 GWth reactor of the Kalinin Nuclear Power Plant (KNPP, Russia) at 13.9 m distance from the core center which provides the antineutrino flux of 2.7×10^{13} 1/cm²/s. The data analysis is based on the comparison of energy spectra measured in the range from 3 to 55 keV in the reactor operation (ON) and shutdown (OFF) periods.

As a result of the measurement (about 13000 ON hours and 3000 OFF hours of active time) the best world-wide upper limits of $5.0 \times 10^{-12} \mu\text{B}$ and $3.2 \times 10^{-11} \mu\text{B}$ at 90% C.L. were found for the NMM with and without using the AI mechanism respectively.

At present, analysis of the data taken under improved conditions has just been started but it indicates that further sensitivity improvement of the spectrometer can be reached only by its significant upgrading. Within the framework of the new project (GEMMA-II) we will use the antineutrino flux of $\sim 5.4 \times 10^{13}$ 1/cm²/s, increase the mass of the germanium detector by a factor of four and decrease the level of the background. The main improvement is expected to be the significant lowering of the energy threshold (below 1 keV). These measures will provide the possibility of achieving the NMM limit at the level of $1.0 \times 10^{-12} \mu\text{B}$.

[1] H.T. Wong, H.-B. Li, S.-T. Lin, (2010) hep-ph/1001.2074.

[2] A.G. Beda et al. Yad. Fiz. (Rus.) 70 (2007) 1925, [Phys. At. Nucl. 70 (2007) 1873]; hep-ex/0705.4576.

615 track 07

Sat, Jul 24, 2010

15:30 12 mn

Salle Maillot

Update to the Bodek-Yang Unified Model for Electron- and Neutrino-Nucleon Scattering Cross Sections

presented by: Arie Bodek (University of Rochester)

We present update to the Bodek-Yang model for inelastic neutrino- and electron-nucleon scattering cross sections using effective leading order parton distribution functions with a new scaling variable ξ_w .

Non-perturbative effects are well described using the ξ_w scaling variable, in combination with multiplicative K factors at low Q^2 for $Q^2 < 1 \text{ GeV}^2$.

Our model describes all inelastic charged lepton-nucleon scattering (including resonance) data (HERA/NMC/BCDMS/SLAC/JLab) ranging from very high Q^2 to very low Q^2 and down to the photo-production region. The model describes existing inelastic neutrino-nucleon scattering measurements, and is currently used in analyses of neutrino oscillation experiments in the few GeV region.

637 track 07

Sat, Jul 24, 2010

16:15 20 mn

Salle Maillot

Latest results from the MINOS experiment

merged from abstracts: 697 510

presented by: Justin Evans (University College London)

The MINOS experiment utilizes the NuMI neutrino beam to study the phenomenon of neutrino oscillations. Neutrinos are sent over a baseline of 735 km, with a detector near the production point at Fermilab and one at the Soudan underground laboratory in northern Minnesota. By observing the neutrino disappearance characteristic of oscillations, MINOS can measure the oscillation parameters. MINOS has previously made the best measurement of the atmospheric-regime mass splitting to date. I will present new results, released this summer, in which the dataset is doubled. Further analysis improvements, and the inclusion of additional event samples, further improve the sensitivity to the oscillation parameters. The corresponding antineutrino oscillation parameters are much less precisely known. From September 2009 to March 2010, MINOS has taken data with a dedicated antineutrino beam, allowing the first direct precision measurement of the antineutrino oscillation parameters in the atmospheric regime. I will present the results of this measurement, which is an important test of CPT invariance in the neutrino sector.



ICHEP2010 Parallel Sessions

816 track 07

Fri, Jul 23, 2010

17:30 12 mn

Salle 251

The NEXT experiment: a high-pressure xenon gas (HPGXe) TPC for the search of neutrinoless double-beta decay.

presented by: Alfredo Tomas (University of Zaragoza)

Though Neutrino oscillation experiments have shown that neutrinos have finite rest mass, their absolute mass scale is still unknown. The exploration of the degenerate hierarchy, which corresponds to an effective neutrino mass up to 50 meV, is the goal of the next generation of neutrinoless double beta decay experiments. Very good energy resolutions and ultra-low background levels are the two main experimental requirements for a successful experiment.

The NEXT collaboration projects to build a 100 kg high-pressure Xe gas TPC enriched with ^{136}Xe for the search of the two modes of double-beta decay. This detector will be installed in the new LSC (Canfranc Underground Laboratory) in the Spanish Pyrenees. Two are the features which will make this experiment very competitive in the field: an excellent energy resolution offered by high pressure Xe gas TPC; and the possibility of pattern recognition to reject background events thanks to the electron tracks recorded by a photosensor array (SiPMs, APDs or PMTs) or a Micromegas plane. Here we will present the experiment and results of the first generation of prototypes studying both the electroluminescence signal, and the charge amplification signal with Micromegas in pure HPGXe.

906 track 07

Sat, Jul 24, 2010

17:40 15 mn

Salle Maillot

Radiative generation of neutrino masses and its experimental signals

presented by: Kaladi Babu (Oklahoma State University)

I will first summarize the radiative mass generation mechanism for small neutrino masses, which is an alternative to the seesaw mechanism. Because of loop and chirality suppressions, this mechanism typically requires the scale of new physics to be near the TeV. A recent discovery wherein small neutrino masses arise as two-loop radiative corrections via leptoquark exchange will be presented. The leptoquarks must be within reach of the LHC. In the neutrino sector this class of models predict, by virtue of the structure of the neutrino mass matrix, that the angle θ_{13} should be near its current limit. Leptoquark decays probe the neutrino mass generation mechanism, with their branching ratios into e, μ and τ correlated with the neutrino oscillation phase δ .

This work is primarily based on a forthcoming paper "Two-loop neutrino mass generation via leptoquarks", by K.S. Babu and J. Julio. The radiative generation mechanism has long history, my contributions in this area include "Two loop neutrino mass generation and its experimental consequences", by K.S. Babu and C. Macesanu, Phys.Rev.D67:073010,2003, and "Model of calculable neutrino masses", by K.S. Babu, Phys.Lett.B203:132,1988.

914 track 07

Sat, Jul 24, 2010

09:40 15 mn

Salle 251

KamLAND double beta experiment using ^{136}Xe

presented by: Masayuki Koga (Tohoku University)

The KamLAND 1000 ton ultra pure LS environment has a good advantage for the double beta decay experiment. We are planning to install the 20m³ volume mini balloon with ^{136}Xe loaded LS in 2011. The target sensitivity of Xe phase is 60 meV on neutrino mass using 400kg enriched Xe. We will report our progress of KamLAND Xe phase and recent analysis topics.

987 track 07

Fri, Jul 23, 2010

16:15 15 mn

Salle 251

Search for neutrinoless double beta decay with NEMO-3

presented by: Christine MARQUET (CENBG University Bordeaux I and CNRS)

The NEMO-3 experiment located in the Modane Underground Laboratory is searching for neutrinoless double beta decay. The experiment has been taking data since 2003 with seven isotopes. The main isotopes are 7kg of ^{100}Mo and 1kg of ^{82}Se . The new results with 4 years of data taking will be presented for ^{100}Mo . No evidence for neutrinoless double beta decay has been found to date. The data are also interpreted in terms of alternative models, such as weak right-handed currents or Majoron emission. We will show results for the standard model double beta decay process for all seven isotopes employed in NEMO-3, in particular ^{150}Nd , an isotope of special interest due to its potential use in future experiments, as well as ^{96}Zr and ^{116}Cd will also be presented. These measurements are important for reducing the uncertainties on nuclear matrix elements.



ICHEP2010 Parallel Sessions

997 track 07

Sat, Jul 24, 2010

15:00 12 mn

Salle Maillot

Hadron production measurements for neutrino experiments by the NA61/SHINE experiment at CERN

presented by: Sandro Bravar (Section de Physique - Univ. de Genève)

As neutrino long baseline experiments enter a new domain of precision, important systematic errors due to poor knowledge of production cross sections for pions and kaons require more precise measurements. Among other goals, the NA61/SHINE (SHINE SPS Heavy Ion and Neutrino Experiment) experiment at the CERN SPS aims at precision (5% and below) measurements to improve the prediction of the neutrino flux for the T2K experiment at J-PARC. The spectrometer is equipped with a large set of TPCs, whose acceptance covers the relevant phase-space for the T2K beamline. Extensive dE/dx measurements in the TPC, complemented by an upgraded Time-of-Flight system, provide particle identification over the whole kinematic range. Data were taken in 2007 and again in 2009 after a major readout upgrade, using both a thin target and a full size replica of the T2K target. Preliminary spectra for positive and negative pions obtained with the 2007 thin target data will be presented. An overview of the foreseen program of measurements will be given.

1014 track 07

Fri, Jul 23, 2010

16:35 15 mn

Salle 251

CUORICINO and CUORE: present and future of ^{130}Te neutrinoless double beta decay searches

presented by: Angelo Nucciotti (Univ. Milano-Bicocca and INFN Sez. Milano-Bicocca)

The search for neutrinoless double beta decay is a powerful tool to assess the neutrino mass scale and to establish whether the neutrino is a Majorana or a Dirac particle.

To date, CUORE is the only fully approved next generation 1-ton size experiment with the goal of approaching the inverted hierarchy region of the effective neutrino mass spectrum.

CUORE is an array of 988 TeO_2 cryogenic detectors containing 200 kg of Te-130 , the neutrinoless double beta decay candidate. It is presently being built in Gran Sasso Underground Laboratory and it is due to start data taking in 2013.

The feasibility of this very challenging project has been proved by CUORICINO, the pilot experiment that took data in Gran Sasso Laboratory until 2008, for about five years, with 62 TeO_2 cryogenic detectors.

In this talk I will present the final analysis of the whole CUORICINO exposure and report about the status of CUORE construction.

1060 track 07

Fri, Jul 23, 2010

16:55 15 mn

Salle 251

A brief review of Leptogenesis

presented by: Marta Losada (Universidad Antonio Narino, Bogota, Colombia)

In this talk a rapid overview of the mechanism of leptogenesis that can provide a response to the Baryon Asymmetry of the Universe is given.

The main part of the talk will focus on three main issues which have been recently of high relevance for leptogenesis:

- the importance of flavor
- the importance of flavor violating equilibration effects
- models that are testable in the near future.

1061 track 07

Sat, Jul 24, 2010

17:20 15 mn

Salle Maillot

Neutrinos and Supernova

presented by: Basudeb Dasgupta (Ohio State University)

Neutrinos emitted from a supernova encode information about neutrino physics and astrophysics. Interpreting the neutrino signal depends crucially on understanding neutrino production, flavor mixing during propagation, and detection.

In this talk, we review the physics potential of a SN neutrino observation.



ICHEP2010 Parallel Sessions

1062 track 07

Sat, Jul 24, 2010

14:40 15 mn

Salle Maillot

New neutrino interactions at large colliders

presented by: Francisco Del Aguila (Facultad de Fisica)

Neutrino oscillations can be explained introducing Dirac or/and Majorana neutrino masses and the corresponding charged current mixing matrix. Neither of them can be directly measured at large colliders, but their generating mechanism and/or new neutrino interactions can be unveiled at LHC if they are mediated by new particles at the TeV scale.

1063 track 07

Sat, Jul 24, 2010

16:40 15 mn

Salle Maillot

Theoretical Frameworks for Neutrino Masses

presented by: Ferruccio Feruglio (Dipartimento di Fisica Galileo Galilei)

Neutrino oscillations represent the first, and so far unique, evidence for the incompleteness of the Standard Model (SM) of particle interactions.

After summarizing the main theoretical questions raised by the discovery of neutrino oscillations, theoretical concepts and ideas leading to extensions of the SM compatible with the present experimental data will be reviewed. Possible tests of some representative models at existing and future facilities will be also discussed.



ICHEP2010 Parallel Sessions

08 - Heavy Ion Collisions and Soft Physics at Hadron Colliders

60 track 08 Thu, Jul 22, 2010 14:40 12 mn Salle 253

Azimuthal correlations of forward di-pions in d+Au collisions suppressed by saturation

presented by: Cyrille Marquet (Theory Division - CERN)

The STAR collaboration has recently measured the azimuthal correlation function of forward di-pions. The data show a disappearance of the away-side peak in central d+Au collisions, compared to p+p collisions. We argue that this effect, absent at mid-rapidity, is a consequence of the small-x evolution into the saturation regime of the Gold nucleus wave function, and we show that the data can be quantitatively described in the Color Glass Condensate framework. This confirmation that forward monojets are produced in central d+Au collision is a concrete evidence for parton saturation.

67 track 08 Thu, Jul 22, 2010 14:00 16 mn Salle 253

The Color Glass Condensate at NLO: Phenomenology at HERA, RHIC and the LHC.

presented by: Javier Albacete (IPhT-CEA-Saclay)

The Color Glass Condensate is the effective theory of QCD for high energy scattering. The recent theoretical progress achieved through the calculation of next-to-leading order corrections to the small-x renormalization group equations has opened up a period for precision CGC phenomenology. I shall present CGC analyses of experimental data for the inclusive structure functions in electron-proton scattering as measured in HERA. Next I shall present a description of inclusive particle production measurements in high energy proton-proton, deuteron-gold and gold-gold collisions carried out at RHIC. Together, these works yield a consistent picture that present experiments can probe the non-linear part of the hadronic and nuclear wave functions at small-x, and that they can be successfully described by the CGC effective theory. Prospects for both the proton-proton and heavy ions programs at the LHC will be discussed.

QCD Factorization at Forward Rapidities

presented by: Michal Sumbera (Nuclear Physics Institute ASCR-Acad. of Sciences of the Czech Re)

We analyze several reactions on nuclear targets at forward rapidities and different energies (at smallest experimentally accessible Bjorken x). Nuclear effects are usually interpreted as a result of shadowing or the Color Glass Condensate. QCD factorization of soft and hard interactions requires the nucleus to be an universal filter for different Fock components of the projectile hadron. We demonstrate, however, that this is not the case in the vicinity of the kinematic limit, $x \rightarrow 1$, where sharing of energy between the constituents becomes an issue. The rise of suppression with x is confirmed by the E772 and E886 data on the Drell-Yan and heavy quarkonium production. We show that this effect can be treated alternatively as an effective energy loss proportional to initial energy. This leads to nuclear suppression at any energy, and predicts of Feynman x_F scaling of the suppression. We demonstrate also that the same kinematic limit can be approached in transverse momentum when the Cronin enhancement of particle production at medium-high p_T switches to a suppression at larger p_T violating thus QCD factorization. Such an unexpected effect seems to be confirmed by data for pion production in d+A collisions at RHIC, and even for direct photons. We show that this effect also brings significant corrections to all calculations for jet quenching in heavy ion collisions at RHIC.

References

- [1] B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, M.B. Johnson and I. Schmidt, Phys. Rev. C72, 054606 (2005); e-Print: hep-ph/0501260.
- [2] B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, M.B. Johnson and I. Schmidt, Nucl. Phys. Proc. Suppl. 146, 171 (2005).
- [3] J. Nemchik, V. Petracek, I. K. Potashnikova and M. Sumbera, Phys. Rev. C78, 025213 (2008); e-Print: arXiv:0805.4267 [hep-ph].
- [4] J. Nemchik and I.K. Potashnikova, AIP Conf. Proc. 1056, 207 (2008); e-Print: arXiv:0807.1605 [hep-ph].
- [5] J. Nemchik and M. Sumbera, Proceedings of Science [High-pT physics 09] ISSN 1824-8039 (2009) 042.
- [6] J. Nemchik and M. Sumbera, Nucl. Phys. A 830, 611C (2009); e-Print: arXiv:0907.4062 [hep-ph].

Phase diagram of hot QCD in an external magnetic field

presented by: Eduardo Fraga (Instituto de Fisica, Universidade Federal do Rio de Janeiro)

The structure of the phase diagram for strong interactions becomes richer in the presence of a magnetic background, which enters as a new control parameter for the thermodynamics, and can exhibit new phases and interesting features. Motivated by the relevance of this physical setting for current and future high-energy heavy ion collision experiments and for the cosmological QCD transitions, we use the linear sigma model coupled to quarks and to Polyakov loops as an effective theory to investigate how the chiral and the deconfining transitions are affected, and present a general picture for the temperature-magnetic field phase diagram. We compute and discuss each contribution to the effective potential for the approximate order parameters, and uncover new phenomena such as the paramagnetically-induced breaking of $Z(3)$.

The present status of the EPS nuclear PDFs

presented by: Hannu Paukkunen (University of Santiago de Compostela)

The recent global analyses of the nuclear parton distribution functions lend support to the validity of the factorization theorem of QCD in high-energy processes involving bound nucleons. With special attention on the recent global analysis EPS09, we review the latest developments in the domain of nuclear PDFs.



ICHEP2010 Parallel Sessions

399 track 08 Thu, Jul 22, 2010 15:10 12 mn Salle 253

Inclusive Photoproduction of ρ^0 , K^{*0} and ϕ Mesons at HERA

presented by: Andrei Rostovtsev (ITEP Institute for Theoretical and Experimental Physics (ITEP)-U)

Inclusive non-diffractive photoproduction of $\rho(770)^0$, $K^*(892)^0$ and $\phi(1020)$ mesons is investigated with the H1 detector in ep collisions at HERA. The corresponding average gamma p centre-of-mass energy is 210 GeV. The mesons are measured in the transverse momentum range $0.5 < p_T < 7$ GeV and the rapidity range $|y_{lab}| < 1$. Differential cross sections are presented as a function of transverse momentum and rapidity, and are compared to the predictions of hadroproduction models.

470 track 08 Thu, Jul 22, 2010 15:25 16 mn Salle 253

Refining Geometrical Scaling

presented by: Robi Peschanski (IPhT, CEA-Saclay)

We consider and compare various geometric-scaling solutions of the QCD Balitsky-Kovchegov (BK) equation, for fixed or running QCD coupling.

These solutions predict different scaling variables which we first test with recent DIS cross-section data using the "Quality Factor" method. Then we use a χ^2 method to compare the different predicted parametrisations of the traveling wave representation of the BK equation's solutions. A geometric scaling corresponding to running coupling is finally favored, with a satisfactory χ^2 by d.o.f.. There is no indication of a sizeable scaling violation term.

531 track 08 Thu, Jul 22, 2010 17:20 16 mn Salle 253

Charged particle multiplicities in inelastic pp events with the ATLAS detector

presented by: Alison Lister (University of Geneva)

The measurement of the properties of proton-proton interactions at center-of-mass energies ranging from 900 GeV (injection energy) to 7 TeV in the ATLAS detector are presented. The charged-particle density, its dependence on transverse momentum and pseudo-rapidity, and the relationship between transverse momentum and charged-particle multiplicity are measured for events with at least one charged particle in a defined kinematic range. The measurements are compared to Monte Carlo models for inelastic events and to results from other experiments.

533 track 08 Thu, Jul 22, 2010 12:00 12 mn Salle 253

Identified particle production in inelastic pp events with the ATLAS detector

presented by: Leonid Gladilin (Moscow State University)

Studies of the long-lived resonances K_s and Λ , reconstructed in inelastic collisions at 900 GeV and 7 TeV using a minimum bias trigger, have been performed using the ATLAS inner tracking detector. The spectra for these resonances are measured as a function of their transverse momentum and rapidity, and compared with Monte Carlo models. The ratio of anti- Λ to Λ production is evaluated, providing further tests of Monte Carlo models. The results are corrected for all detector effects, to simplify comparisons to models and other experiments.

839 track 08

Thu, Jul 22, 2010

17:00 16 mn

Salle 253

Measurements of Hadron Production at CMS

presented by: Keith Ulmer (University of Colorado)

We report on measurements of hadron production in pp collisions at $\sqrt{s} = 0.9, 2.36$ and 7 TeV, recorded with the CMS detector. Transverse momentum, pseudorapidity and multiplicity distributions of charged hadrons are presented. For non-single diffractive collisions, the average charged-hadron transverse momentum and pseudorapidity density near mid-rapidity are compared with other measurements in p \bar{p} and pp collisions. To extend the statistical reach of the measurements of charged hadron transverse momentum spectra, calorimeter-based high-ET jet triggers are employed to enhance yields at high pT. Finally, measured spectra of identified hadrons are presented. The charged pions, kaons and protons are identified with help of their energy loss in the silicon tracker, while the K 0 s and lambda and anti-lambda are reconstructed based on their decay topology. The obtained rapidity and pT spectra, as well as per event yields are compared to theoretical models. The energy dependence of the above quantities is also studied.

840 track 08

Thu, Jul 22, 2010

17:40 16 mn

Salle 253

Measurements of Two-Particle Correlations in pp collisions

presented by: Stefano Lacaprara (INFN Padova)

We present results on two-particle angular correlations in proton-proton collisions over a broad range of pseudorapidity ($\Delta\eta$) and azimuthal angle ($\Delta\phi$). The data were collected with the CMS detector. A complex two-dimensional correlation structure in $\Delta\eta$ and $\Delta\phi$ is observed. In the context of an independent cluster model of short-range correlations, the cluster size and its decay width are extracted from the two-particle pseudorapidity correlation function and compared with previous measurements in proton-proton and proton-antiproton collisions, as well as PYTHIA predictions. The results at 0.9 TeV are in agreement with previous measurements. The new results at 2.36 and 7 TeV represent the highest-energy measurements at a particle collider to date. Furthermore, Bose-Einstein correlations have been measured using samples of proton-proton collisions at 0.9 and 2.36 TeV center-of-mass energy. The signal is observed in the form of an enhancement of pairs of same-sign charged particles with small relative four-momentum. A significant increase of the size of the correlated particle emission region with the particle multiplicity in the event is observed.

877 track 08

Thu, Jul 22, 2010

12:15 12 mn

Salle 253

Inclusive production of hyperons, as well as of pions, charged kaons, protons, anti-protons and neutrons in p+p collisions at 158 GeV/c beam momentum

presented by: Tome Anticic (Rudjer Boskovic Institute)

New data on the production of hyperons, as well as of pions, charged kaons, protons, anti-protons, neutrons in p+p interactions are presented. The data come from a sample of 8.2 million inelastic events obtained with the NA49 detector at the CERN SPS at 158 GeV/c beam momentum. The high statistics data sample allows the extraction of detailed differential distributions as a function of x_f, y and p_T . The results are compared with published data and models. Moreover, the measurements provide an important reference for studying effects of cold nuclear matter in proton-nucleus and hot dense matter in nucleus-nucleus collisions.

897 track 08

Thu, Jul 22, 2010

11:40 16 mn

Salle 253

Heavy flavour measurements with ALICE at the LHC

presented by: Javier Castillo Castellanos (Service de Physique Nucleaire (SPHN))

ALICE is the LHC experiment dedicated to the study of heavy-ion collisions. The main purpose of ALICE is to investigate the properties of a state of deconfined nuclear matter, the Quark Gluon Plasma. Heavy flavour measurements will play a crucial role in this investigation. The physics programme of ALICE has started by studying proton-proton collisions at unprecedented high energies. We will present the first results on open heavy flavour and quarkonia in proton-proton collisions at $\sqrt{s}=7$ TeV measured by the ALICE experiment at both mid- and forward-rapidities. We will conclude with the prospects for heavy flavour and quarkonium measurements in both proton-proton and nucleus-nucleus collisions.



ICHEP2010 Parallel Sessions

918 track 08

Thu, Jul 22, 2010

16:40 16 mn

Salle 253

Identified particle spectra measured by the ALICE experiment in pp collisions at 0.9 and 7 TeV at LHC.

presented by: Mercedes Lopez Noriega (IPNO)

We will present the transverse momentum spectra of identified particles measured with the ALICE experiment in proton-proton collisions at LHC recorded at the center-of-mass energies of 0.9 and 7 TeV. The spectra of the charged particles (π^\pm , K^\pm , p and \bar{p}) were obtained measuring the dE/dx in the ALICE TPC and ITS complemented at higher momenta by the time-of-flight information provided by the ALICE TOF detector. The spectra of the K^*_S and hyperons were reconstructed using the decay topology of these particles.

These measurements demonstrate the exceptional operation of both the LHC machine and the ALICE experiment. On the physics side, they provide insights about the mechanisms of the particle production at these energies and will serve as a baseline for the future measurements at even higher LHC energies and for heavy-ion collisions.

1025 track 08

Thu, Jul 22, 2010

09:20 16 mn

Salle 253

Jet-medium interactions in heavy ion collisions

presented by: Olga Evdokimov (University of Illinois at Chicago)

One of the most remarkable discoveries of the ongoing heavy ion physics program at RHIC is the experimental observation of the jet quenching. The STAR detector, with its extended angular coverage, has made possible novel studies of jet interactions with QCD matter using angular correlations.

Di- and tri-hadron correlation studies have shown evidence of strong interactions between hard partons and the QCD matter, providing experimental constraints on medium properties, jet fragmentation and theoretical models of energy loss. Jet reconstruction, recently becoming available, can provide a more direct measurement of the initial parton energy, thereby further advancing our knowledge of jet-medium interactions.

In this talk an overview of recent STAR results for jet quenching via triggered correlations will be presented along with the first measurements from jet reconstruction in Au+Au collisions.

1026 track 08

Thu, Jul 22, 2010

11:00 16 mn

Salle 253

Heavy quarkonia production at STAR

presented by: Daniel Kikola (Lawrence Berkeley Nat. Lab./Warsaw Univ. of Technology)

According to lattice QCD calculation, the suppression pattern of quarkonia states is expected to provide insight into thermodynamic properties of hot and dense matter, Quark-Gluon Plasma (QGP), predicted to be created in relativistic heavy ions collisions at RHIC energies. The suppression in this calculation is caused by screening of the binding potential between quark and antiquark in QGP. To understand the suppression of heavy quark hadron production in heavy-ion collisions a systematic measurement is required in p+p, d+Au and Au+Au collisions. For J/ψ , the data from p+p collisions may allow us to understand the basic production mechanisms, such as due to direct production, parton fragmentation and feed down from higher states while the data from the p+A collision would provide insights into contributions from cold nuclear matter effects.

In this talk we will report results on heavy quarkonia production via di-electron decay channel in mid-rapidity in p+p, d+Au, Cu+Cu and Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV in STAR. Special emphasis would be given to J/ψ measurements at high p_T to understand the basic processes of quarkonium production and to compare the measurements with several model calculations of the J/ψ nuclear modification factor. Measurements of Upsilon production in p+p, d+Au and Au+Au collisions will be also reported. Presented results will be compared with theoretical models for quarkonia production.



ICHEP2010 Parallel Sessions

1070 track 08

Thu, Jul 22, 2010

10:00 12 mn

Salle 253

First glance at hard scattering phenomena with ALICE at LHC

presented by: Jan Rak (BNL)

In the first LHC 2009 and 2010 runs ALICE experiment collected about 10 nb^{-1} at $\sqrt{s}=900 \text{ GeV}$ and $10 \mu\text{b}^{-1}$ at $\sqrt{s}=7 \text{ TeV}$ of minimum bias $p + p$ events. I will present a first look at the hard scattering phenomena exploring high- p_T leading charged hadron correlations. An azimuthal and pseudorapidity correlations are analyzed in order to extract the mean transverse fragmentation momentum $\langle j_T \rangle$ and intrinsic primordial parton momentum $\langle k_T \rangle$, massive hadron pairs production is used to study the NLO phenomena.

1071 track 08

Thu, Jul 22, 2010

11:20 16 mn

Salle 253

Quarkonia measurements with the PHENIX detector

presented by: Alex Linden-Levy (LLNL)

Over the last ten years the PHENIX experiment has continued to increase the amount of recorded and analyzed data available for $p + p$, $d + \text{Au}$ and $\text{A} + \text{A}$ colliding species at various energies. These data have allowed us to analyze J/ψ mesons in all three collision types which contributes to the understanding of J/ψ formation, suppression in cold nuclear matter and anomalous suppression in heavy ion collisions. In particular the recent $d + \text{Au}$ J/ψ results have shown that it is very difficult to match the forward rapidity data with a shadowing model and constant break up cross section. In addition PHENIX has measured Ψ' and X_c cross sections in $p + p$ collisions at 200 GeV and their feed-down into the J/ψ . Recently PHENIX has also measured the $\psi(2S)$ in $p + p$ and $d + \text{Au}$ collisions as well as setting an upper limit for the $\psi(2S)$ suppression in $\text{Au} + \text{Au}$ collisions. These new measurements enrich the quarkonia story and will be discussed in context of their broader impact on the field. In addition to current measurements PHENIX is entering a period of upgrades where new capabilities are going to come available. In particular a new FVTX detector scheduled to be installed by the 2012 RHIC run promises to add the Ψ' in the di-muon channel and the forward calorimeter promises to help with the acceptance of the X_c . The SVTX detector will allow the unambiguous identification of open charm in the central arms of the detector which will benefit the closed charm measurements greatly.

1077 track 08

Thu, Jul 22, 2010

09:00 16 mn

Salle 253

Jet reconstruction in heavy ion collisions

presented by: Matteo Cacciari (LPTHE)

Jet algorithms cluster final state particles in high energy collisions with the aim of identifying "jets" that can be considered as proxies of the original hard partons, and therefore allow one to study their production mechanism and subsequent evolution. In heavy ion collisions, this task is severely complicated by the huge underlying event that accompanies the hard one: the particle content of jet is contaminated by a multitude of low-momentum particles, unrelated to the hard collision. This contamination must be understood and removed before the genuinely hard content of a jet can be studied. We will present a proposal for doing so using standard jet-algorithms (so as to facilitate the comparison with proton-proton results) and an entirely data-driven technique.

1078 track 08

Thu, Jul 22, 2010

16:15 20 mn

Salle 253

LHC data confront Monte Carlo predictions

presented by: Frank Krauss (Durham)

In this talk Monte Carlo models for Minimum Bias physics and their corresponding tunes will be confronted with data from the LHC.

Jets and Jet-like Correlations in Heavy Ion and p+p Collisions at PHENIX

presented by: Chris Pinkenburg (BNL)

Jets from heavy ion collisions provide a measurement of the medium-induced parton energy loss and the in-medium fragmentation properties, and therefore can significantly enhance our understanding of the energy loss mechanism and medium property. The medium modification effects are determined by comparing to a p+p baseline measurement. However the presence of high multiplicity backgrounds in heavy ion collisions inhibits the direct application of traditional jet reconstruction techniques.

Instead angular correlations between the hadronic fragments of energetic partons can be used to understand the hot dense matter produced in relativistic heavy ion collisions. The yield and shape modifications of the away side peaks as function of transverse momentum compared to p+p has been interpreted as a medium response to parton energy loss. Direct photon-hadron correlations are another excellent channel to study jets from heavy ion collisions. Photons do not interact strongly with the medium and thus the photon approximately balances the momentum of the opposing jet, allowing the measurement of the effective modification to the fragmentation function through jet energy loss in the medium. We will present the latest jet measurements by PHENIX for p+p and heavy ion collisions.

09 - Progress in Lattice Techniques and New Results

223 track 09

Fri, Jul 23, 2010

17:45 15 mn

Salle 252A

Towards the continuum limit of the lattice Landau-gauge gluon and ghost propagators.

presented by: Igor Bogolubsky (JINR)

Considerable efforts have been devoted during the last decade to exploring QCD's elementary two-point functions using the framework of lattice QCD. Thereby, much attention has been paid to the gluon and ghost propagators in Landau gauge whose low-momentum behavior has been explored using relatively coarse lattices to reach momenta as low as possible. To ultimately confront such lattice results with corresponding predictions from continuum functional theory, the extrapolation to the continuum limit has to be under control, however. Also, the influence of the Gribov ambiguity needs to be understood, in particular as there are strong indications that this ambiguity has a big impact on these propagators at low momenta. To further clarify this still actively debated issue we have launched a large scale lattice study of this problem in SU(2) gluodynamics, paying special attention to the continuum limit of the gluon and ghost propagators and the associated coupling at a fixed physical volume.

274 track 09

Fri, Jul 23, 2010

14:30 25 mn

Salle 252A

The excited hadron spectrum in lattice QCD using a new variance reduction method

presented by: Colin Morningstar (Carnegie Mellon University)

Progress in determining the spectrum of excited baryons and mesons in lattice QCD is described. Large sets of carefully-designed hadron operators have been studied and their effectiveness in facilitating the extraction of excited-state energies is demonstrated. A new method of stochastically estimating the low-lying effects of quark propagation is proposed which will allow reliable determinations of temporal correlations of single-hadron and multi-hadron operators.

284 track 09

Fri, Jul 23, 2010

16:45 30 mn

Salle 252A

Recent results from heavy flavour physics on the lattice

presented by: Michele Della Morte (Institut fuer Kernphysik, Mainz)

We review the most recent lattice results on a few selected hadronic quantities and discuss some recent theoretical development. We try to put the emphasis on the challenges, which have to be faced, on the way to precise heavy flavour physics on the lattice.

301 track 09

Fri, Jul 23, 2010

11:00 35 mn

Salle 252A

The QCD phase diagram at low baryon density from lattice simulations

presented by: Owe Philipsen

The QCD phase diagram as a function of temperature and chemical potential for baryon number is largely unknown. Straightforward Monte Carlo simulations of lattice QCD are prohibited by the so-called sign problem for systems with a non-vanishing net baryon number. After a brief introduction to the origin of the sign problem, I review some recent computational techniques valid for sufficiently small baryon chemical potentials, and summarize our current knowledge of the QCD phase diagram resulting from such simulations.

323 track 09 Fri, Jul 23, 2010 09:00 35 mn Salle 252A

Light quarks on the lattice: methods and results for pion physics

presented by: Stefan Schaefer (Humboldt University Berlin)

Ab-initio studies of the physics of pions using lattice QCD have become possible over the last decade, where particular attention was given to the computation of the constants of the chiral Lagrangian. This is due to significant progress in algorithms, which now allow simulations with light sea quarks on fine lattices. This talk has two objectives: the first is to introduce the ideas behind the algorithmic advances along with the status and prospects of the simulations. After that, the state of the physics results will be reviewed, with particular emphasis on the chiral low-energy constants.

338 track 09 Fri, Jul 23, 2010 14:00 30 mn Salle 252A

Recent progress on nuclear potentials from lattice QCD

presented by: Sinya Aoki (University of Tsukuba)

I review the recent progress on the determination of potentials between baryons from lattice QCD, based on works by HAL (Hadron to Atomic nuclei from Lattice) QCD Collaboration, who uses the Bethe-Salpter amplitudes to extract potentials in quantum field theories. The method is first applied to two nucleons on the lattice with quenched QCD simulations. By disentangling the mixing between the S-state and the D-state, both central and tensor potentials in the leading order of the velocity expansion of the non-local NN potential are obtained. The method has also been applied to hyperon-nucleon potentials and hyperon-hyperon potentials. The possible extension of the method to extract hadron interactions in general from lattice QCD is also discussed.

346 track 09 Fri, Jul 23, 2010 14:55 25 mn Salle 252A

Nucleon Structure using twisted mass fermions

presented by: Constantia Alexandrou (University of Cyprus)

We present recent results on the nucleon form factors and low moments of generalized parton distributions. They are obtained using two degenerate flavors of dynamical twisted mass fermions corresponding to pion masses in the range of about 260-450 MeV. Finite volume and cut-off effects are investigated. Chiral extrapolations of the magnetic moment, Pauli and Dirac radii and the axial charge to the physical point are discussed.

366 track 09 Fri, Jul 23, 2010 09:35 25 mn Salle 252A

Lattice studies of hadron physics with disconnected quark loops

presented by: Takashi Kaneko (KEK)

Disconnected diagrams give crucial contributions to the physics of flavor singlet hadrons and to scalar form factors of non-singlet hadrons. Lattice calculation of the disconnected diagrams is not straightforward because naively it requires huge number of fermion matrix inversions. In this talk, we present recent progress with improved simulation methods particularly focusing on the flavor-singlet meson spectrum and nucleon strange quark content.

390 track 09 Fri, Jul 23, 2010 12:05 25 mn Salle 252A

Effects of a potential fourth fermion generation on the upper and lower Higgs boson mass bounds

presented by: Philipp Gerhold (Humboldt-University Berlin)

We study the effect of a potential fourth fermion generation on the upper and lower Higgs boson mass bounds. This investigation is based on the numerical evaluation of a chirally invariant lattice Higgs-Yukawa model emulating the same Higgs-fermion coupling structure as in the Higgs sector of the electroweak Standard Model. In particular, the considered model obeys a Ginsparg-Wilson version of the underlying $SU(2)_L \times U(1)_Y$ symmetry, being a global symmetry here due to the neglect of gauge fields in this model. Here we present our first results on the fermion mass dependence of the Higgs boson mass bound as well as its cutoff dependence at very heavy fermion masses.



ICHEP2010 Parallel Sessions

432 track 09 Fri, Jul 23, 2010 16:15 30 mn Salle 252A

Continuum limit results from 2+1 flavor Domain Wall QCD

presented by: Enno E. Scholz (University of Regensburg)

Quantum Chromodynamics with two mass degenerate light quark flavors and an additional single heavier quark flavor has been simulated on the lattice using the domain wall fermion formulation. These simulations cover a range of dynamical pion masses between 300 and 420 MeV and were performed at two different values for the lattice spacing with $1/a=1.73$ and 2.32 GeV and a linear lattice extent of 2.8 fm. This talk will focus on the determination of the kaon bag parameter B_K and the semi-leptonic kaon form factor K_{l3} . The various methods for extrapolating these quantities to the limit of physical light quark mass will be evaluated.

560 track 09 Fri, Jul 23, 2010 17:15 30 mn Salle 252A

Heavy flavour phenomenology from lattice QCD

presented by: Elvira Gamiz (Fermilab)

Heavy quark quantities are useful for testing lattice techniques against well known experimental results, as well as for testing the Standard Model (SM) itself, and searching for physics beyond the SM. I will review the results of recent lattice calculations relevant for this program including those of B and D decay constants and semileptonic decay form factors, and neutral B mixing. The impact of future improvements of lattice results on the clarification of the origin of several disagreement between theory and experiment which are starting to show up in the quark flavour sector, and the study on the lattice of processes with potential to probe new physics at future experiments, like rare B -decays, will also be discussed.

1226 track 09 Fri, Jul 23, 2010 10:00 30 mn Salle 252A

Leading order hadronic contribution to $g-2$ from lattice QCD

presented by: Dru Renner (DESY, Zeuthen)

The nonperturbative calculation of the hadronic contributions to the anomalous magnetic moment of the muon is an interesting challenge for QCD, especially in light of the continuing discrepancy between the Standard Model prediction and experimental measurements. We have calculated the leading order hadronic contribution using lattice QCD with pion masses ranging from 600 MeV down to 300 MeV. The systematic errors in such a calculation have been studied with calculations at two lattice spacings and several volumes.

1228 track 09 Fri, Jul 23, 2010 15:20 25 mn Salle 252A

α_s from Lattice QCD: progresses and perspectives for a realistic full-QCD determination of the running Strong coupling

presented by: Jose Rodriguez-Quintero (University of Huelva)

QCD is believed to be the theory of the strong interactions with, as only inputs, one mass parameter for each quark species and the value of the QCD coupling constant at some energy or momentum scale in some renormalization scheme. This is Λ_{QCD} , the only non-perturbative parameter in the limit of massless quarks, to be taken from experiment, and the one which expresses the scale of strong interactions and drives the running of the QCD coupling. The QCD running coupling can be also obtained from lattice computations, the free parameters being adjusted from experimental numbers, masses, decay constants etc. As far as the non-perturbative lattice computation could be realistic, a comparison with direct experimental determination of the strong coupling, at different transferred momenta, would be in order. In this talk, the last new results concerning the lattice evaluation of the running QCD coupling constant will be discussed.



ICHEP2010 Parallel Sessions

1234 track 09

Fri, Jul 23, 2010

11:35 30 mn

Salle 252A

Origin of Mass, Strong Dynamics and the Lattice

presented by: George Fleming (Yale University)

One of the important missions of LHC is to probe the mechanism behind the electroweak symmetry breaking through which elementary particles, such as the W and Z gauge bosons and the quarks, acquire mass. While the most economical solution is to have the Standard Model Higgs mechanism, other possibilities exist. One such possibility is to have dynamical electroweak symmetry breaking (DEWSB) as a result of some new strong interactions at energies of the TeV scale. As the only systematically improvable non-perturbative tool, lattice gauge theory has the potential to (in)validate many non-perturbative methods developed to search for new kinds of strong dynamics that might satisfy phenomenological constraints on DEWSB, and may facilitate the interpretation of the LHC data and hopefully shed light on the origin of mass. In this talk I will give an overview of the recent efforts by the lattice community to understand strong dynamics beyond QCD.



ICHEP2010 Parallel Sessions

10 - Beyond the Standard Model (theory and experimental searches)

123 track 10 Fri, Jul 23, 2010 11:00 10 mn Salle 242B

Spin determination of single-produced resonances at the LHC

presented by: Nhan Viet Tran (Rowland Dept. of Phys. and Astron.-Johns Hopkins University)

We present techniques and analysis tools to study the production and decay of a single resonance produced at the LHC. In a model-independent way, we show how to perform analysis of the resonance decay products to ascertain the spin of the resonance, its parity and production mechanism, and its general couplings to Standard Model matter and gauge fields. Examples of spin-zero, -one, and -two resonances ranging from the Standard Model Higgs boson to the KK Graviton are considered. Though noting implications for other final states, we focus on resonances decaying to a pair of Z bosons in a fully reconstructed final state. Through detailed MC simulation including all spin correlations and major detector effects, we use the multivariate likelihood method to extract the maximal amount of information about the resonance and separate various signal hypotheses.

140 track 10 Sat, Jul 24, 2010 11:00 15 mn Salle 242B

Fermion mass hierarchy and new physics at the TeV scale

presented by: Satyanarayan Nandi (Oklahoma State University)

We present a new framework to understand the long-standing fermion mass hierarchy puzzle. We extend the Standard Model gauge symmetry by an extra local $U(1)_S$ symmetry, broken spontaneously at the electroweak scale. All the SM particles are singlet with respect to this $U(1)_S$. We also introduce additional flavor symmetries, $U(1)_{F_i}$'s, with flavon scalars F_i , as well as vectorlike quarks and leptons at the TeV scale. The flavon scalars have VEV in the TeV scale. Only the top quark has the usual dimension four Yukawa coupling. EW symmetry breaking to all other quarks and leptons are propagated through the messenger field, S through their interactions

involving the heavy vector-like fermions and S , as well as through their interactions involving the vector-like fermions and F_i . In addition the explaining the hierarchy of the charged fermion masses and mixings, the model has several interesting predictions for Higgs decays, flavor changing neutral current processes in the top and the b quark decays, decays of the new singlet scalars to the new Z'

boson, as well as productions of the new vectorlike quarks. These predictions can be tested at the LHC. I will also briefly review the other approaches to the fermion mass hierarchy puzzle.

169 track 10 Sat, Jul 24, 2010 14:20 15 mn Salle 242B

Vanishing Dimensions and Planar Events at the LHC

presented by: Greg Landsberg (Brown University)

We propose that the effective dimensionality of the space we live in depends on the length scale we are probing. As the length scale increases, new dimensions open up. At short scales the space is lower dimensional; at the intermediate scales the space is three-dimensional; and at large scales, the space is effectively higher dimensional. This setup allows for some fundamental problems in cosmology, gravity, and particle physics to be attacked from a new perspective. The proposed framework, among the other things, offers a new approach to the cosmological constant problem and results in striking collider phenomenology.

172 track 10 Sat, Jul 24, 2010 15:00 15 mn Salle 242B

Hidden fine tuning in the quark sector of little higgs models

presented by: Benjamin Grinstein (University of California San Diego and CERN)

In little higgs models a collective symmetry prevents the higgs from acquiring a quadratically divergent mass at one loop. By considering first the littlest higgs model we show that this requires a fine tuning: the couplings in the model introduced to give the top quark a mass do not naturally respect the collective symmetry. We show the problem is generic: it arises from the fact that the would be collective symmetry of any one top quark mass term is broken by gauge interactions.



ICHEP2010 Parallel Sessions

174 track 10 Fri, Jul 23, 2010 15:00 15 mn Salle Maillot

Effective operators in top physics

presented by: Juan Antonio Aguilar Saavedra (University of Granada and LIP)

I will show how the general trilinear interactions of the top quark (or any other fermion) arising from dimension-six gauge invariant operators are simplified when several operators in the Buchmuller & Wyler list, recently found to be redundant (arxiv:0811.3842, arxiv:0904.2387) are dropped. I will present some practical applications of this simplification for phenomenology, including the study of top FCNC processes (arxiv:1003.3173).

262 track 10 Sat, Jul 24, 2010 11:40 15 mn Salle 242B

Can the Supersymmetric Flavour Problem decouple in case of a Non Standard Supersymmetric Spectrum?

presented by: Paolo Lodone (Scuola Normale Superiore of Pisa)

It has been shown that, in the context of the MSSM, the Supersymmetric Flavour Problem cannot be solved by just letting the sfermions of the first two generations be relatively heavy. The reason is twofold: naturalness of the Fermi scale on one side, need for positive squared stop masses on the other.

The situation is much more promising in models without a light Higgs boson, in which the goal can be met. The prices are: a relatively low messenger scale, semiperturbativity before the GUT scale, and some amount of degeneracy/alignment of order of the Cabibbo angle in the sfermion sector. The resulting phenomenology is quite different from the MSSM one in many respects.

308 track 10 Fri, Jul 23, 2010 09:00 20 mn Salle 242B

A Review of the Mass Measurement Techniques proposed for the Large Hadron Collider

presented by: Christopher Gorham Lester (University of Cambridge)

We review the methods which have been proposed for measuring masses of new particles at the Large Hadron Collider paying particular attention to the kinematical techniques suitable for extracting mass information when invisible particles are expected. This talk is, in effect, a companion to a recent review with the same title: <http://arxiv.org/abs/1004.2732> (Barr & Lester)

309 track 10 Sat, Jul 24, 2010 09:20 15 mn Salle 242B

Search for Nucleon Decays in Super-Kamiokande

presented by: Makoto Miura (ICRR)

Grand Unified Theories (GUTs) is motivated by merging of the coupling constants of the strong, weak, and electromagnetic forces at a large energy scale ($\sim 10^{16}$ GeV), which is out of the reach of accelerators. One of the other general features of GUTs is that they allow lepton and baryon number violations and they predict instability of nucleons. Then nucleon decay experiments are the direct probe for GUTs.

The Super-Kamiokande (SK) is a water cherenkov detector which keeps running to detect nucleon decays with large mass. There are no other nucleon decay detectors which have as long exposure as SK. The results of nucleon decay search based on 173 kton year (1996-2008) will be presented in the conference. The favored decay mode in GUTs based on SU(5) symmetry is $p \rightarrow e^+ \pi^0$. On the other hand, $p \rightarrow \nu K^+$ is favored by SUSY GUTs model. Those two modes will be mainly discussed.



ICHEP2010 Parallel Sessions

314 track 10 Fri, Jul 23, 2010 17:15 15 mn Salle Maillot

The global electroweak fit and constraints on new physics

presented by: Doerthe Ludwig (DESY)

Physics beyond the Standard Model (SM) can modify the relations between electroweak observables and their theoretical predictions. Such effects can be parametrised in terms of effective, so-called oblique parameters. A global fit of the electroweak SM, as performed with the Gfitter package, allows one to determine the oblique parameters and to derive constraints on new physics. In this talk, the Gfitter results for the oblique parameters are presented coherently together with constraints on various new physics models, including Little Higgs models, Extra Dimensions, Supersymmetry, Technicolour and Four Generations.

326 track 10 Fri, Jul 23, 2010 16:35 15 mn Salle Maillot

Model independent analysis of the forward-backward asymmetry of top quark production at the Tevatron

presented by: Pyungwon Ko (KIAS)

Motivated by a possible anomaly in the forward-backward (FB) asymmetry of top quark (A_{FB}) observed at the Tevatron, we perform a model independent analysis on $q\bar{q} \rightarrow t\bar{t}$ using an effective lagrangian with dim-6 four-quark operators. We derive necessary conditions on new physics structures and the couplings that are consistent with the $t\bar{t}$ production cross section and A_{FB} measured at the Tevatron, and discuss possible new physics scenarios that could generate such dim-6 operators.

541 track 10 Fri, Jul 23, 2010 14:20 15 mn Salle Maillot

Early Searches with Jets with the ATLAS Detector at the LHC

presented by: Georgios Choudalakis (University of Chicago, Enrico Fermi Institute)

We summarize the analyses of high-pt jets in early pp collisions recorded with the ATLAS detector. The data are confronted with Standard Model predictions with the goal of searching for new phenomena: resonances, gravitationally mediated effects, and contact interactions.

662 track 10 Sat, Jul 24, 2010 09:40 10 mn Salle 242B

Geometrical Origin of CP Violation and CKM and MNS Matrices in $SU(5) \times T'$

presented by: Kalyana Mahanthappa (University of Colorado)

: We propose the complex group theoretical Clebsch-Gordan coefficients as a novel origin of CP violation. This is manifest in our model based on SUSY $SU(5)$ combined with the double tetrahedral group, T' , as the family symmetry. Due to the presence of the doublet representations in T' , there exist complex CG coefficients, leading to explicit CP violation in the model, while the Yukawa couplings and the vacuum expectation values of the scalar fields remain real. The tri-bimaximal neutrino mixing matrix arises from the CG coefficients of T' . In addition to the prediction for $\theta_{13} \sim (1/(3\sqrt{2}))\theta_c$, the model gives rise to a sum rule, $\tan 2(\theta_{sol}) \sim \tan 2(\theta_{sol_TBM}) + (1/2)\theta_c \cos(\delta_{ell})$, which is a consequence of the Georgi-Jarlskog relations in the charged fermion sector. The predicted leptonic Dirac CP phase, δ_{ell} , gives the correct value of the solar mixing angle, and the predicted CP violation measures in the quark sector are consistent with the current experimental data. With flavor effects included, sufficient amount of baryon number asymmetry can be obtained through leptogenesis. Since the Dirac CP phase is the only non-vanishing phase predicted in the lepton sector, there is a connection between leptogenesis and low energy leptonic CP violating processes in our model.



ICHEP2010 Parallel Sessions

847 track 10

Fri, Jul 23, 2010

14:40 15 mn

Salle Maillot

Search for new Physics in the dijet mass spectrum and dijet ratio in pp Collisions at $\sqrt{s} = 7$ TeV

presented by: Konstantinos Kousouris (Fermilab)

We report on a search for new physics in dijet production at CMS, using the first pp collision data at $\sqrt{s}=7$ TeV provided by CERN's Large Hadron Collider. The measured dijet mass spectrum is compared with QCD predictions. We use the dijet mass spectrum to search for dijet resonances that could come from several models, such as, axiglons, flavor universal colorons, excited quarks or E6 diquarks. We have also measured the production ratio for events with two leading jets in two regions of pseudorapidity. The dijet centrality ratio, $N(|\eta| < 0.7)/N(0.7 < |\eta| < 1.3)$, is sensitive to dijet angular distributions. The dijet centrality ratio is measured in bins of dijet mass, compared with the predictions of QCD, and used to search for the following new physics models: quark contact interactions and excited quarks.

849 track 10

Fri, Jul 23, 2010

11:30 15 mn

Salle 242B

Search for stopped gluinos and Heavy Stable Charged Particles at CMS in pp collisions at $\sqrt{s}=7$ TeV

presented by: Jim Brooke (H.H. Wills Physics Laboratory)

We report the preliminary results of searches for long-lived particles produced in 7 TeV pp collisions from CERN's Large Hadron Collider. A signature-based search for heavy stable charged particles using a high transverse-momentum muon trigger was performed. The search uses time-of-flight and ionization energy loss to isolate slowly moving, heavy, high transverse momentum particles. This result is interpreted within the context of stable stop squark and gluino models. We have also looked for long-lived particles which have stopped in the CMS detector. We search for the subsequent decay of these particles during time intervals where there were no pp collisions. In particular, we search for decays during gaps between crossings in the LHC beam structure as well as the inter-fill period between the beam being dumped and re-injection using a dedicated calorimeter trigger.

872 track 10

Fri, Jul 23, 2010

09:45 15 mn

Salle 242B

Z' discovery potential at the LHC in the minimal B-L model

presented by: Lorenzo Basso (Rutherford Appleton Laboratory - STFC)

We present the Large Hadron Collider (LHC) discovery potential in the Z' sector of a $U(1)_{B-L}$ enlarged Standard Model (that also includes three heavy Majorana neutrinos and an additional Higgs boson) for $\sqrt{s}=7$ and 14 TeV centre-of-mass (CM) energies, considering both the $Z'_{B-L} \rightarrow e^+e^-$ and $Z'_{B-L} \rightarrow \mu^+\mu^-$ decay channels.

The run of the LHC at $\sqrt{s}=7$ TeV, assuming at most $\int L \sim 1 \text{ fb}^{-1}$, will be able to give similar results to those that will be available soon at the Tevatron in the lower mass region, and to extend them for a heavier $M_{Z'}$. Finally, the run at 14 TeV is needed to fully probe the parameter space and its potential is comparable in scope to that of a future TeV scale Linear Collider (LC).

If no evidence is found in any energy configuration, 95% C.L. limits can be determined, and, given their better resolution, the limits from electrons will always be more stringent than those from muons.

889 track 10

Sat, Jul 24, 2010

16:35 15 mn

Salle 242B

Non-universal, Non-anomalous $U(1)'$ in a Model with Anomaly-Mediated SUSY Breaking

presented by: Mu-Chun Chen (University of California at Irvine)

We propose a Minimal Supersymmetric Standard Model combined with a non-universal, non-anomalous $U(1)'$ symmetry. All anomalies are cancelled in the model without any exotic fields other than the three right-handed neutrinos which are needed to generate neutrino masses. The D-term associated with the $U(1)'$ gives rise to additional contributions to the slepton masses, rendering all slepton masses positive thus solving the slepton mass problem which generically is present in models with anomaly-mediated SUSY breaking. In addition to accommodating all SM fermion mass hierarchy, the $U(1)'$ charges of the matter fields also dictate the flavor structure in the soft SUSY sector, leading to predictions for various flavor violating processes. The $U(1)'$ charges of the superfields also automatically suppress baryon number violating operators.



ICHEP2010 Parallel Sessions

893 track 10 Fri, Jul 23, 2010 11:15 10 mn Salle 242B

Search for Color Sextet Scalars in Early LHC Experiments

presented by: Edmond Berger (ANL)

We explore the potential for discovery of an exotic color sextet scalar in same sign top quark pair production in early running at the LHC. We present the first phenomenological analysis at collider energies of a color sextet scalar with full top quark spin correlations included. We demonstrate that one can measure the scalar mass, the top quark polarization, and confirm the scalar resonance with 1 fb^{-1} of integrated luminosity. The top quark polarization can distinguish gauge triplet and singlet scalars.

903 track 10 Fri, Jul 23, 2010 14:00 15 mn Salle Maillot

Supermodels: Early new physics at the LHC?

presented by: Zoltan Ligeti (Lawrence Berkeley National Laboratory)

We explore which new physics signatures could be discovered in the first year of the LHC, beyond the expected sensitivity of the Tevatron data and other constraints. We construct "supermodels", for which the LHC sensitivity even with only 10 pb^{-1} useful luminosity is greater than that of the Tevatron with 10 fb^{-1} . The simplest scenarios involve s-channel resonances in the quark-antiquark and especially in the quark-quark

channels. We concentrate on easily visible final states with small standard model backgrounds, and find that there are simple searches, besides those for Z' states, which could discover new physics in early LHC data. Many of these are well-suited to test searches for "more conventional" models, often discussed for larger data sets.

904 track 10 Sat, Jul 24, 2010 09:00 15 mn Salle 242B

Recent Progress in SUSY GUTs

presented by: Kaladi Babu (Oklahoma State University)

I will summarize recent developments in 4-dimensional supersymmetric grand unified model building. A class of SUSY GUTs based on $SO(10)$ will be presented which successfully addresses for the first time (i) the doublet-triplet splitting problem to all orders, (ii) realistic quark and lepton mixing, (iii) gauge coupling unification including GUT scale threshold effects, and (i) the origin of the μ term. Expectations for proton lifetime in these models will be discussed, which shows an interesting correlation between the $e^+ \pi^0$ mode and the $\bar{\nu}_\mu K^+$ mode. An improvement in the experimental sensitivity by about a factor of ten should reveal proton decay in both these channels, with the lifetime for $p \rightarrow e^+ \pi^0$ predicted to be below a few times 10^{34} years.

This work is primarily based on the paper "Constraining Proton Lifetime in $SO(10)$ with Stabilized Doublet-Triplet Splitting", by K.S. Babu, Jogesh C. Pati and Zurab Tavartkiladze, arXiv:1003.2625v2 [hep-ph].

909 track 10 Fri, Jul 23, 2010 17:35 15 mn Salle Maillot

Possible early signs of warped space at the LHC

presented by: Amarjit Soni (BNL)

One of the most interesting theoretical scenarios for extending the Standard Model is based on the notion of a single warped extra-dimension. Though the original idea was proposed to address the Planck-weak hierarchy, it actually can also lead to an understanding of flavors. As purely a theory of flavor the UV cut-off may be much much less than the Planck mass and may be around 10^4 TeV . The corresponding Kaluza-Klein electroweak gauge bosons may be at a few TeV scale and can have significantly enhanced signals at the LHC. For example, a $2 \text{ TeV } Z'$ may require only around $1/\text{fb}$ luminosity in the very clean di-lepton channel. Implications for the LHC of such a modest application of the warped space idea for the LHC are discussed.



ICHEP2010 Parallel Sessions

1086 track 10

Sat, Jul 24, 2010

17:15 15 mn

Salle 242B

Dirac Neutralinos and Electroweak Scalar Bosons of N=1/N=2 Hybrid Supersymmetry at Colliders

presented by: Jan Kalinowski (Inst. Theor. Physics, University of Warsaw)

In the N=1 supersymmetric extension of the Standard Model, neutralinos associated in supermultiplets with the neutral electroweak gauge and Higgs bosons are, as well as gluinos, Majorana fermions. They can be paired with the Majorana fermions of novel gaugino/scalar supermultiplets, as suggested by extended N=2 supersymmetry, to Dirac particles. Matter fields are not extended beyond the standard N=1 supermultiplets in N=1/N=2 hybrid supersymmetry to preserve the chiral character of the theory.

Complementing earlier analyses in the color sector, central elements of such an electroweak scenario are analyzed in the present study. The decay properties of the Dirac fermions and of the scalar bosons are worked out, and the single and pair production channels of the new particles are described for proton collisions at the LHC, and electron/positron and photon-photon collisions at linear colliders. Special attention is paid to modifications of the Higgs sector, identified with an N=2 hypermultiplet, by the mixing with the novel electroweak scalar sector.

1087 track 10

Fri, Jul 23, 2010

12:10 15 mn

Salle 242B

Impact of squark generation mixing on the search for squarks and gluinos at LHC

merged from abstracts: 445 446

presented by: Keisho Hidaka (Tokyo Gakugei University)

We study gluino decays, and squark production and decays, in the Minimal Supersymmetric Standard Model (MSSM) with squark generation mixing. We show that the mixing effects can be very large in a significant range of quark-flavour-violating parameters despite the very strong constraints on quark-flavour-violation (QFV) from experimental data on B mesons.

We find that under favourable conditions the branching ratio of the QFV decay $\text{gluino} \rightarrow c \text{ tbar} (\text{cbar } t) + \text{neutralino}_1$ can be as large as about 50%.

We also find that the squark generation mixing can result in a multiple-edge (3- or 4-edge) structure in the charm-top quark invariant mass distribution.

Further we show that the two lightest up-type squarks $\text{su}_{\{1,2\}}$ can have very large branching ratios for the decays $\text{su}_i \rightarrow \text{charm-quark neutralino}_1$ and $\text{su}_i \rightarrow \text{top-quark neutralino}_1$ simultaneously due to the mixing effect, resulting in QFV signals 'p p \rightarrow c tbar (t cbar) + missing-E_T + X' at a significant rate at LHC. These remarkable signatures provide an additional powerful test of supersymmetric QFV at LHC. They could have an important impact on the search for gluinos and squarks and the determination of the MSSM parameters at LHC.

1088 track 10

Fri, Jul 23, 2010

09:25 15 mn

Salle 242B

Early LHC data preparations for beyond-the-standard-model searches at CMS

merged from abstracts: 848 858 850

presented by: Didar Dobur (University of Florida)

Searches for supersymmetry (SUSY) and other phenomena beyond the standard model involve a broad range of signatures with jets, leptons, photons, and missing transverse momentum (MET). These searches require careful control over backgrounds from standard model processes. We present the current understanding of these issues both in SUSY searches and in other beyond-the-standard-model searches such as first and second generation leptoquarks. We present several methods for data-driven background determinations that have been tested on early LHC data collected by the CMS experiment at $\sqrt{s}=7$ TeV. These data allow us to study QCD backgrounds, to evaluate methods to suppress the effects of jet-energy mis-measurement, to validate data-driven methods for predicting the MET distribution, and to measure background contributions from processes producing fake leptons.



ICHEP2010 Parallel Sessions

1099 track 10

Fri, Jul 23, 2010

10:05 15 mn

Salle 242B

Early Searches with Leptons and Photons with the ATLAS Detector at the LHC

presented by: **Dominique Fortin (TRIUMF)**

The Standard Model predicts relatively low backgrounds to processes with high-pt leptons, and photons making them strong candidates for early discoveries. We present the results of the most sensitive such searches based on first data collected with the ATLAS detector at the LHC.

1100 track 10

Fri, Jul 23, 2010

11:50 15 mn

Salle 242B

Searches for Exotic Long-lived Particles using Early Data from the ATLAS Detector at the LHC

merged from abstracts: 545 546

presented by: **Pasquale-Fabrizio Salvatore (University of Sussex)**

Exotic heavy long-lived particles are predicted in a range of theories which extend the Standard Model. Supersymmetry models alone allow for meta-stable sleptons, squarks and gauginos. Such particles are identifiable as they traverse the detector by observables related to tracking, timing and energy loss which differ for Standard Model and exotic processes. Also, if a model such as split-supersymmetry is realized in nature, R-hadrons, which contain a long-lived gluino or squark, can be produced and may lose enough of their energy through ionization to become captured and stop in the densest materials. Such "stopped" particles would decay at some later time, producing a high energy deposit which can be picked up by the trigger and detector, provided they remain active. This talk presents results from searches to discover both types of particles using data from proton-proton collisions at 7 TeV centre-of-mass energy which have been accumulated by the ATLAS detector at the LHC.

1102 track 10

Fri, Jul 23, 2010

15:20 15 mn

Salle Maillot

Search for T-Tbar Resonances at the Tevatron

merged from abstracts: 302 607

presented by: **Nathan Goldschmidt (Univ. of Florida)**

We describe searches for resonant top-antitop production at the Tevatron. Resonant top pair production could arise from the decays of massive Z-like bosons in extended gauge theories, KK states of the gluon or Z, axigluons, topcolor, and other BSM theories. We use different techniques to study the top-antitop invariant mass spectrum and set model independent limits on new resonant top-antitop production mechanisms that would appear as bumps in invariant mass

1104 track 10

Sat, Jul 24, 2010

14:00 15 mn

Salle 242B

Signature based Searches for new physics involving photons at the Tevatron

presented by: **Robert Blair (ANL (HEP Div.))**

We present a variety of model-independent studies of final states involving photons in combination with other objects. These include charged leptons (including taus), jets (including b-tagged jets), additional photons, and missing energy. Several kinematic distributions are examined in each final state considered to search for discrepancies from the standard model. One of the final states examined, involving a photon, a charged lepton, a b-tagged jet, and missing energy, is employed to study standard model production of t-tbar-gamma in addition to potential new physics. The results use data collected at the Tevatron



ICHEP2010 Parallel Sessions

1105 track 10

Sat, Jul 24, 2010

16:55 15 mn

Salle 242B

Searches for Gauge Mediated Supersymmetry at the Tevatron

merged from abstracts: 629 655

presented by: **Pierre Lutz (CEA Orsay)**

We present a variety of model-independent studies of final states involving photons in combination with other objects. These include charged leptons (including taus), jets (including b-tagged jets), additional photons, and missing energy. Several kinematic distributions are examined in each final state considered to search for discrepancies from the standard model. One of the final states examined, involving a photon, a charged lepton, a b-tagged jet, and missing energy, is employed to study standard model production of t-tbar-gamma in addition to potential new physics. The results use data collected at the Tevatron corresponding to up to 2/fb of integrated luminosity.

1106 track 10

Fri, Jul 23, 2010

16:15 15 mn

Salle Maillot

Searches for Massive T' quark decaying to W + b at the Tevatron

merged from abstracts: 297 609

presented by: **Alison Lister (University of Geneva)**

Fifteen years since the discovery of top at the Tevatron, with the large Run 2 dataset in hand and plenty of analysis experience, we have now reached the point where we can perform in-depth examinations of the top quark event sample for evidence of physics beyond the Standard Model. We present a search for a massive quark (t') decaying to Wq or Wb and thus mimicking the top quark decay signature. We set limits on a 4th generation t' quark using the latest Tevatron data.

1107 track 10

Sat, Jul 24, 2010

15:20 15 mn

Salle 242B

Searches for W' and b' at the Tevatron

merged from abstracts: 298 616

presented by: **Luca Scodellaro**

We present two Tevatron search results for massive particles; the search for a massive quark (b') decaying to t quark and W boson and the search for the production of a massive W' gauge boson that decays into a t and b quark. In the former, we use the scalar sum of the transverse energies and the number of jets present in the event to discriminate possible new quarks or other particles from Standard Model processes, and set limits on a standard 4th generation b' quark. In the latter, we analyze the final-state invariant mass distribution and set upper limits on the production cross section times branching fraction. We set lower mass limits for a left-handed W' boson with SM couplings and for right-handed W' bosons decaying to both leptons and quarks and decaying only to quarks. We also set limits on the coupling of the W' boson to fermions as a function of its mass.

1108 track 10

Sat, Jul 24, 2010

14:40 15 mn

Salle 242B

Search for Leptoquarks and Technicolor at the Tevatron

merged from abstracts: 631 635 652

presented by: **Gerald Grenier (IPN Lyon)**

Leptoquarks arise naturally in all models of unification of leptons and quarks, and might have masses close to the electroweak scale. In this case, to avoid flavor-changing neutral currents, leptoquarks cannot mix generations and separate searches are performed in separate final states for first, second and third generation leptoquarks. Technicolor models postulate the existence of new (techni-) fermions bound into (techni-)hadrons by a new confining interaction with characteristic energy scale close to the electroweak scale. At the Tevatron collider, technirho and techniomuon vector mesons could be produced with their subsequent decays likely to contain weak bosons. Results from searches using up to 6 fb⁻¹ of data collected at the Fermilab Tevatron collider are presented.



ICHEP2010 Parallel Sessions

1109 track 10

Sat, Jul 24, 2010

12:00 15 mn

Salle 242B

Search for Supersymmetry and R-Parity violating Supersymmetry at the Tevatron

merged from abstracts: 628 654 660

presented by: **Eva Halkiadakis (Rutgers University)**

The production of chargino-neutralino pairs and their subsequent leptonic decays is one of the most promising supersymmetry (SUSY) signatures at the Tevatron proton-antiproton collider. We present here the most recent results on searches for the three-lepton and missing-transverse-energy SUSY signature using data collected at the Tevatron. The results are interpreted within the minimal supergravity (mSUGRA) scenario. Also presented is a search for R-Parity violating supersymmetry in which signals of possible non-conservation of R-parity through resonant production of supersymmetric neutrinos which decay to a pair of leptons.

1110 track 10

Sat, Jul 24, 2010

16:15 15 mn

Salle 242B

Search for Massive Long Lived Particles, quirks, and potential valleys at the Tevatron

merged from abstracts: 632 633 634

presented by: **Yunhe Xie (Fermilab)**

New physics can present itself in many different ways, in some scenarios, some of the postulated new particles can have a lifetime that allows them to escape typical particle detectors before decaying. In others, potential new particles with relatively light masses are hypothesized to exist in a "potential valley" separated from the SM by a high potential barrier. Yet a third postulate are quirks, a hypothetical new fermion bound by a new SU(N) "infracolor" gauge coupling in which the breaking of the "infracolor" string is exponentially suppressed, implying the bound states can have even macroscopic size. We present the latest search results of for such particles at the Fermilab Tevatron collider.

1111 track 10

Sat, Jul 24, 2010

11:20 15 mn

Salle 242B

Searches for New Physics at the B-Factories

merged from abstracts: 582 700 708 712 713 714 715 716 719 902 973

presented by: **Swagato Banerjee (University of Victoria)**

The B-Factories have accumulated huge data sets and provide an important window into possible new physics. In this talk, the latest search results for physics beyond the standard model will be presented from both BABAR and Belle experiments.

1112 track 10

Sat, Jul 24, 2010

10:10 15 mn

Salle 242B

The Search for New Physics at HERA

merged from abstracts: 400 401 403 404 406 408 409 800 804

presented by: **Gerhard Immanuel Brandt (Deutsches Elektronen-Synchrotron (DESY))**

This talk will cover the latest results on a variety of searches for new physics at HERA by the ZEUS and H1 Collaborations.

1113 track 10

Sat, Jul 24, 2010

17:35 15 mn

Salle 242B

Di-photon, and Di-lepton Searches at the Tevatron

merged from abstracts: 359 624 651 658

presented by: **Christopher Hays (University of Oxford)**

We search for resonances in the invariant mass spectrum of two electromagnetic (EM) object from the decay of new Z' bosons or Randall-Sundrum gravitons to electron-positron and/or photon pairs at the Tevatron. In addition, various studies of collider and cosmological data have found multilepton sources that are not well described by the usual models. These studies have motivated a theory of a new O(GeV) force that interacts with standard-model particles only through a high-mass intermediary. This new 'dark' force could produce multiple leptons with small opening angles, dubbed 'lepton jets', at hadron colliders. We present a general search for low-mass muon pairs at high transverse momentum, with sensitivity to any new light resonance.



ICHEP2010 Parallel Sessions

1170 track 10

Fri, Jul 23, 2010

16:55 15 mn

Salle Maillot

Search for Same Sign Charge Dilepton Events and WZ resonances at the Tevatron

merged from abstracts: 625 657

presented by: Adam Lyon (FERMI NATIONAL ACCELERATOR LABORATORY)

We study same-charge dilepton events and WZ resonances at the Tevatron. Same sign dilepton events are rare in the standard model and could indicate new physics processes such as chargino neutralino production in super symmetric models. A model-independent search is presented. A second analysis in which examines both lepton + jets and fully leptonic final states are used to search for resonances decaying into a WZ pair and limits are placed based on the existence of such resonances.

11 - Particle Astrophysics and Cosmology

49 track 11 Sat, Jul 24, 2010 11:00 17 mn Salle Maillot

Dark matter signature from the sky and at colliders

presented by: Shou-Hua Zhu (ITP, Peking University)

Dark matter signature can be observed via the cosmic ray (electron/positron, neutrino, gamma, etc), as well as at LHC and/or low energy colliders (e.g. BES). In this talk, I will review our recent several studies on these aspects.

156 track 11 Sat, Jul 24, 2010 14:00 17 mn Salle 251

Detecting Astrophysical Neutrinos with the IceCube Observatory

presented by: Chad Finley (Stockholm University)

Observations spanning TeV gamma rays to EeV cosmic rays suggest that a correlated flux of neutrinos within this energy range should also exist. The principal mission of the IceCube Neutrino Observatory is to detect these high energy neutrinos and identify their sources. The leading candidates are objects long suspected of accelerating cosmic rays, including supernova remnants, active galactic nuclei, and gamma ray bursts. Other potential sources of high energy neutrinos include dark matter annihilation in the Sun, which offers a complementary search channel to direct detection experiments on Earth. Next winter, the 7-year construction of the observatory will be completed, and the challenge begins in earnest. I will describe the promising results obtained so far with the early stages of the detector, and what we might learn with the full observatory in the not-too-distant future.

162 track 11 Sat, Jul 24, 2010 09:50 17 mn Salle Maillot

WIMPlless Dark Matter: Models and Signatures

presented by: Jason Kumar (University of Hawaii)

The recently proposed WIMPlless dark matter scenario provides a dark matter candidate which can have a wide range of possible masses, while still retaining the naturally correct thermal relic density of the WIMP scenario. WIMPlless dark matter thus leads to a broad array of possible signatures at current and upcoming experiments. We review the WIMPlless scenario and discuss detection strategies. We focus on possible signatures at the Tevatron, the LHC and IceCube/DeepCore, and on specific models which can explain data from DAMA/LIBRA and CoGeNT.

226 track 11 Sat, Jul 24, 2010 14:40 13 mn Salle 251

Electroweak stars: Electroweak Matter Destruction as an Exotic Stellar Engine

presented by: Dejan Stojkovic (SUNY at Buffalo)

Stellar evolution from a protostar to neutron star is one of the best studied subjects in modern astrophysics. Yet, it appears that there is still a lot to learn about the extreme conditions where the fundamental particle physics meets strong gravity regime. After all of the thermonuclear fuel is spent, and after the supernova explosion, but before the remaining mass crosses its own Schwarzschild radius, the temperature of the central core of the star might become higher than the electroweak symmetry restoration temperature. The source of energy, which can at least temporarily balance gravity, are baryon number violating instanton processes which are basically unsuppressed at temperatures above the electroweak scale. We constructed a solution to the Oppenheimer-Volkoff equation which describes such a star. The energy release rate is enormous at the core, but gravitational redshift and the enhanced neutrino interaction cross section at these densities make the energy release rate moderate at the surface of the star. The lifetime of this new quasi-equilibrium can be more than ten million years, which is long enough to represent a new stage in the evolution of a star.



ICHEP2010 Parallel Sessions

244 track 11 Sat, Jul 24, 2010 12:15 13 mn Salle Maillot

The CAST experiment: status and perspectives

presented by: Esther Ferrer Ribas (Laboratoire de l'Accelérateur Lineaire (LAL) (IN2P3) (LAL))

The status of the solar axion search with the CERN Axion Solar Telescope (CAST) will be discussed. Results from the first part of CAST phase II where the magnet bores were filled with 4He gas at variable pressure in order to scan m_a up to 0.4 eV will be presented. From the absence of excess X-rays when the magnet was pointing to the Sun, we set a typical upper limit on the axion-photon coupling of $g_{a\gamma} < 2.17 \times 10^{-10} \text{ GeV}^{-1}$ at 95% CL for $m_a < 0.4 \text{ eV}$, the exact result depending on the pressure setting. Our search for axions with masses up to about 1.2 eV using 3He as a buffer gas is in progress in the second part of CAST phase II. Expectations for sensibilities will be given. Near future perspectives as well as more long term options for a new helioscope experiment will be evoked.

257 track 11 Sat, Jul 24, 2010 09:20 13 mn Salle Maillot

Dark Matter Searches with Germanium Detectors with sub-keV Sensitivities

presented by: Shin-Ted Lin (Academia Sinica)

Experiments with sub-keV sensitivities open a window to search for WIMPs at the mass range of less than 10 GeV and for axions through resonant absorption. We will present data taken with a 500-g Point Contact Germanium detector at the Kuo-Sheng Neutrino Laboratory in 2009-2010, which improve over previous sensitivities [1]. A dedicated experiment is now under preparation at the new China Jin-Ping Underground Laboratory which has over 2500 m of rock overburden and has horizontal drive-in access [2]. Data taking is scheduled by Fall 2010. The status of construction of the laboratory and the experiment will be presented. Future plans will be discussed.

Reference:

1. S.T. Lin et al., Phys. Rev. D 79, 061101 (R) (2009).
2. D. Normile, Science 324, 1246 (2009).

263 track 11 Fri, Jul 23, 2010 14:00 17 mn Salle 251

Cosmology with Wide Field Astronomy

presented by: Marc Moniez (IN2P3-CNRS)

Wide field astronomy has recently produced important results for the dark matter and dark energy problematics. I will summarize the scientific impact of the ongoing wide field surveys and focus on the future LSST program (Large Synoptic Survey Telescope). This program will use a 8.4 m diameter telescope, equipped with a 3.2 Gpixel wide field camera. Cosmological studies is one of his main objectives.

265 track 11 Fri, Jul 23, 2010 14:20 17 mn Salle 251

Modified Gravity and Degravitation

presented by: Claudia de Rham (Geneva University)

The idea of degravitation is to account for the small late time acceleration of the Universe by modifying gravity at large distances. After reviewing the fundamental aspects of degravitation, I will discuss the importance of interactions in models that can exhibit degravitation, and present the Galileon as a broader class of modifications of gravity. Finally I will establish a link between the Galileon and the DBI action unifying models of early Universe inflation with that of late time degravitation.

278 track 11 Fri, Jul 23, 2010 14:40 13 mn Salle 251

The CHASE laboratory search for chameleon dark energy

presented by: Jason Steffen (Fermilab)

A scalar field is a favorite candidate for the particle responsible for dark energy. However, few theoretical means exist that can simultaneously explain the observed acceleration of the Universe and evade tests of gravity. The chameleon mechanism, whereby the properties of a particle depend upon the local environment, is one possible avenue. I present the results of the Chameleon Afterglow Search (CHASE) experiment, a laboratory probe for chameleon dark energy. CHASE marks a significant improvement over other searches for chameleons both in terms of its sensitivity to the photon/chameleon coupling as well as its sensitivity to the classes of chameleon dark energy models and standard power-law models. Since chameleon dark energy is virtually indistinguishable from a cosmological constant, CHASE tests dark energy models in a manner not accessible to astronomical surveys.

328 track 11 Sat, Jul 24, 2010 10:10 17 mn Salle Maillot

Electroweak symmetry breaking and cold dark matter from strongly interacting hidden sector

presented by: Pyungwon Ko (KIAS)

We consider a hidden sector with new confining gauge theory similar to ordinary QCD, and show that the lightest mesons in the hidden sector (hidden sector pion h) are automatically stable as a consequence of flavor conservation of hidden sector strong interaction. There would be more than one neutral Higgs-like scalar bosons, and they could decay mainly into the CDM pair, if that decay channel is kinematically allowed.

362 track 11 Sat, Jul 24, 2010 12:00 13 mn Salle Maillot

Antiparticle Detection in Space for Dark Matter Search: the PAMELA Experiment

presented by: Oscar Adriani (INFN Firenze)

Data on antiproton, proton, positron, electron cosmic rays between tens MeV and hundreds GeV have been obtained in four years in flight by the PAMELA experiment. The results have been theoretically studied in an extensive way as dark matter annihilation signals, as well as pulsar contributions and new mechanisms of acceleration and propagation of cosmic rays in the Galaxy. The instrument PAMELA, in orbit since June 15th 2006 on board the Russian satellite Resurs DK1, is daily delivering to ground 16 Gigabytes of data. A combination of a magnetic spectrometer and different detectors allows particles and antiparticles to be reliably identified. New data collected by PAMELA, including light nuclei, will be presented with an overview of the main trends in the theoretical interpretation of the results.

368 track 11 Fri, Jul 23, 2010 14:55 13 mn Salle 251

Dark Energy density in Split SUSY models inspired by degenerate vacua

presented by: Roman Nevzorov (University of Hawaii)

It is well known that in no-scale supergravity global symmetries protect local supersymmetry (SUSY) and a zero value for the cosmological constant. The breakdown of these symmetries that ensures the vanishing of the vacuum energy density near the physical vacuum leads to the natural realization of the multiple point principle (MPP) assumption, i.e. results in the set of degenerate vacua with broken and unbroken local supersymmetry. We present the minimal SUGRA model where the MPP assumption is realised naturally at the tree-level. In this model vacua with broken and unbroken local supersymmetry in the hidden sector (first and second phases) have the same energy density without any extra fine-tuning. Although hidden sector does not give rise to the breakdown of supersymmetry in the second phase SUSY may be broken there dynamically in the observable sector. Then a positive value of the energy density in the second vacuum is induced which can be assigned, by virtue of MPP, to all other phases including the one in which we live. The total vacuum energy density is naturally tiny or zero in this case. If gauge couplings in the physical and second vacua are the same then the dark energy density depends on the SUSY breaking scale in the physical vacuum only. Assuming Split SUSY type spectrum we argue that the observed value of the cosmological constant can be reproduced if the masses of squarks and sleptons are of order of 10^{10} GeV.



ICHEP2010 Parallel Sessions

372 track 11

Fri, Jul 23, 2010

15:10 13 mn

Salle 251

Reheating Temperature after Inflation in String-inspired Supergravity

presented by: Mitsuo J. Hayashi (Tokai University)

By using a string-inspired modular invariant supergravity model, which was proved well to explain WMAP observations appropriately, a mechanism of preheating just after the end of inflation is investigated. By using the canonically normalized and diagonalized scalars, the decay rates of these fields are calculated inflaton S into gauge sector fields.

The reheating temperature is estimated by both the stability condition of Boltzmann equation and the instant preheating mechanism. Both of reheating temperatures are almost the same order of magnitude $\sim O(10^{10})$ GeV. Because two mechanisms are completely independent processes, the former is caused through the inflaton decays into gauge fields and gauginos and the latter is caused by the scattering process of two inflatons into two right handed sneutrinos, which will decay into Higgs fields and other minimal SUSY standard model (MSSM) particles, we conclude that both mechanisms play essential roles in the preheating process after inflation.

383 track 11

Sat, Jul 24, 2010

15:30 13 mn

Salle 251

Astroparticle Physics with the ARGO-YBJ Experiment

presented by: Giovanni Marsella (Università del Salento and INFN Lecce)

The ARGO-YBJ experiment, installed at the Yangbajing Cosmic Ray Laboratory (Tibet, China), at 4300 m a.s.l., is a detector $100 \times 110 \text{ m}^2$ large, made by a layer of Resistive Plate Counters (RPCs) consisting of a central carpet with almost full coverage extending over an area of about 5.500 m^2 , surrounded by a guard ring with partial coverage. The high space-time granularity, the full-coverage technique and the high altitude location make this detector a unique device for a detailed study of the atmospheric shower characteristics with an energy threshold of a few hundred GeV. These properties in addition to the large field of view and the high duty cycle enable the ARGO-YBJ experiment to monitor the sky in a continuous way. Results have been reached in a wide variety of fields ranging from Gamma Astronomy, to Solar Physics, from Cosmic Rays composition to hadronic interactions and proton-antiproton ratio. A summary of all these results will be presented and reviewed.

451 track 11

Sat, Jul 24, 2010

14:55 17 mn

Salle 251

Recent Results From VERITAS

presented by: David Hanna (McGill University)

VERITAS (Very Energetic Radiation Imaging Telescope Array System) is an array of four 12-m atmospheric Cherenkov telescopes located near Tucson, Arizona, USA. It is sensitive to astrophysical gamma rays at energies above 100 GeV. Since becoming fully operational in September 2007, VERITAS has detected a variety of sources, including active galactic nuclei, pulsar wind nebulae, and supernova remnants. Gamma rays have also been observed from a starburst galaxy, a radio galaxy and an X-ray binary system. Searches for dark-matter annihilation and black-hole evaporation are a continuing part of the science program. This presentation will highlight recent results from VERITAS and outline plans for future upgrades and further observations.

468 track 11

Sat, Jul 24, 2010

16:15 17 mn

Salle 251

GeV to Multi-TeV Cosmic Ray: Experimental Status and Future Prospects

presented by: Martin Pohl (Université de Genève)

I review the present experimental situation of high energy cosmic rays, in the GeV to multi-TeV region. Performance of existing instruments, spectrum and composition measurements are presented. Future instruments and their expected contributions to questions like cosmic ray origin, acceleration and propagation, as well as non-standard sources like dark matter are commented on.



ICHEP2010 Parallel Sessions

517 track 11 Sat, Jul 24, 2010 11:20 17 mn Salle Maillot

Recent Results from the Fermi Gamma-ray Space Telescope

presented by: Robert Johnson (University of California at Santa Cruz)

The Fermi Gamma-ray Space Telescope, formerly named GLAST, is a mission in low-Earth orbit to observe gamma rays from the cosmos in the broad energy range from 20 MeV to >300 GeV, with supporting observations of gamma-ray bursts from 8 keV to 30 MeV. The telescope far surpasses previous generations in its ability to detect and localize faint gamma-ray sources, as well as its ability to see 20% of the sky at any instant and scan the entire sky on a timescale of a few hours. With its launch on 11 June 2008, Fermi opened a new and exciting window on a wide variety of exotic astrophysical objects and is enabling new research on such topics as the origin and circulation of cosmic rays and searches for hypothetical new phenomena such as annihilation of dark matter. In addition to introducing the mission and the instruments, this talk will present the latest results on dark matter searches, diffuse gamma-ray production, galactic sources such as pulsars and micro-quasars, and extragalactic sources such as active galaxies and gamma-ray bursts.

619 track 11 Sat, Jul 24, 2010 09:00 17 mn Salle Maillot

Results from the Final Runs of the CDMSII Experiment

presented by: Marek Kos (Syracuse University/CDMS)

The Cryogenic Dark Matter Search (CDMS) is a world leader in sensitivity to Weakly Interacting Massive Particles (WIMPs). CDMS uses a combination of ionization and phonon energy to identify nuclear recoils arising from potential WIMP scatters. As published in Science vol. 327 p.1619, exposure from the final run of the CDMS-II detectors totalled 612 kg-days for the Ge detectors after data-quality cuts were applied. In this final run we observed 2 candidate events in our signal region with an expected background of 0.9+/-0.2 events. The probability to observe 2 events with our expected background is 23%, thus we cannot claim a WIMP detection. The combined CDMSII result excludes new parameter space in elastic and inelastic dark matter models. The analysis of the final CDMSII run will be described

627 track 11 Sat, Jul 24, 2010 17:10 17 mn Salle 251

Recent Results from the Pierre Auger Observatory

presented by: Karl-Heinz Kampert (Universität Wuppertal)

The Pierre Auger Observatory is a hybrid air shower experiment which uses multiple detection techniques to investigate the origin, spectrum, and composition of ultra-high energy cosmic rays. We present recent results on these topics and discuss their implications to the understanding the origin of the most energetic particles in nature as well as for physics beyond the Standard Model, such as violation of Lorentz invariance and "top-down" models of cosmic ray production. Future plans, including enhancements underway at the southern site in Argentina will be presented.

834 track 11 Sat, Jul 24, 2010 09:35 13 mn Salle Maillot

A search for weakly interacting dark matter with the LUX experiment

presented by: Carter Hall (University of Maryland)

Cosmological and astrophysical measurements indicate that our galaxy is filled with a new type of matter previously unknown to physics. This "dark matter" apparently has no electromagnetic or strong interactions, but an interaction of the strength of the weak nuclear force is strongly suggested by the data. The LUX collaboration is attempting to detect the faint signature of weakly interacting dark matter as it passes through the earth. The experiment searches for recoiling atomic nuclei in a target consisting of 350 kg of liquefied xenon. LUX is the largest experiment of its type ever attempted, and it is expected to improve upon current experimental sensitivities by two orders of magnitude. The experiment is being assembled at the Sanford Underground Science and Engineering Laboratory (SUSEL) in Lead, South Dakota, USA, and first data is expected in 2011. We report on the status of LUX and the prospects for future large-scale dark matter searches with liquid xenon.



ICHEP2010 Parallel Sessions

896 track 11 Sat, Jul 24, 2010 15:15 13 mn Salle 251

Recent Results from Milagro and Prospects for HAWC

presented by: John Pretz (Los Alamos National Lab)

Milagro, a water Cherenkov air shower detector located in the Jemez Mountains, operated from 2000 to 2008. With its wide field of view and nearly continuous operation, Milagro has shed new light on the TeV sky. As a gamma-ray detector, it has detected and monitored known sources such as the Crab Nebula and Markarian 421, and it has discovered TeV emission from a number of other sources. As a cosmic-ray detector, Milagro characterized the large scale anisotropy, and it also discovered localized regions of excess cosmic rays. I will discuss recent results from Milagro and the status and prospects for the High Altitude Water Cherenkov experiment, under construction in Sierra Negra, Mexico.

898 track 11 Sat, Jul 24, 2010 11:40 17 mn Salle Maillot

Indirect Dark Matter searches with H.E.S.S.

presented by: Jean-Francois Glicenstein (CEA)

The H.E.S.S. experiment is an array of four identical imaging atmospheric Cherenkov telescopes in the Southern hemisphere, designed to observe very high energy gamma-rays ($E > 100$ GeV). The annihilation of dark matter particles in large mass density astrophysical objects could produce detectable very high energy gamma-rays. The HESS collaboration has searched for a dark matter annihilation signal towards several potential targets: the Galactic Centre, dwarf spheroidal galaxies, globular clusters and speculative Intermediate Mass Black Holes. The H.E.S.S. observations towards these targets will be described. In the absence of clear signals, constraints on the Dark Matter particle annihilation cross-section in several particle physics scenarios are derived.

1015 track 11 Sat, Jul 24, 2010 17:45 13 mn Salle 251

Hadron production at fixed target energies and extensive air showers

presented by: Michael Unger (Karlsruhe Institute of Technology)

NA61/SHINE is a fixed-target experiment to study hadron production in hadron-nucleus and nucleus-nucleus collisions at the CERN SPS. Due to the very good acceptance and particle identification in forward direction, NA61/SHINE is well suited for measuring particle production to improve the reliability of air shower simulations. We show the energy and phase space regions of secondary particles in hadronic interactions that are of relevance to muon production in air showers. These phase space regions of interest are almost completely covered by NA61/SHINE. Data with proton and pion beams have been taken in 2007 and 2009. First analysis results for the pion yield in proton-carbon interactions at 30 GeV will be shown and compared to predictions from models used in air shower simulations. Implications of the results will be discussed and planned analyses outlined.

1032 track 11 Sat, Jul 24, 2010 17:30 13 mn Salle 251

The trouble with ultra-high-energy cosmic rays

presented by: Glennys Farrar (New York University)

Data relating to the composition and sources of UHECRs appear to be self-contradictory. The observations will be reviewed and the question will be addressed of whether there is any way to reconcile the observations. Different options and possible interpretations will be discussed.

1035 track 11 Sat, Jul 24, 2010 16:35 17 mn Salle 251

Results from the High Resolution Fly's Eye Experiment

presented by: Pierre Sokolsky (University of Utah)

The High Resolution Fly's Eye (HiRes) experiment studied ultrahigh energy cosmic rays using the fluorescence technique. HiRes had two fluorescence sites located atop desert mountains in west-central Utah, and ran from 1997-2006. Results from the complete HiRes data set will be presented, on the spectrum, composition, and anisotropy of cosmic rays.



ICHEP2010 Parallel Sessions

1036 track 11

Sat, Jul 24, 2010

16:55 13 mn

Salle 251

Results from the Telescope Array Experiment

merged from abstracts: 724 749

presented by: **Gordon Thomson (University of Utah)**

The Telescope Array (TA) Experiment is a hybrid experiment located in west-central Utah that studies ultrahigh energy cosmic rays. The TA experiment has a surface detector of 507 scintillation counters deployed on a 1.2 km grid, and three fluorescence detector stations arranged around the surface detector which overlook it. TA is the largest cosmic ray detector in the northern hemisphere. TA results on the spectrum and composition of cosmic rays will be presented.

1039 track 11

Sat, Jul 24, 2010

14:20 17 mn

Salle 251

The ANTARES neutrino telescope

merged from abstracts: 723 868

presented by: **Maurizio Spurio (University of Bologna and INFN)**

The ANTARES high-energy neutrino telescope is a three-dimensional array of 885 photomultipliers distributed over 12 lines, installed deep in the Mediterranean Sea and completed in May 2008. The detector is optimized for the detection of muon neutrinos in an energy range from a few hundred GeV up to 1 PeV. The main goal of the experiment is to probe the Universe by means of neutrino events in an attempt to investigate the nature of high energy astrophysical accelerators, to contribute to the identification of cosmic ray sources, and to explore the nature of dark matter. The status of the detector and the first results from the analyses carried out will be reported. In particular, the results of the searches for point-like neutrino sources and of the search for an excess of events over the expected atmospheric neutrino background due to a diffuse flux of very-high energy ($E > 100$ TeV) neutrinos will be presented.

1089 track 11

Fri, Jul 23, 2010

15:25 17 mn

Salle 251

Gravitational wave detectors: First astrophysical results and path to next generation

presented by: **Fabien Cavalier (Laboratoire de l'Accelérateur Lineaire Orsay)**

After several years of construction and commissioning, LIGO, GEO600 and Virgo gravitational waves detectors have reached or exceeded their foreseen sensitivities and are in operation for few years. Even if a first detection remains unlikely with these sensitivities, meaningful results from the astrophysical point of view have been obtained on gamma-ray bursts or pulsars for example. For the current joint scientific run of LSC and Virgo collaborations, the "multi-messenger" approach has reached maturity and, in particular, online searches have been implemented in order to trigger external observations by satellites or telescopes. We hope that this "multi-messenger" strategy will be fruitful when the next generation of detectors will perform their first science runs in 2015. With a sensitivity increased by a factor 10, gravitational wave events should become frequent and will allow a better understanding of the source physics.



ICHEP2010 Parallel Sessions

12 - Beyond Quantum Field Theory Approaches (including String Theories)

126 track 12

Thu, Jul 22, 2010

12:06 18 mn

Salle 252A

Loop quantum gravity and the early universe

presented by: Aurelien Barrau (LPSC Laboratoire de Physique Subatomique et de Cosmologie)

Loop quantum gravity is, together with string theory, one of the major candidate approaches to quantize gravity. It provides a framework which allows for a non-perturbative and background-independent canonical quantization of general relativity. In this talk, I will briefly go through the basic conceptual groundings of the theory and switch to the latest developments associated with its implementation in the cosmological context. I will show that the Big Bang is replaced by a Big Bounce (therefore solving the initial singularity problem) and that inflation unavoidably occurs. Furthermore, the primordial tensor power spectrum should exhibit some characteristic features that could lead to experimental tests of this "Planck-scale" physics.

159 track 12

Thu, Jul 22, 2010

17:43 14 mn

Salle 252A

Planck Scale Cosmology and Asymptotic Safety in Resummed Quantum Gravity

presented by: Bennie Ward (Baylor University, Waco, TX, USA)

In Weinberg's asymptotic safety approach to quantum gravity, one has a finite dimensional critical surface for a UV stable fixed point to generate a theory of quantum gravity with a finite number of physical parameters. The task is to demonstrate how this fixed point behavior actually arises. We argue that, in a recently formulated extension of Feynman's original formulation of the theory, which we have called resummed quantum gravity, we recover this fixed-point UV behavior from an exact re-arrangement of the respective perturbative series. We argue that the results we obtain are consistent both with the exact field space Wilsonian renormalization group results of Reuter and Bonanno and with recent Hopf-algebraic Dyson-Schwinger renormalization theory results of Kreimer. We calculate the first "first principles" predictions of the respective dimensionless gravitational and cosmological constants and argue that they support the Planck scale cosmology advocated by Bonanno and Reuter as well. Comments on the prospects for actually predicting the currently observed value of the cosmological constant are also given.

376 track 12

Thu, Jul 22, 2010

11:00 18 mn

Salle 252A

SUSY Breaking in the Klebanov-Strassler Background by Anti-D3 Branes

presented by: Nick Halmagyi (CEA)

Constructing models of meta-stable vacua in supersymmetric theories is a crucial task for string phenomenology. It has been conjectured that anti-D3 branes in the Klebanov-Strassler background indeed produce such a supersymmetry breaking scenario. In this talk I will outline the results of a supergravity calculation which represents the backreaction of such anti-D3 branes and discuss the implications for finding meta-stable vacua from warped deformed conifolds.

391 track 12

Thu, Jul 22, 2010

11:22 18 mn

Salle 252A

Superstring Cosmology

presented by: John Estes (ENS)

In a string theory framework, one may unambiguously compute the free-energy density including the vacuum energy, in backgrounds with spontaneously broken supersymmetry. For certain classes of models, the resulting backreaction induces a cosmological evolution which mimics a radiation dominated expansion. The supersymmetry breaking scale is attracted to the temperature scale and the internal moduli may be stabilized at points of enhanced symmetry. Finally the expansion may go through several higher dimensional phases, before the final attraction to a four dimensional evolution.



ICHEP2010 Parallel Sessions

447 track 12 Thu, Jul 22, 2010 14:42 18 mn Salle 252A

Quantum entropy function

presented by: Ashoke Sen (Harish-Chandra Research Institute)

In this talk we shall describe how quantum entropy function formalism allows us to compute classical, perturbative and non-perturbative contribution to the extremal black hole entropy. We shall also compare the results with microscopic results.

589 track 12 Thu, Jul 22, 2010 15:24 18 mn Salle 252A

Classical solutions of open string field theory

presented by: Martin Schnabl (Institute of Physics AS CR, Prague)

We review recent progress in finding and analyzing classical solutions of open string field theory.

746 track 12 Thu, Jul 22, 2010 09:44 18 mn Salle 252A

Monodromies and the structure of gauge and gravity amplitudes

presented by: Pierre Vanhove (IPHT CEA/Saclay & IHES)

We show that different color-ordered tree-level amplitudes in gauge theories satisfy monodromy relations. These relations imply the existence of minimal basis of amplitude and provide the numerator factors of the amplitude for a parametrisation of the tree-level amplitude using only cubic vertices. Applications to supergravity amplitudes follow straightforwardly through the KLT-relations. Through the cuts, these tree-level relations give rise to non-trivial identities at loop level. At higher loop this constrains the critical ultraviolet behaviour of the four-graviton amplitude in N=8 supergravity to all order in perturbation. We argue this implies that the four-graviton N=8 amplitudes has a seven-loop logarithmic divergence in four dimensions.

756 track 12 Thu, Jul 22, 2010 16:15 27 mn Salle 252A

Holography for Schroedinger

presented by: Kostas Skenderis (University of Amsterdam)

There has been a lot of interest in recent times in systems with non-relativistic conformal symmetry, such as the Schroedinger symmetry. Such systems appear in condensed matter physics such as, for example, fermions at unitarity. Here we discuss how to set up holography for bulk systems with Schroedinger symmetry.

862 track 12 Thu, Jul 22, 2010 10:06 18 mn Salle 252A

Bounds on Anomalous Dimensions and OPE Coefficients from Crossing Symmetry in 4D CFTs. Applications to Conformal Technicolor and Unparticles

presented by: Slava Rychkov (ENS & Jussieu)

A classic result of 4D CFT says that, in a unitary theory, a scalar operator of dimension $d=1$ is free. We will present results showing in which sense a scalar O of dimension $d>1$ but close to 1 is "nearly free". Namely, we analyze the OPE $O \times O$ of such a scalar with itself and show that 1) there must be a scalar of dimension $2+O(\sqrt{d-1})$ in this OPE; 2) in the $d \rightarrow 1$ limit, no scalars of dimension different from 2 can appear in this OPE. Our methods use the crossing symmetry constraint for the 4-point function $\langle OOOO \rangle$. They give numerical bounds on anomalous dimensions and OPE coefficients even as $d-1$ gets large. Apart from theoretical interest, such bounds have application to phenomenology (models of conformal EWSB and unparticles).

865 track 12

Thu, Jul 22, 2010

09:22 18 mn

Salle 252A

Perturbative Quantum Gravity from Gauge Theory

presented by: Henrik Johansson (IPhT CEA Saclay)

In a previous paper we observed that (classical) tree-level gauge theory amplitudes can be rearranged to display a duality between color and kinematics. Once this is imposed, gravity amplitudes are obtained using two copies of gauge-theory diagram numerators. Here we suggest that this duality persists to all quantum loop orders and can thus be used to obtain multi-loop gravity amplitudes easily from gauge-theory ones. As a non-trivial test, we show that the three-loop four-point amplitude of $N=4$ super-Yang-Mills theory can be arranged into a form satisfying the duality, and by taking double copies of the diagram numerators we obtain the corresponding amplitude of $N=8$ supergravity. We also remark on a non-supersymmetric two-loop test based on pure Yang-Mills theory resulting in gravity coupled to an anti-symmetric tensor and dilaton.

931 track 12

Thu, Jul 22, 2010

15:03 18 mn

Salle 252A

Multicentered Microstates and Large Quantum Fluctuations

presented by: Sheer El-Showk (CEA Saclay)

We quantize a family of smooth multicentered supergravity solutions generating (micro)states of a large supersymmetric black hole in five dimensions. Certain special states are found to suffer from unexpected, macroscopically large quantum fluctuations in the near horizon region of the putative black hole. This breakdown in effective field theory near the horizon may be relevant in resolving black hole paradoxes and hence warrants further study. We report on on-going attempts to re-introducing "stringy" degrees of freedom in the near horizon region, continuing these solutions (by virtue of a non-renormalization theorem) to a weakly coupled D-brane quantum mechanics, where additional degrees of freedom, unapparent in supergravity, may be more tractably studied.

933 track 12

Thu, Jul 22, 2010

17:06 18 mn

Salle 252A

Recent progress in the AdS₄/CFT₃ correspondence

presented by: James Sparks (University of Oxford)

I will summarize recent progress in constructing M-theory/string theory duals to (2+1)-dimensional superconformal field theories.

1114 track 12

Thu, Jul 22, 2010

11:44 18 mn

Salle 252A

Supersymmetry breaking branes and de Sitter vacua in generalised geometry

presented by: Michela Petrini (CNRS/LPTHE)

We discuss supersymmetry breaking compactifications in type IIA and we propose a new treatment of non-supersymmetric sources: for space-time filling supersymmetric branes, the energy density is minimized by a pullback of a special form given by a pure spinor. We propose to extremise the combined bulk-brane energy density by replacing the DBI action by a pullback of a polyform from the bulk, which is no longer pure.

1161 track 12

Thu, Jul 22, 2010

16:45 18 mn

Salle 252A

Towards a novel description of flavor dynamics in holographic QCD

presented by: Vasilis Niarchos (University of Crete and Ecole Polytechnique)

D-branes with a U-shaped geometry, like the D8 flavor branes in the Sakai-Sugimoto model of QCD, are encountered frequently in holographic backgrounds. We argue that the commonly used DBI action is inadequate as an effective field theory description of these branes, and discuss an effective action that incorporates naturally the non-local physics of a complex scalar mode. Our results are relevant for the holographic description of chiral symmetry breaking and bare quark mass in QCD and open string tachyon condensation in curved backgrounds.



ICHEP2010 Parallel Sessions

1201 track 12

Thu, Jul 22, 2010

14:00 37 mn

Salle 252A

Gravity as an Emergent Force

presented by: Erik Verlinde (ITP, University of Amsterdam)

Starting from first principles and general assumptions Newton's law of gravitation is shown to arise naturally and unavoidably in a theory in which space is emergent through a holographic scenario. Gravity is explained as an entropic force caused by changes in the information associated with the positions of material bodies. A relativistic generalization of the presented arguments directly leads to the Einstein equations. When space is emergent even Newton's law of inertia needs to be explained. The equivalence principle leads us to conclude that it is actually this law of inertia whose origin is entropic.

1202 track 12

Thu, Jul 22, 2010

09:00 18 mn

Salle 252A

Scattering amplitudes in maximally supersymmetric Yang-Mills theory

presented by: Gregory Korchemsky (CEA Saclay)

I will review a recent progress in computing scattering amplitudes in maximally supersymmetric Yang-Mills theory. In addition to the conventional symmetry of the underlying Lagrangian, the scattering amplitudes in this theory exhibit a new, dual superconformal symmetry. This symmetry is powerful enough to completely determine the scattering amplitudes for arbitrary coupling in a suitably defined limit.

1205 track 12

Thu, Jul 22, 2010

17:27 14 mn

Salle 252A

Virtual Compton Scattering off a Spinless Target in the AdS/QCD correspondence

presented by: Samuel Wallon (CNRS/LPT Orsay)

We study the doubly virtual Compton scattering off a spinless target $\gamma^* P \rightarrow \gamma^* P'$ within the Anti-de Sitter(AdS)/QCD formalism. We find that the general structure allowed by the Lorentz invariance and gauge invariance of the Compton amplitude is not easily reproduced with the standard recipes of the AdS/QCD correspondence. In the soft-photon regime, where the semi-classical approximation is supposed to apply best, we show that the measurements of the electric and magnetic polarizabilities of a target like the charged pion in real Compton scattering, can already serve as stringent tests.



ICHEP2010 Parallel Sessions

13 - Advances in Instrumentation and Computing for HEP

193 track 13

Sat, Jul 24, 2010

09:00 15 mn

Salle 252A

Performance of the MEG detector to search for $\mu^+ \rightarrow e^+ \gamma$ decays at PSI

presented by: Toshiyuki Iwamoto (The University of Tokyo)

The MEG experiment, which searches for a rare muon decay, $\mu \rightarrow e \gamma$, to explore supersymmetric grand unification, has started physics run since 2008 at Paul Scherrer Institute, Switzerland. Its innovative detector system, which consists of a 900 liter liquid xenon scintillation photon detector and a positron spectrometer with a superconducting magnet, drift chamber, and timing counter, enables orders of magnitude better sensitivity than previous experiments. The detector performance of the MEG experiment mainly at physics run in 2009 is described here in detail together with the detector calibration and monitoring methods.

215 track 13

Sat, Jul 24, 2010

16:55 15 mn

Salle 252A

The LHCb Upgrade

presented by: Marina Artuso (Syracuse university)

LHCb probes physics beyond the Standard Model by measuring CP violating and rare b and c decays. It also searches for the production of exotic objects at large rapidities and relatively small transverse momenta. Sensitivities can be greatly enhanced by having an order of magnitude larger data sample than originally planned and a more flexible trigger. We can reconfigure the LHCb experiment to collect data at ten times the rate of its current design. We also can improve the efficiency of triggering on purely hadronic final states by about a factor of two. We will describe the physics objectives of such an upgrade, and discuss the necessary changes in the detector. Our plans include being able to examine each of the 40 MHz of beam crossings in order to decide which events to keep, by reading out the entire detector into a farm of computers and making the selections purely in software. Such a flexible "trigger" design allows for easy and highly efficient changes when different processes or decay modes are indicated to be important to analyze. We also will outline progress for a new pixel based vertex detector and improvements in other systems.

361 track 13

Sat, Jul 24, 2010

11:20 13 mn

Salle 252A

The ATLAS High Level Trigger Configuration and Steering Software; Experience with 7 TeV Collisions.

presented by: Simon George (Royal Holloway)

In 2010 ATLAS has seen the first proton-proton collisions at 7 TeV. Later this year a collision rate of nearly 10 MHz is expected. Events of potential interest for physics analysis are selected by a three-level trigger system, with a final recording rate of about 200 Hz. The first level (L1) is implemented in customized hardware, the two levels of the high level trigger (HLT) are software triggers.

The selection is described by the Trigger Configuration in the form of menus, each of which contains more than 500 signatures. Each signature corresponds to a chain of algorithms which reconstruct and refine specific event features. The HLT Steering receives information from the Configuration system, dynamically creates chains and controls the execution of algorithms and flow of information during event processing. The Steering tests each signature on L1-accepted events, and those satisfying one or more test are recorded for later analysis. To save execution time, the Steering has a facility to cache results, avoiding later recalculation. To control rate, prescale factors can be applied to L1 or HLT signatures. Where needed for later analysis, the Steering has a test-after-accept functionality to provide the results of the tests for prescaled signatures.

In order to maintain a high selection efficiency it is essential that the trigger can be dynamically re-configured in response to changes in the detector or machine conditions, such as the status of detector readout elements, instantaneous LHC luminosity and beam-spot position. This relies on techniques that allow configuration changes, such as L1 and HLT prescale updates, to be made during a run without disrupting data taking, while ensuring a consistent and reproducible configuration across the entire HLT farm.

We present the performance of the steering and configuration system during collisions and the expectations for the first phase of LHC exploitation.

365 track 13

Sat, Jul 24, 2010

16:15 15 mn

Salle 252A

Online track reconstruction at hadron colliders

presented by: **Silvia Amerio (INFN Padova)**

Real time event reconstruction plays a fundamental role in High Energy Physics experiments. Reducing the rate of data to be saved on tape from millions to hundreds per second is critical. In order to increase the purity of the collected samples, rate reduction has to be coupled with the capability to simultaneously perform a first selection of the most interesting events. A fast and efficient online track reconstruction is important to effectively trigger on leptons and/or displaced tracks from b-quark decays. This talk will be an overview of online tracking techniques in different HEP environments: we will show how H1 experiment at Hera faced the challenges of online track reconstruction implementing pattern matching and track linking algorithms on CAMs and FPGAs in the Fast Track Processor (FTT). The pattern recognition technique is also at the basis of the Silicon Vertex Trigger (SVT) at the CDF experiment at Tevatron: coupled to a very fast fitting phase, SVT allows to trigger on displaced tracks, thus greatly increasing the efficiency for the hadronic B decay modes. A recent upgrade of the SVT track fitter, the Gigafitter, can perform more than 1 fit/ns and further improves the CDF online trigger capabilities at high luminosity. At SLHC, where luminosities will be 2 orders of magnitude greater than Tevatron, online tracking will be much more challenging: we will describe CMS future plans for a Level-1 track trigger and the Fast Tracker (FTK) processor at the ATLAS experiment, based on the Gigafitter architecture and designed to provide high quality tracks reconstructed over the entire detector in time for a Level-2 trigger decision. At SLHC, where luminosities will be 2 orders of magnitude greater than Tevatron, online tracking will be much more challenging: we will describe CMS future plans for a Level-1 track trigger and the Fast Tracker (FTK) processor at the ATLAS experiment, based on the Gigafitter architecture and designed to provide high quality tracks reconstructed over the entire detector in time for a Level-2 trigger decision. We will describe the GF architecture, its performance, the impact on the CDF physics program and its use in the future FTK processor for ATLAS.

553 track 13

Sat, Jul 24, 2010

17:15 15 mn

Salle 252A

ATLAS Upgrade for the sLHC: meeting the challenges of a five-fold increase in collision rate

presented by: **Andrey Loginov (Yale University, Physics Department)**

With the LHC collecting first data at 7 TeV, plans are already advancing for a series of upgrades leading eventually to about five times the LHC design-luminosity some 10 years from now in the super-LHC (sLHC) project. The goal is to extend the data set from about 500 fb⁻¹ proposed for the LHC to 3000 fb⁻¹ by around 2030. Coping with the high instantaneous and integrated luminosity will require many changes to the ATLAS detector. The designs are developing rapidly for an all-new inner-tracker, big changes in the calorimeter and muon systems, as well as improved triggers. This talk summarises the environment expected at the sLHC and the status of the improvements to the ATLAS detector.

736 track 13

Sat, Jul 24, 2010

11:50 15 mn

Salle 252A

The KLOE-2 experiment at DAFNE upgraded in luminosity.

presented by: **Flavio Archilli (University of Rome Tor Vergata)**

The KLOE experiment at the DAFNE e⁺e⁻ collider of the Frascati Laboratories of INFN is going to start a second data-taking campaign (KLOE-2). The detector has been upgraded with small angle electron taggers, while the insertion near the interaction point of an inner tracker is planned for the next year. The interaction region of DAFNE has been modified using a crabbed waist scheme. It has been successfully tested and an improvement in luminosity of about a factor 3 is expected. The KLOE-2 scientific program aims to further improve the experimental studies on kaon and low energy hadron physics, e.g. CKM unitarity and Lepton universality, CPT symmetry and quantum mechanics, low energy QCD, gamma-gamma physics, the contribution of hadron vacuum polarization to muon anomalous moment.



ICHEP2010 Parallel Sessions

744 track 13

Sat, Jul 24, 2010

11:35 13 mn

Salle 252A

The CMS Level 1 Triggersystem - functionality and performance

presented by: Herbert Rohringer (Institut fuer Hochenergiephysik (HEPHY) - Oesterreichische Akad.)

We describe the functionality of the hardware based CMS L1 trigger system, which uses special trigger data from our Muon system, the Electromagnetic and Hadronic calorimeters for triggering on jets, electron/gammas and muons, total transverse and missing energy. With these "triggerobjects" complex algorithms can be built, which run simultaneously in the hardware, can be grouped together and masked on demand and are easily changeable by adapting the firmware via a GUI. Technical triggers care for clean collisions, whereas physics triggers are set up to catch interesting physics channels. The available trigger decision (latency) time is designed for 3.2 microseconds, after which via the DAQ the detector data are read out for further processing, reconstruction and filtering (High Level trigger HLT) online in a computerfarm. In addition a central trigger steering and controlling system allows to control the trigger components. The hardware trigger decisions are checked via software during event processing. We show our experience with this flexible and adaptive system in cosmic runs and the tuning, performance and efficiency with collision data of the LHC.

763 track 13

Sat, Jul 24, 2010

14:00 15 mn

Salle 252A

T2K near detector tracker

presented by: Flor de Maria Blaszczyk (CEA / Irfu / SPP)

Tokai to Kamioka (T2K) is a new generation neutrino oscillation experiment that started collecting data in 2009 in Japan. A ν_μ beam produced by an intense proton beam colliding onto a target is directed from J-PARC (Tokai) to the 50kt water Cerenkov detector Super Kamiokande at a distance of 295 km. T2K's main goals are measuring one of the last unknown parameters of the PMNS matrix θ_{13} by using ν_e appearance in the beam, and measuring precisely Δm^2_{23} and θ_{23} by using ν_μ disappearance.

A near detector (ND280) placed in a 0.2 T magnetic field is located at 280m from the target to allow the characterisation of the neutrino beam before oscillation. In particular, the detector measures the neutrino energy spectra, beam flavor composition, background and cross-sections. ND280 started taking data at the end of 2009. An essential element of ND280 is the tracker, composed of two fine grained detectors (FGD) to serve as targets for neutrino interactions and measure cross-sections, and three time projection chambers (TPC) to track and identify charged particles. The TPCs' readout planes are equipped with Micromegas micro-pattern detectors, achieving a total active surface of 9m². The first FGD is made of scintillator bars only whereas the second one includes water targets. The performance of the tracker with cosmic ray and neutrino data will be presented.

843 track 13

Sat, Jul 24, 2010

11:00 15 mn

Salle 252A

High energy photon production in bent crystals: status and perspectives.

presented by: Said Hasan (Universita dell'Insubria - Como and INFN Milan-Bicocca)

Bent crystals are devices able to deflect ultrarelativistic particle beams, exploiting the electric fields, present at the atomic scale, which are equivalent to a magnetic field of hundreds of tesla. For this reason they are currently used in particle accelerators for beam extraction, splitting and collimation. Inside a bent crystal, several particle trajectories are possible as a function of the crystal orientation, dimension and curvature; a positron or an electron following these trajectories emits a high energy radiation spectrum; compared with the bremsstrahlung one these spectra are about 10 times larger in intensity and have a peaked structure thus becoming a photon source of great interest. In this work the results of a series of measurements performed on the CERN H4 SPS beam line with 120~GeV/c positrons are presented. The setup consists of a three layer silicon microstrip telescope to measure the crystal deflection properties, two 9.5x9.5~cm² silicon beam chambers which act, in combination with a bending magnet, as a spectrometer and two electromagnetic calorimeters, one for the positron identification and the other to measure the photon energy. During the tests, different effects have been studied in detail. Planar channeling and volume reflection have been characterized as a function of the crystal radius and compared in terms of emitted radiation and angular acceptance; the results are in agreement with the theoretical prediction. Moreover for the first time the axial orientation has been investigated from the radiation emission point of view providing interesting results in terms of intensity both for the axial channeling and the multi volume reflection phenomenon. A beamtest to investigate the axial phenomena more deeply is foreseen in June 2010 completing the scenario that will be presented at the conference.



ICHEP2010 Parallel Sessions

890 track 13

Sat, Jul 24, 2010

16:35 15 mn

Salle 252A

Development of ultra-light pixelated systems based on CMOS sensors for future high precision vertex detectors

presented by: **Marc Winter (Institut Pluridisciplinaire Hubert Curien)**

CMOS pixel sensors have demonstrated attractive performances in terms of spatial resolution and material budget. The recent emergence of high resistivity substrates in mass production CMOS processes has originated particularly high signal-to-noise ratios and improved the non-ionising radiation tolerance to fluences close to 10^{14} Neq/cm². These achievements, obtained with MIMOSA sensors developed at IPHC (Strasbourg) and IRFU (Saclay) will be overviewed and put in perspective of the numerous applications of the sensors. These include collider experiments at RHIC, LHC, ILC and CLIC. The development of ultra-light ladders composed of these sensors and featuring 0.1% to 0.3% of radiation length, will be summarised. The contribution to the conference will also address the evolution of these pixelated systems, including on-going R&D on multi-tier sensors exploiting vertical integration technologies.

996 track 13

Sat, Jul 24, 2010

12:10 15 mn

Salle 252A

Detectors for leptonic CP violation at the Neutrino Factory

presented by: **Andrew Laing (University of Glasgow)**

The Neutrino Factory is the most powerful of the proposed facilities to search for CP violation in the lepton sector via neutrino oscillations. It delivers a well known beam of electron neutrinos and muon-antineutrinos from positive muon decay (electron-antineutrinos and muon neutrinos from negative muon decay) produced in the straight sections of the storage rings in which the muons are confined at an energy of 25 GeV. Studies carried out in the framework of the International Design Study for the Neutrino Factory (the IDS-NF) show that the sensitivity to the CP-violating phase, the mass hierarchy, and the last unknown mixing angle θ_{13} is maximised with far detectors able to detect with low background the sub-leading ν_e to ν_μ oscillations. The IDS-NF baseline configuration calls for two detectors, one situated between 2000 km and 5000 km and another at the magic baseline of around 7500 km. Several technologies are being discussed for these magnetised detectors: iron calorimeters; giant liquid argon TPCs; and totally active scintillating detectors. The IDS-NF baseline option – as a compromise between feasibility, cost, mass, and performance – is a 100 Kton magnetised iron sampling calorimeter at the intermediate baseline, similar to the existing MINOS detector but with 20 times more mass and improved performance, and a 50 Kton detector at the magic baseline. The other far-detector options, which have better granularity and offer both a lower energy threshold and an improved energy resolution, would complete the scientific return of the facility by detecting additional oscillation channels or unexpected effects and carry out a rich non-accelerator based neutrino programme. All options still require significant R&D. A near detector of much smaller mass for precise measurement of neutrino flux and neutrino cross-sections will be situated close to the end of the muon storage ring straight section(s). The various detector options will be discussed, covering the most important aspects: performance; technological challenges; as well as the R&D program and expected cost drivers.

CALICE results and future plans

merged from abstracts: 331 332

presented by: **Imad Laktineh (Lyon)**

The CALICE Collaboration is carrying out R&D for a highly granular calorimeter system, optimised for particle flow calorimetry at a future linear collider. Starting in 2006, a complete calorimeter chain (ECAL, HCAL and tail catcher) has been tested in muon, electron and hadron beams at CERN and Fermilab. Two electromagnetic calorimeters were tested, both based on tungsten absorber – one using ~ 10000 1×1 cm² silicon diode pads as the sensitive medium, and the other using small (1×4 cm²) scintillator strips. The hadron calorimeter had an iron-scintillator sandwich structure, using ~ 10000 scintillator tiles read out using silicon photomultipliers (SiPMs).

We report here on the analysis of shower data, and the comparison of the results with GEANT4 simulations. Muons are used to calibrate all the detectors, and the study of the response to electrons is a crucial first step in the understanding of all the detectors. One of the main objectives of the analysis is the study of the hadron response, since this can be more difficult to simulate reliably. Amongst the topics discussed will be the energy response of the system to hadrons, and the use of techniques of software compensation to improve the energy resolution. The high granularity of the calorimeters permit the comparison between data and simulations in unprecedented resolution; for example, individual tracks within the shower can be reconstructed, the start of the shower can be identified with high precision, and the longitudinal and transverse distributions of energy studied. These measurements provide interesting new ways of assessing the accuracy of the various physics models available in GEANT4. We also use the data to test features of the showers which are important for particle flow algorithms.

Much of the current work is now directed towards second generation prototypes in which more realistic mechanical designs and readout systems are employed. In 2010-11 a cubic prototype of a digital HCAL based on RPCs with 1×1 cm² readout will be tested at Fermilab. This calorimeter will contain ~ 40 active layers and the total number of readout channels will be close to 400,000, and will permit extensive tests of the digital HCAL concept, and evaluation of its suitability for particle flow applications. In addition, modules of an alternative design, intended to be as close as possible to the one proposed in the ILD LOI, is being produced. These will be based on 1m² gas-filled RPCs of 3 mm thickness and fully equipped with a semi-digital electronics readout. Further technologies are being developed within CALICE for the sensitive layers in a digital calorimeter, using either GEMs or MicroMegas, and these results will allow critical comparisons between different technologies to be performed.

Second generation prototypes are also being developed for two ECAL options – a Si-W calorimeter using 5×5 mm² pads with very thin sensors and readout electronics embedded in a very thin PCB, and a scintillator-strip option. A scintillator tile HCAL is also in preparation, using 3×3 cm² tiles, and the whole system will be operated in a mechanical structure close to that which is envisaged for the full-scale ILD detector. In all cases, the main focus will be the mechanical and electrical integration of realistic front-end electronics into the calorimeter absorber structure so as to create a high-density calorimeter. Issues such as temperature control and heat flow, and the impact of power pulsing of the electronics are to be addressed.

Operation of the CMS detector with first collisions at 7 TeV at the LHC

presented by: **Gianluca Cerminara (CERN)**

The CMS detector, now taking data at the LHC in Geneva, is a very complex apparatus with more than 70 million acquisition channels. To exploit its full physics potential, a very careful calibration of the various components (crystal, drift tubes, silicon devices) and their attached electronics, together with an optimal knowledge of them in 3D space, is absolutely needed. The CMS Collaboration is putting a big effort in developing and deploying an infrastructure to allow for the best knowledge of those conditions at any given moment, thus following as fast as possible any change in running conditions. The talk will cover the development side of the Calibration and Alignment system, together with planned features and the operational report from the first data taking period for the different detectors. Focus is also put on the detector performances and features of the Reconstruction used to allow for such high precision calibrations.



ICHEP2010 Parallel Sessions

1197 track 13

Sat, Jul 24, 2010

15:00 15 mn

Salle 252A

Operation of the ATLAS detector with first collisions at 7 TeV at the LHC

presented by: Peter Onyisi (University of Chicago)

The ATLAS experiment at the LHC started to accumulate 7TeV pp collisions data early in 2010. We shall report on the operations of the detector, discussing e.g. details of the detector status, the data acquisition efficiency with beam, the online measurement of the LHC luminosity. The online monitoring and data quality assessment will be described.

1220 track 13

Sat, Jul 24, 2010

15:20 20 mn

Salle 252A

Micro Pattern Gas Detectors in High Energy Physics

merged from abstracts: 438 518 926

presented by: Jochen Kaminski (Bonn University)

Micro-pattern gas detectors are used for an increasingly wide range of detector applications in particle physics. Both GEM based detectors and Micromegas based detectors are being studied. Several new production techniques in particular for Micromegas detectors have recently been announced.

In this talk the state of the different technologies will be discussed, together with a review of their current and planned applications. Both the traditional readout of GEM or Micromegas using a pad plane as well as the novel combination of a Micro pattern gas detector with a silicon pixel readout will be presented.

1221 track 13

Sat, Jul 24, 2010

14:20 15 mn

Salle 252A

LHCb Computing experience with first data

presented by: Marco Adinolfi (University of Bristol)

After several years of experience with Grid production and Analysis dealing with simulated data, the first LHC collision data (as of March 2010) have confronted the LHCb Computing Model with real data. The LHCb Computing Model is somewhat different from the traditional MONARC hierarchical model used by the other LHC experiments: first pass reconstruction, as well as further reprocessings, are performed at a set of 7 Tier-1 sites (including CERN), while Tier2 sites are used mainly for simulation productions. User analysis is performed at LHCb Analysis Centres for which the timeline is the 7 Tier1s. Event reconstruction is enabled only after thorough checking of the quality of the data. In case there is a need for a new calibration or alignment of the detector, new calibration constants are generated and certified, before the reconstruction can proceed. Analysis relies on the concept of reduced datasets (so-call stripped datasets) that are centrally produced at the 7 Tier-1's and then distributed to all the analysis centres. We shall review the performance of this model with the 2010 real data, and give an outlook for possible modifications to be put in place for the 2011 run.

1223 track 13

Sat, Jul 24, 2010

09:45 15 mn

Salle 252A

Experience with CMS Offline and Computing from Commissioning to Collisions

merged from abstracts: 818 852

presented by: Markus Klute (Massachusetts Institute of Technology)

In this presentation we will discuss the early experience with the CMS computing model from the last large scale challenge activities through the early collisions runs. Between the initial definition of the CMS Computing Model in 2004 and the start of high energy collisions in 2010, CMS exercised numerous scaling tests. We will discuss how those tests have helped prepare the experiment for operations. We will outline how the experiment operations has evolved during the first few months of operations. The current state of the Offline and Computing projects will be presented and we will describe the initial experience with active analysis users and real data. We will include Tier0 processing, reprocessing steps on data and fast turn-around calibrations. We will address the issues that worked well in addition to identifying areas where future development and refinement are needed.



ICHEP2010 Parallel Sessions

1224 track 13

Sat, Jul 24, 2010

17:35 15 mn

Salle 252A

Upgrade of the CMS detector

presented by: Ivan Kresimir Furic (Department of Physics - University of Florida)

The CMS detector will be upgraded during the anticipated year-long shutdowns of 2012 and 2015/2016 to enhance its physics reach. Operating after collection of few tens of fb⁻¹ luminosity at nominal energy, the upgraded detector would have already explored the Standard Model higgs sector and TeV-scale SUSY and other new physics processes. The physics program beyond 2015 will be primarily for thorough exploration of higgs sector and any new physics phenomena discovered earlier. While most of the CMS detector is built for operations several hundred fb⁻¹ luminosity will not only mitigate the calorimeter noise problems and data losses in the pixel system for 50 ns operation at design luminosity but also enhance CMS physics capability. The focus of the early upgrades will be on 1) improved pixel detector with four layers, one of which could be closer to the beam pipe, 2) use of higher efficiency light detectors and associated electronics for the hadron calorimeters, 3) additional cathode strip and resistive plate chambers in the forward regions to improve acceptance and redundancy for muons and 4) the trigger system built with more powerful modern processors to increase its functionality. The upgraded pixel system will provide improved b-tagging, pixel track seeding and stand-alone tracking capabilities, which will enhance CMS physics reach in exploring the higgs sector where b-jets and tau-leptons are often produced in association with the higgs boson or in its decays. The calorimeter upgrade improves the resolution of jets and provides better isolation of leptons. The forward muons upgrades will provide additional muon hit measurements to provide higher efficiency and resolution for muons in certain pseudo-rapidity regions, providing significant additional acceptance for muons at the trigger level. The enhanced trigger system will allow CMS to operate at low enough lepton, especially tau-lepton, trigger thresholds to enable the study of the higgs boson properties in both Standard Model and MSSM scenarios.

1225 track 13

Sat, Jul 24, 2010

10:05 15 mn

Salle 252A

ATLAS Computing: From Commissioning to 7TeV Data

merged from abstracts: 260 549

presented by: Graeme Andrew Stewart (University of Glasgow)

In this paper we summarise ATLAS operations from the STEP09 campaign in June 2009 through to ATLAS taking data in the first 7 TeV collisions at the LHC in 2010. We describe the lessons which were learned from the STEP09 challenge, both in proving which parts of the system were in good shape, but also in highlighting those areas which required improvement. We then describe the experience of ATLAS computing operations during the first LHC data taking era. The ATLAS experiment has successfully recorded, reconstructed, distributed and analysed millions of collision events delivered by the LHC at an unprecedented centre-of-mass energy of 7 TeV. The involved large-scale data processing operations, both the prompt reconstruction at Tier0 and the subsequent reprocessing campaigns in the Tier1 sites in the Grid, worked remarkably well.



ICHEP2010 Parallel Sessions

14 - Future Machines and Projects

312 track 14

Sat, Jul 24, 2010

14:05 20 mn

Salle 253

The SuperB Project

presented by: **Marcello Giorgi (INFN& Universita' di Pisa)**

SuperB is a project to build in Italy a high luminosity (Peak Luminosity $> 10^{36}$) asymmetric $e^+ e^-$ collider to study flavour physics in the present decade with the goal of discovery New Physics beyond Standard Model. One of the beams will be longitudinally polarized ($P > 80\%$) and the machine can be operated at open charm threshold.

Beauty and Charm rare decays can be studied in five years run with a statistics 100 times higher than the present. In addition thanks to the high luminosity and to the beam polarization, Tau lepton physics will be studied with unprecedented precision, the Tau magnetic structure and CP violation in Tau decays can be explored.

Together with the approval process, the status of the project is reported with an update of the machine design, the detector and the physics program.

561 track 14

Sat, Jul 24, 2010

14:30 20 mn

Salle 253

The SuperKEKB accelerator status

presented by: **Masako Iwasaki (KEK)**

For the next generation B-factory experiment in Japan, SuperKEKB, the high luminosity e^+e^- asymmetric collider at the B mesons CM energy, is planned as an upgrade of the current KEKB.

It is designed to achieve a luminosity of $8 \times 10^{35} / \text{cm}^2/\text{s}$, 40 times higher than the highest luminosity record at KEKB.

A summary of the current machine design and R&D status will be presented.

585 track 14

Sat, Jul 24, 2010

13:50 12 mn

Salle 253

Status of KM3NeT

presented by: **Paul Kooijman (Univ. of Amsterdam)**

The technical design report of the KM3NeT neutrino detector has been published. In this talk we describe the main features of this future telescope. The detector will be located on the floor of the Mediterranean Sea and will have a total volume of about 8 km³. The point source sensitivity for sources near the Galactic Centre will be more than two orders of magnitude better than any other telescope. The physics capabilities for other cosmic processes will also be covered. The technical solutions and innovations employed to achieve the quoted sensitivity will be presented together with a likely timeline for the building of the telescope.

590 track 14

Sat, Jul 24, 2010

11:00 20 mn

Salle 253

The Global Design Effort for the International Linear Collider

presented by: **Barry Barish (CalTech)**

A reference design and costing for a 500 GeV electron-positron linear collider based on superconducting radio frequency acceleration (ILC) was produced by the Global Design Effort (GDE) in 2007. That design and the risk mitigating R&D toward a technical design are being evolving with a goal of developing a technical design report and implementation plan at the end of 2012. The ILC TDR, CLIC feasibility tests and early LHC physics results are all necessary elements for deciding the next generation major project for high energy physics. The status and prospects for the ILC will be presented.



ICHEP2010 Parallel Sessions

1027 track 14

Sat, Jul 24, 2010

11:40 20 mn

Salle 253

CLIC Progress and Status

presented by: Daniel Schulte (CERN)

The compact linear collider study (CLIC) is aiming at delivering a conceptual design for a multi-TeV linear electron-positron collider in 2011.

This concept is based on high gradient normal-conducting accelerating structures. The RF power for the acceleration of the colliding beams is produced by a novel Two Beams Acceleration scheme based on extracting power from a high current drive beam that runs in parallel with the main linac through special power extraction structures. In order to establish the feasibility of this concept a number of key issues need to be addressed. A short summary of the progress and status of the corresponding studies will be given.

1028 track 14

Sat, Jul 24, 2010

17:30 20 mn

Salle 253

LHC machine upgrades

presented by: Roger Bailey (CERN)

The plans for increasing the integrated luminosity of the LHC beyond its nominal parameters are well under way. The first upgrade is based on improvement of the collimation system, probably the most limiting factor at present. This will allow to reach and to pass the nominal $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$. Other improvements in the injector chain (Linac4, PSB at 2 GeV, SPS upgrade) and in the LHC ring (a new cryo-plant for cooling of SC RF cavities, removal of radiation limitation in electronic equipment, etc.) should be able to bring us around $1.7\text{-}2 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$. Then, in the longer term a major upgrade involving :

- a new Inner Triplets and insertion magnets (possibly based on High Field Nb3Sn technology)
- a revision of the matching region and of the corrector system
- Crab Cavities to allow full exploitation of the low beta* of the new triplet
- new cryoplants dedicated to the cooling of the new magnets and cavities in the two high luminosity IRs.

The implementation of this new scheme accompanied by other possible improvements under consideration (shorter bunches, etc.) should allow a peak luminosity of $\sim 5 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ and improved luminosity lifetime by "luminosity leveling". Finally, the very preliminary outcome of first discussions and studies on a LHC energy upgrade to around 28-33 TeV cm will be presented.

1029 track 14

Sat, Jul 24, 2010

11:25 10 mn

Salle 253

Governance of the International Linear Collider Project

presented by: Brian Foster (University of Oxford)

The ILC is unique in particle physics in not having a "host" laboratory and in being fully international from the outset. Studies over the last two years have gathered data from other major projects of a similar size in order to learn lessons and formulate suggestions for how an ILC project can best be realised and managed. The current report is interim and is intended to engage with funding authorities in advance of the presentation of the Technical Design Report of the ILC in 2012.

1031 track 14

Sat, Jul 24, 2010

15:20 20 mn

Salle 253

The Large Hadron Electron Collider (LHeC) Project

presented by: Max Klein (University of Liverpool)

Under the auspices of CERN, ECFA and NuPECC, a Conceptual Design Report is being prepared on the physics, detector and accelerator for an ep/eA collider, which by adding an O(60) GeV energy electron beam to the proton/ion beams of the LHC, will open a path to high mass and lowest Bjorken x explorations of polarised electron/positron-quark/gluon interactions at TeV energies. The LHeC will extend the kinematic range of ep deep inelastic scattering (in $1/x$ and Q^2) and the integrated luminosity by factors of 100 as compared to HERA. The presentation will highlight the physics programme and describe the design of a new detector and the two options of the accelerator considered, a ring-ring and a linac-ring version of the LHeC.



ICHEP2010 Parallel Sessions

1033 track 14

Sat, Jul 24, 2010

12:05 20 mn

Salle 253

Present Limits and Future Prospects for Dielectric Acceleration

presented by: Eric R. Colby (SLAC)

With the potential to reach high gradient with unrivaled compactness, acceleration using dielectric structures is an area of active research. Dielectrics offer an order-of-magnitude improvement in damage resistance to short pulses of radiation compared to metals, and exhibit lower loss at optical and terahertz frequencies. Dielectrics have demonstrated the ability to withstand broadband short-pulse radiation fields in excess of 10 GV/m. Developing suitable accelerator structures that combine these strengths to efficiently accelerate particles is the next step.

We will briefly survey the concepts that have been proposed for dielectric accelerators, and focus on two areas that have received particular attention recently: beam-driven dielectric wakefield accelerators and laser-driven dielectric structure based concepts. Key issues impacting the application of these technologies to a High Energy Physics accelerator will be discussed. The R&D needed to move these ideas from concept to reality will be discussed.

1037 track 14

Sat, Jul 24, 2010

14:55 20 mn

Salle 253

The heavy ion collider project NICA/MPD at JINR (Dubna)

merged from abstracts: 385 721

presented by: Grigory Trubnikov (Joint Institute for Nuclear Research, Dubna)

New project - heavy ion collider facility NICA/MPD (Nuclotron-based Ion Collider fAcility + MultyPurpose Detector) is under active development now at JINR (Dubna).

The general goal of the project is to start in the coming 5 years experimental study of hot and dense strongly interacting baryonic matter and search for possible signs of the mixed phase and critical endpoint in heavy ion collisions (centre-of-mass energy vs $N N = 5-11$ GeV (for Au^{79+}), average luminosity of $L = 10^{27} \text{ cm}^{-2} \text{ s}^{-1}$)

The MultiPurpose Detector (MPD) is proposed for this purpose. Another goal of NICA is performance of experimental studies on spin physics with colliding beams of polarized protons and light nuclei.

The report contains physics motivation and main characteristics of the project: the facility scheme and operation scenario, proposed methods of intense ion beam formation, achievement of the required luminosity, conceptual design of the MPD. Status and plans of the project development are presented as well.

1067 track 14

Sat, Jul 24, 2010

16:15 20 mn

Salle 253

Project-X at Fermilab

merged from abstracts: 248 255

presented by: Bob Tschirhart (Fermilab)

Fermilab is leading an international consortium to develop the design of "Project-X" which is an accelerator complex based on a new H- linac that will drive a broad range of experiments at the Intensity Frontier. Project X will provide multi-MW beams from the Main Injector over the energy range 60-120 GeV, simultaneous with multi-MW beams at 3 GeV. The Project-X research program includes world-leading sensitivity in long-baseline neutrino experiments, neutrino scattering experiments, and a rich program of ultra-rare decay and electric dipole moment experiments that are sensitive to most new physics scenarios beyond the Standard Model. Shared technology development with ILC and the Muon Collider will establish a bridge to future facilities at the energy frontier. This talk will describe the Project-X accelerator configuration, associated performance projections, status of the accelerator and detector R&D program and the strategy for moving forward.



ICHEP2010 Parallel Sessions

1074 track 14

Sat, Jul 24, 2010

16:40 20 mn

Salle 253

The International Design Study for the Neutrino Factory

merged from abstracts: 994 989 990

presented by: **Kenneth Long (Imperial College London)**

The International Design Study for the Neutrino Factory (the IDS-NF) has been established by the Neutrino Factory community to deliver the Reference Design Report (RDR) for the facility by the 2012/13 decision point identified by the Strategy Session of CERN Council. The baseline design for the facility will provide 10^{21} muon decays per year from 25 GeV stored muon beams. The facility will serve two neutrino detectors; one situated at source-detector distance of between 3000–5000 km, the second at 7000–8000 km. The discovery reach of the Neutrino Factory will be presented and compared with alternative techniques (beta-beam and super-beam). The option of a 'low-energy' Neutrino Factory, which may be attractive if θ_{13} is found to be large, will be presented. The muon-beam requirements will be defined and the specification of the accelerator facility required to deliver them will be described. The accelerator subsystems of which the facility is comprised will be briefly described along with an outline of some of the challenges such a facility presents. Several technologies are being discussed for the magnetised neutrino detectors: iron calorimeters; giant liquid argon TPCs; and totally active scintillating detectors. The IDS-NF baseline option is a 100 Kton magnetised iron sampling calorimeter at the intermediate baseline and a 50 Kton detector at the magic baseline. A near detector of much smaller mass for precise measurement of neutrino flux and neutrino cross-sections will be situated close to the end of the muon storage ring straight section(s). The various detector options will be discussed, covering the most important aspects: performance; technological challenges; as well as the R&D program and expected cost drivers.

1075 track 14

Sat, Jul 24, 2010

17:05 20 mn

Salle 253

The Research and Development Program towards an Energy-Frontier Muon Collider

merged from abstracts: 240 663

presented by: **Gail Hanson (University of California)**

The physics potential of a high-energy lepton collider has been shown to be extraordinary. This facility is capable of detailed studies of potential new physics uncovered at the LHC and can extend the search to mass scales beyond those accessible at the LHC. The Muon Collider provides a possible realization of a multi-TeV lepton collider. A muon accelerator facility that leads to a multi-TeV Muon Collider presents the unique opportunity to explore new physics within a number of distinct programs that can be brought online as the facility evolves. This paper will give an introduction to the Muon Collider facility and its unique capabilities, will discuss the Research and Development program that strives to make it a reality and finally will briefly give some detail regarding the machine-detector interface, background issues and detector performance.

Posters



160 First Results from the LHCb Vertex Locator

Presented by: Silvia Borghi (University of Glasgow)

LHCb is a dedicated experiment to study new physics in the decays of beauty and charm hadrons at the Large Hadron Collider (LHC) at CERN. The beauty and charm hadrons are identified through their flight distance in the Vertex Locator (VELO), and hence the detector is critical for both the trigger and offline physics analyses.

The VELO is the silicon detector surrounding the interaction point, and is the closest LHC vertex detector to the interaction point, located only 7 mm from the LHC beam during normal operation. The detector will operate in an extreme and highly non-uniform radiation environment. The VELO consists of two retractable detector halves with 21 silicon micro-strip tracking modules each. A module is composed of two n+-on-n 300 micron thick half disc sensors with R-measuring and Phi-measuring micro-strip geometry, mounted on a carbon fibre support paddle. The minimum pitch is approximately 40 μm . The detector is also equipped with one n-on-p module. The detectors are operated in vacuum and a bi-phase CO₂ cooling system used. The detectors are readout with an analogue front-end chip and the signals processed by a set of algorithms in FPGA processing boards. The performance of the algorithms is tuned for each individual strip using a bit-perfect emulation of the FPGA code run in the full software framework of the experiment.

The VELO has been commissioned and successfully operated during the initial running period of the LHC. The detector has been time aligned to the LHC beam to within 2 ns, and spatially aligned to 4 μm . The halves are inserted for each fill of the LHC once stable beams are obtained. The detector is centred around the LHC beam during the insertion through the online reconstruction on the primary vertex position. Preliminary operational results show a signal to noise ratio of 20:1 and a cluster finding efficiency of 99.6 %. The small pitch and analogue readout, result in a best single hit precision of 4 μm having been achieved at the optimal track angle.

375 Performance of the ATLAS tau trigger with 7 TeV collision data at the LHC

Presented by: Pilar Casado Lechuga (Universidad Autonoma de Barcelona)

Tau leptons are a fundamental ingredient in the discovery of New Physics at the LHC. The Standard Model and various SuperSymmetric models predict an abundant production of taus with respect to other leptons. The reconstruction of hadronic tau decay at the trigger level, although a very challenging task in proton proton collisions environment, allows to double the signal sample collected, and provides additional discovery power to final states including tau leptons. In this contribution we show the present understanding of the tau trigger system in recent proton proton collisions at 7 TeV collected with the ATLAS detector. We present the most relevant quantities used in the different stages of the trigger selection, and the trigger efficiencies as a function of p_T and pseudorapidity using Tau-like QCD events passing the offline reconstruction and identification selection. Finally, we present the prospects for tau trigger measurements with real taus from $W \rightarrow \tau \nu$ and $Z \rightarrow \tau \tau$ processes.

454 Luminosity and Beamspot Determination Using the ATLAS Detector

Presented by: David W. Miller (SLAC)

We present the algorithms and results of the reconstruction of the luminous region (also known as beam spot) and measurement of the luminosity in the ATLAS experiment during the first LHC run at energies between $\sqrt{s} = 900$ GeV (in 2009) and $\sqrt{s} = 7$ TeV (in 2010).

The LHC luminosity is determined in real time approximately once per second using a number of detectors and algorithms, each having different acceptances, systematic uncertainties and sensitivity to background. These results are displayed in the ATLAS control room and archived every two minutes; a single "preferred" measurement is reported to the LHC. During offline analysis, additional luminosity algorithms are studied and are compared to online results to further constrain systematic uncertainties on the measurement. Relative luminosities between detectors and methods agree to within a few per cent. Determination of the absolute luminosity using Monte Carlo calibrations is limited by a $\sim 20\%$ systematic uncertainty from the modeling of diffractive components of the cross section. Smaller systematic uncertainties are obtained using an absolute calibration of the luminosity via beam separation scans.

The spatial distribution of pp interactions is first reconstructed in real time by a dedicated algorithm in the high-level trigger and later more precisely by an offline reconstruction algorithm. The latter takes full advantage of the high tracking efficiency and resolution of the Inner Detector through an unbinned maximum-likelihood fit to reconstructed vertices of candidate primary interactions. This fit determines all relevant parameters of the LHC luminous region at the ATLAS interaction point, including the resolution-corrected size of the beam spot. Using beam separation scans, the length scales of the beam-position monitors are calibrated against the displacement of the luminous centroid measured during these scans. This significantly improves the absolute accuracy of the luminosity calibration obtained via beam scans. The rate of reconstructed primary vertex candidates provides a relative measurement of the luminosity.

458 Alignment of the ATLAS Inner Detector tracking system

Presented by: Jike Wang (Institute of Physics-Academia Sinica-Unknown)

ATLAS is a multipurpose experiment that records the products of the LHC collisions. To reconstruct trajectories of charged particles produced in these collisions, ATLAS is equipped with a tracking system built of silicon planar sensors and drift-tube based detectors. They constitute the ATLAS Inner Detector.

In order to achieve its scientific goals, the alignment of the ATLAS tracking system requires the determination of its almost 36000 degrees of freedom (DoF) with high accuracy. Thus the demanded precision for the alignment of the silicon sensors is below 10 micrometers. This implies to use a large sample of high momentum and isolated charge particle tracks. The high level trigger selects those tracks online. Then the raw data with the hits information of the triggered tracks is stored in a calibration stream. Tracks from cosmic trigger during empty LHC bunches are also used as input for the alignment.

The implementation of the track based alignment within the ATLAS software framework unifies different alignment approaches and allows the alignment of all tracking subsystems together. Primary vertexing and beam spot constraints have also been implemented, as well as constraints on survey measurements. As alignment algorithms are based on minimization of the track-hit residuals, one needs to solve a linear system with large number of DoF. The solving involves the inversion or diagonalization of a large matrix that may be dense. The alignment jobs are executed at the CERN Analysis Facility. The event processing is run in parallel in many jobs. The output matrices from all jobs are added before solving.

We will present the results of the alignment of the ATLAS detector using real data recorded during the LHC start up run in 2009 plus the recent 7 TeV data collected during 2010 run. Validation of the alignment was performed by measuring the alignment observables as well as many other physics observables, notably resonance invariant masses. The results of the alignment with real data reveal that the precision of the alignment constants is just below 10 microns.

477 Alignment and detection efficiency of CMS Preshower detector

Presented by: Yeng-Ming Tzeng (Physics Department-National Taiwan University (NTU)-Unknown)

The Preshower detector, as part of the CMS Endcap electromagnetic calorimeter (ECAL), is designed to have good spatial resolution to measure the position of incoming particles and thus aid particle identification in the endcaps. It comprises two layers of lead absorbers, each followed by silicon strip sensors with 1.9mm pitch. The physics performance of the Preshower relies upon excellent detection efficiency and accurate alignment to the Tracker and the Endcap ECAL crystals. Charged tracks from 7 TeV collisions, reconstructed by the Tracker and extrapolated through the Preshower to the Endcap crystals, are used for this purpose. More than 99.8% of Preshower strips are operational, with a detection efficiency better than 99.5%. The alignment is measured with an accuracy of better than 1mm, meeting the specifications.

488 Reconstruction of known particle decays in proton-proton collisions at energies of 900 GeV and 7 TeV with the ATLAS Inner Detector

Presented by: Roberto Di Nardo (INFN, Sezione di Roma II)

The ATLAS experiment is one of two general purpose detectors at the Large Hadron Collider. ATLAS is equipped with a charged particle tracking system consisting of three subdetectors, which provide high precision measurements with fine detector granularity. The pixel and microstrip subdetectors, which use silicon technology, are complemented with the transition radiation tracker.

The reconstruction of known particle decays is an important tool to understand the performance of the ATLAS Inner Detector and its track and vertex reconstruction and particle identification capabilities. Using data taken at center-of-mass energies of 0.9 TeV and 7 TeV, several different particle decays such as K_{short} , Λ , D^* , K^* etc. have been reconstructed and their properties compared to MC predictions.

495 Performance of jet reconstruction and calibration in first ATLAS data at a centre-of-mass energy of 7 TeV

Presented by: Sebastian Eckweiler (University of Mainz)

We report on first results of jet reconstruction and jet calibration in proton-proton collisions produced at a centre-of-mass energy of 7 TeV at the LHC. Jets are reconstructed with the anti-kt jet algorithm and need to satisfy a few selection criteria to reject backgrounds. We compare the data in detail to Monte Carlo simulations and estimate uncertainties on the jet energy scale and jet energy resolution. In addition, in-situ techniques are used to assess the energy scale and resolution.

496 Single isolated hadron response measurements in proton-proton collisions at 7 TeV and determination of the jet energy scale uncertainty with the ATLAS detector

Presented by: Iacopo Vivarelli (Albert-Ludwigs Universitaet - Freiburg)

The response of single isolated hadrons in the ATLAS calorimeter is measured in proton-proton collisions at a centre-of-mass energy of 7 TeV at the LHC. Isolated tracks with a momentum between 0.5 to 10-20 GeV are selected in the rapidity region up to 2.3. Adjacent energy deposits collected in calorimeter clusters are summed together in a cone of size $R=0.2$. The measured calorimeter cluster energy sum is compared to the track momentum. Data are in compared in detail to Monte Carlo simulation based on the Geant4 tool-kit and to test-beam measurements. The response to hadrons at low momenta is described by the Monte Carlo simulation with an accuracy of a few percent. Together with test-beam data the results of the single isolated hadron analysis can be used to get a first estimate of the jet energy scale uncertainty in the ATLAS detector.

497 Performance of Etmis reconstruction in first ATLAS data at a centre-of-mass energy of 7 TeV

Presented by: Albert Olariu (National Institute of Physics and Nuclear Engineering (IFIN-HH)-)

The performance of the missing transverse energy (Etmis) reconstructed with the ATLAS detector is assessed in proton-proton collisions at a centre-of-mass energy of 7 TeV. We report on results in randomly-triggered events, soft proton proton collisions and collisions with jets at high transverse momentum where Etmis is expected to be zero. We also expect to be able to report on first Etmis measurements in events where a W-boson is produced. Particular attention is given to tails in the Etmis distribution and a measurement of the Etmis resolution. The performance of the calibration and the individual terms contributing to Etmis are discussed.

498 Emergence of track jets in inelastic pp events with the ATLAS detector

Presented by: Seth Zenz (LBNL and UC Berkeley)

The precise measurements of reconstructed tracks in inelastic pp interactions as measured with the ATLAS detector at the LHC allow the study of so called 'track jets'. This analysis makes use of the ATLAS inner tracking detector with a coverage in pseudo-rapidity of $|\text{abs}(\eta)| < 2.5$. This approach is completely independent from calorimeter measurements, and thus complements jet measurements using calorimetry. It allows study of the production of jets down to small transverse momenta, probing the emergence of jets in inelastic pp interactions. The status of the reconstruction of jets from tracks and first information on kinematic distributions will be shown for collisions recorded at 7 TeV as well as at 900 GeV center-of-mass energy.

507 The performance of the CMS ECAL Preshower detector at LHC

Presented by: Zong-Kai Liu (National Central University)

The Preshower detector is part of the CMS endcap electromagnetic calorimeter, located in front of the lead tungstate crystals. It is composed of two lead absorbers and two orthogonal planes of silicon strip sensors. The purpose of the Preshower is to identify two closely spaced photons from π^0 decays, which allow an additional rejection of background for Higgs to two photon decay channel. A brief overview of the design of the Preshower, the response to beam commissioning, first in-situ absolute calibration, occupancy and the performance of Preshower-crystal cluster matching will be presented.

525 Inclusive b-jet production measurement on early CMS data

Presented by: Simon Maximilian Honc (Inst. für Experimentelle Kernphys.- KIT)

We describe a measurement of the inclusive b-jet production in pp collisions at $\sqrt{s} = 7$ TeV. The analysis has been done on the first physics data collected in 2010 by the CMS experiment at the Large Hadron Collider at CERN. To improve the low pT measurement, the jets are reconstructed with the Particle Flow algorithm. The experimental uncertainties from jet energy corrections, jet energy resolutions and luminosity are reduced by taking a ratio to the inclusive jet production cross section. A secondary vertex tagger with high purity selection is used as the most reliable b-tagger for this early measurement. The leading uncertainties for the tagging efficiency are the relative LO+NLO contributions from flavor creation, flavor excitation and gluon splitting.

593 Forward-backward Charge Asymmetry for Muon Pairs via Z/gamma* at 7 TeV in CMS

Presented by: Yazgan Efe (Texas Tech University)

We present a study of the forward-backward charge asymmetry (A_{FB}) for $\mu^+\mu^-$ pairs produced via an intermediate Z/gamma* at 7 TeV center-of-mass energy in the CMS experiment. Unlike in the case of proton-antiproton collisions, the quark and anti-quark directions are unknown at the LHC and this lack of information leads to a dilution in this asymmetry parameter. We are able to recover the true asymmetry by defining the quark direction as the direction of motion for the Drell-Yan pair and by accounting for misidentification probabilities on an event-by-event basis. We will present preliminary distributions for the Z/gamma* data sample ($\sim 1 \text{ pb}^{-1}$). The statistical error on the asymmetry becomes systematics limited around 100 pb^{-1} .

824 Commissioning, Performance and Calibration of the Electromagnetic Calorimeter of CMS

Presented by: Yong Yang ()

The operation and general performance of the CMS electromagnetic calorimeter at $\sqrt{s}=7$ TeV are described. The first LHC beams have been used to finalize the commissioning of ECAL readout and trigger. The precision of the inter-channel synchronization and calibration has been verified and improved with in-situ data, exploiting decays of π^0 s and η into two photons, the phi invariance of the energy deposition in Minimum Bias events. Di-electron and di-photon states have been also used to verify and tune the energy scale. The quality of the offline data reconstruction, from low level quantities to showers, has been investigated and improved using known physics processes. In-situ data and thorough Data/MC comparisons have been used to measure and tune the detector performance. First performance results are given.

873 Electron and Photon Trigger Commissioning and Performance on 7 TeV data

Presented by: Clementine Broutin (Laboratoire Leprince-Ringuet (LLR)-Ecole Polytechnique-Unknown)

The CMS electromagnetic calorimeter (ECAL) has been designed to precisely measure electron and photon energy. It is made of 75848 lead tungstate (PbWO₄) crystals and its characteristics have been optimized for the search of the Higgs boson in its two photons decay mode. In view of the high interaction rate at the Large Hadron Collider (LHC), CMS implements a sophisticated online selection system that achieves a rejection factor of nearly 10⁶. In the intense hadronic environment, the ECAL trigger system provides a powerful tool to select interesting physics events which may contain electrons or photons in their final states. The first 7 TeV collision events recorded by the CMS experiment have been analyzed in order to estimate the electron and photon trigger performance in terms of efficiency.

899 A Study of the Production of Vector Bosons and Jets at 7 TeV

Presented by: Jordan Damgov (TTU)

The production of vector bosons with jets is important for testing QCD and for estimating backgrounds for top quark production and for new physics studies. Deviations of the measurements from the standard model predictions can signal the onset of new physics. We present first results on the measurement of cross sections for the production of vector bosons and jets for proton-proton collisions at 7 TeV based on data taken with the CMS detector. Prospects for more precise measurements are also shown.

929 Evidence for Z → tau⁺ tau⁻ Production in 7 TeV proton-proton Collisions

Presented by: Letizia Lusito (Universita & INFN, Bari; Cern)

The reconstruction of tau leptons in a hadronic environment can be challenging, yet is important for many searches for new particles as well as studies of standard model processes. The production of Z bosons decaying subsequently into tau pairs serves as an important benchmark for tau reconstruction. We describe tau reconstruction in CMS and present evidence for Z bosons decaying into tau pairs, for proton-proton collisions at 7 TeV.

1018 Minimum Bias Trigger in ATLAS

Presented by: Regina Kwee (for the ATLAS Collaboration) (CERN/Humboldt University of Berlin)

Since the restart of the LHC in November 2009, ATLAS has collected inelastic pp-collisions to perform first measurements on charged particle densities. These measurements will help to constrain various models describing phenomenologically soft parton interactions. Understanding the trigger efficiencies for different event types are therefore crucial to minimize any possible bias in the event selection. ATLAS uses two main minimum bias triggers, featuring complementary detector components and trigger levels. While a hardware based first trigger level situated in the forward regions with $2.2 < |\eta| < 3.8$ has been proven to select pp-collisions very efficiently, the Inner Detector based minimum bias trigger uses a random seed on filled bunches and central tracking detectors for the event selection. Both triggers were essential for the analysis of kinematic spectra of charged particles. Their performance and trigger efficiency measurements as well as studies on possible bias sources will be presented. We also highlight the advantage of these triggers for particle correlation analyses.

02 - The Standard Model and Electroweak Symmetry Breaking

9 posters

167 $\Delta M_W < 10 \text{ MeV}/c^2$ at the LHC: a forlorn hope?

Presented by: Andrzej Konrad Siodmok (Karlsruhe Institute of Technology (KIT))

At the LHC, the measurement of the W mass with a precision of $O(10) \text{ MeV}/c^2$ is both mandatory and difficult. In the analysis strategies proposed so far, shortcuts have been made that are justified for proton-antiproton collisions at the Tevatron, but not for proton-proton collisions at the LHC. The root of the problem lies in the inadequate knowledge of parton density functions of the proton. It is argued that in order to reach a $10 \text{ MeV}/c^2$ precision for the W mass, more precise parton density functions of the proton are needed, and an LHC-specific analysis strategy ought to be pursued. Proposals are made on both issues.

177 Search for neutral Higgs bosons decaying into four taus at LEP

Presented by: Yavin Itay (New York University)

A search for the production and non-standard decay of a Higgs boson, h , into four taus through intermediate pseudoscalars, a , is conducted on 683 pb^{-1} of data collected by the ALEPH experiment, at centre-of-mass energies from 183 to 209 GeV. No excess of events above background is observed, and exclusion limits are placed on the combined production cross section times branching ratio, $\xi^2 = \sigma(e^+ e^- \rightarrow Zh)/\sigma_{\text{SM}}(e^+ e^- \rightarrow Zh) \times B(h \rightarrow aa) \times B(a \rightarrow \tau^+ \tau^-)^2$. For $m_h < 107 \text{ GeV}/c^2$ and $4 < m_a < 10 \text{ GeV}/c^2$, $\xi^2 > 1$ is excluded at the 95% confidence level.

241 Study of Drell-Yan processes in SANC.

Presented by: Renat Sadykov (Joint Institute for Nuclear Research (JINR))

The results of computation of one-loop electroweak (EW) corrections to the cross sections of single W and Z boson production at LHC: $pp \rightarrow W \rightarrow l \nu$, $pp \rightarrow Z \rightarrow ll$ with help of SANC Monte Carlo generators of unweighted events are presented. These calculations are combined with QCD parton showers, realized in general-purpose Monte Carlo generators Pythia8 and Herwig++, which use different approach to generating parton showers and give 2-3 % difference for corrections to certain observables. The EW corrections itself are about -2-3% for inclusive cross-sections and reach up to $\sim 10\%$ for some distributions.

251 Prospects of precision hadronic cross sections measurements at VEPP-2000

Presented by: Boris Khazin (Budker Institute of Nuclear Physics)

Two detectors - CMD-3 and SND are now performing first technical run on VEPP-2000 electron-positron collider at Budker Institute of Nuclear Physics. One of the main goals of physical program for both detectors is the precision measurements of $e^+e^- \rightarrow \text{hadrons}$ cross sections up to the highest achievable at VEPP-2000 energy, equal to 2 GeV in c.m. While the previous set of experiments performed with VEPP-2M collider allowed the comparison of measured at BNL muon ($g-2$) value with SM prediction, revealing 3 sigma difference, the precision of experiments on VEPP-2000 should match an accuracy of new muon ($g-2$) measurement now planning at Fermilab. Some detail of detectors performance and first physical results will be presented in the talk.

343 Prospects for Higgs boson discovery and measurement in the $H \rightarrow \tau \tau$ decay mode

Presented by: Christopher Boddy (University of Oxford-Unknown-Unknown)

We present the potential for measurement of a low-mass Higgs boson at the LHC using WH and ttH production, with the Higgs boson decaying to tau pairs. We find that these modes can enhance discovery and coupling-ratio sensitivity with 30/fb and 300/fb of 14 TeV collision data, respectively, for a Higgs boson with mass between 115 and 135 GeV.

866 New method for data-driven determination of m_t in pp collisions at the LHC

Presented by: Stefan Kluth (Max-Planck-Institut für Physik)

A new method for a data driven determination of the mass of the top quark m_t is proposed. It uses in $t\bar{t}$ events selected in the lepton+jets decay mode the recently proposed distribution of $R_t = m_t/m_W$ calculated from selected jet triplets associated with the hadronically decaying top quark. The jets stemming from the hadronic W decay are found either by requiring one b-tagged jet in the triplet or by associating the two closest jets in top rest frame with the W. The distribution of m_t from the same jet triplets is used to define sideband and signal regions. Events from the sidebands in m_t can be used to constrain the shape of the combinatorial background distribution in R_t . The MC@NLO Monte Carlo generator and a simple model for the dominant experimental effects are used to study the prospective performance of the method.

995 Precision Theory for Precision Measurements: Tests of Standard Model via Parity-Violating Electron-Proton and Møller Scattering

Presented by: Svetlana Barkanova (Acadia University)

As the experimental techniques continue to be developed and improved, they will require more precise contributions from theory. The indirect tests of the Standard Model via high-precision measurements like Q_{weak} and 12 GeV Møller scattering planned at JLab will demand a complete theoretical evaluation of the Next-to-the-Leading-Order and higher effects in electroweak interactions done at unprecedented precision. We show what kind of theoretical support our group can provide to above and other experiments with the new codes we have developed. Some of the key features of our approach, including our method for dealing with many-body effects in ep scattering and our treatment of the Hard Photon Bremsstrahlung, will be discussed.

1156 Electroweak physics at HERA

Presented by: Trong Hieu Tran (LAL/Desy)

Studies of ep collisions at electroweak scale in both exclusive and inclusive processes using HERA data will be presented.

1244 On 2D and 3D solitons in SU(2) gluodynamics

Presented by: Alla Bogolubskaya (JINR)

We plan to indicate the possibility of soliton existence in 2D and 3D SU(2) gluodynamics. Hamiltonians in terms of radial functions will be presented. Localized in space field distributions which provide local minima to these hamiltonians are studied. Their physical implications are discussed.

145 Differential Reduction Techniques for the Evaluation of Feynman Diagrams

Presented by: Scott Yost (The Citadel)

Stable reduction methods will be important in the evaluation of high-order perturbative diagrams appearing in QCD and mixed QCD-electroweak radiative corrections at the LHC. We describe differential reduction techniques in the hypergeometric function representation of Feynman diagrams and present some representative examples.

222 A study of the b-quark fragmentation function with the DELPHI detector at LEP I and an averaged distribution obtained at the Z pole

Presented by: Eli Ben-Haim (LPNHE Paris)

The nature of b-quark jet hadronisation has been investigated using data taken at the Z peak by the DELPHI detector at LEP in the year 1994. The average value of $x_b^{\text{weak}} = E_b^{\text{weak}}/E_{\text{beam}}$ is measured to be 0.699 ± 0.011 . The resulting x_b^{weak} distribution is then analyzed in the framework of two choices for the perturbative contribution (parton shower and Next to Leading Log QCD calculation) in order to extract the non-perturbative component to be used in studies of b-hadron production in other experimental environments than LEP. In the parton shower framework, data favour the Lund model ansatz and corresponding values of its parameters have been determined within PYTHIA 6.156 from DELPHI data: $a = 1.84^{+0.23}_{-0.21}$ and $b = 0.642^{+0.073}_{-0.063}$ with a correlation factor $\rho = 92.2\%$. Combining the present measurement of b-quark fragmentation distributions with those obtained at the Z peak by ALEPH, OPAL and SLD, the average value of x_b^{weak} is found to be 0.7092 ± 0.0025 and the non-perturbative fragmentation component is also extracted. Using the combined distribution, a better determination of the Lund parameters is then obtained: $a = 1.48^{+0.11}_{-0.10}$ and $b = 0.509^{+0.024}_{-0.023}$ with a correlation factor $\rho = 92.6\%$.

389 The NLO photon impact factor for Deep Inelastic Scattering: analytic result

Presented by: Giovanni Antonio Chirilli (CPHT-Polytechnique & LPT d'Orsay)

To study the high-energy amplitudes, the T-product of two currents can be expanded in terms of coefficient functions (impact factors) and matrix elements of "composite color dipoles" made of Wilson line operators with rapidity cutoff preserving conformal invariance. In the leading order, the high-energy evolution of color dipoles is governed by the non-linear Balitsky-Kovchegov (BK) equation.

To describe the high-energy amplitudes in the next-to-leading order (NLO) one needs to know the coefficient function ("impact factor") and the evolution of corresponding Wilson-line operators. Using the high-energy OPE, we find the next-to-leading order (NLO) correction to the BK equation and calculate the impact factor for virtual photons in deep inelastic scattering.

478 Jet Transverse Structure and Momentum Distribution in pp Collisions at 7 TeV

Presented by: Natalia Lychkovskaya (ITEP Institute for Theoretical and Experimental Physics (ITEP))

We present a study of the jet transverse structure, the charged hadrons multiplicity in jet and charged hadrons longitudinal and transverse momentum distribution relative to the jet axis on $X \text{ pb}^{-1}$ integrated luminosity of proton-proton collisions at $\sqrt{s} = 7$ TeV with the CMS detector at LHC. The jet transverse structure is measured using the second moment of the charged hadron transverse jet profile. A comparison with predictions from different Monte Carlo generators is presented.

530 Dijet physics with the CMS detector at LHC

Presented by: Cosmin Dragoiu (University of Illinois at Chicago)

We present preliminary results from the CMS experiment for various dijet distributions in proton-proton collisions at a center-of-mass energy of 7 TeV. Early measurements of the dijet mass spectra, centrality ratio, azimuthal decorrelation and angular distribution will be shown. Sensitivity of the phenomenological parameters used to model the initial and final-state radiation in PYTHIA is also investigated. Prospects for observing evidence for new physics in these distributions will also be presented.

623 Study of the underlying event with the CMS detector at the LHC

Presented by: Andrea Lucaroni (Università degli Studi di Perugia & INFN Perugia)

The underlying event in pp interactions at both 900 GeV and 7 TeV is studied exploiting the performances of the powerful CMS tracking system. Charged multiplicity and energy densities are measured in charged jet events concentrating in the regions perpendicular to the plane of the hard 2-to-2 scattering which includes the beam and the jet directions. A significant underlying event activity increase with the jet transverse momentum is reported, confirming the so called "Pedestal Effect". A factor two increase of the Underlying activity is observed at 7 TeV with respect to 900 GeV. These studies allow to discriminate between various QCD Monte Carlo models which correctly reproduce the Tevatron Underlying Event phenomenology but achieve different predictions at different energies. The knowledge of some key aspects of the models is improved, in particular for what concerns the energy dependency of the phenomenological parameters regulating the minimal scale of the Multiple Parton Interactions.

876 Study of hadronic event shapes with the CMS detector at LHC

Presented by: Matthias Artur Weber (ETH Zuerich)

We present a study of hadronic event shapes in 7 TeV collisions at the Large Hadron Collider (LHC) using the data recorded so far. We use purely calorimetric jets, track jets and jets constructed using particle flow techniques as input for calculating various event-shape variables, which probe the structure of the hadronic final state. It is shown that the normalized event-shape distributions are robust against various sources of systematic uncertainty and we demonstrate that early measurements of event-shape variables allow to study differences in the modeling of QCD multi-jet production.

1181 Early QCD Analyses with Photons at CMS

Presented by: Pasquale Musella (LIP Laboratorio de Instrumentaco e Fisica Experimental de Particulas)

The measurement of inclusive photon production is a crucial step for the understanding of Standard Model Physics at the Large Hadron Collider (LHC) and an important prerequisite for many new physics searches. The identification of photons' experimental signatures and their discrimination against instrumental background is a challenging task in the severe LHC environment. We present a technique to extract the content of true isolated photons in an inclusive sample based on the study of electromagnetic shower deposits. The technique is applied to proton-proton collision events at $\sqrt{s} = 7\text{TeV}$ recorded by the Compact Muon Solenoid (CMS) detector and the isolated photon spectrum is extracted. Various sources of systematic uncertainties are studied in detail.

Determination of the cross section of photon+jet and diphoton production are important tests of standard model physics. In addition, they are significant backgrounds to Higgs di-photon searches. We demonstrate the use of a linear fisher discriminant to determine the purity of photons in $pp \rightarrow \text{photon}+\text{jet}$ events with CMS at $\sqrt{s} = 7\text{TeV}$. It is based on a minimal number of isolation and cluster shape variables to reduce uncertainty in this small, early dataset. Finally, readiness for the diphoton cross section measurement is shown by the comparison, for key kinematical distributions, of proton-proton collisions events at $\sqrt{s} = 7\text{TeV}$ with Monte Carlo simulations.

04 - Hadronic Structure, Parton Distributions, soft QCD, Spectroscopy

7 posters

179 Renormalization of the baryon axial vector current in large- N_c

Presented by: Maria de los Angeles Hernandez-Ruiz (San Luis Potosi Aut. University)

The baryon axialvector current is computed at one-loop order in heavy baryon chiral perturbation theory in the large- N_c limit, where N_c is the number of colors. Loop graphs with octet and decuplet intermediate states cancel to various orders in N_c as a consequence of the large- N_c spin-flavor symmetry of QCD baryons. We present a preliminary study of the convergence of the chiral expansion with $1/N_c$ corrections in the case of $g_A = N_c = 3$.

337 Measurement of J/Ψ , $\Psi(2s)$ and tau-lepton masses with KEDR detector at VEPP-4M collider.

Presented by: Andrey Shamov (Budker Institute of Nuclear Physics)

We report the final result of the KEDR detector on the tau-lepton mass which should supersede our previously published values. The results of the new J/Ψ , $\Psi(2s)$ mass measurements are also reported confirming our high precision results published in 2003.

587 Hadroproduction on nuclei: inclusive cross-sections and parametrizations

Presented by: Mikhail Gostkin (Joint Inst. for Nuclear Research (JINR)-Unknown-Unknown)

Inclusive hadron production cross-sections of the interactions of few GeV/c protons and charged pions with nuclei are of interest for the understanding of the underlying physics, the modeling of Monte Carlo generators of hadron-nucleus collisions, and for the design of neutrino beams. Precise and comprehensive double-differential inclusive hadron production cross-sections from Be, C, Cu, Ta and Pb target nuclei are presented and their characteristics discussed, with emphasis on their dependence on the nuclear mass number.

592 Results from ISTR+ experiment

Presented by: Oleg Yushchenko (State Res.Center of Russian Feder. Inst.f.High Energy Phys. (IFVE))

The summary of results concerning $K13$ decay data collected by ISTR+ experiment is presented. The results are focused on the form factor fits in different representations.

932 The study of the electromagnetic N^* transition form factors with CLAS12 at Jefferson Lab

Presented by: Kyungseon Joo (University of Connecticut)

We will discuss the program to study the electromagnetic N^* transition form factors with the CLAS12 detector and the energy upgraded 12 GeV CEBAF beam at Jefferson Lab. We plan to measure exclusive single-meson and double-pion electroproduction cross sections off a proton target to study almost all well established N^* 's at still unexplored area of highest photon virtualities ever achieved in the resonance studies from 5.0 to 10 GeV². Exclusive final states will be measured including the identification of π^0 and eta mesons by measuring the two decay photons as well as of charged multi-pions. From the proposed measurements, we expect to obtain the electromagnetic transition form factors (electro-couplings) for well established excited nucleon states at the distance scales, which correspond to the leading contribution from quark degrees of freedom. Expected data on electrocouplings of excited nucleon states with various quantum numbers will allow us to explore how the non-perturbative strong interactions between dressed quarks create nucleon resonances and how they emerge from QCD. For the first time we will be able to study generation of dressed quark dynamical mass that account for more than 97 % of hadron mass and to extend our knowledge on behavior of running strong coupling in transition regime from confinement to pQCD. The close collaboration between experimentalists and theorists will allow us to provide high-precision data, high-quality analyses, as well as state of the art model and QCD based calculations. In this talk, we also review the current N^* program with CLAS at Jefferson Lab as well.

1239 Hadroproduction in FLUKA and Geant4: agreement with data?

Presented by: Anastasia BOLSHAKOVA (Joint Inst. for Nuclear Research (JINR))

Monte Carlo tool kits such as FLUKA and Geant4 have models of the production of secondary hadrons in the interactions of few GeV/c protons and charged pions with nuclei implemented. For the first time, the comprehensive and precise hadroproduction data published by the HARP-CDP group permit a critical comparison of data with modelling. Overall production cross-sections are reasonably well reproduced, within factors of two. In more detail, there are areas with poor agreement that are unsatisfactory and call for modelling improvements. Overall, the current FLUKA simulation fares better than the current Geant4 simulation.



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1240 Study of Coherent π^0 -Photoproduction on the Deuteron

Presented by: Mohamed Ahmed EL-ZOHRY ALY (Yerevan Physics Institute, Br. Alikhanian 2, 0036 Yerevan,

In the present paper, we consider the coherent neutral-pion photoproduction reaction on the deuteron in the energy region from pion-threshold up to 1 GeV using an enhanced elementary pion photoproduction operator on the free nucleon and a realistic high-precision nucleon-nucleon potential model for the deuteron wave function. Numerical results for total and differential cross sections are presented for which the sensitivity to various models for the elementary pion photoproduction amplitude is investigated. Considerable dependence of the results on the elementary amplitude is found at photon lab-energies close to threshold and above 600 MeV. In addition, the results of differential and total cross sections are compared with the available experimental data and a good agreement was found.

05 - Heavy Quarks Properties (experiment and theory)

5 posters

192 Measurement of $\Gamma_{ee}(J/\psi) \cdot \text{Br}(J/\psi \rightarrow ee)$ and $\Gamma_{e\mu}(J/\psi) \cdot \text{Br}(J/\psi \rightarrow \mu\mu)$

Presented by: Evgeny Baldin (BINP)

The products of the electron width of the J/ψ meson and the branching fraction of its decays to the lepton pairs were measured using data from the KEDR experiment at the VEPP-4M electron-positron collider. The results are $\Gamma_{ee}(J/\psi) \cdot \text{Br}(J/\psi \rightarrow e^+e^-) = (0.3323 \pm 0.0064 \pm 0.0048)$ keV, $\Gamma_{e\mu}(J/\psi) \cdot \text{Br}(J/\psi \rightarrow \mu^+\mu^-) = (0.3318 \pm 0.0052 \pm 0.0063)$ keV.

Their combinations $\Gamma_{ee} \cdot (\Gamma_{ee} + \Gamma_{\mu\mu}) / \Gamma = (0.6641 \pm 0.0082 \pm 0.0100)$ keV, $\Gamma_{ee} / \Gamma_{\mu\mu} = 1.002 \pm 0.021 \pm 0.013$ can be used to improve the accuracy of the leptonic and full widths and test leptonic universality. Assuming e/μ universality and using the world average value of the lepton branching fraction, we also determine the leptonic $\Gamma_{ll} = 5.59 \pm 0.12$ keV and total $\Gamma = 94.1 \pm 2.7$ keV widths of the J/ψ meson.

249 Heavy quark pair production in proton-proton collisions including subdominant terms.

Presented by: Marta Luszczak (University of Rzeszow)

Up to now, we have calculated the inclusive cross sections for heavy quarks production at hadron colliders. These calculations were performed using approach based on the unintegrated parton distributions functions. I have tested some of the models in photoproduction and in hadroproduction. For the $c\bar{c}$ and $b\bar{b}$ production at high-energies the gluon-gluon fusion is assumed to be the dominant mechanism. This process was calculated in the NLO collinear as well as in the k_t -factorisation approaches. Now, I study production of the charm and bottom quarks for following subprocesses: $gg \rightarrow Q \text{ anti-}Q$, $\gamma g \rightarrow Q \text{ anti-}Q$, $g\gamma \rightarrow Q \text{ anti-}Q$, $\gamma\gamma \rightarrow Q \text{ anti-}Q$. I used MRST_QED (Martin, Roberts, Stirling, Thorne) parton distributions. I would like to show detail analyzed that other processes ignored so far should be carefully evaluated. The number of potential contributions is not small.

919 Flavor Changing Neutral Currents Transition of the Σ_Q to Nucleon in Full QCD and Heavy Quark Effective Theory

Presented by: Mehmet Zeyrek (Physics Department, Middle East Technical University (METU), Ankara)

The loop level flavor changing neutral currents transitions of the $\Sigma_b \rightarrow n \text{ l}^+ \text{ l}^-$ and $\Sigma_c \rightarrow p \text{ l}^+ \text{ l}^-$ are investigated in full QCD and heavy quark effective theory in the light cone QCD sum rules approach. Using the most general form of the interpolating current for Σ_Q , $Q=b$ or c , as members of the recently discovered sextet heavy baryons with spin 1/2 and containing one heavy quark, the transition form factors are calculated using two sets of input parameters entering the nucleon distribution amplitudes, namely, QCD sum rules and lattice QCD inputs. The obtained results are used to estimate the decay rates of the corresponding transitions. Since such type transitions occurred at loop level in the standard model, they can be considered as good candidates to search for the new physics effects beyond the SM.

1069 Heavy Flavor Electron in ALICE at the LHC

Presented by: Raphaelle Bailhache (GSI Darmstadt)

In nucleus-nucleus collisions, the formation time of heavy quarks (charm and beauty) is approximately $1/M_Q$ (0,1 fm/c for c and 0,02 fm/c for b), much smaller than the expected lifetime of the QGP at LHC (about 10 fm/c). Therefore heavy quarks are uniquely suited to probe the QGP over its whole lifetime. The $c\bar{c}$ and $b\bar{b}$ production in pp collisions serves as an important baseline for the nucleus-nucleus studies and allows to test pQCD calculations. The cross-sections can be measured indirectly with semi-electronic decays of heavy flavor hadrons. Compared to the direct measurements of heavy flavor hadrons via their hadronic decay channels the large branching ratios are an advantage. We present first results on electron identification in pp collisions at 7 TeV with the central barrel of ALICE.

Electrons are identified using the Time Projection Chamber, the Transition Radiation Detector and the Time Of Flight Detector. Each detector has to be first calibrated and understood. The first results from the electron analysis are presented and discussed.



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1238 New Experiments with Antiprotons

Presented by: Daniel Kaplan (Illinois Institute of Technology)

Fermilab operates the world's most intense antiproton source. Newly proposed experiments can use those antiprotons either parasitically during Tevatron Collider running or after the Tevatron Collider finishes in about 2011. For example, the annihilation of 8 GeV antiprotons might make the world's most intense source of tagged D^0 mesons, and thus the best near-term opportunity to study charm mixing and, via CP violation, to search for new physics. Other precision measurements that could be made include properties of the $X(3872)$ and the charmonium system. An experiment using a Penning trap and an atom interferometer could make the world's first measurement of the gravitational force on antimatter. These and other potential measurements using antiprotons could lead to a broad physics program at Fermilab in the post-Tevatron era.

43 A New Search For Muon-to-Electron Conversion at Fermilab

Presented by: Yury Kolomensky (UC Berkeley/LBNL)

The Mu2e collaboration will search for coherent, neutrino-less conversion of muons into electrons in the field of a nucleus with a sensitivity improvement of approximately 10,000 over existing limits. Such a lepton flavor-violating reaction probes new physics at a scale unavailable by direct searches at either present or planned high energy colliders. The physics motivation for Mu2e and the design of the muon beamline and spectrometer will be presented, along with a scheme by which the experiment can be mounted in the present Fermilab accelerator complex. We will also examine the prospects for increased sensitivity of as much as two orders-of-magnitude at the proposed Fermilab Project X Linac.

219 Electroweak penguins in isospin-violating Bs decays

Presented by: Dominik Scherer (Karlsruhe Institute of Technology)

During the last decade, experimental data from $B \rightarrow K \pi$ decays has caused many discussions about deviations from Standard Model predictions and their possible explanation by New Physics. In particular, models which allow for enhanced electroweak penguins have been investigated in this context since they allow for sizeable isospin-violating effects.

We study the consequences of such enhanced electroweak penguins in the purely isospin-violating decays $B_s \rightarrow \phi \rho$ and $B_s \rightarrow \phi \pi$. The branching fractions of these modes are highly sensitive to New Physics in EW penguins and are thus an interesting topic for LHCb and Super-B-factories, complementary to precise $B \rightarrow K \pi$ measurements.

363 Precision Measurement of $K^+ \rightarrow \pi^+ \nu \text{ anti-}\nu$ at Fermilab

Presented by: Jonathan Lewis (Fermilab)

The $K^+ \rightarrow \pi^+ \nu \text{ anti-}\nu$ process is both highly suppressed and calculable with high accuracy within the Standard Model. The rate of this process is consequently sensitive to most new physics scenarios beyond the Standard Model. A precision measurement of $K^+ \rightarrow \pi^+ \nu \text{ anti-}\nu$ would be one of the more incisive probes of quark flavor physics this decade. The experimental challenge to date of measuring $K^+ \rightarrow \pi^+ \nu \text{ anti-}\nu$ is from the 8 in 100-billion Standard Model rate. Several candidate events of the $K^+ \rightarrow \pi^+ \nu \text{ anti-}\nu$ process have been observed using the full resources of the AGS accelerator at BNL. CERN is now actively pursuing a 100-event (Standard Model) sensitivity experiment using a new technique driven by the SPS. Operating the Fermilab Tevatron after Run-II as a 150 GeV high-duty factor synchrotron "Stretcher" offers the opportunity to mount a 1000-event experiment based on the techniques developed and demonstrated at the BNL AGS. The Tevatron Stretcher would be a unique facility that would provide nearly ideal properties for rare-decay experiments, allowing the demonstrated performance of the AGS experiment to be extrapolated with confidence to an experiment driven by the Tevatron Stretcher at Fermilab. A proposal (Fermilab P996) submitted to Fermilab has received strong scientific support, and the P996 collaboration is now working with US funding agencies. The status and prospects of the P996 initiative will be presented and discussed.

441 Determining the photon polarization of the radiative $B \rightarrow K_1(1270) \gamma$ decay

Presented by: Andrey Tayduganov (Laboratoire de l'Accélérateur Linéaire (LAL))

Recently the radiative B decay to the strange axial-vector mesons, $B \rightarrow K_1(1270) \gamma$, was observed. This process is particularly interesting as the subsequent K_1 decay into its three body final state allows us to determine the polarization of the gamma, which is mostly left- (right-) handed for $B^{\bar{}}$ (B) in the SM while various new physics models predict additional right- (left-)handed components. In order to obtain a theoretical prediction for this polarization measurement, it is important to understand the hadronic uncertainties for this decay channel. We first revisit the strong decays of the K_1 mesons, namely the partial wave amplitudes as well as their relative phases, in the framework of the $3P_0$ quark-pair-creation model. Then, we present our result on the sensitivity of the $B \rightarrow K_1(1270) \gamma$ process to the photon polarization.

734 Final Results on the Rare Decay $KL \rightarrow \pi^0 \nu \text{ anti-}\nu$ from the KEK E391a Experiment

Presented by: Hiroaki Watanabe (KEK)

The neutral-kaon decay $KL \rightarrow \pi^0 \nu \text{ anti-}\nu$ is a direct CP-violating process caused by a flavor-changing neutral current, and the branching ratio is predicted to be $(2.49 \pm 0.39) \times 10^{-11}$ in the Standard Model. The rare decay is one of the processes expected to have a significant impact on new physics searches. The E391a experiment at the KEK 12-GeV proton synchrotron was the first dedicated search for $KL \rightarrow \pi^0 \nu \text{ anti-}\nu$. The final results, which have just been published in Phys.Rev.D81, 072004 (2010), are reported in this contribution. Combining the data sets in February-April 2005 (Run-2) and October-December 2005 (Run-3), the single event sensitivity was 1.11×10^{-8} and no events were observed in the signal region. The upper limit on the branching ratio was set to be 2.6×10^{-8} at the 90% confidence level. The E391a experiment as a whole has improved the limit from the experiments (FNAL-KTeV, ...) by a factor of 20.

789 A New Idea of the Experiment Searching for $\mu \rightarrow e$ Conversion

Presented by: Masaharu Aoki (Osaka U., DeeMe working group)

A new experiment searching for muon-electron conversion by fully utilizing the high-power pulsed proton beam available at J-PARC MLF will be discussed. Both a Monte Carlo simulation and a test measurement indicated that the muonic carbon atom formation rate in a muon target of MLF J-PARC is approximately 10^{10} /sec for 1 MW operation of the RCS. The muonic atom formation rate in an Aluminium muon stopper located close to the muon target will be more than 10^9 /sec. With this high formation rate of the muonic atoms, it is possible to perform a competitive search for muon-electron conversion from the muon stopper placed nearby the production target at the level of 10^{-14} , nearly two orders of magnitude below current limits. A new secondary beam line at the High-Momentum Decay Muon port will be dedicated to extract 105-MeV/c electrons from the muon stopper. A high performance kicker system will be used in the secondary beam line to eliminate the prompt beam burst.

905 Family Symmetry for Flavor and SUSY Flavor

Presented by: Kaladi Babu (Oklahoma State University)

Non-Abelian family symmetries can help us understand the observed pattern of quark and lepton masses, and possibly lead to testable predictions in the flavor sector. The same family symmetries can also control excessive flavor violation that generally arises in supersymmetric models. I will present a class of models with a non-Abelian family symmetry wherein the first two family fermions (and sfermions) belong to a doublet, and the third family is a singlet. Such a setup based on the symmetry group Q_6 leads to a successful prediction for the CKM mixing parameter $\sin(2\beta)$. There are interesting and calculable flavor changing as well as CP-violating effects in the B_d and B_s systems, which arise from SUSY particle exchange. These predictions will be summarized, and the expectation for the SUSY spectrum will be presented. This work is based on a series of papers written in collaboration with Jisuke Kubo and Yanzhi Meng. The most recent work is "Variations of the supersymmetric Q_6 model of flavor", by K.S. Babu and J. Kubo (to appear). Recent work includes "Flavor violation in supersymmetric Q_6 model", by K.S. Babu and Yanzhi Meng, Phys.Rev. D80:075003,2009, and an earlier work "Dihedral families of quarks, leptons and Higgs bosons", by K.S. Babu and J. Kubo, Phys.Rev. D71:056006,2005.

916 Measurement of the KL yield at the KL beam line newly built at J-PARC

Presented by: Koji Shiomi (for the KOTO collaboration) (Kyoto university)

The KOTO experiment aims to discover the decay $KL \rightarrow \pi^0 \nu \bar{\nu}$ at the J-PARC 50 GeV Proton Synchrotron. The branching ratio of this decay mode is predicted to be 2.5×10^{-11} in the Standard Model (SM). Because its theoretical uncertainty is very small, this decay mode is a powerful tool for measuring Standard Model parameters and searching for new physics beyond the SM. The current upper limit on the branching ratio was set to be 2.6×10^{-8} by the KEK-E391a experiment. Because the branching ratio is very small, a high intensity KL beam is required to achieve the SM level sensitivity. We constructed a new KL beam line at J-PARC by summer 2009. In order to determine the properties of the beam line, we carried out a beam survey experiment from November 2009 to February 2010. The most important measurement in the beam survey experiment was KL yield measurement, because it is directly related to the experimental sensitivity of our experiment. Moreover, the expected KL yield for the Monte Carlo simulations with different hadronic interaction models differed up to a factor of 3. We needed to measure the KL yield by an actual measurement.

For the KL yield measurement, we used the $KL \rightarrow \pi^+ \pi^- \pi^0$ decay. The detection system consisted of hodoscopes and electromagnetic calorimeters. The vertex position and direction of π^+ and π^- were measured by two layers of hodoscopes, each of which consisted of plastic-scintillator bars. The energies and positions of two photons from the π^0 decay were measured by the electromagnetic calorimeters, which consisted of pure CsI crystals. In our detection system, all kinematic parameters can be solved by assuming momentum balance in transverse direction, because the KL beam is very narrow (its solid angle is 7.8 μ sr). The $KL \rightarrow \pi^+ \pi^- \pi^0$ decay can be identified by the following requirements: the invariant mass of two gammas equal to the π^0 mass and the invariant mass of the π^+ , π^- and π^0 equal to the KL mass. The KL yield and the KL momentum distribution were measured by this method. In this talk, the detail of this method and the experimental result are reported.

1080 CP measurements in $K^+ \rightarrow \pi^+ l^- l^+$ and $KS \rightarrow \pi^+ \pi^- e^+ e^-$ decays at NA48

Presented by: Andreas Winhart (Institut für Physik)

We report on the measurements of the branching ratios and form factors for the rare decays $K^+ \rightarrow \pi^+ l^- l^+$ done with the full NA48/2 data set. Our results improve the existing world averages significantly and the CP violating asymmetry between K^+ and K^- in this channel results to be less than a few percent. In addition, the branching ratio of the decay $KS \rightarrow \pi^+ \pi^- e^+ e^-$ has been measured, and the result is used to set an upper limit on the presence of E1 direct emission in the decay amplitude. The CP-violating asymmetry has been also measured.

1085 Precision Kaon Physics with KLOE

Presented by: Flavio Archilli (University of Rome Tor Vergata)

A ϕ -factory offers the possibility to select pure kaon beams: neutral kaons from $\phi \rightarrow KS KL$ are in fact produced in pairs and the detection of a KS (KL) tags the presence of a KL (KS), the same holds for charged kaons. This allows to perform precise measurement of kaon properties. The KLOE experiment has measured most decay branching ratios of K_S , K_L and K^{*+} mesons. It has also measured the KL and the K^{*+} lifetime and determined the shape of the form factors involved in kaon semileptonic decays. These data provide the basis for the determination of the CKM parameter V_{us} and the most precise test of the unitarity of the quark flavor mixing matrix. We are presently finalizing new determinations of the KL and KS lifetimes using the whole KLOE data set, consisting of more than 109 $\phi \rightarrow KS KL$ decays. The KL lifetime, which has been already measured by KLOE with 0.6% accuracy using 20% of the total data sample (PLB 626, 2005, 15), will be extracted from the proper time distribution of $KL \rightarrow 3\pi^0$ decays, tagged by a $KS \rightarrow \pi^+ \pi^-$ decay on the opposite hemisphere of the apparatus. A competitive measurement of the KS lifetime is obtained from the proper time distribution of $KS \rightarrow \pi^+ \pi^-$ decays. Bounds on new physics extensions of the standard model with lepton flavor violation can be set using the KLOE result on $R_K = \Gamma(K \rightarrow \pi e^+ e^-) / \Gamma(K \rightarrow \mu^+ \mu^-)$ based on the complete data set of 2.2 fb^{-1} collected at the Frascati e^+e^- collider DAFNE. The final 1.3% accuracy on the ratio R_K has been achieved measuring the differential width $d\Gamma(K \rightarrow e^+ e^- \gamma) / dE_\gamma / \Gamma(K \rightarrow \mu^+ \mu^-)$ for photon energies $10 < E_\gamma < 250$ MeV. KLOE recent results will be presented together with an outlook for further improvements in the near future.

1241 The new muon g-2 experiment at Fermilab

Presented by: Brendan Casey (Fermilab)

One of the most powerful tools for constraining new physics models is the measurement of the anomalous magnetic moment of the muon. This measurement has been performed most recently at Brookhaven by E821 by measuring the spin precession of muons stored in a uniform magnetic field. A proposal has been submitted to Fermilab to repeat this measurement with a factor of 21 increase in statistics and factor of 4 reduction in the total error using the existing Fermilab accelerator complex and by relocating the E821 storage ring from Brookhaven to Fermilab. We will discuss the scientific motivation, the layout of the new experiment, and cover the status of the proposal. This would be the first in a series of precision muon experiments hosted by Fermilab and would double the physics output of the currently approved muon program with roughly a 10% increase in cost.

1242 Rare B Decay potential of SuperB

Presented by: Alejandro Perez (Laboratoire de l'Accélérateur Linéaire (LAL))

The study of rare B Decays at SuperB provide unique opportunities to understand the Standard Model and constrain new physics. We discuss the physics potential of such measurements from the proposed SuperB experiment with $75ab^{-1}$ of data.

225 The NOvA Experiment - Present and Future

Presented by: Alexandre Sousa (Harvard University)

The NOvA experiment is a next generation long-baseline, accelerator-based neutrino oscillation experiment, currently under construction at Fermilab. Using a totally active liquid scintillator detector, positioned off the NuMI neutrino beam axis, NOvA will improve the existing constraints on electron neutrino appearance by more than an order of magnitude. Running a NuMI facility upgraded to 700 kW of beam power in neutrino and anti-neutrino modes, on a 810 km long baseline, NOvA is sensitive to the neutrino mass hierarchy and will pioneer searches for CP violation in the leptonic sector. We present the expected neutrino physics sensitivities of NOvA and report on the ongoing installation of the prototype Near Detector and construction at the Far Detector site, as well as on the future prospects for the experiment.

259 Monitoring nuclear reactors with anti-neutrino detectors: the ANGRA project

Presented by: Pietro Chimenti (UFABC)

We describe the status of the ANGRA Project, aimed at developing an anti-neutrino detector for monitoring nuclear reactors. Indeed the detection of anti-neutrinos provides a unique handle for non-invasive measurements of the nuclear fuel. This kind of measurements are of deep interest for developing new safeguards tools which may help in nuclear non-proliferation programs. The ANGRA experiment, placed at about 30 m from the core of the 4 GW Brazilian nuclear power reactor ANGRA II, is based on a water Cherenkov detector with about one ton target mass. A few thousand anti-neutrino interactions per day are expected. The latest results from simulations and the status of the construction are presented.

276 Measurements of Atmospheric Neutrinos using the MINOS Detector

Presented by: Luke Corwin (Indiana University)

This talk presents the latest atmospheric neutrino results from the MINOS experiment. The results are based on a data set of 1657 live-days, and combine together observations of contained vertex neutrino interactions and neutrino-induced upward muons in the MINOS far detector. The measured curvature of muons in the MINOS magnetic field is used to separate neutrinos and anti-neutrinos, and the observed ratio of neutrinos to anti-neutrinos is compared to the Monte Carlo expectation. The data are separated into bins of L/E resolution, and a maximum likelihood fit to the observed L/E distributions is used to determine the oscillation parameters separately for neutrinos and anti-neutrinos. Confidence limits are placed on the difference between these oscillation parameters. The techniques and current status of an analysis using this data set to search for the neutrino mass hierarchy are also reported.

281 MiniBooNE's measurements of muon neutrino interaction cross sections

Presented by: Eric D. Zimmerman (University of Colorado)

Understanding neutrino interaction cross-sections on nuclear targets has become increasingly important to current and proposed neutrino oscillation experiments. Before the last few years, only low-statistics measurements, most on deuterium targets, have been available in the ~ 1 GeV range. The MiniBooNE data set, with over a million muon neutrino-carbon interactions from a well-understood flux, is producing a full suite of detailed charged-current and neutral-current cross-section measurements. In many channels these are the first-ever measurements on carbon, and include differential and double-differential cross-sections that have never been measured on any targets. MiniBooNE's measurements of quasi-elastic, elastic, and neutral-current neutral pion production will be presented. New results on charged-current charged and neutral pion production will be shown, and results of a new measurement of the inclusive charged-current cross-section from 400 MeV to 2 GeV will be presented for the first time.

336 Solar neutrino results from Super-Kamiokande

Presented by: Hiroyuki Sekiya (University of Tokyo)

Super-Kamiokande currently continues data taking as the fourth phase of the experiment (SK-IV), but high quality 8B solar neutrino data has been accumulated since August 2006 when SK resumed operations as the third phase of the experiment (SK-III). In this presentation, new results of the solar neutrino measurement of SK-III and status/prospects of SK-IV are reported.

The global analysis of solar neutrino experiments established the Large Mixing Angle (LMA) solution with a high confidence level. In order to examine the shape (and search for a possible low energy distortion due to LMA oscillations) of the 8B solar neutrino energy spectrum in SK, larger statistics with lowered analysis threshold and smaller systematic uncertainty are necessary.

In SK-III, due to a water purification system upgrade and water flow tuning in the SK tank, the background level was lowered. Furthermore, with improved detector calibrations, a full detector simulation, and new analysis methods, the systematic uncertainty on the total neutrino flux is estimated to be 2.1%, which is about two thirds of the systematic uncertainty during the first phase of Super-Kamiokande (SK-I). These improvements have allowed SK-III to derive solar neutrino results in the 4.5-5.0 MeV energy region.

In SK-IV, additional water flow tuning has been conducted and the low-background volume in the SK tank has been enlarged. As a result, it is expected that SK-IV has sufficient sensitivity for a 2-3 σ level discovery of the LMA-induced spectral distortions within several years of operation.

345 Status of MICE, the international Muon Ionisation Cooling Experiment

Presented by: Yordan Karadzhov (University of Sofia)

Muon ionization cooling provides the only practical solution to prepare high brilliance beams necessary for a neutrino factory or muon colliders. The muon ionization cooling experiment (MICE)* is under development at the Rutherford Appleton Laboratory (UK). It comprises a dedicated beam line to generate a range of input emittance and momentum, with time-of-flight and Cherenkov detectors to ensure a pure muon beam. A first measurement of emittance is performed in the upstream magnetic spectrometer with a scintillating fiber tracker. A cooling cell will then follow, alternating energy loss in liquid hydrogen and RF acceleration. A second spectrometer identical to the first one and a particle identification system provide a measurement of the outgoing emittance. In July 2010 the beam and most detectors will be commissioned and the time of the first measurement of input beam emittance closely approaching. The plan of steps of measurements of emittance and cooling, that will follow in the rest of 2010 and later, will be reported.

394 Status of India-based Neutrino Observatory Project

Presented by: Naba Mondal (Tata Institute of Fundamental Research (TIFR))

The India-based Neutrino Observatory (INO) collaboration is planning to setup an underground laboratory for carrying out front ranking experiments in the area of neutrino physics and related fields. A massive 50 kton magnetized Iron Calorimeter (ICAL) detector will be built to study atmospheric neutrinos and to make precision measurements of the parameters related to neutrino oscillations. Since ICAL will be able to distinguish neutrino events from anti-neutrino events by detecting the sign of the produced muon, it will also be possible to study the earth matter effect and thereby the neutrino mass hierarchy problem. This detector could also be used as a very long base line detector during the neutrino factory era. In this talk we plan to give a brief status report of the INO project and the ICAL detector.

466 Search for Muon Neutrino Disappearance in a Short-Baseline Accelerator Neutrino Beam

Presented by: Yasuhiro Nakajima (Kyoto University)

Neutrino oscillations have been observed and confirmed at $\Delta m^2 \sim 10^{-3}$ and 10^{-5} eV² with various experiments. While oscillations at other mass splittings are prohibited by the current standard model, the LSND experiment observed an excess of electron antineutrinos in a muon antineutrino beam, indicating a possible oscillation at $\Delta m^2 \sim 1$ eV².

To test the oscillation at $\Delta m^2 \sim 1$ eV², we search for muon neutrino disappearance using the Fermilab Booster Neutrino beamline and two experiments, SciBooNE and MiniBooNE. The neutrino fluxes are measured in the SciBooNE and MiniBooNE detectors, located at 100 m and 540 m downstream from the neutrino production target, respectively. We collected beam data from June 2007 through August 2008 with SciBooNE, and over a five year period with MiniBooNE. Results from the flux measurement at SciBooNE and the SciBooNE-MiniBooNE joint oscillation analysis will be presented.

508 Hadroproduction measurements for simulations of new neutrino beams

Presented by: Maurizio Bonesini (INFN Sezione di Milano Bicocca)

Hadroproduction measurements (with emphasis on the final results of the HARP experiment) will be reviewed and their parametrization for the optimization and design of new neutrino beams (superbeams/neutrino factory beams) will be presented. The influence of the measurement systematics in the simulation for these future developments will be illustrated. Comparisons with available MC, for the validation and tuning of the used hadroproduction models, will be also shown.

515 New results for muon neutrino to electron neutrino oscillations in the MINOS experiment

Presented by: Justin Evans (University College London)

MINOS is a long-baseline neutrino oscillation experiment situated along Fermilab's high-intensity NuMI neutrino beam. MINOS has completed an updated search for muon neutrino to electron neutrino transitions, observation of which would indicate a non-zero value for the neutrino mixing angle θ_{13} . The present 7×10^{20} protons-on-target data set represents more than double the exposure used in the previous analysis. The new result and its implications are presented.

588 Is there any "LSND anomaly"?

Presented by: Alexey Zhemchugov (Joint Inst. for Nuclear Research (JINR)-Unknown-Unknown)

The LSND Collaboration reported a 3.8 sigma excess of $\bar{\nu}_e$ over background, in an experiment that dumped 800 MeV protons into a water target. They interpreted this excess as evidence for $\bar{\nu}_\mu$ to $\bar{\nu}_e$ oscillations, which led to the suggestion of 'sterile' neutrinos. LSND's claim was not confirmed by the MiniBooNE Collaboration, yet the origins of the LSND result were never clarified. In this talk, data from the HARP-CDP group on pion production by 800 MeV protons are presented. These data are used in a new Monte Carlo simulation of the LSND experiment and result in a new background estimate of the LSND signal.

726 Magical properties of 2540 km baseline Superbeam Experiment

Presented by: Sankagiri Umasankar (I.I.T. Bombay, Mumbai, India)

The determination if the neutrino mixing matrix and mass-squared differences is one of the aims of neutrino physics today. This is a complicated affair, owing to the various parameter degeneracies. While the proposed 7500 km long 'magic baseline' experiment simplifies the task considerably, the intense beam required for such an experiment seems futuristic by current standards. As an alternative, we highlight the 'magical' properties of the 2540 km baseline. We propose a superbeam experiment at this much shorter baseline with a narrow band NuMI-like beam, and demonstrate the ability of this single setup to distinguish between the two mass hierarchies. This, we show, is possible with a moderate exposure and by running the experiment in the neutrino mode only.

Our results hold up to fairly small values of the mixing angle θ_{13} and irrespective of the value of the CP violating parameter. Unlike the magic baseline, it may also be possible to use this setup to measure CP violation in neutrino oscillation experiments.

757 Testing New TeV-scale Seesaw Mediators at the LHC

Presented by: Ivica Picek (Phys. Dept., University of Zagreb)

We are presenting a further elaboration of our recent work on a novel seesaw model which at the tree level corresponds to an effective $\dim > 5$ operator. This enables one to lower the seesaw scale on account of the TeV-scale new states testable at the LHC. Vectorlike non-zero hypercharge fermionic seesaw mediators at hand would have at the LHC an appearance which is different from their commonly discussed Type I and Type III counterparts.

915 Search for Neutrinoless Double Beta Decay with the COBRA Experiment

Presented by: Tobias Koettig (TU Dortmund)

Even though more than 50 years have passed since the experimental detection of the neutrino, many important properties of this outstanding lepton are still unknown. It is the last elementary particle whose rest mass could not be measured yet, and because it is neutral it is also the only fundamental particle that may be its own anti-particle. Observation of neutrinoless double beta decay can clarify both important questions at once. But the expected half-life of more than 10^{25} years for this decay is an ambitious challenge to experimental physics. Currently first experiments are under commissioning that will be able to probe this magnitude of half-lives. If they succeed, it will be important to verify the results with other experiments using different isotopes and different approaches. If they do not succeed, again new approaches will be required.

COBRA provides the necessary properties to be an excellent candidate for such a successive experiment. It uses CdZnTe room-temperature semiconductor detectors that contain several double beta decay candidate isotopes, among them also beta+ emitters and two of the most promising isotopes, ^{130}Te and ^{116}Cd . ^{116}Cd has a decay energy that lies even well above the naturally occurring gamma background.

The comparatively new semiconductor material CdZnTe has received more and more interest in recent years. Consequently, there has been major progress with these detectors and an end of the boost of this technology is not conceivable.

CdZnTe detectors are operated mainly with two readout techniques. The Co-Planar Grid (CPG) technology was developed specially for CdZnTe. With this approach energy resolutions better than 2% FWHM @ 662 keV can be achieved and such detectors are commercially available. During the last year, COBRA succeeded in growing CdZnTe crystals and producing detectors of this type from them. We acquired large experience in operating CPG detectors in ultra-low background mode and with the test set-up at the Italian underground laboratory LNGS half-life limits above 10^{20} years for several isotopes and decay modes have been determined.

Operating CdZnTe as pixelated detectors is also possible. Besides in-depth Monte Carlo studies including charge transport also for the first time ever three different pixelated detector types have been operated in an ultra-low background environment. Results that will be shown demonstrate clearly the power of background suppression with this detector type. Furthermore, if applying pixelated detectors, COBRA is the only experiment that will have the opportunity of operating a kind of solid state TPC. Thus it can combine the large advantages of a source equals detector approach with the possibility of particle identification via particle track reconstruction.

Also studies to further reduce the currently achieved background level of less than 8 counts / keV / kg / yr are under investigation. They include in-depth Monte Carlo studies for a shielding for a large scale experiment as well as new innovative approaches such as operating CdZnTe detectors in liquid scintillator. These studies will further increase the huge potential of COBRA as the next generation experiment for the search for neutrinoless double beta decay.

917 Optimization of neutrino fluxes for european Super-Beams

Presented by: Andrea Longhin (CEA Saclay)

The feasibility of a European next-generation very massive neutrino observatory in seven potential candidate sites located at distances from CERN ranging from 130 km to 2300 km, is being considered within the LAGUNA design study.

Neutrino fluxes to LAGUNA sites were calculated using a recently developed GEANT4 based simulation assuming a high intensity proton driver at 4.5 GeV (SPL) or 50 GeV (PS2). Several cross-checks of the simulation will be presented together with an optimization of the focusing system for each baseline. Physics performance (θ_{13} , CP violation, mass hierarchy) was also studied with the GLOBES software assuming for the far detector a 440 kton Water Cherenkov (MEMPHYS) or a 100 kton LAr TPC (GLACIER).



ICHEP2010 Posters

1236 Low Energy Anti-Neutrino Detection with Super-Kamiokande

Presented by: Michael Smy (UCI)

Detection of low energy anti-neutrinos in large water Cherenkov detectors via inverse beta decay reactions opens the door to the observation of the diffuse supernova neutrino background and allows high statistics measurements of the anti-neutrino flux and spectrum of distant reactors. At present, these signals are buried by backgrounds which would be greatly reduced by the observation of the produced neutrons in delayed coincidence. At present, a 200t test facility is being constructed underground near Super-Kamiokande to study the impact of the proposed addition of Gadolinium ions to the water of Super-Kamiokande in order to reliably tag neutron captures by the 8 MeV gamma cascade emitted by the excited Gadolinium nucleus.

71 e^+e^- pair production in peripheral collisions of ultrarelativistic heavy ions

Presented by: Roman Lee (Budker Institute of Nuclear Physics)

Status of the theoretical predictions for the process of e^+e^- pair production in peripheral ultrarelativistic nuclear collisions is presented. Special emphasis is made on the Coulomb and unitarity corrections to the cross section of this process. We also discuss multiple pair production. New predictions based on the calculation of Coulomb corrections in the next-to-leading logarithmic approximation are presented. It is shown that the next-to-leading term changes significantly the magnitude of the Coulomb corrections even for LHC. The large magnitude of this term also naturally explains the results of the experiments at SPS.

648 Direct Photon and Heavy Quark Jet Production at the LHC

Presented by: Tzvetalina Stavreva (LPSC)

The associated production of direct photons and heavy quarks at the LHC is presented. Predictions for both p-p and p-A collisions at ALICE, ATLAS and CMS are shown. It is demonstrated that this process is a great probe of the gluon and heavy quark nuclear PDFs, as over 80 % of the nPDF dependence at NLO comes from those nPDFs. Therefore we will show that measurements of this process will provide an excellent constraint on the gluon nPDF, which is currently mostly unconstrained. These measurements will also be very useful in distinguishing between different nPDF sets currently out on the market. Finally this process is also perfect for studying the effects of the hot nuclear medium, as the photon remains blind to it, while the heavy quarks interact with it, causing them to lose energy. Our results represent a necessary baseline for corresponding predictions for A-A collisions.

874 Magnetic knots of deconfined CP-odd matter in heavy-ion collisions

Presented by: Maxim Chernodub (University of Tours, France)

We show that the local parity violation in the quark-gluon plasma supports existence of free (meta)stable knots of deconfined hot quark matter stabilized by superstrong magnetic fields. The magnetic field in the knots resembles the spheromak plasma state of the magnetic confinement approach to nuclear fusion. The size of the knot is quantized, being inversely proportional to the chiral conductivity of the quark-gluon plasma. The parity symmetry is broken inside the knot. A specific flavor content and azimuthal distribution of particles produced in decays of the knots may serve as good experimental signatures of these unusual objects in heavy-ion collisions.

895 NA61/SHINE ion program

Presented by: Pawel Staszal (Jagiellonian University)

This presentation will summarize status and plans of the NA61/SHINE ion program. NA61/SHINE at the SPS facility is the successor of the former NA49 experiment. The aim of the new project is to explore the phase diagram of strongly interacting matter within the range of thermodynamical variables (like e.g. temperature and baryon chemical potential) where QCD predicts the existence of a 1-st order phase boundary between hadronic and partonic phases and the critical end point.

The detector and data acquisition system upgrades have resulted in an increase of the data rate by factor about 10 as compared to the standard NA49 data rate. These new conditions allows to perform a 2D scan of the phase diagram by varying energy (10A-158A GeV) and size of the colliding nuclear systems (p+p, p+Pb, C+B, Ar+Ca, Xe+La). The main goal of the scan is a search for the critical point and a detailed study of the onset of QGP formation by measuring the dynamical event-by-event fluctuations, the azimuthal anisotropy as well as the inclusive pion and strange hadron production. The increase in the data rate will also give a unique possibility to measure the inclusive and correlated yields of high p_T hadrons.

1010 Charged particle multiplicities at $\sqrt{s}=0.9, 2.36$ and 7.0 TeV with the CMS detector at LHC

Presented by: Romain Rougny (Universiteit Antwerpen, Belgium)

The charged particle multiplicity, n , is an essential observable in hadron collisions. It is the result of the counting of all charged particles produced by the primary proton-proton interaction. In particular, the events collected by minimum bias triggers contain soft interactions and produce mostly particles with low transverse momenta. The shape of the charged particle multiplicity spectrum is sensitive to the particle production mechanism of these soft interactions which are described by non-perturbative models, inspired by QCD. The correlations between produced hadrons are reflected in the shape of the multiplicity spectrum, while the mean multiplicity increases with the center of mass energy of the collision.

We present the measurement of the charged particle multiplicity distributions, $1/\sigma d\sigma/dn$, in increasing subdomains of pseudorapidity and transverse momentum acceptance, for non single diffractive interactions. The data are further corrected for the trigger and event selection efficiency and the effects of tracking inefficiency and secondary tracks originating from the decay of long lived particles and products of interaction with the beampipe and the detector material. This measurement is based on minimum bias data collected by the CMS detector at $\sqrt{s} = 0.9, 2.36$ and 7 TeV. The data were collected during the LHC commissioning run in 2009 and at the beginning of 2010.

38 Accessing the properties of the elementary Higgs beyond perturbation theory

Presented by: Axel Maas (University of Graz)

The description of the Higgs in the standard model is gauge-dependent, as for any elementary particle in a gauge theory. To extract the mass or running couplings from the correlation functions therefore requires gauge-fixing. If non-perturbative effects become relevant, e.g. for a very heavy Higgs, due to the presence of (hadronic) bound-states, or strong physics at or beyond the TeV scale, this is complicated by the Gribov problem. The consequence of the Gribov problem is that perturbative gauge definitions become ambiguous. In Yang-Mills theory this ambiguity affects the correlation functions even qualitatively. Thus it has to be resolved to obtain unique results. This problem can be addressed using lattice gauge theory and continuum methods. Using lattice gauge theory, a possible resolution of the ambiguity is presented. This yields that the ambiguous perturbative gauges become families of well-defined non-perturbative gauges. For scalar fields the propagator and gauge-boson-two-scalar interaction vertex are then presented for a particular non-perturbatively well-defined 't Hooft gauge. From these the properties of the scalar, like its mass and the running coupling, are obtained. It is outlined how this procedure can be generalized to other and higher correlation functions, constructing a general framework.

261 Some phenomenology from the lattice: decay constants and sigma terms.

Presented by: Alberto Ramos (CNRS)

Thanks to the recent developments both in our understanding of lattice simulations and in computer power, lattice gauge theory can give accurate predictions of QCD with all the sources of error under control. After a brief survey on the difficulties of these computations, I would review some interesting recent results of the Budapest-Marseille-Wuppertal lattice collaboration: First π and K decay constants can be used to compute CKM matrix elements and check the unitarity relation. Second the strange content of the nucleon is key to understand how dark matter could be detected. During the talk I will emphasize how the different sources of error are controlled to make physical predictions.

1008 Moving NRQCD

Presented by: Georg Matthias Von Hippel (University of Mainz)

Moving NRQCD (mNRQCD) is Non-Relativistic Quantum Chromodynamics (NRQCD) formulated on a lattice which is boosted relative to the usual discretization frame. mNRQCD allows to treat the momentum for the heavy quark arising from the frame choice exactly. The action for mNRQCD has been derived through $O(1/m^2, v^4)$, as accurate as the NRQCD action in present use, including $O(a^4)$ improvements. We have carried out extensive tests of the formalism through calculations of two-point correlators for both heavy-heavy (bottomonium) and heavy-light (B_s) mesons in 2+1 flavor lattice QCD and obtained both perturbative and non-perturbative determinations of energy shift and external momentum renormalization. The results demonstrate the effectiveness of mNRQCD. In particular we show that the decay constants of heavy-light mesons can be calculated with small systematic errors up to much larger momenta than with standard NRQCD.

10 - Beyond the Standard Model (theory and experimental searches)

9 posters

147 Limits on the anomalous HZgamma vertex arising from the process $e^+e^- \rightarrow \tau^+ \tau^- \gamma$

Presented by: Alejandro Gutierrez-Rodriguez (Universidad Autonoma de Zacatecas)

We study the sensitivity for testing the anomalous triple coupling HZgamma via the process $e^+e^- \rightarrow \tau^+\tau^- \gamma$ at high energy linear colliders. Using as an input the data obtained by the L3 and OPAL Collaborations for the reaction $e^+e^- \rightarrow \tau^+\tau^- \gamma$, we get limits on the anomalous HZgamma vertex.

175 Resonant Production of Color Octet Electron at the LHeC

Presented by: Semsettin Turkoz (Ankara University)

In composite models with colored preons leptogluons (l_8) has a same status with leptoquarks, excited leptons and quarks etc. We analyze resonant production of color octet electron (e_8) at QCD Explorer stage of the Large Hadron electron Collider (LHeC). It is shown that the e_8 discovery at the LHeC will simultaneously determine the compositeness scale.

269 Z' Signature from Muon Pair Production at LHC

Presented by: José Borges Filho (Instituto de Física UERJ)

We search for signatures of the extra neutral gauge boson Z' , predicted in some extensions of the Standard Model, from the analysis of some distributions for $p + p \rightarrow \mu^+ + \mu^- + X$, where the only exotic particle involved is Z' . In addition to the invariant mass and charge asymmetry distributions, we propose in our search to use the transverse momentum distribution (p_T) as an observable. We do our calculation for two values of the LHC center of mass energy (7 and 14 TeV), corresponding to 1 and 100 fb⁻¹ of luminosity, in order to compare our findings from some models with the distributions following from the Standard Model. By applying convenient cuts in the invariant mass, we show that the final particles p_T distributions can reveal the presence of an extra neutral gauge boson contribution. We also claim that it is possible to disentangle the models considered here and we emphasize that the minimal version of the model, based on $SU(3)_C \times SU(3)_L \times U(1)_X$ symmetry, presents the more clear signatures for Z' existence.

481 Searches for Supersymmetry in hadronic final states with the CMS detector at the LHC

Presented by: Robert John Bainbridge (Imperial College London)

Supersymmetry may give rise to striking events that could be discovered early in LHC running. We discuss search strategies based on the generic event signatures of high jet multiplicity and large missing transverse momentum in the final state, which have great potential for discovery. An important aspect of such searches is the commissioning of search variables with LHC data, and demonstrating a good understanding of the detector, which is discussed in detail. Techniques for estimating the contributions from Standard Model background processes using data are presented. Finally prospects for a discovery are reviewed.

543 Inclusive Searches for Supersymmetry with Jets and Missing Transverse Energy with the ATLAS Detector

Presented by: Marija Vranjes Milosavljevic (Institute of Physics-Belgrade)

We report on preparations for inclusive searches for new physics, in particular supersymmetry, in events with jets and missing transverse energy, with the ATLAS detector at the LHC. We focus on the relevant performance of the ATLAS detector in measuring jets and missing energy in first collision data. We study how Standard Model backgrounds to new physics can be extracted from the data, and we take a first look at the 7 TeV data set. We investigate the sensitivity of ATLAS for supersymmetry searches in this channel for the 2010-2011 LHC run.

544 Inclusive Searches for Supersymmetry with Leptons with the ATLAS Detector

Presented by: Stephan Horner (Albert-Ludwigs-Universitaet Freiburg)

We report on preparations for inclusive searches for new physics, in particular supersymmetry, in events with one or two isolated high momentum leptons, and possibly jets and missing transverse energy, with the ATLAS detector at the LHC. We focus on the relevant performance of the ATLAS detector, in particular for the measurement of leptons, in first collision data. We study how Standard Model backgrounds to new physics can be extracted from the data, and we take a first look at the 7 TeV data set. We investigate the sensitivity of ATLAS for supersymmetry searches in this channel for the 2010-2011 LHC run.

630 Searches for Sbottom Quarks with the D0 Detector

Presented by: Cecile Deterre (CEA - Centre d'Etudes de Saclay (CEA))

In supersymmetry, the partner of the bottom quark could be among the lightest supersymmetric particles. In that case, it would be produced abundantly at the Fermilab Tevatron collider. We search for pair-produced sbottom quarks each decaying to a bottom quark and an undetected lightest neutralino in 5.4 fb⁻¹ of data and obtain the most stringent limits to date on the sbottom quark mass.

777 Phenomenologies of exotic particles in the lepton sector

Presented by: Sandy Law (Chung Yuan Christian University)

We consider all new interaction terms in the lepton sector that are renormalisable, SM gauge invariant but with only one exotic particle appearing per term. Following this setup, we have investigated those new couplings which have been rarely studied. Using the available low-energy experimental data, constraints can be placed on the interaction strength of these new processes via their contributions to the FCNC effects.

920 Trigger Issues for New Physics Searches in the CMS Experiment

Presented by: Massimiliano Chiorboli (Dipartimento di Fisica)

The CMS trigger system has been designed to cope with unprecedented luminosities and accelerator bunch-crossing rates of up to 40 MHz at the LHC. We discuss the performance of the CMS trigger and some of the issues relevant to searches for new physics.

11 - Particle Astrophysics and Cosmology

9 posters

120 Very Short Gamma Ray Bursts Study and Primordial Black Holes

Presented by: David Cline (UCLA)

We show the locations of the SWIFT short hard bursts (SHB) with afterglows on the Galactic map and compare with the VSB BATSE events. As we have pointed out before, there is an excess of events in the galactic map of BATSE VSB events. We note, that none of VSB SWIFT era events fall into this cluster. More SWIFT events are needed to check this claim. We also report a new study with KONUS data of the VSB sample with an average energy above 90 keV showing a clear excess of events below 100 ms duration (T90) that have large mean energy photons. We suggest that VSB themselves consists of two subclasses: a reaction of events have peculiar distribution properties and have no detectable counter parts, as might be expected for exotic sources such as Primordial Black Holes. New results from SWIFT will be compared with the BATSE VSB data.

125 Status of the TUS space experiment preparation

Presented by: Leonid Tkachev (Joint Inst. for Nuclear Research (JINR))

The TUS space project for investigation of Ultra High Energy Cosmic Rays (UHECR) by the measurement of Extensive Atmospheric Shower fluorescent radiation is in the construction stage. The main goal of the TUS mission is to search for cosmic ray particles beyond GZK energy limit, $E=50$ EeV. In comparison to ground based detectors TUS has an advantage of the all sky observation of primary particle arrival directions. The TUS experience of UHECR study from space will be important for future space detectors like the next JEM-EUSO mission for which the TUS space detector could be considered as a "pathfinder". UV sensor of the TUS detector was operated on board the Russian "Universitetsky-Tatiana" satellite. The JEM-EUSO UV sensor will be tested during the TUS data taking for atmospheric transient luminous events measurements by pinhole camera at the TUS apparatus. The technological TUS prototype is produced and their tests are in progress. The flight TUS detector has to be produced in 2010-2011. The mission is planned for operation at the end of 2011 at the dedicated "Mikhail Lomonosov" satellite.

188 Cosmological constraint on the mass of Higgs boson in the Standard model

Presented by: Valery Kiselev (IHEP, Russia)

If the mass of Higgs boson exceeds the decoupling value, then the Higgs scalar is not able to produce the inflation, that is the preferable option for the observed properties of our Universe. The inflation is finished at the Hubble rate H related with the constant of field self-coupling λ by $2\pi G H^2 = \lambda$.

Therefore, if the coupling constant is about unit, then the Hubble rate takes a Planckian value, thus, the classical description of gravity becomes invalid and the inflation regime does not occur. Considering the de Sitter spacetime we find that quantum fluctuations of metric are essential at the action equal to 2π , that leads to the critical value of self-coupling constant $\lambda = 1/6$.

Then, the decoupling mass of Higgs particle in the tree approximation for the potential is given by $m_{\min} = 140$ GeV.

The renormalization group analysis within the two-loop approximation results in the lower cosmological bound to the Higgs boson mass $m_{\min} = 150 \pm 3$ GeV, wherein the uncertainty is mainly determined by the experimental accuracy in the measuring the t-quark mass as well as by the estimate of higher order contributions in the perturbation theory.

315 Determinations of flavor ratios and flavor transitions of astrophysical neutrinos

Presented by: Guey-Lin Lin (National Chiao-Tung University)

We argue that effective flavor discrimination in neutrino telescopes is the key to probe the flavor ratios of astrophysical neutrinos at the source [1,3] and flavor transition mechanisms [2] of these neutrinos during their propagations from the source to the Earth. We first discuss how well one can reconstruct the flavor ratios of astrophysical neutrinos at the source, given achievable efficiencies of neutrino telescopes in flavor discriminations and expected understandings of neutrino mixing parameters in the future. It will be shown that the signatures for tau neutrinos are energy dependent, hence the methods for flavor reconstruction depend on neutrino energies as well. We then discuss how to probe flavor transition mechanisms of propagating astrophysical neutrinos. In this regard, we propose a model independent parametrization for neutrino flavor transitions, with the neutrino oscillation as a special case. We illustrate how one can determine parameters of this parameterization by neutrino telescope measurements. The situation with non-conservation of neutrino flux during neutrino propagations (such as that caused by neutrino decays) is also discussed.

Refs.: [1] T. C. Liu, M. A. Huang and G. L. Lin, arXiv: 1004.5154. [2] K. C. Lai, G. L. Lin and T. C. Liu, arXiv: 1004.1583. [3] K. C. Lai, G. L. Lin and T. C. Liu, Phys. Rev. D80, 103005 (2009).

373 Status of XMASS experiment

Presented by: Ko Abe (University of Tokyo)

XMASS is multi purpose low background and low energy threshold experiment using large amount of liquid xenon. The second stage of XMASS, 800kg detector, is now under construction. Main target of this detector is Dark Matter with sensitivity of 10^{-45} cm² in spin independent cross section. To keep background level as low as 10^{-4} /day/keV/kg level, experiment uses many key components such as newly developed extremely low BG PMT, water shield, purification system and self shielding effect of xenon itself. The detector construction started from end of last year. It will be finished around this July and commissioning will start soon after that.

621 Dark Matter Detection with the DEAP/CLEAN Detectors

Presented by: Marek Kos (Syracuse University/DEAP,CLEAN)

The MiniCLEAN and DEAP-3600 dark matter detectors use pulse-shape discrimination of scintillation light in liquid Argon (or Neon) to differentiate between electron-recoil background events and nuclear-recoil events from potential WIMP interactions. The simple design allows for scaling up to larger detectors without loss of discrimination power or detection efficiency. Both detectors are currently in construction, with expected sensitivities one to two orders of magnitude beyond the world's best current limits. The status of the MiniCLEAN and DEAP-3600 experiments will be discussed as well as plans for a larger detector.

810 Measurement of the charge asymmetry of atmospheric muons with the CMS detector

Presented by: Lars Sonnenschein (RWTH Aachen)

A measurement is presented of the flux ratio of positive and negative muons from cosmic ray interactions in the atmosphere, using data collected by the CMS detector at ground level and in the underground experimental cavern. The excellent performance of the CMS detector allowed detection of muons in the momentum range from 3 GeV/c to 1 TeV/c. For muon momenta below 100 GeV/c the flux ratio is measured to be a constant 1.2766 ± 0.0032 (stat) ± 0.0032 (syst), the most precise measurement to date. At higher momenta an increase in the charge asymmetry is observed, in agreement with models of muon production in cosmic ray showers and compatible with previous measurements by deep underground experiments.

911 Search for novel origins of cosmic-ray antiprotons and antimatter with BESS-Polar flight over Antarctica.

Presented by: Koji YOSHIMURA (High Energy Accelerator Research Organization (KEK))

The primary aims of the BESS-Polar program are precise measurements of the low-energy antiproton spectrum and search for cosmologically significant antimatter, which would provide new clues to understand the early Universe. The second flight (BESS-Polar II) over Antarctica was successfully carried out in December 2007 - January 2008. We performed 24.5 days scientific observation just at the solar minimum. The payload worked well during the flight and 4.7 billion cosmic-ray events were collected, which corresponds to 10-20 times statistics of the BESS data taken in the previous solar minimum period (1995 and 1997). Based on the BESS-Polar II data, we will present recent preliminary results of cosmic-ray antiproton measurements and sensitive search for antimatter.



ICHEP2010 Posters

1023 Inert Model and evolution of the Universe

Presented by: Dorota Sokolowska (University of Warsaw)

We consider evolution of the Universe after EWSB leading to the present Inert phase, containing a SM-like Higgs boson and scalar dark particles among them a Dark Matter candidate. In particular we address the question, whether there is a possibility to have a sequence of the phase transitions instead of a single one leading directly from EW symmetric phase to the Inert one. The phenomenological consequences of various options will be discussed.

122 RESUMMATION OF INFRARED DIVERGENCES IN THE FREE-ENERGY OF SPIN-TWO FIELDS

Presented by: Fernando Tadeu Brandt (Universidade de São Paulo)

The finite temperature behavior of spin-two fields may have some relevant connections with the low energy behavior of more fundamental approaches to gravity, specially in the high temperature limit, when resummation is unavoidable. In this work we derive a closed form expression for the sum of all the infrared divergent contributions to the free-energy of a gas of gravitons. An important ingredient of our calculation is the use of a gauge fixing procedure such that the graviton propagator becomes both traceless and transverse. This has been shown to be possible, in a previous work, using a general gauge fixing procedure, in the context of the lowest order expansion of the Einstein-Hilbert action, describing non-interacting spin two fields. In order to encompass the problems involving thermal loops, such as the resummation of the free-energy, in the present work, we have extended this procedure to the situations when the interactions are taken into account. We will also present some possible consequences which may arise from the imaginary part of the resummed free-energy.

999 Search for Trapped Antihydrogen: First Candidate Events

Presented by: Richard Hydomako (TRIUMF)

Precision symmetry tests at low energies have played important roles in our understanding of fundamental interactions. ALPHA (Antihydrogen Laser Physics Apparatus) is an international project located at CERN, whose prime goal is to perform tests of CPT symmetry on antihydrogen. By precise spectroscopic comparisons of well-studied atomic hydrogen with its antimatter counterpart, we hope to probe indirectly physics at or beyond the Planck scale. High precision tests with antihydrogen would likely require samples of trapped antihydrogen atoms. While substantial numbers of antihydrogen atoms have been produced in several experiments, their trapping has not yet been achieved. It is the initial goal of ALPHA to demonstrate stable trapping of antihydrogen. In the ALPHA apparatus, cold plasmas of typically 3×10^4 antiprotons and of 4×10^6 positrons are mixed in a Penning trap to form cold antihydrogen. A multipolar magnetic trap of depth 0.5 Kelvin is superimposed on the Penning trap to confine the anti-atoms. The ALPHA experiment features a 30,000 channel silicon vertex detector in order to identify annihilations of the expected small number of trapped atoms.

Since its first beam in 2006, ALPHA has been making substantial progress towards trapping of antihydrogen. In 2009, we have reached, for the first time, the detection sensitivity and trap conditions for which observation of antihydrogen trapping can be realistically expected. In this talk, we will present results from that run, where we have observed first candidate events. The details of the detector analysis, as well as possible sources of background will be discussed. Prospects for precision CPT tests with trapped antihydrogen will also be discussed.

239 New capabilities of coordinate detectors on the basis of the straws

Presented by: Vladimir Peshekhonov (Joint Institute for Nuclear Research (JINR))

The necessity of providing high track reconstruction efficiency in high multiplicity processes requires highly granulated track detectors with good spatial resolution. The development of gas coordinate detectors (GEM, Micromegas, etc) promises good results. Straw track detectors possess some advantages: the least material budget in comparison with any other detector types, the good ratio of the detector area to its cost. The executed researches have shown possibilities to create the detectors on the basis of granulated straws, and also to increase their gas mixture pressure till up to 5 bars. The segmented straws and the high pressure straws were studied in JINR earlier, the length of these straws was till up to 1.6 m. Beam tests of the prototypes of the granulated straws and the high pressure straws have been executed on H6 SPS beam channel in CERN. Each granulated straw of first prototype contained 4 segments with the area of 4 cm², and the prototype contains 360 segments. The straw length were 40 cm and diameter was 4 mm. The spatial resolution of the prototype was 160÷180 μm for the ArCO₂ (80/20) mixture, the insensitive area of the straw plane was < 5%, and material budget has been almost kept. Diameter of the second prototype straws was 10 mm. The spatial resolution at pressure 3 bars was less than 50 μm for the ArCO₂ (80/20) gas mixture. Development of the detectors on the basis of the granulated high pressure straws should allow to keep all straw detector advantages and to increase their spatial resolution till 30-50 μm.

344 TMVA - Toolkit for Multivariate Data Analysis in ROOT

Presented by: Jan Therhaag (Univ. Bonn, Physikalisches Institut)

Given the ever-increasing complexity of modern HEP data analysis, multivariate analysis techniques have proven an indispensable tool in extracting the most valuable information from the data. TMVA, the Toolkit for Multivariate Data Analysis, provides a large variety of advanced multivariate analysis techniques for both signal/background classification and regression problems. In TMVA, all methods are embedded in a user-friendly framework capable of handling the pre-processing of the data as well as the evaluation of the results, thus allowing for a simple use of even the most sophisticated multivariate techniques. Convenient assessment and comparison of different analysis techniques enable the user to choose the most efficient approach for any particular data analysis task. TMVA is an integral part of the ROOT data analysis framework and is widely-used in the LHC experiments. In this talk I will review recent developments in TMVA, discuss typical use-cases in HEP and present the performance of our most important multivariate techniques on example data by comparing it to theoretical performance limits.

442 Development of very low-threshold detection system for low-background experiments.

Presented by: Ivan Alexandrov (ITEP, Moscow)

A concept of readout of noble gas two-phase emission detectors by means of multipixel avalanche Geiger photodiodes (MGPDs or SiPMs) and a THGEM structure is presented.

It is well known that a two-phase emission technique with noble gases is a very sensitive method of detection of very small ionisation signals (down to few or single ionisation electrons). Electroluminescent "amplification" provides the unique possibility to detect reliably even the single ionisation electron extracted from the liquid to the gas phase. Due to this reason such detectors are currently successfully used in the Dark Matter search experiments and are considered for the use in the neutrino experiments: for coherent scattering of reactor antineutrino off atomic nuclei.

To increase the capabilities of a two-phase detector a system of THGEM + WLS (wavelength shifter) +MGPD is proposed for its readout. Additional amplification of the charge in the THGEM holes gives the large light signal of electroluminescence detected with an array of SiPMs. This readout system provides the mm accuracy for the very low-energy events, that is important for the reliable separation of the rare physical events from the background ones caused by spontaneous emission of the electrons from the liquid noble gas surface.

"Blue sensitive" SiPMs has been tested in LXe with a wavelength shifter (WLS) to detect the VUV scintillation light from LXe. A wavelength shifter p-terphenyl was vacuum deposited on a sapphire window and specially protected from pollution to the LXe medium with a poly-para-xylylen film. It was found that the p-terphenyl has a strong absorption peak at a wavelength of ~ 180 nm, very close to the peak of the LXe molecular continuum emission (175 nm). A Photon Detection Efficiency (PDE) of up to ~ 10% has been obtained for the combination of WLS and SiPM.

443 Instrumentation of the very forward region at future linear colliders – design and R&D by the FCAL Collaboration

Presented by: Iftach Sadeh (Tel Aviv University)

Detectors closing the very forward region in experiments at future linear colliders have to match specific requirements. The forward region design is affected by a phenomenon called beamstrahlung which at high centre of mass energies creates a severe e^+e^- pair background, leading to annual doses of several MGy in the very forward calorimeters. On the other hand, since beamstrahlung depends on the detailed collision parameters, measuring the pair background may provide a fast luminosity estimate. For the measurement of the luminosity through Bhabha scattering rates, high reconstruction accuracy in the polar angle of electromagnetic showers is mandatory. Due to high occupancy, the very forward calorimeters need a fast readout. In this talk, we report on the optimisation of the design of the very forward region for an ILC and CLIC detector, comprising two calorimeters, LumiCal and BeamCal. Requirements on the mechanical design of LumiCal and the readout electronics are derived. In addition, first results on the sensor R&D for these future forward calorimeters are reported.

455 ATLAS Data Quality Monitoring: Experience with First Collision Data

Presented by: Peter Waller (University of Liverpool-Unknown-Unknown)

It is essential to get quick feedback at all stages of the collection and reconstruction of particle physics data, and to correctly record quality decisions to ensure that only good data are used to obtain physics results. The ATLAS data quality system provides prompt investigation of collected data, initial calibrations, and later reconstruction, and propagates the corresponding quality decisions to analysis users. This talk describes the significant experience we have gained in 2009 and 2010 with collision data operations and analysis.

456 Processing, Calibration and Reprocessing of ATLAS Data from LHC Collisions at 7 TeV

Presented by: Michael Boehler (Deutsches Elektronen-Synchrotron (DESY))

The ATLAS experiment has successfully recorded, reconstructed and analyzed millions of collision events delivered by the LHC at an unprecedented centre-of-mass energy of 7 TeV. The involved large-scale data processing operations worked remarkably well, from an early commissioning period that gradually evolved to a stable operation mode aiming at physics. The early commissioning samples were promptly processed at the CERN "Tier-0" computer farm in all ATLAS data formats: from raw, to reconstructed, to a variety of reduced datasets. From these, the reconstruction software was tuned and state-of-the-art calibration and alignment constants were derived very quickly. These improvements were then used for a series of centralized data reprocessings, using world-wide distributed computing on the Grid. The reprocessing exercises were done coherently for real and simulated data samples, and could provide the high-quality data sets required for the publication of the first ATLAS physics results. By April 2010, the prompt reconstruction was stabilized and pre-calibrated run by run, so that the new data samples produced by the Tier0 are directly usable for physics analysis and can be combined with the earlier reprocessed data, real and simulated.

552 ATLAS Tracker Upgrade: Silicon Strip Detectors and Modules for the sLHC

Presented by: Mercedes Minano Moya (Instituto de Fisica Corpuscular (IFIC) UV-CSIC)

It is foreseen to increase the luminosity of the Large Hadron Collider (LHC) at CERN by a factor ten, with the upgraded machine dubbed Super-LHC or sLHC. The ATLAS experiment will require a new tracker for sLHC operation. In order to cope with the increase in pile-up backgrounds at the higher luminosity, an all silicon detector is being designed. The new strip detector will use significantly shorter strips than the current SCT in order to minimise the occupancy. As the increased luminosity will mean a corresponding increase in radiation dose, a new generation of extremely radiation hard silicon detectors is required. Extensive R&D programmes are underway to develop silicon sensors with sufficient radiation hardness. In parallel, new front-end electronics and readout systems are being designed to cope with the higher data rates. The challenges of powering and cooling a very large strip detector will be discussed. Ideas on possible schemes for the layout and support mechanics will be shown.

740 An Optical Transition Radiation Monitor for the T2K Proton Beam (for the T2K Collaboration)

Presented by: Mark Hartz (University of Toronto/York University)

The neutrinos studied in the T2K long baseline neutrino experiment are generated by the decay of hadrons produced when a 30 GeV proton beam is incident on a graphite target. Shifts in the proton beam position and direction at the target will cause changes in the neutrino energy spectra seen by the T2K off-axis neutrino detectors, while a small shift in the beam position or width when operating at high beam power can cause damage to the target, hence the need for accurate measurements of the proton beam profile near the target. The Optical Transition Radiation (OTR) monitor measures the profile of the proton beam perpendicular to the beam direction by imaging transition radiation produced by the beam as it traverses a metallic foil located 30 cm upstream of the target. The OTR monitor provides fine grained 2D images of the beam, giving better than 1 mm accuracy for beam position and width measurements, while placing only optical and mechanical components in the high radiation environment near the T2K target. This talk will include an introduction to the theory of transition radiation, a discussion of the OTR monitor design and implementation, and results from the first year of operation.

803 The MICE PID instrumentation system

Presented by: Maurizio Bonesini (INFN Sezione di Milano Bicocca)

The PID instrumentation of the MICE experiment at RAL, to be used to demonstrate muon cooling, is presented. It must provide good PID capabilities, to contribute to a high precision emittance measurement, in a harsh environment with high incoming particle rates, non-uniform fringe magnetic fields and high backgrounds. It is based mainly on a TOF system, CKOV counters and a downstream calorimeter. Design choices for the detector construction will be illustrated. The performances obtained in the first characterization of the MICE muon beamline will be presented.

812 The alignment of the CMS Silicon Tracker

Presented by: Jula Draeger (UHH - Institut fuer Experimental Physik-Universitaet Hamburg-Un)

The complex system of the CMS all-silicon Tracker, with 15 148 silicon strip and 1440 silicon pixel modules, requires sophisticated alignment procedures. In order to achieve an optimal track-parameter resolution, the position and orientation of its modules need to be determined with a precision of few micrometers. We present results of the alignment of the full Tracker, in its final position, used for the reconstruction of the first collisions recorded by the CMS experiment. The aligned geometry is based on the analysis of several million reconstructed tracks recorded during the commissioning of the CMS experiment, both with cosmic rays and with the first proton-proton collisions. The geometry has been systematically monitored in the different periods of operation of the CMS detector. The results have been validated by several data-driven studies (laser beam cross-checks, track fit self-consistency, track residuals in overlapping module regions, and track parameter resolution) and compared with predictions obtained from a detailed detector simulation.

851 Deployment and Operations of the CMS Prompt Skimming System

Presented by: Si Xie (Massachusetts Inst. of Technology (MIT))

CMS has many automated and time critical workflows that are used to monitor and commission the detector. Most of the automated workflows are run at the Tier-0 computing facility at CERN, but CMS has recently deployed an infrastructure for automated workflow submission at the Tier-1 centers. In this presentation we will present the development, deployment and operations experience with the Tier-1 prompt skimming system. The Tier-1 skimming system automatically tracks and submits workflows from CERN to the Tier-1 centers as the data arrives through the grid interfaces. The Tier-1 facilities do not have the same low latency access to the data, but there is a larger pool of processing and storage resources at the remote sites than at CERN. The prompt skimming system is an interesting example of utilizing the Tier-1 centers as a natural extension of the data acquisition system to the remote facilities. The prompt skimming system automatically selects events as they are available and can be used to deploy additional resources at the Tier-1 centers for prompt selection and commissioning.

854 Commissioning and Performance of the CMS Hadronic Calorimeters in pp Collisions at a Center of Mass Energy of 7 TeV at the Large Hadron Collider

Presented by: Pawel De Barbaro (High Energy Group)

We present results on the commissioning and performance of the CMS hadron calorimeters in pp collisions at a center of mass energy of 7 TeV at the Large Hadron Collider. The hadron calorimeters consist of sub systems covering a wide range of pseudo-rapidity utilizing different technologies and electronics. Anomalous background signals, which had been previously observed in data collected in test beam running, have been characterized and studied in collision data. Methods to identify and remove these anomalous signals have been developed and their performance is presented. The hadronic calorimeters are used to trigger the experiment on energy clusters and the trigger performance is discussed. Methods to calibrate the calorimeters using cosmic muons, beam splash events (where the LHC beam is targeted on upstream collimators), and collision data are presented.

871 Performance of CMOS sensors for a digital electromagnetic calorimeter

Presented by: Paul Dauncey (Imperial College London)

We have developed monolithic silicon pixel sensors as study devices for a digital electromagnetic calorimetry application at future collider detectors, such as a linear collider. The motivation for a digital ECAL and the sensor requirements which arise from this are discussed.

We present results from the "TPAC" CMOS sensors produced using the 0.18 μ m INMAPS process. The sensors have 50 μ m pixel size and the technology is also applicable to tracking and vertexing applications where highly granular pixels with on-sensor readout is needed.

Several varieties of the TPAC sensors were fabricated with and without some of the various processing innovations available in INMAPS, specifically deep P-wells and high-resistivity epitaxial silicon. The performance of these sensor variants has been measured both in the laboratory and at beam tests. Comparisons of these sensors with each other and with simulation are presented, showing that the INMAPS innovations result in significant improvements in the sensor performance.

1016 Aerogel RICH for Belle II

Presented by: Samo Korpar (Maribor Univ. and J. Stefan Institute, Ljubljana)

For the Belle-II experiment, we have been developing a proximity focusing RICH counter with silica aerogel radiator as a new particle identifier in the forward endcap region to reach a π/K separation capability corresponding to 4 sigma at 4 GeV/c. We have developed a novel radiator concept, a multilayer stack of radiator tiles with increasing refractive index in a focusing configuration. The central issue is, however, to develop a reliable single photon detector which can be operated at 1.5 T, has a sufficiently fine granularity and compact size. To fulfill these conditions, R&D on a new hybrid avalanche photo-detector (HAPD) has been conducted with Hamamatsu for several years. We have studied the device on the bench, and in beam tests, and have shown that it can be successfully operated in an axial magnetic field of 1.5 Tesla.

14 - Future Machines and Projects

3 posters

379 Polarimeters and Energy Spectrometers for the ILC Beam Delivery System

Presented by: Anthony Hartin (Queen Mary University of London-University of London-Unknown)

Any future high energy e+e- linear collider aims at precision measurements of Standard Model quantities as well as of new, not yet discovered phenomena. In order to pursue this physics programme, excellent detectors at the interaction region have to be complemented by beam diagnostics of unprecedented precision. This talk gives an overview of current plans and issues for polarimeters and energy spectrometers at the International Linear Collider, which have been designed to fulfill the precision goals at a large range of beam energies from 45.6 GeV at the Z pole up to 250 GeV or, as an upgrade, up to 500 GeV.

727 Measurement of emittance and emittance reduction in MICE

Presented by: Vassil VERGUILOV (DPNC - University of Geneva)

MICE is building at RAL a muon beam with tunable emittance and an array of detectors capable to measure the emittance of the beam before and after any ionization cooling device that will be designed in the future.

This talk will present the details of the measurements of beam emittance and of emittance reduction, the tracking and particle identification instrumentation used for this purpose, the physical observables and the techniques being prepared to provide convincing evidence of effective ionisation cooling.

After the measurement of the transverse cooling performances of the cooling cell designed in early feasibility studies of a neutrino factory, the MICE beam and emittance measurement devices will remain as a facility for the study of new candidate cooling cell prototypes, including exchange between transverse and longitudinal emittance cooling. Some of those emerging options will also be briefly mentioned.

939 Search for Muon to Electron Conversion at J-PARC

Presented by: Yoshitaka KUNO (Osaka University)

We would like to present the status of the COMET experiment, which aims at searching for muon to electron conversion in a muonic atom at J-PARC with an experimental sensitivity of better than 10^{-16} . The muon to electron conversion is one of the processes of charged lepton flavor violation (cLFV). Physics of cLFV has attracted much attention from theorists and experimentalists since cLFV would have a potential to find a clue of physics beyond the Standard Model. In particular, muon to electron conversion in a muonic atom has been identified as a next-generation process to improve a sensitivity beyond the MEG at PSI. The aimed sensitivity with the COMET is a factor of 10,000 better than the present experimental limits. The COMET proposal has been approved at the stage-1 level at J-PARC, Japan in 2009, and the detailed design works and R&D are being undertaken. In addition, R&D for the subsequent project called the PRISM/PRIME with an experimental sensitivity of better than 10^{-18} has started in the international framework. In this paper, we would like to present physics motivation and report all the experimental status on the COMET.

Merged Abstracts



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The logo features the word "ICHER" in large, bold, blue capital letters. Below it, "PARIS" is written in red and "2010" in blue, with a gradient effect. The text is overlaid on a stylized, 3D molecular structure composed of grey rods and spheres. The entire logo is set against a background of a faint, repeating pattern of the same logo.

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40

Semileptonic Decays of the Heavy Baryons in Light Cone QCD Sum Rules

Taking into account the Lambda, Sigma and Nucleon distribution amplitudes and the most general form of the interpolating currents of the heavy Lambda_{b,c}, Sigma_{b,c} and Chi_{b,c} which generalize the Ioffe current for the baryons, the semileptonic transitions of the heavy sextet spin 1/2 baryons to the light octet baryons are investigated in the framework of the light cone QCD sum rules. Sum rules for all form factors responsible for such channels are constructed. The obtained results for the form factors are used to compute the related branching fractions. A comparison of the obtained results with the existing predictions of the heavy quark effective theory is also presented. The results of the branching ratio shows the detectability of some of these channels at the LHCb in the near future is quite high.

54

Measurement of the FCNC Decays $K^{+-} \rightarrow \pi^{+-} l^+ l^-$ at NA48

We report on measurements of the rare decays $K^{+-} \rightarrow \pi^{+-} e^+ e^-$ and $K^{+-} \rightarrow \pi^{+-} \mu^+ \mu^-$. The full NA48/2 data set was analyzed, leading to more than 7200 reconstructed events in the electronic and more than 3000 events in the muonic channel, the latter exceeding the total existing statistics by a factor of five. For both channels the selected events are almost background-free. From these events, we have determined the branching fraction and form factors of $K^{+-} \rightarrow \pi^{+-} e^+ e^-$ using different theoretical models. Our results improve the existing world averages significantly. In addition, we measured the CP violating asymmetry between K^+ and K^- in this channel to be less than a few percent.

55

Measurement of $KS \rightarrow \pi\pi e\bar{e}$ decay mode at NA48

The $KS \rightarrow \pi\pi e\bar{e}$ decay mode has been investigated using the data collected in 2002 by the NA48/1 collaboration. With about 23k signal events and 59k $KL \rightarrow \pi^+ \pi^- \pi^0$ normalization decays, the $KS \rightarrow \pi\pi e\bar{e}$ branching ratio was determined with respect to the KL one. This result is also used to set an upper limit on the presence of $E1$ direct emission in the decay amplitude. The CP-violating asymmetry has been also measured.

56

Precision Measurement of $\pi\pi$ Scattering Lengths in $Ke4$ Decays at NA48

The measurement of the S-wave $\pi\pi$ scattering lengths is a fundamental test of the validity of Chiral Perturbation Theory. We report on the final NA48/2 result, which uses the complete NA48/2 data set with more than a million reconstructed $Ke4$ decays. From these events we have determined the decay form factors and $\pi\pi$ scattering lengths $a_{0,0}$ and $a_{2,0}$. The result is the most precise measurement of the scattering lengths and in excellent agreement with the prediction of Chiral Perturbation Theory.

57

Precision Measurement of Photon Emission in $K^{+-} \rightarrow \pi^{+-} \pi^0 \gamma$ Decays at NA48

We report our final result on the measurement of direct photon emission (DE) in the decay $K^{+-} \rightarrow \pi^{+-} \pi^0 \gamma$ and its interference (INT) with the inner bremsstrahlung amplitude. For this measurement the full NA48/2 data set with about 600k reconstructed $K^{+-} \rightarrow \pi^{+-} \pi^0 \gamma$ decays was analyzed, which is factor of 30 larger than for previous experiments and a factor of three w.r.t. our preliminary result. From this, the sizes of both the DE and the INT amplitudes have been measured with high precision, with the INT amplitude being observed for the first time. In addition, a measurement of the CP violating asymmetry between K^+ and K^- has been obtained.

58

Measurement of the rare Decay $K^{+-} \rightarrow \pi^{+-} \gamma \gamma$ at NA48

We report on the measurement of the branching fraction of the rare decay $K^{+-} \rightarrow \pi^{+-} \gamma \gamma$ using the full NA48/2 dataset of more than 5000 reconstructed decays from the full NA48/2 data set. From the spectrum of the invariant $\gamma \gamma$ mass, the decay parameter c^{\wedge} can be extracted with unprecedented precision.

59

Measurement of the radiative Decay $K^{+-} \rightarrow \pi^0 e^{+-} \nu_e \gamma$ at NA48

We report on the measurement of more than 200000 events of the decay $K^{+-} \rightarrow \pi^0 e^{+-} \nu_e \gamma$, recorded with the NA48/2 detector at CERN. These statistics, about two orders of magnitude more than previous experiments, allow measurements of the decay rate and of possible CP violation in this decay with per cent precision.

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Test QCD symmetries via precision measurements of Light Pseudoscalar Mesons

Symmetries and their dynamical breaking effects play fundamental roles in physics. In particular, the three light neutral pseudoscalar mesons π^0 , η and η' contain fundamental information about QCD symmetries. While π^0 and η are Goldstone bosons due to spontaneous chiral symmetry breaking, the η' is not due to the axial U(1) anomaly. There is a second type of chiral anomaly driving the two-photon decays of these mesons. This system harbors information about the effects of SU(3) symmetry and the mixing phenomena of the mesons due to isospin symmetry breaking. It provides a unique approach model independently to determine the light quark-mass ratio and the η - η' mixing angle, and represents a rich laboratory to study the origin and the dynamics of chiral symmetry breaking at low energy. A comprehensive experimental program has been developed at Jefferson Laboratory to perform high precision measurements of the two-photon decay widths and transition form factors at low Q^2 (~ 0.001 - 0.5 GeV²) on π^0 , η and η' via the Primakoff effect. A measurement on the π^0 radiative decay width (PrimEx I) was performed in 2004 with 6 GeV beam and a precision of 3% total error has been achieved. The second run on π^0 (PrimEx II) is currently under preparation to reach the final goal of 1.4% precision. The advent of a 12 GeV electron beam at Jlab will make it possible to extend the program to η and η' . A new experimental proposal to measure the η radiative decay width at 3% level with an 11 GeV tagged photon beam in Hall D has been approved recently. The detail of the Primakoff program at Jlab 12 GeV will be presented.

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Deeply Virtual Exclusive Reactions with CLAS

Deeply virtual exclusive reactions offer a unique opportunity to study the structure of the nucleon at the parton level as one varies both the size of the probe, i.e. the photon virtuality Q^2 , and the momentum transfer to the nucleon t . Such processes can reveal much more information about the structure of the nucleon than either inclusive electroproduction (Q^2 only) or elastic form factors ($t=Q^2$).

A dedicated experiments to study Deeply Virtual Compton Scattering (DVCS) and Deeply Virtual Meson Production (DVMP) has been carried out in Hall B at Jefferson Lab. DVCS helicity-dependent and helicity-independent cross sections, as well as beam spin asymmetry, and cross sections and asymmetries for the π^0 and η exclusive electroproduction in a very wide kinematic range of Q^2 , x_B and t have been measured with CLAS. The preliminary data will be presented for the wide kinematic range in $Q^2=1$ - 4.5 GeV², $x_B=0.1$ - 0.5 and t up to 2 GeV².

We view the work presented in this report as leading into the program of the Jefferson Lab 12 GeV upgrade. The increased energy and luminosity will allow us to make the analysis at much higher Q^2 and x_B and perform Rosenbluth L/T separations of the cross sections.

164

A case for hidden $b\bar{b}$ tetraquarks based on $e^+e^- \rightarrow b\bar{b}$ cross section between $\sqrt{s}=10.54$ and 11.20 GeV

We study the spectroscopy and dominant decays of the bottomonium-like tetraquarks (bound diquarks-antidiquarks), focusing on the lowest lying P-wave $[bq][\bar{b}\bar{q}]$ states $Y_{[bq]}$ (with $q=u,d$), having $J^{PC}=1^{--}$. To search for them, we analyse the recent BaBar data obtained during an energy scan of the $e^+e^- \rightarrow b\bar{b}$ cross section in the range of $\sqrt{s}=10.54$ to 11.20 GeV. We find that these data are consistent with the presence of an additional $b\bar{b}$ state $Y_{[bq]}$ with a mass of 10.90 GeV and a width of about 30 MeV apart from the Upsilon(5S) and Upsilon(6S) resonances. A closeup of the energy region around the $Y_{[bq]}$ -mass may resolve this state in terms of the two mass eigenstates, $Y_{[b,l]}$ and $Y_{[b,h]}$, with a mass difference, estimated as about 6 MeV. We tentatively identify the state $Y_{[bq]}(10900)$ from the R_b -scan with the state $Y_b(10890)$ observed by Belle in the process $e^+e^- \rightarrow Y_b(10890) \rightarrow \text{Upsilon}(1S, 2S)\pi^+\pi^-$ due to their proximity in masses and decay widths.

165

Tetraquark interpretation of the Belle data on the anomalous Upsilon(1S) $\pi^+\pi^-$ and Upsilon(2S) $\pi^+\pi^-$ production near the Upsilon(5S) resonance

We analyze the Belle data [K.F.Chen et al. (Belle Collaboration), Phys. Rev. Lett. 100, 112001 (2008) I. Adachi et al. (Belle Collaboration), arXiv:0808.2445] on the processes $e^+e^- \rightarrow \text{Upsilon}(1S)\pi^+\pi^-$, $\text{Upsilon}(2S)\pi^+\pi^-$ near the peak of the Upsilon(5S) resonance, which are found to be anomalously large in rates compared to similar dipion transitions between the lower Upsilon resonances. Assuming these final states arise from the production and decays of the $J^{PC}=1^{--}$ state $Y_b(10890)$, which we interpret as a bound (diquark-antidiquark) tetraquark state $[bq][\bar{b}\bar{q}]$, a dynamical model for the decays $Y_b \rightarrow \text{Upsilon}(1S)\pi^+\pi^-$, $\text{Upsilon}(2S)\pi^+\pi^-$ is presented. Depending on the phase space, these decays receive significant contributions from the scalar 0^{++} states, $f_0(600)$ and $f_0(980)$, and from the $2^{++} q\bar{q}$ -meson $f_2(1270)$. Our model provides excellent fits for the decay distributions, supporting Y_b as a tetraquark state.

199

W and Z boson production in the forward region with LHCb

We report on studies of W and Z boson production using first data collected at the LHCb experiment. Measurements of the W^+ , W^- and Z boson cross-sections can test the Standard Model predictions at a Q^2 of $10,000 \text{ GeV}^2$ and x values of 10^{-4} . The triggering, selection and background reduction strategies are described and first results are shown.

200

Low mass Drell-Yan production in the forward region with LHCb

We report on studies of low mass Drell-Yan production using the dimuon decay channel carried out using first data collected at the LHCb experiment. Measurements of the production cross-section can improve the uncertainty on the parton density functions by a factor of two to x values down to 6×10^{-5} . The triggering, selection and background reduction strategies are described and first results are shown.

202

Prompt K^0_S production in pp collisions at the LHCb experiment

The inclusive production of prompt K^0_S mesons, which are either produced directly in the fragmentation process or in the decay chain of prompt resonances decaying strongly or electromagnetically, has been studied with the very first data collected in pp collisions at $\sqrt{s} = 0.9$ TeV using the LHCb detector in December 2009. K^0_S decays are identified kinematically using the information recorded by the LHCb tracking detectors, in events passing a minimum bias trigger. The absolute differential production cross section is measured as a function of the K^0_S transverse-momentum (p_T) and rapidity y in the region $0.2 < p_T < 1.6$ GeV/c and $2.5 < y < 4.0$. The p_T spectra, which are a sensitive probe of the hadronization mechanism, are compared with predictions from specific tunings of the PYTHIA generator. Preliminary results obtained at $\sqrt{s} = 7$ TeV may be shown as well.

203

Baryon/anti-baryon production studies at LHCb

Baryon number and strangeness can be used to probe the fragmentation field. Predictions for the inclusive production of baryons and anti-baryons at LHC energies differ significantly between models tuned on the same lower-energy data, especially at large pseudo-rapidities (η). The LHCb experiment, with its forward coverage ($2 < \eta < 5$), is in a unique position at LHC to study how well the quantum numbers of the beam particles are transported to the central region. Preliminary results on the inclusive production of protons and anti-protons, as well as Λ and anti- Λ hyperons, will be presented, with a specific emphasis on the baryon/anti-baryon production ratios as a function of rapidity, transverse momentum, and center-of-mass energy. Measurement will be compared with predictions from Monte Carlo generators tuned on experimental results.

204

First studies with J/ψ signals at LHCb

An important part of the LHCb physics programme relies on the ability to efficiently trigger and cleanly reconstruct $J/\psi \rightarrow \mu^+\mu^-$ decays. The first heavy flavour measurement at LHCb will concern J/ψ production, and open the road for further quarkonium and B physics studies. Experience on the triggering and reconstruction of J/ψ decays acquired by LHCb during the initial phase of the LHC startup at $\sqrt{s} = 7$ TeV will be reported. Contributions of J/ψ from b-hadron decays will be separated from prompt J/ψ produced directly in the pp collisions or in the decays of heavier prompt states. Preliminary results on the prompt and non-prompt J/ψ production cross section will be presented as a function of the J/ψ transverse-momentum (p_T) and rapidity (y) in the range $3 < y < 5$ and $p_T < 7$ GeV/c.

206

First open heavy-flavour studies at LHCb

The LHCb experiment is primarily designed to study charm and bottom hadron decays at the LHC. The first exclusively reconstructed charm and bottom hadrons signals have been observed shortly after the start of the first LHC physics run at $\sqrt{s} = 7$ TeV, in events collected with a minimum bias trigger. Charm cross-sections for D^0 , D^+ , D_s and Λ_c are measured in the forward region covered by LHCb ($2 < \eta < 5$). We also use the semi-inclusive decay $B \rightarrow D^0 \mu^- \text{anti-}\nu$ to ascertain the b anti-b production cross-section. Preliminary results will be shown.

213

Electroweak Penguin decays at LHCb

With the first data collected at $\sqrt{s} = 7$ TeV from the LHC we describe the validation of the analyses of radiative penguin decays in LHCb. The most promising ways to search for New Physics effects in radiative penguin decays are in the measurement of direct CP violation in $B_d \rightarrow K^* \gamma$, a time dependent analysis of $B_s \rightarrow \phi \gamma$ and an angular analysis of $B_d \rightarrow K^* \mu^+\mu^-$. Preparations for these analyses can already be conducted using the $B_d \rightarrow K^* \gamma$ signal for demonstrating the calorimeter performance at high energies, prompt J/ψ events for the validation of the di-muon signatures, and minimum bias events for studying the vertexing performance.

216

The LHCb Vertex Detector Upgrade

The LHCb experiment is planning an upgrade that will enhance its sensitivity by at least an order of magnitude and will allow probing very subtle new physics effects. A new vertex detector is a crucial element of this project. The requirement of providing a fast, efficient, and precise reconstruction of the event topology at luminosity up to $2 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$ is an important design consideration. Thus a vigorous R&D on a pixel vertex detector system is under way. Important considerations include radiation resistance up to a fluence of $10^{16} \text{ n}_{\text{eq}}/\text{cm}^2$, minimization of the overall system mass, and real time data flow out of the front-end electronics synchronized with the beam crossing rate of 40 MHz. Highlights of the progress in all the component of the complex R&D plan that we are undertaking will be presented.

217

Exclusive electroproduction of the ρ^+ meson on the proton at CLAS.

We will present our latest results on ρ^+ exclusive electroproduction on the proton measured with the CLAS detector of Jefferson Lab. We have measured for the first time ever for this process the longitudinal and transverse parts of the cross sections in the kinematic domain $0.15 < x_B < 0.70$ and $1.5 < Q^2 < 5 \text{ GeV}^2$. We will discuss the interpretation of these data in terms of traditional t-channel Reggeon exchanges as well as in the latest Generalized Parton Distributions formalism. We will compare our results to the other exclusive vector meson channels measured at CLAS and in other facilities: ρ , ω and ϕ .

220

Alignment and Calibration of the Tracking System at the LHCb Experiment

The LHCb detector is a forward spectrometer with tracking system based on silicon strip detectors and straw tube drift chambers before and after the magnetic field, to precisely measure the vertex position and the momentum resolution of the particles traveling through the detector. An important ingredient to the track parameter resolution is the spatial alignment of the tracking system. We will report on the current alignment status as well as on the calibration of the magnetic field, which is crucial for a precise mass measurements.

232

Confirmation of ppbar mass threshold enhancement at BESIII

The decays of $\psi' \rightarrow \text{pipi}/\psi(J/\psi \rightarrow \gamma \text{ppbar})$, $\psi' \rightarrow \gamma \text{ppbar}$ and $J/\psi \rightarrow \gamma \text{ppbar}$ are analyzed using the samples of $2.26 \times 10^8 J/\psi$ events and $1.06 \times 10^8 \psi'$ events collected with the BESIII detector. In $\psi' \rightarrow \text{pipi}/\psi(J/\psi \rightarrow \gamma \text{ppbar})$ decay, an enhancement at ppbar threshold is observed. The enhancement can be fit with an S-wave Breit-wigner resonances function with a mass of $M = 1861 \pm 6 \text{ (stat)} \pm 7 \text{ (syst)} \text{ MeV}/c^2$ and a narrow width $\Gamma < 38 \text{ MeV}/c^2$ at the 90% confidence level. The similar structure is also observed in $J/\psi \rightarrow \gamma \text{ppbar}$. These results are consistent with published BESII results. The mass and width of this structure do not match with any well established mesons. No similar narrow structure is seen in $\psi' \rightarrow \gamma \text{ppbar}$.

233

Confirmation of $X(1835)$ and searches for new resonances in $J/\psi \rightarrow \gamma \pi \pi \eta'$ and $J/\psi \rightarrow \omega \pi \pi \eta$ at BESIII

The decays of $J/\psi \rightarrow \gamma \pi \pi \eta'$ and $J/\psi \rightarrow \omega \pi \pi \eta$ are studied using a sample of $2.26 \times 10^8 J/\psi$ events collected by the BESIII experiment at BEPCII. For the decays of $J/\psi \rightarrow \gamma \pi \pi \eta'$, the resonance $X(1835)$, which was observed at BESII in the same decays, is confirmed in both of the two decay modes of η' ($\eta' \rightarrow \gamma \rho$ and $\eta' \rightarrow \pi \pi \eta$). Besides, the hint for two new additional structures is revealed. We also search for possible new structure in $J/\psi \rightarrow \omega \pi \pi \eta$.

234

The study of $a_0(980)$ - $f_0(980)$ mixing at BESIII

More than 30 years after their discovery, the nature of the light scalar mesons $f_0(980)$ and $a_0(980)$ is still controversial. They have been described as quark-antiquark states, four quark states, $K\bar{K}$ molecules, quark-antiquark-gluon hybrids, and so on. The study of their nature has been one of the important topics in the light hadron spectroscopy. The mixing intensity of $f_0(980)$ and $a_0(980)$ is expected to shed light on the nature of these two resonances. The a_0 - f_0 mixing intensity has been predicted to be in the range of 0.01 to 0.2 by various theoretical models, but no any experimental results available yet. The transition of $f_0(980)$ to $a_0(980)$ or $a_0(980)$ to $f_0(980)$ will provide complementary constraints to the parameters of a_0 and f_0 mesons. Using the samples of 2.26×10^8 J/ψ events and 1.06×10^8 ψ' events collected with the BESIII detector, we perform direct measurements of a_0 - f_0 mixing via the isospin breaking processes $J/\psi \rightarrow \phi f_0 \rightarrow \phi a_0$ and $\chi_{c1} \rightarrow \pi^0 a_0 \rightarrow \pi^0 f_0$. The preliminary results on the $a_0(980)$ - $f_0(980)$ mixing intensity are presented.

236

New observation in χ_{cJ} decays into vector meson pairs at BESIII

Using a sample of 100 million $\psi(2S)$ events collected with the BESIII detector at the BEPCII e^+e^- collider, χ_{cJ} decays into vector meson pairs, $\chi_{cJ} \rightarrow \phi \phi$, $\omega \omega$ and $\omega \phi$, are studied. The χ_{cJ} decay mechanism into vector meson pairs (VV) remains puzzling. Previous measurements of χ_{c0} , $\chi_{c2} \rightarrow \phi \phi$ and $\omega \omega$ have shown that the branching fractions can not be explained by color singlet contributions using perturbative QCD. In addition, the decays $\chi_{c1} \rightarrow VV$ are supposed to be highly suppressed due the helicity selection rule. The doubly OZI-suppressed decay $\chi_{cJ} \rightarrow \omega \phi$ is also expected to be highly suppressed. We present first observations of the doubly OZI-suppressed decays of χ_{c0} and $\chi_{c2} \rightarrow \omega \phi$. We also present dramatically improved measurements of the branching fractions $\chi_{cJ} \rightarrow \phi \phi$ and $\omega \omega$. Measurements of the rates of these rare decays will provide more information on the role of nonperturbative QCD effects χ_{cJ} decay and the mechanisms that suppress χ_{cJ} decay into vector meson pairs.

238

Charmonium Radiative Decays into Light Mesons

Charmonium radiative decays into light mesons allow the study of charmonium decay mechanisms, as well as the properties of light mesons. For the decays of $\psi(2S) \rightarrow \gamma \pi^0$ and $\gamma \eta$, branching fraction measurements provide information on SU(3)-flavor symmetry breaking [1]. The color singlet contribution to $\chi_{cJ} \rightarrow \gamma V$ ($V = \rho, \omega, \phi$) has been calculated in perturbative QCD [2], and the color octet contribution to the decay of χ_{cJ} into light mesons has been determined based on perturbative QCD [3].

Using a sample of 106 million $\psi(2S)$ events collected at BEPCII/BESIII, charmonium radiative decays, $\psi(2S) \rightarrow \gamma P$ ($P = \pi^0, \eta, \eta'$), $\chi_{cJ} \rightarrow \gamma V$ ($V = \rho, \omega, \phi$) and $\chi_{cJ} \rightarrow PP$ ($P = \pi^0, \eta$) are studied. The ratio $\text{Br}[\psi(2S) \rightarrow \gamma \eta'] / \text{Br}[\psi(2S) \rightarrow \gamma \eta]$ is a first measurement, and provides information on η - η' mixing and SU(3)-flavor symmetry breaking. The measurement of the branching fraction $\chi_{cJ} \rightarrow \gamma V$ and PP will shed light on the color singlet and octet component contributions to χ_{cJ} decay.

Reference

- [1] R. N. Cahn and M. S. Chanowitz, Phys. Lett. B 3, 277 (1975);
T. K. Pedlar, et al, (CLEO Collaboration), Phys. Rev. D79, 11101 (2009);
Y. P. Kuang, Y. P. Yi and B. Fu, Phys. Rev. D42, 2300.
- [2] Y. J. Gao, Y. J. Zhang and K. T. Chao, Chin. Phys. Lett. 23, 2376;
Y. J. Gao, Y. J. Zhang and K. T. Chao, arXiv: hep-ph/0701009
- [3] J. Bolz, P. Kroll and G. A. Schuler, Eur. Phys. J. C2, 705;
W. M. H. Wong, Eur. Phys. J. C14, 643

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The Research and Development Program towards an Energy-Frontier Muon Collider

The physics potential of a high-energy lepton collider has been shown to be extraordinary. This facility is capable of detailed studies of potential new physics uncovered at the LHC and can extend the search to mass scales beyond those accessible at the LHC. The Muon Collider provides a possible realization of a multi-TeV lepton collider. A muon accelerator facility the leads to a multi-TeV Muon Collider also presents the unique opportunity to explore new physics within a number of distinct programs that can be brought online as the facility evolves. This paper will give an introduction to the Muon Collider facility and its unique capabilities and then will discuss the R&D program that strives to make it a reality.

247

$\Sigma_{\{b,c\}}$ to Nucleon Transitions in Light Cone QCD Sum Rules

The loop level flavor changing neutral currents transitions of the $\Sigma_{\{b\}} \rightarrow n$ and $\Sigma_{\{c\}} \rightarrow p$ are investigated in full QCD and heavy quark effective theory in the light cone QCD sum rules approach. Using the most general form of the interpolating current for $\Sigma_{\{Q\}}$, $Q=b$ or c , as members of the recently discovered sextet heavy baryons with spin 1/2 and containing one heavy quark, the transition form factors are calculated using two sets of input parameters entering the nucleon distribution amplitudes, namely, QCD sum rules and lattice QCD inputs. The obtained results are used to estimate the decay rates of the corresponding transitions. Since such type transitions occurred at loop level in the standard model, they can be considered as good candidates to search for the new physics effects beyond the SM.

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Project X: A multi-MW Proton Source at the Intensity Frontier

As the Fermilab Tevatron Collider program draws to a close a strategy has emerged of an experimental program built around the high intensity frontier. The centerpiece of this program is a superconducting H⁻ linac that will support world leading programs in long baseline neutrino experimentation and the study of rare processes. Project X will provide multi-MW beams from the Main Injector over the energy range 60-120 GeV, simultaneous with multi-MW beams at 3 GeV. Shared technology development with ILC and the Muon Collider will establish a bridge to future facilities at the energy frontier. This talk will describe the currently favored accelerator configuration, associated performance projections, status of the accelerator R&D program, and the strategy for moving forward.

255

The Fermilab Project-X Research Program

Fermilab is leading an international consortium to develop the design of "Project-X" which is an accelerator complex that will drive a broad range of experiments at the Intensity Frontier. The Project-X research program includes world-leading sensitivity in long-baseline neutrino experiments, neutrino scattering experiments, and a rich program of ultra-rare decay and electric dipole moment experiments that are sensitive to most new physics scenarios beyond the Standard Model. These experiments are driven with very high fluxes of neutrinos, muons, kaons, hyperons and exotic nuclei that are possible with Project-X. The status and prospects of the growing research program will be discussed.

260

ATLAS Computing Operations: from Commissioning to 7TeV Data

In this paper we summarise ATLAS operations from the STEP09 campaign in June 2009 through to ATLAS taking data in the first 7TeV collisions at the LHC in March 2010. We describe the lessons which were learned from the STEP09 challenge, both in proving which parts of the system were in good shape, but also in highlighting those areas which required improvement. Improvements which were undertaken ranged from improving the hardware on the ATLAS Tier-0 pools to improve data distribution rates, retuning of FTS channels between CERN and the Tier-1s to studying the data access patterns for analysis on Tier-2s to improve analysis rates. We then describe the experience of ATLAS computing operations during the first LHC data taking era.

264

Accessing transversity generalized parton distributions

The chiral-odd transversity generalized parton distributions of the nucleon can be accessed experimentally through the exclusive photoproduction process $\gamma + N \rightarrow \pi + \rho + N'$, in the kinematics where the meson pair has a large invariant mass and the final nucleon has a small transverse momentum, provided the vector meson is produced in a transversally polarized state. Estimated counting rates show that the experiment is feasible with real or quasi real photon beams expected at JLab@12 GeV and in the COMPASS experiment. (Phys Letters B688,154,2010)

285

Top quark mass: latest CDF results, Tevatron combinations, and electroweak implications

We present results on the precision measurement of the top quark mass and a combination of the best CDF top mass measurements. We present also a combination by the TevEWWG (Tevatron electroweak working group) of the best top mass results from CDF and D0 in Run 1 and Run 2 of the Tevatron. This result is the current world average, and offers an uncertainty less than 1%. The new mass value has been included in traditional LEP EWWG fits to precision electroweak data, and implications for the Standard Model Higgs have been derived.

286

Measurement of the Top quark Mass at CDF using a Matrix Element Technique

We report a measurement of the top quark mass obtained from proton-antiproton collisions at a center-of-mass energy of 1.96 TeV at the Fermilab Tevatron using the CDF II detector. The measurement relies on using a matrix element integration method to calculate a signal likelihood, as well as a neural network discriminant to distinguish signal from backgrounds. The result is currently the single most precise measurement of the top quark mass in the world.

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Measurement of the Top Quark Mass and $p\bar{p} \rightarrow t\bar{t}$ Cross Section in the All-Hadronic Mode with the CDFII Detector

We present a measurement of the top quark mass and of the top-antitop pair production cross section using over 4fb^{-1} of $p\bar{p}$ data collected at CDFII. We select events with six or more jets, where at least one of these jets must originate from a b quark, and satisfying a number of kinematical requirements imposed by means of a neural network algorithm. The mass measurement is based on a likelihood fit incorporating reconstructed mass distributions representative of signal and background, where the absolute jet energy scale (JES) is measured simultaneously with the top quark mass. The top quark cross section in the all-hadronic channel is also extracted from this technique.

288

Direct measurements of the top quark mass, width, and mass difference between the top and anti-top quark using the template method at CDF

We present measurements of the top quark mass, width, and mass difference between the top and anti-top quark in the lepton+jets channel using the CDF II detector at Fermilab's Tevatron. We developed the template method with non-parametric kernel density estimation which uses multidimensional observables without parametrization and produces probability density functions of signal and background events. By applying different signal modelings and observables for each measurement, we extract the properties of the top quark from CDF data.

289

Measurement of the Top Quark Mass in the hadronic tau + jets channel at CDF

We measure the top quark mass in lepton + jet top quark decays, where the lepton has been identified as a hadronically decaying tau, using a matrix element technique. Over 2 fb⁻¹ of collected CDF Run II data is used. This is the first measurement of the top quark mass in this channel at CDF.

290

Measurement of the Ratio of the Top Pair to Z Boson Cross Section and Precise Extraction of the Top Cross Section at CDF

The ratio of the top pair cross section with the Z boson cross section has been measured in over 4 fb⁻¹ of collected data from the high Pt lepton triggers. The top cross section is measured in the lepton plus jets channel using two complementary methods, a b-jet tagging measurement and a topological approach. By multiplying the ratios by the well-known theoretical Z/gamma cross section, the extracted t-tbar cross sections are effectively insensitive to the uncertainty on luminosity. The results are the most precise measurements of the t-tbar cross section in the world to date.

291

Measurement of the top cross section in the lepton+jets channel using simultaneous kinematic fits in 2.7 fb⁻¹ of CDF data

We measure both the t-tbar cross section and the background level of W+jets, QCD, and electroweak processes using a simultaneous kinematic fit to the b-tagged lepton + jets data. This is the first application of a procedure of this kind. The top cross section and Monte Carlo simulation K factors for W+jets processes are found to be in good agreement with existing measurements using other procedures. This approach has an added advantage that many systematic uncertainties are measured in-situ and inversely scale with integrated luminosity similarly to statistical uncertainties.

292

Measurement of the single top production cross section at CDF

We present the most precise measurement of electroweak single top quark production by the CDF experiment. Candidate events are selected for further classification by four parallel analysis techniques: one using a likelihood discriminant, one using a matrix-element discriminant, one using decision trees, and one using a neural network. The results of these four analyses are combined in order to improve the expected sensitivity. We also present the most current value of the CKM matrix element V_{tb} .

293

Measurement of top pair spin correlations using CDF Run II data

Top quark spin is one of the most interesting, yet not well-measured, quantities in top physics. Standard model top pair production through qq annihilation or gluon fusion produces a characteristic spin correlation which can be modified by exotic production mechanisms such as Z' bosons or KK gluons. According to the standard model, top quarks decay weakly before any hadronization processes take effect. This enables top quark spin information to be transmitted to the top quark decay products. We report on measurements of the t-tbar spin correlation using lepton+jet and dilepton events in over 4 fb⁻¹ of CDF data. The results are combined and the result is the most precise determination of t-tbar spin correlation to date.

294

Latest CDF Results on the Measurement of W-Boson Polarization in Top-quark Decay

The top quark is the most massive fundamental particle observed by experiment. Due to its large mass, the top quark decays before forming a bound state and provides a unique opportunity to study the properties of a "bare" quark. In the Standard Model (SM) the top quark decays via the weak interaction into a W boson and a b quark most of the time, and the W boson is expected to have longitudinal, left-handed and right-handed polarization fractions of ~ 0.70 , ~ 0.30 and 0.0 , respectively. In beyond the SM scenarios, significant deviations from the SM expectation are possible due to the presence of anomalous couplings in the tWb vertex. I will present the latest CDF results probing the tWb vertex by measurement of W-Boson polarization in top-pair decay.

295

Measurement of the Forward Backward asymmetry in top-antitop quark pairs at CDF

A method of reconstructing $t\bar{t}$ events in the lepton plus jets decay mode is applied to a measurement of the forward backward asymmetry in $t\bar{t}$ pair production at CDF. The measurement is a test of discrete symmetries in $t\bar{t}$ production and strong interactions at large Q^2 . In the present data set it is potentially sensitive to the presence of parity-violating production channels such as a massive Z' -like boson or new physics within strong interactions. We present a measurement of the top quark forward-backward asymmetry in over 5 fb^{-1} of collected CDF Run II data.

296

Towards Boosted Top: First Study of Boosted Jet Substructure at CDF

We report preliminary results from a study of the properties of highly boosted and massive jets produced at the Tevatron and recorded by the CDF II Detector. The data consist of several thousand jets with transverse momenta greater than $400 \text{ GeV}/c$ collected in a data sample of 5 fb^{-1} . The detailed properties of these jets have been measured, including the mass of the jet and several variables such as angularity and planar flow that have been proposed for studies of QCD in the perturbative region and its showering mechanism, as well as discriminants between massive jets produced via QCD radiation and those arising from the decay of massive particles. We also examine these jets for evidence of high transverse momentum top quark production.

297

Search for Heavy Top-like Quarks Using Lepton Plus Jets Events in 1.96-TeV ppbar Collisions

Fifteen years since the discovery of top at the Tevatron, with the large Run 2 dataset in hand and plenty of analysis experience, we have now reached the point where we can perform in-depth examinations of the top quark event sample for evidence of physics beyond the Standard Model. We present a search for a massive quark (t') decaying to Wq or Wb and thus mimicking the top quark decay signature. We use the reconstructed mass of the t' quark and the scalar sum of the transverse energies in the event to discriminate possible new quarks or other particles from Standard Model processes, and set limits on a 4th generation t' quark using 4.6 fb^{-1} of collected CDF Run II data.

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Search for Heavy Bottom-like Quarks Using Lepton Plus Jets Events in 1.96-TeV ppbar Collisions

We present a search for a massive quark (b') decaying to tW . We use the scalar sum of the transverse energies and the number of jets present in the event to discriminate possible new quarks or other particles from Standard Model processes, and set limits on a standard 4th generation b' quark. The search is performed with over 4 fb^{-1} of collected CDF Run II data.

300

Search for Light Higgs Boson from Top Quark Decays at CDF

We present a search for light (with mass below $2m_b$) NMSSM pseudo-scalar Higgs boson A originating from top quark decays $t \rightarrow H + b \rightarrow W^* A b$. Under assumption that A decays into tau-tau, we search in events with lepton + ≥ 3 jets and ≥ 1 b-tag for an additional isolated track in the P_t range from 3 to 20 GeV/c. Using a fit to the isolated track P_t spectrum we derive limits on the branching ratio of $t \rightarrow H + b$ for various H and A masses.

302

Searches for resonant top-antitop production at CDF

We describe searches for resonant top-antitop production in over 4fb^{-1} of 1.96 TeV proton-antiproton collisions at the Tevatron, using data collected by the CDF collaboration. Resonant top pair production could arise from the decays of massive Z-like bosons in extended gauge theories, KK states of the gluon or Z, axigluons, topcolor, and other BSM theories. We use different techniques to study the top- antitop invariant mass spectrum and set model independent limits on new resonant top- antitop production mechanisms that would appear as bumps in invariant mass.

324

A classification of chiral-odd pion GPDs beyond leading twist

A consistent classification of the chiral-odd pion GPDs beyond the leading twist 2 is presented. Based on QCD equations of motion and on the invariance under rotation on the light-cone of any scattering amplitude involving such GPDs, we reduce the basis of these chiral-odd GPDs to a minimal set.

331

Results from the CALICE Calorimeter test beams

The CALICE Collaboration is carrying out R&D for a highly granular calorimeter system, optimised for particle flow calorimetry at a future linear collider. Starting in 2006, a complete calorimeter chain (ECAL, HCAL and tail catcher) has been tested in muon, electron and hadron beams at CERN and Fermilab. Two

electromagnetic calorimeters were tested, both based on tungsten absorber -- one using ~ 10000 $1 \times 1 \text{ cm}^2$ silicon diode pads as the sensitive medium, and the other using small ($1 \times 4 \text{ cm}^2$) scintillator strips. The hadron calorimeter had an iron-scintillator sandwich structure, using ~ 10000 scintillator tiles read out using silicon photomultipliers (SiPMs).

We report here on the analysis of shower data, and the comparison of the results with GEANT4 simulations. Muons are used to calibrate all the detectors, and the study of the response to electrons is a crucial first step in the understanding of all the detectors. One of the main objectives of the analysis is the study of the hadron response, since this can be more difficult to simulate reliably. Amongst the topics discussed will be the energy response of the system to hadrons, and the use of techniques of software compensation to improve the energy resolution. The high granularity of the calorimeters permit the comparison between data and simulations in unprecedented resolution; for example, individual tracks within the shower can be reconstructed, the start of the shower can be identified with high precision, and the longitudinal and transverse distributions of energy studied. These measurements provide interesting new ways of assessing the accuracy of the various physics models available in GEANT4. We also use the data to test features of the showers which are important for particle flow algorithms.

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Future plans for CALICE Calorimetry

The CALICE Collaboration is carrying out R&D for a highly granular calorimeter system, optimised for particle flow calorimetry at a future linear collider. A first round of beam tests from 2006-9 were based on first generation prototypes, with the main intention of understanding the technologies and validating Monte Carlo simulation models. Much of the work is now directed towards second generation prototypes in which more realistic mechanical designs and readout systems are employed.

In 2010-11 a cubic prototype of a digital HCAL based on RPCs with $1 \times 1 \text{ cm}^2$ readout will be tested at Fermilab. This calorimeter will contain ~ 40 active layers and the total number of readout channels will be close to 400,000, and will permit extensive tests of the digital HCAL concept, and evaluation of its suitability for particle flow applications. In addition, modules of an alternative design, intended to be as close as possible to the one proposed in the ILD LOI, is being produced. These will be based on 1 m^2 gas-filled RPCs of 3 mm thickness and fully equipped with a semi-digital electronics readout. Further technologies are being developed within CALICE for the sensitive layers in a digital calorimeter, using either GEMs or MicroMegas, and these results will allow critical comparisons between different technologies to be performed.

Second generation prototypes are also being developed for two ECAL options -- a Si-W calorimeter using $5 \times 5 \text{ mm}^2$ pads with very thin sensors and readout electronics embedded in a very thin PCB, and a scintillator-strip option. A scintillator tile HCAL is also in preparation, using $3 \times 3 \text{ cm}^2$ tiles, and the whole system will be operated in a mechanical structure close to that which is envisaged for the full-scale ILD detector. In all cases, the main focus will be the mechanical and electrical integration of realistic front-end electronics into the calorimeter absorber structure so as to create a high-density calorimeter. Issues such as temperature control and heat flow, and the impact of power pulsing of the electronics are to be addressed.

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Search for Associated Production of Z and Higgs Bosons in $\ell\ell b\bar{b}$ Final States in $p\bar{p}$ Collisions at $\sqrt{s}=1.96 \text{ TeV}$

We present a search for a low mass Standard Model Higgs boson produced in association with a Z boson decaying to charged leptons at a center-of-mass energy of $\sqrt{s}=1.96 \text{ TeV}$ with the D0 detector at the Fermilab Tevatron collider. The search is performed in events containing two opposite-sign leptons (electron or muon) and one or two b-tagged jets with up to 6.4 fb^{-1} of data. Inclusion of the full data set and recent sensitivity improvements will be discussed.

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Neutral meson measurement in $p+p$ collisions with ALICE

Spectra of neutral mesons (neutral pions, eta and omega mesons) are traditionally used for the detailed study of hard QCD processes in pp collisions. Data taken at LHC energies will provide the possibility to test QCD at a new energy regime and access novel regions of phase space. Furthermore, these spectra will be an important baseline in the study of possible medium modifications of hard scattered partons in AA collisions in the future.

The ALICE experiment has an excellent abilities to reconstruct neutral meson spectra via the photon decay channel. ALICE incorporates two electromagnetic calorimeters, EMCAL and PHOS, build from different technologies and thus having different systematic errors. Photons in ALICE can also be measured via conversion in the material of the inner detectors and the subsequent reconstruction of the e^+e^- pair. Comparison of all available methods provides a reliable crosscheck for the measured spectra.

Since the start of the LHC in 2009 ALICE has taken data from pp collisions at $\sqrt{s}=900 \text{ GeV}$ and 7 TeV . In my talk I will present first results of neutral meson reconstruction in the ALICE experiment and its perspectives.

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Up type flavor violation at the LHC

We discuss the implications of recent bounds related to CP violation in the D system on beyond the SM dynamics. We further discuss projected bounds on top FCNC processes to be constrained by the LHC experiments and also discuss the implications to specific SM extensions.

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Heavy ion collider project NICA at JINR (Dubna)

The report is dedicated to newly created heavy ion collider facility – project NICA (Nuclotron-based Ion Collider Facility), which is under active development now at JINR (Dubna). The general goal of the project is to start in the coming 5 years experimental study of hot and dense strongly interacting barionic matter and search for possible signs of the mixed phase and critical endpoint in heavy ion collisions. The MultiPurpose Detector (MPD) is proposed for this purpose. Another goal of NICA construction is performance of experimental studies on spin physics with colliding beams of polarized protons and light nuclei. The superconducting ion synchrotron Nuclotron, that has been constructed and being operated at JINR since 1993, is one of key elements of NICA.

The report contains description of physics motivation and main characteristics of the project: the facility scheme and operation scenario, proposed methods of intense ion beam formation, acceleration and achievement of the required luminosity, accelerator and detector elements parameters. Status and plans of the project development are presented as well.

395

Jet Production in ep Collisions at Low Q^2 and Determination of α_s

The production of jets is studied in deep-inelastic e+p scattering at low negative four momentum transfer squared $5 < Q^2 < 100 \text{ GeV}^2$ and at inelasticity $0.2 < y < 0.7$ using data recorded by the H1 detector at HERA in the years 1999 and 2000, corresponding to an integrated luminosity of 43.5 pb^{-1} . Inclusive jet, 2-jet and 3-jet cross sections as well as the ratio of 3-jet to 2-jet cross sections are measured as a function of Q^2 and jet transverse momentum. The 2-jet cross section is also measured as a function of the proton momentum fraction x_i . The measurements are well described by perturbative quantum chromodynamics at next-to-leading order corrected for hadronisation effects and are subsequently used to extract the strong coupling α_s .

396

Prompt Photons in Photoproduction at HERA

The production of prompt photons is measured in the photoproduction regime of electron-proton scattering at HERA. The analysis is based on a data sample corresponding to a total integrated luminosity of 340 pb^{-1} collected by the H1 experiment. Cross sections are measured for photons with transverse momentum and pseudorapidity in the range $6 < E_t < 15 \text{ GeV}$ and $-1.0 < \eta < 2.4$, respectively. Cross sections for events with an additional jet are measured as a function of the transverse energy and pseudorapidity of the jet, and as a function of the fractional momenta x_γ and x_p carried by the partons entering the hard scattering process. The correlation between the photon and the jet is also studied. The results are compared with QCD predictions based on the collinear and on the k_T factorisation approaches.

397

Observation of the Hadronic Final State Charge Asymmetry in High Q^2 Deep-Inelastic Scattering at HERA

A first measurement is presented of the charge asymmetry in the hadronic final state from the hard interaction in deep-inelastic ep neutral current scattering at HERA. The measurement is performed in the range of negative squared four momentum transfer $100 < Q^2 < 8,000 \text{ GeV}^2$. The difference between the event normalised distributions of the scaled momentum, x_p , for positively and negatively charged particles, measured in the current region of the Breit frame, is studied together with its evolution as a function of Q . The results are compared to Monte Carlo models at the hadron and parton level.

398

Jet Production in ep Collisions at High Q^2 and Determination of α_s

The production of jets is studied in deep-inelastic ep scattering at large negative four momentum transfer squared $150 < Q^2 < 15000 \text{ GeV}^2$ using HERA data taken in 1999-2007, corresponding to an integrated luminosity of 395 pb^{-1} . Inclusive jet, 2-jet and 3-jet cross sections, normalised to the neutral current deep-inelastic scattering cross sections, are measured as functions of Q^2 , jet transverse momentum and proton momentum fraction. The measurements are well described by perturbative QCD calculations at next-to-leading order corrected for hadronisation effects. The strong coupling as determined from these measurements is $\alpha_s(M_Z) = 0.1168 \pm 0.0007 \text{ (exp.)} + 0.0046 / - 0.0030 \text{ (th.)} \pm 0.0016 \text{ (pdf)}$.

400

Search for Single Top Quark Production at HERA

A search for single top quark production is performed in the full ep data sample collected by the H1 experiment at HERA, corresponding to an integrated luminosity of 474 pb^{-1} . Decays of top quarks into a b quark and a W boson with subsequent leptonic or hadronic decay of the W are investigated. A multivariate analysis is performed to discriminate top quark production from Standard Model background processes. An upper limit on the top quark production cross section via flavour changing neutral current processes $\sigma(\text{ep} \rightarrow \text{etX}) < 0.25 \text{ pb}$ is established at 95% CL. Limits on the anomalous coupling $\kappa_{\text{t}\gamma}$ are derived.

401

Search for Excited Quarks in ep Collisions at HERA

A search for excited quarks is performed using the full ep data sample collected by the H1 experiment at HERA, corresponding to a total integrated luminosity of 475 pb^{-1} . The electroweak decays of excited quarks $q^* \rightarrow q\gamma$, $q^* \rightarrow qZ$ and $q^* \rightarrow qW$ with subsequent hadronic or leptonic decays of the W and Z bosons are considered. No evidence for first generation excited quark production is found. Mass dependent exclusion limits on q^* production cross sections and on the ratio f/Λ of the coupling to the compositeness scale are derived within gauge mediated models. These limits extend the excluded region compared to previous excited quark searches.

402

Strangeness Production at low Q^2 in Deep-Inelastic ep Scattering at HERA

The production of neutral strange hadrons is investigated using deep-inelastic scattering events measured with the H1 detector at HERA. The measurements are made in the phase space defined by the negative four-momentum transfer squared of the photon $2 < Q^2 < 100 \text{ GeV}^2$ and the inelasticity $0.1 < y < 0.6$. The K_0^0 and Λ production cross sections and their ratios are determined. K_0^0 production is compared to the production of charged particles in the same region of phase space. The Λ -anti- Λ asymmetry is also measured and found to be consistent with zero. Predictions of leading order Monte Carlo programs are compared to the data.

403

General Search for New Phenomena at HERA

A model-independent search for deviations from the Standard Model prediction is performed using the full ep data sample collected by the H1 experiment at HERA. All event topologies involving isolated electrons, photons, muons, neutrinos and jets with transverse momenta above 20 GeV are investigated in a single analysis. Events are assigned to exclusive classes according to their final state. A dedicated algorithm is used to search for deviations from the Standard Model in the distributions of the scalar sum of transverse momenta or the invariant mass of final state particles and to quantify their significance. Variables related to angular distributions and energy sharing between final state particles are also introduced to study the final state topologies. No significant deviation from the Standard Model expectation is observed in the phase space covered by this analysis.

404

Events with Isolated Leptons and Missing Transverse Momentum and Measurement of W Production at HERA

Events with high energy isolated electrons, muons or tau leptons and missing transverse momentum are studied using the full ep data sample collected by the H1 experiment at HERA, corresponding to an integrated luminosity of 474 pb^{-1} . Within the Standard Model, events with isolated leptons and missing transverse momentum mainly originate from the production of single W bosons. The total single W boson production cross section is measured as $1.14 \pm 0.25 \text{ (stat.)} \pm 0.14 \text{ (sys.) pb}$, in agreement with the Standard Model expectation. The data are also used to establish limits on the $WW\gamma$ gauge couplings and for a measurement of the W boson polarisation.

405

Transverse Momentum of Charged Particles at low Q^2 at HERA

The electron-proton collider HERA allows deep-inelastic scattering (DIS) at very small Bjorken- x of about 10^{-5} . At such small x new parton dynamics beyond DGLAP are expected to become important. Charged particle spectra are measured in DIS ($Q^2 > 5 \text{ GeV}^2$), in different regions of pseudorapidity, using the increased statistics of HERA-2. The measurements are compared to simulations based on different Monte Carlo generators. It is shown that the region of small transverse momenta is primarily sensitive to hadronisation, whereas the region of large transverse momenta is mainly driven by perturbative parton radiation. The observed hardness of the transverse momentum spectra, when compared to different model predictions, can be interpreted as supporting the idea of parton dynamics beyond DGLAP.

406

Search for Squarks in R-Parity Violating Supersymmetry with the H1 Experiment at HERA

A search for squarks in R-parity violating supersymmetry is performed in ep collisions at HERA using the H1 detector. The full data sample available is used for the analysis. It corresponds to an integrated luminosity of 438 pb^{-1} . The resonant production of squarks via a Yukawa coupling λ_j is considered, taking into account direct and indirect R-parity violating decay modes. No evidence for squark production is found in the (multi-)lepton and (multi-)jet final state topologies investigated. Mass dependent limits on λ_{1j} and λ_{1k} ($j, k = 1, 2, 3$) are obtained in the framework of the Minimal Supersymmetric Standard Model. At the 95% confidence level squarks with masses up to 275 GeV are excluded in the considered part of the parameter space for a Yukawa-type coupling of electromagnetic strength $\lambda_j = 0.3$. Further constraints on the minimal supergravity model are derived and the dependence on $\tan\{\beta\}$ is shown.

407

K^0_S Production at high Q^2 at HERA

The production of K^0_S mesons is studied at high Q^2 , using DIS events recorded with the H1 Detector. Using the full HERA-2 statistics, the production cross sections of K^0_S are presented, differentially as a function of several kinematical variables. Moreover, the K^0_S production rate is compared to the equivalent charged particles in a similar phase space. The H1 data are compared to theoretical predictions, based on leading order Monte Carlo programs with matched parton showers.

408

Search for Lepton Flavour Violation at HERA

A search for the lepton flavour violating processes $ep \rightarrow \mu + X$ and $ep \rightarrow \tau + X$ is performed with the H1 experiment at HERA. Final states with a muon or tau lepton and a hadronic jet are searched for in an H1 ep data sample corresponding to an integrated luminosity of 410 pb^{-1} . No evidence for lepton flavour violation is found. Limits are derived on the mass and the couplings of leptoquarks inducing lepton flavour violation in an extension of the Buchmuller-Ruckl-Wyler effective model, assuming $\lambda_{\{eq\}} = \lambda_{\{\mu q\}}$ and $\lambda_{\{eq\}} = \lambda_{\{\tau q\}}$ for the second and third generations respectively. Leptoquarks produced in ep collisions with a coupling strength of $\lambda = 0.3$ and decaying with the same coupling strength to a muon-quark pair or a tau-quark pair are excluded at 95% confidence level up to masses of 530 GeV and 440 GeV, respectively.

409

Search for Contact Interactions at HERA

A search for physics beyond the SM in DIS events at high Q^2 is performed in ep collisions at HERA. The full H1 data, including the polarised collisions from the HERA II running, is employed. No significant deviation from the SM is observed. Limits on the quark radius and in various Contact Interaction models are derived.

410

Measurement of Diffractive Scattering of Photons with Large Momentum Transfer at HERA

The first measurement of diffractive scattering of quasi-real photons with large momentum transfer $\gamma p \rightarrow \gamma Y$, where Y is the proton dissociative system, is made using the H1 detector at HERA. The measurement is performed for initial photon virtualities $Q^2 < 0.01 \text{ GeV}^2$. Cross sections are measured as a function of W, the incident photon-proton centre of mass energy, and t, the square of the four-momentum transferred at the proton vertex, in the range $175 < W < 247 \text{ GeV}$ and $4 < |t| < 36 \text{ GeV}^2$. The W dependence is well described by a model based on perturbative QCD using a leading logarithmic approximation of the BFKL evolution. The measured |t| dependence is harder than that predicted by the model and those observed in exclusive vector meson production.

411

Diffractive Electroproduction of rho and phi Mesons at HERA

Diffractive electroproduction of rho and phi mesons is measured at HERA with the H1 detector in the elastic and proton dissociative channels. The data correspond to an integrated luminosity of 51 pb^{-1} . About 10500 rho and 2000 phi events are analysed in the kinematic range of squared photon virtuality $2.5 < Q^2 < 60 \text{ GeV}^2$, photon-proton centre of mass energy $35 < W < 180 \text{ GeV}$ and squared four-momentum transfer to the proton $|t| < 3 \text{ GeV}^2$. The total, longitudinal and transverse cross sections are measured as a function of Q^2 , W and |t|. The measurements show a transition to a dominantly "hard" behaviour, typical of high gluon densities and small $q\bar{q}$ dipoles, for Q^2 larger than 10 to 20 GeV^2 . They support flavour independence of the diffractive exchange, expressed in terms of the scaling variable $(Q^2 + M_V^2)/4$, and proton vertex factorisation. The spin density matrix elements are measured as a function of kinematic variables. The ratio of the longitudinal to transverse cross sections, the ratio of the helicity amplitudes and their relative phases are extracted. Several of these measurements have not been performed before and bring new information on the dynamics of diffraction in a QCD framework. The measurements are discussed in the context of models using generalised parton distributions or universal dipole cross sections.

412

A Precision Measurement of the Inclusive ep Scattering Cross Section at HERA

A measurement of the inclusive deep inelastic neutral current e^+p scattering cross section is reported in the region of four-momentum transfer squared, $12 \text{ GeV}^2 < Q^2 < 150 \text{ GeV}^2$, and Bjorken x , $2 \times 10^{-4} < x < 0.1$. The results are based on data collected by the H1 Collaboration at the ep collider HERA at positron and proton beam energies of $E_e = 27.6 \text{ GeV}$ and $E_p = 920 \text{ GeV}$, respectively. The data are combined with previously published data, taken at $E_p = 820 \text{ GeV}$. The accuracy of the combined measurement is typically in the range of 1.3-2%. A QCD analysis at next-to-leading order is performed to determine the parton distributions in the proton based on H1 data.

413

Deeply Virtual Compton Scattering and its Beam Charge Asymmetry in $e^\pm p$ Collisions at HERA

A measurement of elastic deeply virtual Compton scattering $\gamma^* p \rightarrow \gamma p$ using e^+p and e^-p collision data recorded with the H1 detector at HERA is presented. The analysed data sample corresponds to an integrated luminosity of 306 pb^{-1} , almost equally shared between both beam charges. The cross section is measured as a function of the virtuality Q^2 of the exchanged photon and the centre-of-mass energy W of the $\gamma^* p$ system in the kinematic domain $6.5 < Q^2 < 80 \text{ GeV}^2$, $30 < W < 140 \text{ GeV}$ and $|t| < 1 \text{ GeV}^2$, where t denotes the squared momentum transfer at the proton vertex. The cross section is determined differentially in t for different Q^2 and W values and exponential t -slope parameters are derived. Using e^+p and e^-p data samples, a beam charge asymmetry is extracted for the first time in the low Bjorken x kinematic domain. The observed asymmetry is attributed to the interference between Bethe-Heitler and deeply virtual Compton scattering processes. Experimental results are discussed in the context of two different models, one based on generalised parton distributions and one based on the dipole approach.

414

Leading Neutron production in DIS at HERA

The production of highly energetic forward neutrons has been studied in deep-inelastic positron-proton scattering. The data were taken with the H1 detector at HERA in the years 2006-2007 and correspond to an integrated luminosity of 122 pb^{-1} . Semi-inclusive cross sections have been measured in the range of four momentum transfer squared $6 < Q^2 < 100 \text{ GeV}^2$, Bjorken scaling variable $1.5 \times 10^{-4} < x < 3 \times 10^{-2}$ and the fractional momentum of the neutron $0.32 < x_L < 0.95$. Monte Carlo simulation using the one pion exchange model describes the measurements well at low transverse momenta of the neutrons. The data are used to estimate the structure function of the pion.

415

Measurement of the Inclusive ep Scattering Cross Section at Low Q^2 and x at HERA

A measurement of the inclusive ep scattering cross section is presented in the region of low momentum transfers, $0.2 < Q^2 < 12 \text{ GeV}^2$, and low Bjorken x , $5 \times 10^{-6} < x < 0.02$. The result is based on two data sets collected in dedicated runs by the H1 Collaboration at HERA at beam energies of 27.6 GeV and 920 GeV for positrons and protons, respectively. A combination with data previously published by H1 leads to a cross section measurement of a few percent accuracy. A kinematic reconstruction method exploiting radiative ep events extends the measurement to lower Q^2 and larger x . The data are compared with theoretical models which apply to the transition region from photoproduction to deep inelastic scattering.

416

Diffraction Dijet Photoproduction in ep collisions at HERA

Measurements are presented of single and double-differential dijet cross sections in diffractive photoproduction based on a data sample with an integrated luminosity of 47 pb^{-1} . The events are of the type $ep \rightarrow eXY$, where the hadronic system X contains at least two jets and is separated by a large rapidity gap from the system Y , which consists of a leading proton or low-mass proton excitation. The dijet cross sections are compared with QCD calculations at next-to-leading order and with a Monte Carlo model based on leading order matrix elements with parton showers. The measured cross sections are smaller than those obtained from the next-to-leading order calculations by a factor of about 0.6. This suppression factor has no significant dependence on the fraction x_γ of the photon four-momentum entering the hard subprocess. Ratios of the diffractive to the inclusive dijet cross sections are measured for the first time and are compared with Monte Carlo models.

417

Combined Electroweak and QCD Fit of Inclusive Neutral and Charged Current Data with Polarized Lepton Beams at HERA

Using the deep inelastic e+p and e-p neutral and charged current scattering cross sections, including data with polarised electron beams, a combined electroweak and QCD analysis is performed to determine vector and axial-vector couplings v_q and a_q of light quarks u and d to the Z^0 boson accounting for their correlation with parton distributions. The precision has been improved in particular for vector couplings with respect to the published results based on the unpolarized HERA data only. The determinations from HERA are compared with those from LEP and Tevatron.

418

Measurement of diffractive deep-inelastic scattering with a leading proton at HERA-2

The cross section for the diffractive deep-inelastic scattering process $ep \rightarrow eXp$ is measured, with a leading final state proton with a fractional longitudinal momentum loss x_{IP} satisfying $x_{IP} < 0.1$ detected in the H1 Forward Proton Spectrometer. Using a high statistics data sample for which the squared four-momentum transfer at the proton vertex is in the interval $0.1 < |t| < 0.7 \text{ GeV}^2$ and for photon virtualities in the range $4 < Q^2 < 700 \text{ GeV}^2$ the cross section is measured differentially in t , x_{IP} , Q^2 and β , $0.001 < \beta = x/x_{IP} < 1$, where x is the Bjorken scaling variable. The t and x_{IP} dependences are interpreted in terms of an effective pomeron trajectory and a sub-leading exchange. The data are compared with QCD predictions at next-to-leading order based on diffractive parton distribution functions previously extracted from complementary measurements of inclusive diffractive deep-inelastic scattering. The ratio of the diffractive to the inclusive ep cross section is studied as a function of Q^2 , β and x_{IP} .

419

Measurement of the longitudinal diffractive structure function at HERA

A first measurement of the longitudinal diffractive structure function F_L^D using the H1 detector at HERA is presented. The structure function is extracted from first measurements of the diffractive cross section at centre of mass energies \sqrt{s} of 225 and 252 GeV, together with a new measurement at \sqrt{s} of 319 GeV, using data taken in 2007 at high values of inelasticity y . The measured F_L^D is compared to predictions from NLO QCD fits to previous measurements of the inclusive diffractive DIS cross section.

420

High Q² Charged Current in polarised ep collisions at HERA II

The inclusive single differential cross section $d\sigma/dQ^2$ and the reduced double differential cross section $\tilde{\sigma}(x, Q^2)$ are presented for the charged current process, $e^{\pm}p \rightarrow \nu X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set. The cross sections are measured in the region of large negative four-momentum transfer squared $Q^2 \geq 200$ GeV² and inelasticity $y < 0.9$. In addition the total cross section for $Q^2 > 400$ GeV² and inelasticity $y < 0.9$ is measured. Together with the corresponding cross section obtained from the previously published unpolarised data, the polarisation dependence of the charged current cross section is measured and found to be in agreement with the Standard Model prediction.

421

Inclusive Measurement of Diffractive Deep-Inelastic Scattering at HERA

Measurements of the cross section for the diffractive process $ep \rightarrow eXY$ are presented, where Y is a proton or a low mass proton excitation carrying a fraction $1-x_{IP} > 0.95$ of the incident proton longitudinal momentum and the squared four-momentum transfer at the proton vertex satisfies $|t| < 1.0$ GeV². Using data taken by the H1 experiment, the cross section is measured for photon virtuality in the range $3.5 < Q^2 < 90$ GeV², triple differentially in x_{IP} , Q^2 and $\beta = x/x_{IP}$, where x is the Bjorken scaling variable. These measurements are done after selecting diffractive events showing a large rapidity interval between the hadronic systems X and Y. They cover the periods of data taking 1999-2000 and 2003-2007. Combinations with previous results obtained by H1 with data collected in 1996-1997 are realized to provide a single set of diffractive cross sections using the large rapidity gap selection from the H1 experiment. Comparisons of measurements with predictions from resolved Pomeron and dipole models are shown and discussed.

422

High Q² Neutral Current in polarised ep collisions at HERA II

The inclusive single differential cross section $d\sigma/dQ^2$ and the reduced double differential cross section $\tilde{\sigma}(x, Q^2)$ are presented for the neutral current process, $e^{\pm}p \rightarrow e^{\pm}X$, in interactions with longitudinally polarised lepton beams using the complete HERA-II data set. The cross sections are measured in the region of large negative four-momentum transfer squared $Q^2 \geq 200$ GeV² and inelasticity $y < 0.9$. The data are consistent with the expected Q^2 dependence of polarised cross sections. The data are compared to predictions of the Standard Model which is able to provide a good description of the data.

423

Diffractive deep-inelastic scattering with a leading proton in the VFPS

In 2004, the H1 Collaboration at HERA installed the Very Forward Proton Spectrometer (VFPS) located at 220m from the interaction point, in the cold section of the proton ring. The spectrometer consists of two Roman Pot stations equipped with scintillating fiber detectors. The device allows the measurement of diffractive proton momentum in the range $0.009 < x_{pom} < 0.025$, where x_{pom} is the energy fraction lost by the proton in the interaction, with a very high acceptance (above 90%). The inclusive diffractive deep inelastic scattering, $ep \rightarrow e\gamma^*p \rightarrow eXp$, has been measured with the H1 detector at HERA using VFPS to measure the scattered proton momentum. The data correspond to an integrated luminosity of 95 pb⁻¹. The cross section has been measured for virtualities of the exchanged boson, $5 < Q^2 < 100$ GeV² and in the range $0.005 < \beta < 0.8$, where $\beta = x/x_{pom}$. The cross section is measured differentially in Q^2 , x_{pom} and β and compared to previously measured cross section at HERA.

424

Measurement of the Longitudinal Structure Function F_L of the Proton at Low x in an extended Q^2 range

A measurement is presented of the longitudinal proton structure function $F_L(x, Q^2)$ derived from inclusive deep inelastic scattering cross section measurements with the H1 detector at HERA. The data were taken in the year 2007 at a positron beam energy of $E_e = 27.5$ GeV and proton beam energies E_p of 920 GeV, 575 GeV and 460 GeV. The measurements of F_L use different parts of the H1 detector covering when combined a range of four-momentum transfers squared $5 \leq Q^2 \leq 800$ GeV² and Bjorken x between 0.0001 and 0.035. The data are compared with higher order QCD predictions.

425

Diffractive Jet Production in Deep-Inelastic Scattering with a Leading proton at HERA-2

In this measurement, the cross section for inclusive jet production in diffractive deep-inelastic scattering is presented. The leading final state proton is detected in the H1 Forward Proton Spectrometer. The data have been collected during the HERA-2 period. The data cover the range $x_{IP} < 0.1$ in fractional proton longitudinal momentum loss, $0.1 < |t| < 0.7$ GeV² in squared four-momentum transfer at the proton vertex and $4 < Q^2 < 110$ GeV² in photon virtuality. The dijet topology is defined by two inclusive jets in the central region, found by the k_T cluster

algorithm in the hadronic centre-of-mass. The data are compared to parton shower and to NLO predictions.

426

A measurement of the Pomeron Trajectory based on Elastic Rho Photoproduction

Based on data collected with the H1 detector at HERA in 2005, cross sections for elastic rho photoproduction have been measured at momentum transfer $|t| < 0.58$ GeV² and photon-proton centre-of-mass energies $20 < W < 90$ GeV. This data has been combined with cross sections published previously by the Omega and ZEUS collaborations in a global fit to determine the pomeron trajectory $\alpha(t)$ in 13 bins of t by from the W -dependence of the elastic rho production cross section.

427

Dijet production in diffractive deep inelastic scattering using VFPS at HERA

The production of dijets in diffractive deep inelastic scattering, $ep \rightarrow e \gamma^* p \rightarrow e p \text{ jet1 jet2 X}$, has been measured with the H1 detector at HERA using Very Forward Proton Spectrometer to measure the scattered proton momentum. The data correspond to an integrated luminosity of 95 pb⁻¹. This process is sensitive to the partonic structure of the diffractive exchange between the proton and the virtual photon. The scattered proton is measured using the VFPS with an acceptance of about 90% in the range $0.009 < x_{pom} < 0.025$, where x_{pom} is the energy fraction lost by the proton in the interaction. The dijet cross section has been measured for virtualities of the exchanged boson, $5 < Q^2 < 80$ GeV² and photon-proton centre-of-mass energies, $100 < W < 250$ GeV and $|t| < 1$ GeV². The jets were identified using the inclusive k_T algorithm in the $\gamma^* p$ frame. The two highest transverse energy jets identified in each event were required to satisfy $E_{T, jet}^* > 5.5$ and 4 GeV, respectively in the pseudorapidity range $-2.0 < \eta_{jet} < 2$. The cross sections are compared to the predictions from leading-logarithm parton-shower RapGap Monte Carlo and next-to-leading-order QCD calculations based on recent diffractive parton densities extracted from inclusive diffractive deep inelastic scattering data.

429

Forward photon spectra measured in FNC

The production of energetic photons produced at low scattering angles is studied in deep-inelastic scattering at HERA. The photon is detected in the H1 Forward Neutron Calorimeter. The data were taken with the H1 detector in the years 2006-2007. The cross section is measured as a function of the fractional momentum of the photon $x_L = E_\gamma/E_p$ and compared to the different models of proton remnant fragmentation.

430

Study of Charm Fragmentation into D^{*+-} Mesons in Deep-Inelastic Scattering at HERA

The process of charm quark fragmentation is studied using D^{*+-} meson production in deep-inelastic scattering as measured by the H1 detector at HERA. Two different regions of phase space are investigated defined by the presence or absence of a jet containing the D^{*+-} meson in the event. The parameters of fragmentation functions are extracted for QCD models based on leading order matrix elements and DGLAP or CCFM evolution of partons together with string fragmentation and particle decays. Additionally, they are determined for a next-to-leading order QCD calculation in the fixed flavour number scheme using the independent fragmentation of charm quarks to D^{*+-} mesons.

431

Measurement of the Charm and Beauty Structure Functions using the H1 Vertex Detector at HERA

Inclusive charm and beauty cross sections are measured in $e^- p$ and e^+p neutral current collisions at HERA in the kinematic region of photon virtuality $5 < Q^2 < 2000 \text{ GeV}^2$ and Bjorken scaling variable $0.0002 < x < 0.05$. The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The numbers of charm and beauty events are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are combined with previous data and compared to QCD predictions.

433

Measurement of the D^* Meson Production Cross Section and $F_2^{c\bar{c}}$, at High Q^2 , in ep Scattering at HERA

The inclusive production of D^* mesons in deep-inelastic ep scattering is measured in the kinematic region of photon virtuality $100 < Q^2 < 1000 \text{ GeV}^2$ and inelasticity $0.02 < y < 0.7$. Single and double differential cross sections for inclusive D^* meson production are measured in the visible range defined by $|\eta(D^*)| < 1.5$ and $p_T(D^*) > 1.5 \text{ GeV}$. The data were collected by the H1 experiment during the period from 2004 to 2007 and correspond to an integrated luminosity of 351 pb^{-1} . The charm contribution, $F_2^{c\bar{c}}$, to the proton structure function F_2 is determined. The measurements are compared with QCD predictions.

435

Measurement of Charm and Beauty Jets in Deep Inelastic Scattering at HERA

Measurements of the charm and beauty jet cross sections have been made in deep inelastic scattering at HERA for the kinematic region of photon virtuality $Q^2 > 6 \text{ GeV}^2$ and elasticity variable $0.07 < y < 0.625$ for jets in the laboratory frame with transverse energy $E_{T\text{jet}} > 6 \text{ GeV}$ and pseudorapidity $-1.0 < \eta^{\text{jet}} < 1.5$. Measurements are also made requiring a jet in the Breit frame with $E_{T\text{jet}} > 6 \text{ GeV}$. The data were collected with the H1 detector in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The number of charm and beauty jets are determined using variables reconstructed by the H1 vertex detector including the impact parameter of tracks to the primary vertex and the position of the secondary vertex. The measurements are compared with QCD predictions and with previous measurements obtained using muon tagging.

436

Combination of F_2^{ccbar} from $D^{*\{+-\}}$ Measurement in DIS and inclusive measurement of displaced tracks at H1

Recent measurements by the H1 experiment of the inclusive charm and beauty cross sections in deep inelastic ep scattering at HERA are presented. The data were collected in the years 2006 and 2007 corresponding to an integrated luminosity of 189 pb^{-1} . The numbers of charm and beauty events are determined using variables reconstructed by the H1 vertex detector. The measurement of the inclusive charm cross section is combined with the result obtained using the reconstruction of $D^{*\{+-\}}$ mesons in order to obtain a more precise measurement of the charm contribution F_2^{ccbar} the proton structure function F_2 . The measurements are compared with QCD predictions.

437

D^* with jets in photoproduction

Photoproduction of events containing a D^* meson and two jets are investigated with the H1 detector using the HERA-II data sample. The D^* mesons are reconstructed in the golden decay channel $D^* \rightarrow K \pi \pi_s$. Photoproduction events are selected in the kinematic range $Q^2 < 2 \text{ GeV}^2$ and $0.1 < y < 0.8$ corresponding to $100 < W_{\text{gamma}} < 285 \text{ GeV}$. The jets are reconstructed with the inclusive k_T algorithm in the laboratory frame and are selected if they have $p_T > 3.5 \text{ GeV}$. Differential cross section sensitive to the kinematics of the incoming gluon are measured and compared to QCD calculations.

438

Development and performance of the newest generation of Micromegas detectors: Microbulk detectors

A new Micromegas manufacturing technique, so called Microbulk, has been recently developed, resulting to a further improvement of the characteristics of the detector such as uniformity, stability and energy resolution. Details of the production of several types of Microbulk will be given. This type of detectors are recently receiving much attention from the community of rare event searches, like dark matter (axion or WIMPs) and neutrino experiment due to its excellent energy resolution and radiopure properties. Examples of several experiments where these new detectors are in use will be presented.

439

Measurement of the photoproduction of b-quarks at threshold at HERA

The cross section of $b\bar{b}$ photoproduction in ep collisions is measured with the H1 detector at HERA. Events containing b-quarks are identified through detection of two low momentum electrons in the final state. Semileptonic decays $b\bar{b} \rightarrow ee X$ are exploited in the kinematic range of the photon virtuality $Q^2 < 1 \text{ GeV}^2$, the inelasticity $0.2 < y < 0.8$ and the pseudorapidity of the b-quarks $|\eta(b), \eta(\bar{b})| < 2$. The differential b-quark production cross section is measured as a function of the transverse b-quark momentum and extends the previously experimentally accessible phase space towards the b-quark production threshold. The results are compared to other b-quark cross section measurements, as well as to QCD predictions.

440

Inclusive-jet cross sections in NC DIS at HERA and a comparison of the kt, anti-kt and SIScone jet algorithms

For the first time, differential inclusive-jet cross sections have been measured in neutral current deep inelastic ep scattering using the anti-kt and SIScone algorithms. The measurements were made for boson virtualities $Q^2 > 125 \text{ GeV}^2$ with the ZEUS detector at HERA using an integrated luminosity of 82 pb^{-1} and the jets were identified in the Breit frame. The performance and suitability of the jet algorithms for their use in hadron-like reactions were investigated by comparing the measurements to those performed with the kt algorithm. Next-to-leading-order QCD calculations give a good description of the measurements. Measurements of the ratios of cross sections using different jet algorithms are also presented; the measured ratios are well described by calculations including up to $O(\alpha_s^3)$ terms. Values of $\alpha_s(M_Z)$ were extracted from the data; the results are compatible with and have similar precision to the value extracted from the kt analysis.

445

Impact of squark generation mixing on the search for gluinos at LHC

We study gluino decays in the Minimal Supersymmetric Standard Model (MSSM) with squark generation mixing. We show that the effect of this mixing on the gluino decay branching ratios can be very large in a significant part of the MSSM parameter space despite the very strong experimental constraints on quark flavour violation (QFV) from B meson observables. Especially we find that under favourable conditions the branching ratio of the the QFV gluino decay $\text{gluino} \rightarrow c \bar{t} (\bar{c} t) + \text{neutralino}_1$ can be as large as about 50%. We also find that the squark generation mixing can result in a multiple-edge (3- or 4-edge) structure in the charm-top quark invariant mass distribution. The appearance of this remarkable structure provides an additional powerful test of supersymmetric QFV at LHC. These could have an important impact on the search for gluinos and the determination of the MSSM parameters at LHC. (Published in Phys. Lett. B679 (2009) 260; arXiv:0905.0132 [hep-ph])

446

Impact of squark generation mixing on the search for squarks decaying into fermions at LHC

We study the effect of squark generation mixing on squark production and decays at LHC in the Minimal Supersymmetric Standard Model (MSSM). We show that the effect can be very large in a significant range of quark-flavour-violating parameters despite the very strong constraints on quark-flavour-violation (QFV) from experimental data on B mesons. We find that the two lightest up-type squarks $su_{\{1,2\}}$ can have very large branching ratios for the decays $su_i \rightarrow \text{charm-quark neutralino}_1$ and $su_i \rightarrow \text{top-quark neutralino}_1$ simultaneously due to the effect, resulting in QFV signals ' $p \rightarrow c \bar{t} (t \bar{c}) + \text{missing-}E_T + X$ ' at a significant rate at LHC. The observation of this remarkable signature would provide a powerful test of the supersymmetric QFV at LHC. This could have a significant impact on the search for squarks and the determination of the underlying MSSM parameters at LHC.

448

Search for Higgs bosons produced in association with b-quarks at CDF

We present a search for neutral Higgs bosons decaying into $b\bar{b}$, produced in association with b quarks in $p\bar{p}$ collisions. This process could be observable in supersymmetric models with high values of $\tan\beta$. We search for an enhancement in the mass of the two lead jets m_{12} in triply b-tagged events, using a data sample corresponding to 2.5/fb of integrated luminosity collected with the CDF II detector at the Fermilab Tevatron collider. The dijet mass spectrum of the heavy flavor multi-jet background is derived from double-tagged data in a manner that accounts for tagging biases and kinematic differences introduced by the addition of the third tag. The levels of background and possible signal are determined by a two-dimensional fit of the data, using m_{12} and an additional variable x_{tags} which is sensitive to the flavor composition of the three tagged jets. We set mass-dependent limits on $\sigma \times \text{BR}(H \text{ to } b\bar{b})$ which are applicable for a narrow Higgs or other scalar particle produced in association with b quarks. We also interpret the results as limits on $\tan\beta$ in MSSM models including the effects of the Higgs width.

449

Combination of CDF searches for a Standard Model Higgs boson

A combination of searches for Standard Model Higgs boson production at CDF using a data sample up to 6.0 /fb of integrated luminosity is performed. We determine combined upper 95% C.L. limits on the ratio of the Higgs boson cross section times the branching ratio to its Standard Model prediction for Higgs boson masses between 100 and 200 GeV/ c^2 . The results are compared against expectations obtained from background-only pseudo-experiments.

450

Search for the Standard Model Higgs boson in the all-hadronic final state at CDF

We present a search for the standard model Higgs boson in the VH to $q q' b \bar{b}$ ($V = W, Z$) and $Hq q'$ to $q q' b \bar{b}$ (vector boson fusion) production modes using 4 /fb of p-pbar collisions recorded with the CDF detector. These channels contain significant acceptance from a potential signal as a result of the large hadronic branching ratios of the W and Z bosons. However, the analysis in this channel is difficult due to the presence of very large multi-jet backgrounds. The most recent result in this channel which is presented here yields a factor of two improvement over the previous 2 /fb analysis. We describe new techniques used for data-based modeling of the multi-jet backgrounds and for incorporating jet shapes to suppress some of these backgrounds.

452

Search for the Standard Model Higgs boson in the transverse missing energy plus jets final state at CDF

We present a search for the Standard Model Higgs boson produced in association with a Z or a W boson in p-pbar collisions at 1.96 TeV center of mass energy using the latest available dataset and improved triggers and analysis techniques. We consider cases where the Higgs boson decays into a b-bbar pair and where the Z decays into neutrinos or the lepton originating from the W-decay escapes detection, hence the expectation of an event signature of two b-jets, no leptons, and missing transverse energy. This search is one of the most sensitive in the low mass range ($m_H < 135 \text{ GeV}/c^2$) for a Standard Model Higgs at the Tevatron.

453

Search for the Standard Model Higgs boson in the di-tau final state at CDF

We present the results of a search for the Standard Model Higgs boson in the di-tau decay mode, using approximately 2.3 /fb of CDF Run II data. The search is performed considering the following signal processes: VH to $q q' \tau \tau$ ($V = W, Z$), qHq' to $q \tau \tau q'$ (vector boson fusion), and gg to H to $\tau \tau$ (gluon fusion). Events are selected by requiring a hadronic tau and one isolated electron or muon, which is produced in a leptonic decay of one of the two taus. In addition, at least one jet (reconstructed quark or gluon) is required to be present in the final state. In order to improve the search sensitivity we employ a multivariate technique based on a set of Boosted Decision Trees to obtain the best possible separation between signal and backgrounds. We observe no evidence for a Higgs boson signal and proceed to set a 95% C.L. upper limit on Higgs production, relative to its Standard Model expectation, of 24.7 for a Higgs mass hypothesis of $120 \text{ GeV}/c^2$. The corresponding expected limit assuming the background-only model is 20.8. The new analysis techniques employed in this search lead to an improvement in these limits of between 10% to 40% depending on the Higgs mass value, with respect to the previously published CDF results.

457

B-Tagging studies in 7 TeV Data with the ATLAS detector at the LHC

The identification of b-quark jets is an important tool for the physics program of the ATLAS experiment at the LHC. B-tagging algorithms take advantage of either the decay to a soft lepton or a displaced vertex caused by the long-lived decay of a b hadron via the weak force. As a result key ingredients to b-tagging algorithms are the precise trajectory measurement of charged particle tracks and detection of low pT muons. The properties of charged particle tracks most relevant for b-tagging in the data taken by the ATLAS experiment in 2010 at a centre-of-mass energy of 7 TeV have been studied, in particular the impact parameter resolutions and the detection of secondary vertices, which are crucial for b-tagging algorithms based upon the long lifetime of b hadron decays. These quantities and their comparison to ATLAS simulation are presented. B hadrons that decay semi-leptonically, in particular to muons, are crucial to the ATLAS early-data calibration strategy. Properties of muons in jets and the corresponding b-tagging algorithms are thus discussed. The calibration strategies that will be used for early data and initial studies that will lead to a fully data-driven calibration for the b-tagging algorithms are also presented.

459

Commissioning and performance of the ATLAS Pixel Detector

The ATLAS Pixel Detector is the innermost detector of the ATLAS experiment at the Large Hadron Collider at CERN. It consists of 1744 silicon sensors equipped with approximately 80 M electronic channels, providing typically three measurement points with high resolution for particles emerging from the beam-interaction region, thus allowing to measure particle tracks and secondary vertices with very high precision. The completed Pixel Detector was operated for many months under realistic conditions in the ATLAS experimental hall, after installation. Calibration data has been taken and analyzed to determine the noise performance of the system. Combined operation with other subdetectors in ATLAS allowed to qualify the detector with physics data from cosmic muons.

In this talk, a review of the commissioning and first operational experience of the Pixel Detector will be presented, including monitoring and calibration procedures, and the timing optimization process, as the detector operation progressed from commissioning with cosmic ray data to commissioning with collisions and finally to steady-state data taking. In addition, the Pixel Detector response to LHC high energy proton-proton collisions will be presented.

460

ATLAS Silicon Microstrip Tracker Operation and Performance

In December 2009 the ATLAS experiment at the CERN Large Hadron Collider (LHC) recorded the first proton-proton collisions at a centre-of-mass energy of 900 GeV. The Semiconductor Tracker (SCT) is the key precision tracking device in ATLAS, made up from silicon micro-strip detectors processed in the planar p-in-n technology.

The completed SCT has been installed inside the ATLAS experimental hall. After the commissioning phase it arrived to the first LHC pp collision runs in very good shape: 99.3% of the SCT strips are operational, noise occupancy and hit efficiency exceed the design specifications, the alignment is already close enough to the ideal one to allow on-line track reconstruction and invariant mass determination.

In the talk the current status of the SCT will be reviewed, including results from the latest data-taking periods at autumn 2009 and spring 2010, and from the detector alignment. We will report on the operation of the detector and observed problems. The main emphasis will be given to the performance of the SCT with the LHC in collision mode in a comparison with the expected parameters and with the Monte Carlo simulations.

461

Commissioning and Performance of the ATLAS Transition Radiation Tracker with proton-proton collisions at the LHC

The ATLAS Transition Radiation Tracker (TRT) is the outermost of the three sub-systems of the ATLAS Inner Detector at the Large Hadron Collider at CERN. It consists of close to 300000 thin wall drift tubes (straws) providing on average 30 two-dimensional space points with 0.13 mm resolution for charged particle tracks with $|\eta| < 2$ and $p_T > 0.5$ GeV. Along with continuous tracking, it provides particle identification capability through the detection of transition radiation X-ray photons generated by high velocity particles in the many polymer fibers or films that fill the spaces between the straws.

The front-end electronics implements two thresholds to discriminate the signals: a low threshold (~ 300 eV) for registering the passage of minimum ionizing particles, and a high threshold (~ 6 keV) to flag the absorption of transition radiation X-rays.

Emphasis will be given to performance studies based on the reconstruction and analysis of the several millions of collisions already recorded and to comparisons with the expected TRT response as provided by the current Monte Carlo detector simulation. The unique transition radiation detection capability of the TRT has been profitably used for electron identification and to successfully reconstruct a large sample of photons converting in the ATLAS Inner Detector volume. The particle identification performance of the TRT has been studied using the first collision events and compared with expectations from the analysis of test beam data. In addition, an account of the TRT performance for proton-proton collisions at very different centre of mass energy, namely at 900 GeV and 7000 GeV centre of mass energy, will be given here for the first time.

462

Dalitz plot analysis of $B^0 \rightarrow K_S^0 K_S^0 K_S^0$

We perform the first time-integrated amplitude analysis of $B^0 \rightarrow K_S^0 K_S^0 K_S^0$ decays to extract information about the intermediate resonant modes and measure their branching fractions, using a data sample of 468 million $B\bar{B}$ decays, collected with the BABAR detector at the Upsilon(4S) resonance. We find contributions from $f_0(980)$, $f_0(1710)$, and $f_2(2010)$, and do not observe any contribution from the so called $f_X(1500)$. Given that only contributions from even-spin resonances are allowed, this non observation provides information about the $f_X(1500)$. We measure the total inclusive branching fraction.

463

Dalitz plot analysis of $B^0 \rightarrow K^+ \pi^- \pi^0$

We present results from an amplitude analysis of the $B^0 \rightarrow K^+ \pi^- \pi^0$ Dalitz plot. The $B^0 \rightarrow K^+ \pi^- \pi^0$ decay mode is reconstructed from a sample of 454 million $B\bar{B}$ events collected by the BABAR detector at SLAC. We measure decay rates, phases differences and direct CP violation parameters of all intermediate resonances. In addition we use the $B \rightarrow K^* \pi$ amplitudes obtained from $B^0 \rightarrow K^+ \pi^- \pi^0$ and $B^0 \rightarrow K^0_S \pi^+ \pi^-$ decays to constrain the apex of the CKM triangle.

464

Inclusive BF measurement of $B^0 \rightarrow \pi^+ K_S^0 K^-$

We report an analysis of charmless hadronic decays of neutral B mesons to the final state $K_S^0 K^{\pm} \pi^{\mp}$, using a data sample of (465 ± 5) million $B\bar{B}$ events collected with the BABAR detector at the Upsilon(4S) resonance. We observe an excess of signal events with a significance of 5.2σ including systematic uncertainties and measure the branching fraction to be $B(B^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}) = (3.2 \pm 0.5 \pm 0.3) \times 10^{-6}$, where the uncertainties are statistical and systematic, respectively.

465

Inclusive BF measurement of $B^+ \rightarrow K^+ \pi^0 \pi^0$

We report an analysis of charmless hadronic decays of charged B mesons to the final state $K^+ \pi^0 \pi^0$, using a data sample of 470.9 ± 2.8 million $B\bar{B}$ events collected with the BABAR detector at the Upsilon(4S) resonance. We observe a significant excess of signal events and measure the total inclusive branching fraction.

474

Study of the neutrino oscillations in the vacuum regime and its comparison with the oscillations in matter

Borexino is a large volume liquid scintillator detector installed at the Gran Sasso underground laboratory with a primary goal of the solar ${}^7\text{Be}$ neutrino flux measurement. The exceptional radio-purity needed to guarantee the real-time ${}^7\text{Be}$ neutrino measurement has been successfully reached in Borexino, it made also possible other measurements, in particular the measurement of the solar ${}^8\text{B}$ neutrino flux. In such a way, Borexino is the first experiment detecting in real time, and at the same target, solar neutrinos in the sub-MeV energy range with vacuum dominated oscillations and in the energy range dominated by the matter enhanced oscillations. Borexino measured a survival probability $P_{ee} = 0.56 \pm 0.10$ for ${}^7\text{Be}$ solar neutrinos, at the energy of 0.862 MeV, and $P_{ee} = 0.29 \pm 0.10$ at the mean energy of 8.9 MeV for ${}^8\text{B}$ solar neutrinos. The distance between the two survival probabilities is 1.9σ . Future precision measurements of ${}^7\text{Be}$ and ${}^8\text{B}$ neutrinos in Borexino will provide more stringent test of the difference in P_{ee} for low- and high energy neutrinos predicted by the MSW-LMA theory, up to 3σ .

476

Recent results on the nucleon spin structure from COMPASS

COMPASS is a multi-purpose fixed target experiment at the CERN Super Proton Synchrotron, dedicated to the study of the spin and the structure of the nucleon. From 2002 to 2011, high statistics data for polarized inclusive and semi-inclusive deep inelastic scattering were collected using 160 GeV/c polarized muons on polarized deuteron and proton targets.

The data are used to derive the gluon contribution to the nucleon spin, and to determine the up, down and strange quark and anti-quark polarized distributions. They also constrain the g_1 longitudinal spin structure function, and thus the Björken sum rule, with greater accuracy. The implications of these results to our present understanding of the nucleon spin puzzle will be discussed. The COMPASS plans for the future will be presented.

479

Performance of the ATLAS Liquid Argon Calorimeter at the LHC

The Liquid Argon calorimeter (LAr) is a key detector component in the ATLAS experiment at the LHC. It provides precision measurements of electrons, photons, jets and missing transverse energy produced in the LHC proton-proton collisions. The calorimeter system consists of an electromagnetic barrel calorimeter and two endcaps with electromagnetic (EMEC), hadronic (HEC) and forward (FCAL) calorimeters.

The lead-liquid argon sampling technique with an accordion geometry was chosen for the barrel electromagnetic calorimeter (EMB) and adapted to the endcap (EMEC). A presampler (PS) is installed in the cryostat in front of the EM calorimeter to provide a measurement of the energy lost upstream. The hadronic endcap calorimeter (HEC) uses a copper-liquid argon sampling technique with plate geometry. Finally, the forward calorimeter (FCAL) is composed of three modules featuring cylindrical electrodes with thin liquid argon gaps. The barrel and the two endcaps are housed into three cryostats kept at about 87 K.

We present results assessing the liquid argon calorimeter performance obtained using random triggers, calibration data, cosmic muons and LHC proton-proton collisions. Properties of the read-out channels such as pedestal, noise and gain have been measured and show the high stability of the LAr electronics over several months of data taking. Energies and occupancies from collisions for each cell of the liquid argon subsystems have been recorded and the results have been compared to Monte-Carlo expectations.

482

Performance of the ATLAS Muon Spectrometer at the LHC

The large cosmic data samples collected in fall 2009 by the ATLAS experiment have been used to study the performance of the Muon Spectrometer. Detailed studies of the basic Muon spectrometer performance in terms of sagitta resolution, tracking efficiency and momentum resolution are presented and provide an update with respect to the results recently published. The results are also compared with a cosmic data simulation recently improved with a more realistic drift chamber response. The recent collision data collected at a CM of 7 TeV have also been analyzed to determine basic Muon Spectrometer performance.

483

Muon identification in proton-proton collisions at 7 TeV with the ATLAS detector

Muonic final states provide clean signatures for many physics processes at the LHC. Up to transverse muon momenta of about 30 GeV muons are predominantly produced in weak decays of hadrons while they come from the decays of heavy particles at higher momenta. The design of the ATLAS detector allows for efficient muon identification with high resolution in a wide momentum range from the GeV to the TeV region. High momentum resolution and good rejection of muons from pion and kaon decays in flight are achieved by the combination of the precise momentum measurements in the inner detector and the ATLAS muon spectrometer. The measurement of the energy deposited around a muon in the calorimeters is used to select isolated muons.

The performance of the ATLAS muon identification was studied with 1 inverse nanobarn of LHC proton-proton collision data at a centre of mass energy of 7 TeV. Measured detector efficiencies, hit multiplicities, and residual distributions of reconstructed muon tracks are well reproduced by the Monte Carlo simulation. Exploiting the redundancy in the muon identification at detector and reconstruction level the performance of the identification steps could be checked with data. 4.5 muons per microbarn with $p_T > 6$ GeV and $|\eta| < 2.5$ were identified as predicted by Pythia minimum bias Monte Carlo. The pseudorapidity, ϕ , and p_T distributions of the reconstructed muons are in reasonable agreement with the Monte Carlo prediction.

484

Tau reconstruction with 7 TeV collisions in ATLAS

Tau leptons will play an important role in the physics program at the LHC. They will be used in electroweak measurements and in detector related studies like the determination of the missing transverse energy scale, but also in searches for new phenomena like the Higgs boson or Supersymmetry.

Identifying hadronically decaying tau leptons requires good understanding of the detector performance combining the calorimeter and tracking detectors. We present the current status of the tau reconstruction and identification at the LHC with the ATLAS detector. Some of the basic quantities from the reconstructed tau candidates in dijet backgrounds and $W \rightarrow \tau + \nu$ events are compared with the prediction of the Monte Carlo simulation. We discuss the properties of the tau signature and the plans for measuring tau identification efficiency and fake rate using $Z \rightarrow \tau + \tau$ signal events and dijet, photon+jet and Z+jets background events.

We also report on the commissioning steps and performance of the tau trigger, which is designed to efficiently reject low-energy jets while keeping a high efficiency with respect to hadronic tau leptons identified by the offline algorithms.

485

The ATLAS Tile Hadronic Calorimeter performance in the LHC collision era

The Tile Calorimeter (TileCal), the central section of the hadronic calorimeter of the ATLAS experiment, is a key detector component to detect hadrons, jets and taus and to measure the missing transverse energy. TileCal is built of steel and scintillating tiles coupled to optical fibers and read-out by photomultipliers. The calorimeter is equipped with a system that allows to monitor and to calibrate each stage of the read-out system exploiting different signal sources: laser light, charge injection and a radioactive source. The performance of the calorimeter has been measured and monitored using calibration data, random triggered data, cosmic muons, splash events and in the last months collision events. The results of these studies give important information that assess the uniformity, the stability and the resolution of the energy measurements and in general the quality of the data description as given by the simulation of the TileCal detector. In this presentation the most important results from these analyses will be reported to demonstrate the performance and the quality of understanding the TileCal detector.

486

Performance of the primary vertex reconstruction in proton-proton collisions at energies of 900 GeV and 7 TeV with the ATLAS detector at the LHC

The Large Hadron Collider (LHC) at CERN started its operation in autumn of 2009. The initial run at a center-of-mass energy of 900 GeV is currently followed by an on-going run at the energy of 7 TeV. The probability of several proton-proton collisions (pile up) in the same bunch crossing is steadily increasing. A recently finished analysis of charged particle multiplicities at 7 TeV has shown that the presence of pile up is already an important issue, even for the very first physics analyses at the LHC.

Presented in this contribution is the performance of the primary vertex reconstruction during the data taking at 900 GeV and 7 TeV at the LHC. Different approaches are compared in terms of their reconstruction efficiency and capability to identify events with several pile up collisions. The resolutions of the reconstructed position of the primary vertices is measured using a data driven method.

487

Performance of the track reconstruction in proton-proton collisions at energies of 900 GeV and 7 TeV with the ATLAS detector at the LHC

The ATLAS experiment is one of the two general purpose detectors at the Large Hadron Collider. ATLAS is equipped with a charged particle tracking system built on three subdetectors, which provide high precision measurements made from a fine detector granularity. The pixel and microstrip subdetectors, which use the silicon technology, are complemented with the transition radiation tracker.

Data taken at center-of-mass energies of 900 GeV and 7 TeV was analyzed. The performance of the track reconstruction in terms of tracking efficiency and track parameter resolutions is presented. The precise knowledge of the material in the Inner Detector is vital for understanding the tracking performance and thus important for many physics analyses. Therefore detailed comparisons between data and Monte Carlo have been performed and contributed significantly to the understanding of the detector. The results of these studies will be shown.

489

Mapping the material upstream the ATLAS electromagnetic calorimeter using energy flow

The measurement of the energy flow in the electromagnetic calorimeter (EM) is typically used to spot early detector problems but it is also sensitive to the (radially integrated) amount of material in front of the electromagnetic calorimeter. Using the LHC collision data collected at a centre of mass energy of 7 TeV, the two dimensional (η versus ϕ) occupancy maps of the EM calorimeter for each longitudinal layer have been extracted. Such a method provides a cross-check of the total amount of material in front of the calorimeter and it is complementary to others only sensitive to the amount of material in the tracker. The measurement accuracy will be dominated by the systematic uncertainties and the ultimate accuracy is expected to be about 5% of the material upstream.

490

ATLAS Inner Detector Material Studies with Photon Conversions

With the start of the LHC operations at a center of mass energy of 7 TeV a large sample of low energy photons, mostly coming from the decay of neutral mesons, have been collected with the ATLAS detector. Due to the large amount of material upstream the electromagnetic (EM) calorimeter, about 50% of these photons will convert before reaching it. The converted photons are used as a tool to map the material of the ATLAS tracker in front of the EM calorimeter. The results of the material measurements relative to an accurately measured reference volume inside the tracker, together with an estimate of the most important sources of systematic uncertainties will be shown. The effect of the energy loss due to bremsstrahlung on the conversion vertex reconstruction precision is also discussed. Finally the results from using the extremely pure electron sample provided by the converted photons to study the particle identification capabilities of the ATLAS Transition Radiation Tracker (TRT), are presented.

491

Electron performance with Z, J/psi and W with the ATLAS detector

The understanding of the reconstruction of electrons in the ATLAS experiment at LHC is one of the key issues for the 2010 run at a center of mass energy of 7 TeV. Two aspects are of interest: the energy calibration and the reconstruction efficiency. The energy measurement of electrons is based on the electromagnetic calorimeter over most of the relevant energy range (5 GeV to a few TeV). The electromagnetic calorimeter clusters are formed from electronically calibrated calorimeter cells and are corrected for local position and energy variations. A refined calibration procedure, developed and validated over years of test-beam strives to identify all sources of energy losses upstream of the outside the cluster and corrects for them one by one (using Monte Carlo). The present study is aiming at a first validation of this calibration strategy on prompt electrons from known physics processes. The electron reconstruction efficiency can be measured with data using a tag-and-probe approach with $J/\psi \rightarrow ee$ and $Z \rightarrow ee$ decays. An initial measurement will be shown with the first pb^{-1} and compared to MC.

494

Inclusive electron p_T spectrum measurement with the ATLAS detector

We present the first measurement of the inclusive electron transverse momentum (p_T) spectrum in proton proton collisions at a center of mass energy of 7 TeV using a data sample of a few pb^{-1} collected with the ATLAS experiment at the Large Hadron Collider at CERN. Electrons are reconstructed by a cluster of energy in the electromagnetic calorimeter and a matching track found by the tracking detectors. Cluster shower-shape variables, the quality of cluster and track matching, as well as particle identification using the Transition Radiation Tracker and conversion rejection tools are used to differentiate prompt electrons from backgrounds from hadrons and from electrons from photon conversions.

Electrons from heavy flavour bottom and charm quark decays are expected to be the main source of inclusive prompt electrons at the lower end of the transverse momentum range, whereas isolated electrons from W/Z decays are expected to dominate for $p_T > 20\text{-}25$ GeV. The different components of the measured inclusive electron spectrum are compared to Monte Carlo predictions, both in terms of the prompt signal and of the various backgrounds.

499

Inclusive jet production cross-section in pp at $\sqrt{s} = 7$ TeV with the ATLAS detector

Making use of the excellent calorimetry of the ATLAS experiment, the first measurement of the cross-section for single inclusive jet production in proton-proton interactions at $\sqrt{s} = 7$ TeV will be presented. The corrected and unfolded spectrum for high- p_T jets in pp collision at a center-of-mass energy of 7 TeV will be described. Special emphasis will be given to the discussion of the initial understanding of the jet energy scale.

500

Jet shape studies in pp at $\sqrt{s} = 7$ TeV with the ATLAS detector

Studies of the shapes of jets as produced in proton-proton interactions at $\sqrt{s} = 7$ TeV by the ATLAS experiment will be presented and compared to predictions from Monte Carlo simulations. The energy dependence of the jet shape observables on the center-of-mass energy is investigated by comparing to data collected at lower energies.

501

Azimuthal correlations in di-jet production in pp at $\sqrt{s} = 7$ TeV with the ATLAS detector

The measurement of the difference between the azimuthal angles of the two leading jets in di-jet production allows the study of various mechanisms for QCD radiation. Results from the ATLAS experiment using the early data recorded in proton-proton interactions at a center-of-mass energy of 7 TeV will be described and compared to Monte Carlo simulations.

502

Di-jet production in pp at $\sqrt{s} = 7$ TeV with the ATLAS detector

Measurements of the production of di-jets in proton-proton collisions at $\sqrt{s} = 7$ TeV from the ATLAS experiment will be presented. The observables studied include the invariant di-jet mass, the (polar) angular distribution and other differential distributions. The results will be compared to theoretical expectations for the Standard Model.

504

Exclusive diffractive J/psi production at low W_{gamma} with the H1 detector at HERA

Exclusive diffractive photoproduction of J/psi mesons is measured with the H1 detector at the electron-proton collider HERA. At the end of the HERA operation in 2007 the nominal proton beam energy was reduced from 920 GeV to 575 and 460 GeV, respectively. The reduced proton beam energy allows diffractive J/psi measurements in an extended phase space towards lower photon-proton centre of mass energies W_{gamma} . Differential cross sections are presented as a function of t , the squared four-momentum transfer at the proton vertex, and of W_{gamma} in the kinematical range of low photon virtualities of $Q^2 < 2.5 \text{ GeV}^2$.

505

Measurement of the Azimuthal Correlation between the Scattered Electron and the most Forward Jet in Deep-Inelastic Scattering at HERA

Deep-inelastic scattering events at low Q^2 with a high transverse momentum jet, produced at small angles with respect to the proton beam in the laboratory frame, are studied with the H1 experiment at HERA. Differential cross sections and normalised distributions are measured as a function of the azimuthal angle difference $\Delta\phi$ between the forward jet and the scattered electron. Events with a forward jet and an additional jet, measured in the central region of the laboratory frame, allow to study the $\Delta\phi$ dependence in a phase space region, where a higher proportion of forward jets from additional gluon emission is expected from models based on BFKL type parton evolution. The measurements are compared to fixed order DGLAP and BFKL calculations as well as predictions of Monte Carlo generators based on different QCD evolution schemes.

506

Multi-Jet Production at Low Q^2 at HERA using different Jet Algorithms

The production of four or more jets is studied in neutral current deep-inelastic scattering at low negative four momentum transfer squared $5 < Q^2 < 100 \text{ GeV}^2$. Jet cross sections are measured as a function of Q^2 and jet transverse momentum using the kt, anti-kt and SISCone jet algorithms. The measurements are compared to QCD models based on $O(\alpha_s)$ matrix elements with parton showers and fragmentation and for four-jets to $O(\alpha_s^3)$ QCD calculations corrected for hadronisation effects.

510

Characterizing and Simulating the NuMI Neutrino Beam for MINOS

MINOS is a long baseline neutrino oscillation experiment, which is measuring the so-called atmospheric oscillation parameters using the NuMI neutrino beam at Fermilab.

MINOS uses two detectors, a near detector close to the neutrino production point to characterise the neutrino beam and a far detector 735 km away from the neutrino production to measure the oscillation parameters. In previous experiments the difficulties to predict the neutrino beam have always produced sizeable systematic uncertainties, when measuring neutrino properties. This is different with MINOS. The two detector set-up together with other beam instrumentation and the ability to vary the beam optics allowed MINOS to measure the beam composition and to minimize its uncertainties on the oscillation measurement. The talk will illustrate the different methods used and present the results of the analysis.

511

Search for the Standard Model Higgs boson in the WH to l nu b bbar final state at CDF

We have searched for the Standard Model Higgs boson in the WH to l nu b bbar final state at CDF. This search uses data corresponding to an integrated luminosity of more than 5.0/fb. Experimentally, we select events with one high-pt lepton, large missing transverse energy, and two b-quark jets. After selecting the events, we employ advanced multivariate techniques to provide additional signal versus background discrimination and improve the analysis sensitivity. We set a 95% C.L. upper limit on the WH production cross section times the branching ratio of the Higgs decaying into a b-bbar pair with respect to its Standard Model expectation. This analysis is one of the most sensitive of those included within the combined low-mass Higgs boson search results from the Tevatron.

512

Search for the Standard Model Higgs boson in the ZH to llbb final state at CDF

We search for the Standard Model Higgs Boson in the ZH to ll b bbar final state in the e+e- and mu+mu- channels using up to 5.6 /fb of CDF II data. We use loose lepton and b-tagging requirements to retain high signal acceptance, and an artificial neural network (ANN) to improve the energy resolution of the b-quark jets produced in the decay of a potential Higgs boson. In this updated analysis we have increased acceptance by developing an ANN to utilize a new category of loose muons. To produce signal discrimination while maintaining signal efficiency, we use matrix element output and other variables as input to an additional ANN to simultaneously separate signal from the dominant Z+jets background and kinematically different t-tbar background. We set 95% C.L. upper limit on the Higgs production cross section times the branching ratio of this channel relative to its Standard Model prediction for Higgs boson mass values between 100 and 150 GeV/c².

513

Search for the Standard Model Higgs boson in the diphoton final state at CDF

We present the results of a search for the standard model Higgs boson in the diphoton final state (H to gamma gamma) using data collected with the CDF II detector at the Fermilab Tevatron collider corresponding to more than 5 /fb of integrated luminosity. Searches for a low-mass Higgs typically rely on the H to b bbar decay channel due to the larger branching fraction; however, the diphoton decay mode is complimentary in that its backgrounds are significantly different, and the identification efficiency and energy resolution for photons are typically much better than that for b-quark jets.

514

Measurement of the WW + WZ production cross section using the semi-leptonic final state at CDF

We present a measurement of the WW + WZ production cross section in 4.6 /fb of integrated luminosity collected by the CDF II detector from p-pbar collisions at sqrt(s) = 1.96 TeV. The measurement is performed in final states resulting from semi-leptonic decays containing an identified lepton and two hadronic jets, an event topology also used in searches for the Higgs boson. Separation of the signal from the overwhelming W + jets background is achieved using a discriminant based on matrix element calculations. Modeling of the background processes is studied carefully to ensure that the inputs to the matrix element calculations are well-matched in data and simulation. The measured cross section is found to be in good agreement with NLO predictions.

516

Search for WZ production in the Inubb final state at CDF

An important Tevatron search channel for the Standard Model Higgs boson is associated WH production with subsequent decays of the W to l nu and the H to b bbar. The resulting final state is shared with Standard Model WZ production which necessarily must be well-understood. We present an important cross-check of the Higgs boson search in this channel which is to apply the same analysis techniques to observing and measuring the contribution of WZ production in our event candidate sample. The identification of b-quark jets is an important component of searches for a Higgs boson with a mass below 130 GeV/c². For this search we implement for the first time an improved, artificial neural network b-quark jet identification algorithm that increases acceptance for signal events and thus improves the overall search sensitivity.

518

New pixelized Micromegas detector with low discharge rate for the COMPASS experiment at CERN

Future physics programs using high intensity muon and hadron beams of a few hundred GeV impinging on various targets are being prepared by the COMPASS experiment at CERN for the years 2012 and beyond. We consider to replace the present large size micropattern gaseous Micromegas detectors by new ones featuring new characteristics to cope with the foreseen higher beam intensities. Several objectives have been identified: reducing the discharge rate using resistive layers or GEM foils to stand five times larger hadron flux, detection of beam particles (few hundred of kHz/mm²) using a pixel read-out in the center of the detector, light and integrated electronics, and improved robustness.

Two large prototypes with pixels in the center using an integrated APV25 electronics were tested in 2009. They operated during several months in the hottest region of the COMPASS spectrometer both with muon and hadron beams. Good performances were achieved during the whole COMPASS data taking, validating the pixel readout with APV electronics and the bulk technology used for the first time on a large and thin honeycomb board. New prototypes using a design close to the final detectors will be tested in 2010 in COMPASS nominal conditions.

In order to reduce the rate and impact of discharges occurring between the mesh and the board, two different approaches are privileged: one involves the use of resistive coating deposited to the board, in order to reduce the capacity involved in the discharge process. The second one consists in preamplify primary electrons using a GEM foil placed above the Micromegas mesh. Thus the gain in the Micromegas layer can be reduced and the discharge rate is lower. Ten 10x10cm² prototypes were tested on the CERN SPS hadron beam, four of them using different types of resistive coating, and one equipped with an additional GEM foil above the mesh.

An overview on these different studies will be shown together with test results. The status of the project and the planned timeline will be presented.

519

Combined Tevatron search for a Standard Model-like Higgs boson assuming a 4th generation of fermions

We present combined results from searches performed by the CDF and D0 collaborations for the standard model Higgs boson in the process gg to H to WW in p-pbar collisions at the Fermilab Tevatron Collider at sqrt(s) = 1.96 TeV. With 4.8 /fb and 5.4 /fb of integrated luminosity analyzed at CDF and D0 respectively, the 95% C.L. upper limit on sigma(gg to H) times BR(H to WW) is 1.75 pb at m_H = 120 GeV/c², 0.38 pb at m_H = 165 GeV/c², and 0.83 pb at m_H = 200 GeV/c². Assuming the presence of a fourth sequential generation of fermions with large masses, we exclude at the 95% C.L. a standard-model-like Higgs boson with mass between 131 and 204 GeV/c².

520

Search for the Standard Model Higgs boson in the H to WW to lnujj final state at CDF

We present a search for a standard model Higgs boson decaying to two W bosons (H to WW) in events with an electron or muon, missing energy, and two hadronic jets. A matrix element technique is used to separate signal from background in 4.3 /fb of integrated luminosity collected by the CDF II detector from p-pbar collisions at $\sqrt{s} = 1.96$ TeV. This is the first search for H to WW production in this final state at CDF and is used to set 95% C.L. upper limits on the Higgs boson production cross section times branching ratio relative to its standard model expectation.

521

Search for the Standard Model Higgs boson in the tri-lepton final state at CDF

We present a search for the standard model Higgs boson in tri-lepton final states originating from associated production of a Higgs boson with a vector boson ($V = W, Z$). Potential Higgs boson decays via H to WW result in a final state with three heavy vector bosons whose leptonic decays can result in events containing three and even four charged leptons. In the past CDF has incorporated same-sign dilepton events, which also result from this production mode within its standard model Higgs boson searches. By also incorporating tri-lepton events, we can further improve the overall CDF sensitivity to a high-mass Higgs boson by roughly 5-10%.

523

Combined CDF search for the Standard Model Higgs boson in the H to WW decay channel.

We report a combined search for standard model Higgs boson production in the H to WW decay channel using the two charged lepton (e, mu) and two neutrino final state in p-pbar collisions at $\sqrt{s} = 1.96$ TeV. The data were collected with the CDF II detector at the Tevatron collider at Fermilab and correspond to an integrated luminosity of roughly /6.0 fb⁻¹. In order to maximize sensitivity, three neural networks are separately trained to distinguish signal from background processes in opposite-sign final states with either zero, one, or two or more jets. For 0-jet events, likelihood ratios based on Matrix Element calculations are used as additional inputs to the neural network to further strengthen its discriminating power. In order to take advantage of the maximum potential signal acceptance, we also consider associated production with a W or Z boson and Higgs boson production via vector boson fusion. Additional signal acceptance is gained by incorporating events with low dilepton invariant mass as a separate search region. We also search for associated Higgs production in events with same-sign dileptons and trileptons in the final state. Based on these samples, we determine an 95% C.L. upper limits on standard model Higgs production with respect to the standard model expectation for Higgs masses in the range between 110 and 200 GeV/c². These are compared with the median expected limits obtained from background-only pseudo-experiments.

524

Search for the Standard Model Higgs boson in H to WW final states containing a hadronic tau at CDF

We present the first CDF search for a standard model Higgs boson decaying into a pair of W bosons in the e-tau and mu-tau final states using roughly 6.0 /fb of data collected with the CDF II detector from p-pbar collision at $\sqrt{s} = 1.96$ TeV. The candidate samples are selected by requiring either an electron or a muon and a hadronic tau in the final state. Boosted decision trees are used to separate large backgrounds originating from fake hadronic taus reconstructed from quark or gluon jets. We set a 95% C.L. upper limit on the cross section times branching fraction for Higgs boson production in these final states relative to its standard model expectation.

526

ATLAS Monte Carlo tunes to LHC data

Monte Carlo tunes to the first measurements from the LHC, at center-of-mass energies of 900 GeV and 7 TeV, are presented. Measurements of the charged particle multiplicities and of the momentum flow in the underlying event in inelastic pp collisions are used to constrain the model parameters. The tunes aim for one consistent description of the new measurements with data from the Tevatron and LEP.

527

Evidence for direct CP violation in the measurement of the CKM angle γ with $B^{\pm} \rightarrow D^{(*)} K^{(*)\mp}$ decays

We report on the measurement of the Cabibbo-Kobayashi-Maskawa CP-violating angle γ through a Dalitz Plot analysis of neutral D meson decays to $K^0_S \pi^+ \pi^-$ and $K^0_S K^+ K^-$ produced in the processes $B^{\pm} \rightarrow D^{\pm} K^{\mp}$, $B^{\pm} \rightarrow D^{*\pm} K^{\mp}$ with $D^{*\pm} \rightarrow D^{\pm} \pi^0$, $D^{\pm} \gamma$, and $B^{\pm} \rightarrow D K^{*\mp}$ with $K^{*\mp} \rightarrow K^0_S \pi^{\pm}$, using 468 million B^{\pm} pairs collected by the BaBar detector at the PEP-II asymmetric-energy e^+e^- collider at SLAC.

529

Search for $b \rightarrow u$ transitions in $B^- \rightarrow D^0 K^-$ and $B^- \rightarrow D^{*0} K^-$ decays

We report final results from an updated study of the suppressed B meson decays $B^- \rightarrow D^0 K^-$ and $B^- \rightarrow D^{*0} K^-$ followed by $D \rightarrow K^+ \pi^-$, where $D^{(*)}$ indicates a $D^{(*)0}$ or an anti- $D^{(*)0}$, and $D^{*0} \rightarrow D^0 \pi^0$ or $D^{*0} \rightarrow D^0 \gamma$. These decays are sensitive to the CKM angle γ due to interference between the $b \rightarrow c$ transition $B^- \rightarrow D^{(*)0} K^-$ followed by the doubly Cabibbo-suppressed decay $D^0 \rightarrow K^+ \pi^-$, and the $b \rightarrow u$ transition $B^- \rightarrow D^{(*)0} K^-$ followed by the Cabibbo-favored decay $\text{anti-}D^0 \rightarrow K^+ \pi^-$. We also report an analysis of the decay $B^- \rightarrow D^{(*)} \pi^-$ with the D decaying into the doubly Cabibbo-suppressed mode $D \rightarrow K^+ \pi^-$. These two results are based on 467 million $Upsilon(4S) \rightarrow B^{\pm}$ decays collected with the BaBar detector at SLAC. We measure the ratios of the suppressed to favored branching fractions as well as the CP asymmetries of those modes. Using a frequentist approach we infer one- and two-sigma confidence level intervals for the magnitude of the ratios $r_B^{(*)}$ between the $B^- \rightarrow \text{anti-}D^{(*)0} K^-$ and the $B^- \rightarrow D^{(*)0} K^-$ amplitudes.

In addition, we report on the study of the decay $B^- \rightarrow D^0 \text{anti-}D^0 K^-$, where the D^0 or $\text{anti-}D^0$ decay to $K^+ \pi^- \pi^0$. We measure the ratios of the suppressed to favored branching fractions as well as the CP asymmetries of those modes. Since the amplitudes for the processes $B^+ \rightarrow \text{anti-}D^0 K^+$ and $B^+ \rightarrow D^0 K^+$ are proportional to V_{cb} and V_{ub} , respectively, these decays are sensitive to the weak phase γ as well as to the magnitude r_B of the ratio between the two amplitudes. The analysis is performed using $471 \times 10^6 B^{\pm}$ pair collected with the BaBar detector at the PEP-II factory at SLAC.

532

Underlying Event studies in inelastic pp events with the ATLAS detector

Studies of the momentum flow in inelastic collisions at 900 GeV and 7 TeV recorded with a minimum bias trigger strategy are reported. A single high P_T track is selected, and the distribution of other tracks in the event is evaluated relative to this reference track. The evolution of the charged momentum flow in the rest of the event, as a function of the P_T of the reference track, gives important information about the transition from minimum bias event structure to the full underlying event observed in high- P_T collision events. Results are presented after correction and unfolding of detector effects to allow simpler comparison to Monte Carlo models.

534

Prospects for observation of top quark pair production in ATLAS

Top-quark pairs are expected to be produced copiously at the LHC, even at the lower beam energy and luminosity expected in the first year of running. Establishing the top-pair signal and measuring the production cross-section will be important benchmarks for ATLAS, which will also help understand the detector performance for events with high- p_T leptons, high jet multiplicity, missing transverse energy and b-jets. The prospects for these early top physics measurements will be shown, with a particular emphasis on the understanding of backgrounds through data-driven methods.

535

Top quark mass and properties in ATLAS

The top quark is unique in the Standard Model by virtue of its large mass, possible role in electroweak symmetry breaking, and rapid decay without forming bound states. Precise measurements of its properties offer both sensitive tests of the Standard Model and possible pathways to discovering new physics, and are an important and challenging part of the ATLAS physics program. The prospects for measurements of the top quark mass, top quark decay properties such as polarization, spin correlations and anomalous couplings, and rare top decays signaling beyond-Standard Model physics, will be described.

536

Single top quark production in ATLAS

The study of single top quark production and decay will be an important physics topic at the LHC. The large production cross-section, one third that of top-pairs, will allow detailed studies of electroweak single top quark production in all three of the expected production mechanisms, the Wtb vertex and a precise measurement of the CKM matrix element V_{tb} . The ATLAS physics program in this area will be reviewed, with an emphasis on the prospects for early measurements with the first few years of data.

537

J/psi Observation in ATLAS with the first data at 7 TeV

ATLAS has a rich charmonium and beauty physics programme. After a few pb^{-1} of 7 TeV collision data have been taken at the LHC, ATLAS will be able to start probing the new energy regime with decays of the ψ and Upsilon families of mesons into pairs of muons. The very first measurements, possible with only a pb^{-1} of data, will include the fraction of J/psi mesons produced in B-hadron decays, the average lifetime of B-hadrons decaying via J/psi, and the differential J/psi production cross section. Crucial to all of these measurements are the performance of the muon triggers and the offline muon reconstruction and identification, as well as the inner detector performance and tracking. We will show the J/psi resonance extracted from the earliest data at 7 TeV and present the prospects for the early onia to di-muon measurements.

538

Charm Production observed by ATLAS at 7 TeV at LHC

First ATLAS results on charm production at LHC are reported. Charm production in the 7 TeV LHC data has been identified by the presence of the $D^{*\pm}$ meson resonance. $D^{*\pm}$ mesons have been reconstructed from their decays to $D0\pi^\pm$, followed by the decay $D0 \rightarrow K\pi^+$ (+ c.c.). The signal has been identified in the difference between the invariant masses of the $D^{*\pm}$ and $D0$ candidates. The results are compared with Monte Carlo expectations.

539

D+ Production observed by ATLAS at 7 TeV at LHC

First ATLAS results on $D^+ \rightarrow K^-\pi^+\pi^+$ observation at 7 TeV at LHC are reported. The methods to suppress the $D^+ \rightarrow \phi\pi^+ \rightarrow K^+K^-\pi^+$, as well as the $D^{*\pm}$ decays and their reflections, are presented and a first measurement of differential production cross-sections for D^+ at 7 TeV at LHC are shown. The performance of the general purpose ATLAS detector, to identify the two different decays, without a dedicated particle identification detector is discussed. The results are compared with Monte Carlo expectations.

542

Early Searches with Leptons, Photons, and Highly Ionizing Particles with the ATLAS Detector at the LHC

The Standard Model predicts relatively low backgrounds to processes with highly ionizing particles, high-pt leptons, and photons making them strong candidates for early discoveries. We present the results based on first data collected with the ATLAS detector at the LHC and discuss current sensitivities and future discovery prospects.

545

Search Techniques for Exotic Long-lived Particles using Early Data from the ATLAS Detector at the LHC

Exotic heavy long-lived particles are predicted in a range of theories which extend the Standard Model. Supersymmetry models alone allow for meta-stable sleptons, squarks and gauginos. This talk summarises techniques to discover such particles using data from proton-proton collisions at 7 TeV centre-of-mass energy which have been accumulated by the ATLAS detector at the LHC. Relevant observables from collision data which are related to tracking, timing and energy loss are shown, together with predictions of Standard Model and exotic processes.

546

Search for Stopped Stable Massive Particles with ATLAS

If a model such as split-supersymmetry is realized in nature, R-hadrons, which contain a long-lived gluino or squark, can be produced and detected by the ATLAS experiment at the CERN Large Hadron Collider. These particles will traverse the detector and may lose enough of their energy through ionization to become captured and stop in the densest materials. Such "stopped" particles would decay at some later time, producing a high energy deposit which can be picked up by the trigger and detector, provided they remain active. This presentation discusses the detailed detector simulation, trigger strategy and analysis methods for detecting these stopped long-lived particles in ATLAS. We present a first study of the data collected with ATLAS at 7 TeV center of mass energy.

548

Search for the decays $B^+ \rightarrow D^+ K^0$ and $B^+ \rightarrow D^+ K^{*0}$

We report on the search for the rare decays $B^+ \rightarrow D^+ K^0$ and $B^+ \rightarrow D^+ K^{*0}$ decays using 426 fb^{-1} of data ($468 \times 10^6 B\bar{B}$ pairs) collected at the $\Upsilon(4S)$ resonance with the BaBar detector at the PEP-II $B\bar{B}$ factory at SLAC.

549

ATLAS Operations: From Commissioning to 7 TeV Data

In this paper we summarise ATLAS operations from the STEP09 campaign in June 2009 through to ATLAS taking data in the first 7 TeV collisions at the LHC in March 2010. We describe the lessons which were learned from the STEP09 challenge, both in proving which parts of the system were in good shape, but also in highlighting those areas which required improvement. Improvements which were undertaken ranged from improving the hardware on the ATLAS Tier-0 pools to improve data distribution rates, retuning of FTS channels between CERN and the Tier-1s to studying the data access patterns for analysis on Tier-2s to improve analysis rates. We then describe the experience of ATLAS computing operations during the first LHC data taking era.

550

Measurement of the Branching Fractions of the Decays $B \rightarrow \overline{D}^{(*)} D^{(*)} K$

We present a measurement of the branching fractions of the 22 decay channels B^0 and B^{*+} to $\overline{D}^{(*)} D^{(*)} K$, where $\overline{D}^{(*)}$ and $D^{(*)}$ are fully reconstructed. The B^0 and B^{*+} mesons are reconstructed in a sample of hadronic events for all the possible $\overline{D} D K$ modes, namely $B^0 \rightarrow D^{(*)-} D^{(*)0} K^+$, $D^{(*)-} D^{(*)+} K^0$, $\overline{D}^{(*)0} D^{(*)0} K^0$ and $B^{*+} \rightarrow \overline{D}^{(*)0} D^{(*)+} K^0$, $\overline{D}^{(*)0} D^{(*)0} K^+$, $D^{(*)-} D^{(*)+} K^+$. The results are based on 423 fb^{-1} of data that contained $465 \times 10^6 B \overline{B}$ pairs collected at the $\Upsilon(4S)$ resonance with the BaBar detector at the PEP-II B factory.

554

Observation of exclusive B-hadron decays at 7 TeV at LHC by the ATLAS Detector

Search for exclusive B-hadron decays (like $B \rightarrow J/\psi K$ and $B_0 \rightarrow J/\psi K^*$) at 7 TeV at LHC, by the ATLAS detector are presented. The procedure for a first measurement of the total and differential production cross-sections at 7 TeV are given and the prospects of the ATLAS detector for a simultaneous mass and lifetime measurement of these channels are analysed.

555

The J/ψ resonance as a candle for the ATLAS Inner Detector performance studies related to the B-physics measurements

Aspects of the ATLAS Inner Detector performance are studied with the first J/ψ μ s detected at 7 TeV at LHC. In particular, the understanding of the J/ψ mass position and width are presented together with the capabilities in vertex and consequently in lifetime resolutions are analysed. The consequences of these Inner Detector performance issues in the ATLAS B-physics measurements are elaborated.

562

Search for Associated Production of W and Higgs Bosons in $\nu b\bar{b}$ Final States in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

We present a search for a low mass Standard Model Higgs boson produced in association with a W boson at a center-of-mass energy of $\sqrt{s}=1.96 \text{ TeV}$ with the D0 detector at the Fermilab Tevatron collider. The search is performed in events containing one lepton (electron, muon or tau), an imbalance in the transverse energy, and one or two b-tagged jets with up to 6.4 fb^{-1} of data. This channel is one of the most powerful in the search for a low mass Higgs at the Tevatron. Inclusion of the full data set and recent sensitivity improvements will be discussed.

563

Search for Associated Production of Z and Higgs Bosons in $\nu\nu b\bar{b}$ Final States in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

We present a search for a low mass Standard Model Higgs boson produced in association with a Z boson decaying invisibly into a pair of neutrinos at a center-of-mass energy of $\sqrt{s}=1.96 \text{ TeV}$ with the D0 detector at the Fermilab Tevatron collider. The final state is characterised by the presence of two b-tagged jets from the Higgs boson decay and a large imbalance in the transverse energy of the event. This channel is very powerful because of the large signal yields, but is experimentally challenging due to the large QCD backgrounds and absence of visible leptons in the final state. Inclusion of the full data set, up to 6.8 fb^{-1} , and recent improvements to the sensitivity will be discussed.

564

Search for the Standard Model Higgs boson in the $\tau\tau q\bar{q}$ final state in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a search for a Standard Model Higgs boson in events with a final state containing two taus and two jets, in which one tau decays to either a muon or an electron and the other tau decays to hadrons at a center-of-mass energy of $\sqrt{s}=1.96$ TeV with the D0 detector at the Fermilab Tevatron collider. The final states are sensitive to a combination of associated production of a W/Z boson with a Higgs boson, vector boson fusion and gluon-gluon fusion production processes. Inclusion of the full data set, up to 5.4 fb^{-1} , and recent improvements to the sensitivity will be discussed.

565

Search for the Higgs Boson in $WW^{(*)} \rightarrow l^+l^-$ Decays in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a search for the Standard Model Higgs boson produced via the $H \rightarrow WW^{(*)} \rightarrow l^+l^-$ ($l = e, \mu, \tau$) process at a center-of-mass energy of $\sqrt{s}=1.96$ TeV with the D0 detector at the Fermilab Tevatron collider. A Higgs particle with a mass greater than 140 GeV primarily decays into a pair of W-bosons and the leptonic decay channels of the W provide a clear signature. This channel provides the greatest sensitivity to the Higgs boson at the Tevatron, and sensitivity to the Standard Model Higgs is expected with this data set. Inclusion of the full data set, approximately 6.8 fb^{-1} , and recent improvements to the sensitivity will be discussed.

566

Search for the Higgs Boson in $VH \rightarrow VWW^{(*)} \rightarrow ll' + X$ Decays in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a search for the Standard Model Higgs boson produced via the $VH \rightarrow VWW^{(*)} \rightarrow l^{\pm}\nu l'^{\pm}\nu' + X$ process at a center-of-mass energy of $\sqrt{s}=1.96$ TeV with the D0 detector at the Fermilab Tevatron collider. We require two like-sign leptons (electrons or muons). This channel provides significant sensitivity in the intermediate Higgs boson mass range. Inclusion of the full data set, up to 5.4 fb^{-1} , and recent improvements to the sensitivity will be discussed.

567

Search for Higgs Bosons in $H \rightarrow \gamma\gamma$ Decays in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a search for Higgs bosons decaying to the di-photon final state using up to 4.2 fb^{-1} of data at a center-of-mass energy of $\sqrt{s}=1.96$ TeV with the D0 detector at the Fermilab Tevatron collider. Both gluon fusion and associated production processes are exploited. Whilst the branching ratio to the di-photon final state is small in the Standard Model, this channel contributes appreciably to the overall Higgs sensitivity at Tevatron. In parallel, the limit is re-interpreted in fermiophobic models where the di-photon branching ratio is considerably larger. This decay channel will be of major importance in the light mass Standard Model Higgs search at the LHC.

568

Search for the Standard Model Higgs in Semi-leptonic $WW^{(*)}$ decays in ppbar collisions at $\sqrt{s}=1.96$ TeV

We present a search for the Standard Model Higgs boson produced via the $H \rightarrow WW^{(*)} \rightarrow l\nu jj$ process at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 5.4 fb^{-1} of data collected with the D0 detector at the Fermilab Tevatron collider. We search in events with one lepton (electron or muon), two jets and missing transverse energy. A Higgs particle with a mass greater than 140 GeV primarily decays into a pair of W -bosons. Whilst the di-lepton channels provide a clean signature, the semi-leptonic decay mode has a significantly larger cross section \times branching ratio. Whilst able to reconstruct the Higgs mass the difficulty is in overcoming the very large W +jets background, and the procedures developed to achieve this will be discussed.

569

Combined Upper Limit on Standard Model Higgs Boson Production at D0 in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present the combination of the searches for the Standard Model Higgs boson at a center-of-mass energy of $\sqrt{s}=1.96$ TeV, using up to 7 fb^{-1} of data collected with the D0 detector at the Fermilab Tevatron collider. The major contributing processes include associated production ($WH \rightarrow l\nu bb$, $ZH \rightarrow \nu\nu bb$, $ZH \rightarrow ll bb$, and $WH \rightarrow WW^{(*)}$) and gluon fusion ($gg \rightarrow H \rightarrow WW^{(*)}$). The significant improvements across the full mass range resulting from the larger data sets, improved analyses and inclusion of additional channels are discussed. The combination of all channels results in significantly improved sensitivity across the 100-300 GeV mass range, and in particular around 160 GeV.

570

Measurement of Di-boson Production in Lepton Plus Jets Decays in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a measurement of the cross section for the simultaneous production of two vector bosons (WW, WZ, ZZ) in lepton plus jets decays at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 5.4 fb^{-1} of data collected with the D0 detector. This final state is a direct analog to SM Higgs searches in final states of leptons plus bottom quark pairs, and thus provides a crucial validation benchmark of the signal isolation techniques involved.

571

Search for Neutral Supersymmetric Higgs Bosons in $bb\bar{b}(b)$ Final States in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a search for Higgs bosons in the bh and bbh channels at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 5.4 fb^{-1} of data collected with the D0 detector. In many Supersymmetric models the cross-section for production of neutral Higgs bosons in association with bottom quarks is greatly enhanced compared to the Standard Model, and over much of the parameter space the dominant decay process is $H \rightarrow b\bar{b}$. We search for an excess of events above the multijet background in events with 3 and 4 b -jets. Understanding the multijet background in this channel is particularly challenging. The treatment of the background, the multivariate techniques used to improve the sensitivity and the limit setting procedure are discussed.

572

Search for Neutral Supersymmetric Higgs Bosons in di- τ Final States in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

We present a search for Higgs bosons in the di-tau modes at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 5.4 fb $^{-1}$ of data collected with the D0 detector at the Fermilab Tevatron collider. In Supersymmetric models Higgs boson production cross section can be significantly enhanced compared to the Standard Model. In such models, the Higgs boson has a significant branching ratio to tau leptons at all masses, and the gluon fusion production process can be exploited directly. The di-tau channels complement the $h\bar{b}$ associated production modes through reduced dependence on the details of the Supersymmetric model under test.

573

Search for Neutral Supersymmetric Higgs Bosons in $b\tau\tau$ Final States in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

We present a search for Higgs bosons produced via the associated $p\bar{p} \rightarrow h + b\tau\tau$ process at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 5.4 fb $^{-1}$ of data collected with the D0 detector at the Fermilab Tevatron collider. In Supersymmetric models Higgs boson production cross section can be significantly enhanced compared to the Standard Model; additionally the Higgs boson has a significant branching ratio to tau leptons at all masses. This hybrid 'b-tau' channel complements the di-tau search channel, in particular providing sensitivity around the Z mass.

574

Combined upper limits on MSSM Higgs-boson production with up to 5.4 fb $^{-1}$ of data at D0

We present the combination of the searches for neutral Supersymmetric Higgs bosons at a center-of-mass energy of $\sqrt{s}=1.96$ TeV, using up to 5.4 fb $^{-1}$ of data collected with the D0 detector at the Fermilab Tevatron collider. The searches considered cover the main production and decay mechanisms for Higgs bosons in these models: $gg, bb \rightarrow h \rightarrow \tau^+\tau^-$, $hb(b) \rightarrow b\bar{b}$ and $hb(b) \rightarrow \tau^+\tau^-$. The resulting combination is interpreted in the context of different scenarios within the Minimal Supersymmetric Standard Model.

575

Search for the lightest neutral CP-even Higgs boson in the Next-to-Minimal Supersymmetric Standard Model in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

We present a search for production of the lightest neutral CP-even Higgs boson (h) in the next-to-minimal supersymmetric standard model, where the h decays to a pair of lighter (<10 GeV) neutral pseudoscalar Higgs bosons (a) at a center-of-mass energy of $\sqrt{s}=1.96$ TeV using up to 4 fb $^{-1}$ of data collected with the D0 detector at the Fermilab Tevatron collider. The a bosons are required to either both decay to $\mu\mu$ or one to $\mu\mu$ and the other to $\tau\tau$. This new search at the Tevatron is performed by looking for events with two pairs of collinear muons or a pair of collinear muons and missing transverse energy due to the τ -decays.

576

Combined Upper Limits on Standard Model Higgs Boson Production at the Tevatron in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present the combination of the searches for the Standard Model Higgs boson at a center-of-mass energy of $\sqrt{s}=1.96$ TeV, using up to 7 fb^{-1} of data collected with the CDF and D0 detectors at the Fermilab Tevatron collider. The major contributing processes include associated production ($WH \rightarrow \nu\bar{\nu} b\bar{b}$, $ZH \rightarrow \nu\bar{\nu} b\bar{b}$, $ZH \rightarrow \ell\bar{\ell} b\bar{b}$, and $WH \rightarrow WW^{(*)}$) and gluon fusion ($gg \rightarrow H \rightarrow WW^{(*)}$). The significant improvements across the full mass range resulting from the larger data sets, improved analyses and inclusion of additional channels are discussed. The combination of all channels results in significantly improved sensitivity across the 100-300 GeV mass range, and in particular around 160 GeV.

577

Combined CDF and D0 upper limits on MSSM Higgs boson production in tau-tau final states in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present combined results on the search for a neutral Higgs boson in the di-tau final state with data collected at the CDF and D0 experiments. Data were collected in ppbar collisions at a centre of mass energy of 1.96 TeV during Run II of the Tevatron. Limits are set on the cross section times branching ratio ranging for Higgs masses from 90 GeV to 200 GeV respectively. The results are then interpreted as limits in four different benchmark scenarios within the framework of the MSSM.

578

Search for the decays $B^+ \rightarrow a_1^+ K^{*0}$ and $B^+ \rightarrow \rho^0 K^{*+}$

We report on the search for B-meson decays to the axial-vector vector final state $a_1^+ K^{*0}$ using 465 million $B^+ \bar{B}^0$ pairs collected at the Upsilon(4S) resonance with the BaBar detector at the PEP-II B factory at SLAC. We also report results on the search for the vector vector final state $B^+ \rightarrow \rho^0 K^{*+}$. For the modes where a significant signal is found, we also study the longitudinal polarization fraction f_L .

579

B-meson decays to η' ρ , η' f_0 and η' K^*

We measurements of B-meson decays to the charmless final states $\eta' \rho$, $\eta' f_0$ and $\eta' K^*$ where K^* stands for a vector, scalar, or tensor strange meson. We also measure, where applicable, the charge asymmetries, finding results consistent with no direct CP violation in all cases. The measurements are performed on a data sample consisting of 467×10^6 $B^+ \bar{B}^0$ pairs collected at the Upsilon(4S) resonance with the BaBar detector at the PEP-II B factory at the SLAC National Accelerator Laboratory. Our results favor the theoretical predictions from perturbative QCD and QCD Factorization and we observe an enhancement of the tensor $K_2^*(1430)$ with respect to the vector $K^*(892)$ component.

582

Search for $B^+ \rightarrow K^+ \tau^+ \tau^-$

In the Standard Model, Flavour Changing Neutral Current transitions are forbidden at tree level, however, these processes do occur at one-loop. The study of high order processes, such as $B^+ \rightarrow K^+ \tau^+ \tau^-$, offers sensitivity to not only modifications in their rates but also to the actual form of the new interactions through various kinematical distributions. We report on a search for $B^+ \rightarrow K^+ \tau^+ \tau^-$ using the full BaBar Upsilon(4s) data sample detector at SLAC, corresponding to an integrated luminosity of 423/fb. In this analysis one of the B-mesons is fully reconstructed in a hadronic decay in order to reduce the background and constrain the kinematics of the signal decay.

594

Measurements of the Top Quark Mass in the Lepton+Jets Channel with the D0 detector

We present measurements of the top quark mass based on data collected by the D0 experiment during Run II of the Fermilab Tevatron collider using lepton+jets final states. In the lepton+jets channel, the "Matrix Element Method" is used where for each event a probability based on the differential cross section for production is calculated as a function of the top mass and the overall jet energy scale. The overall jet energy scale is constrained by the two jets from the hadronic W boson decay.

599

Measurement of the top quark mass in final states with two leptons using the D0 Detector

We present measurements of the top quark mass based on data collected by the D0 experiment during Run II of the Fermilab Tevatron collider. We present results in dilepton final states. In the dilepton channel, three different techniques were used: the "Matrix Weighting Method" which uses a likelihood for the observed events to occur for a range of assumed top, the "Neutrino Weighting Method" where distributions are generated from event weights obtained from comparing the calculated and reconstructed missing transverse energy and the "Matrix Element Method" where for each event, a probability based on the differential cross section for production is calculated as a function of the assumed top mass.

600

Difference Between Top and Antitop Quarks with the D0 Detector

We present a measurement of the difference between the masses of the top and antitop quarks in the lepton+jets final state. The analysis is based on the "matrix element" method. The purity of the data sample is enhanced by applying a neural-net-based b-tagging technique. CPT invariance imposes that the mass of a quark and its antiquark should be equal. The top quark is the only quark where one can measure this mass difference and look for a deviation from CPT invariance.

601

Measurement of the Top Production Cross Section with the D0 Detector

We present measurements of the top quark pair production cross section in ppbar collisions in the all jets, l+jets, and ll final states (where l is an electron, muon, or tau) at a center of mass energy of $\sqrt{s}=1.96$ TeV in up to 5 fb^{-1} of data collected with the D0 detector.

602

Measurement of differential distributions of top quarks with the D0 detector

The study of kinematics of top quark pairs produced at Fermilab Tevatron Collider can test Standard Model production and decay of the system or look for new physics. Differential distributions can validate current generators and their level of description of the top quark pairs and provide a detailed window on QCD dynamics of a unique heavy diquark system at large scales. We present measurements of differential

distributions of top quarks produced in pairs in ppbar collisions recorded by the DZero experiment. Events containing a high- p_T lepton, large missing transverse energy, and four or more jets were chosen from the 0.9 fb^{-1} Run II data sample. At least one of the jets was required to be identified as a b jet. A constrained kinematic fit associated these decay products with the individual top quarks. The measured spectra, binned in several observables, are compared to those obtained from the Monte Carlo simulation. We focus on the transverse momentum of the top quark and the top pair system as well as the system invariant mass and the azimuthal decorrelation between top quarks.

603

Single Top Quark Production with the D0 Detector

Using events containing an isolated electron or muon and missing transverse energy, together with jets originating from the fragmentation of b quarks, we measure the cross section of single top quark production. We use several multivariate techniques to extract the signal and combine them. Separate measurements of the t-channel and s-channel are also performed.

604

Single Top Quark production in tau+jets channel at D0

We present the first direct search for single top quark production using reconstructed tau leptons in the final state. The search is based on 4.8 fb^{-1} of integrated luminosity collected in ppbar collisions at 1.96 TeV with the D0 detector at the Fermilab Tevatron Collider. We select events with a final state including an isolated tau lepton, missing transverse energy, two or three jets, one or two of them being identified as b quark jet. We use a multivariate technique to discriminate signal from background. The number of events observed in data in this final state is consistent with the signal plus background expectation. We set in the tau+jets channel an upper limit on the single top quark cross section of 7.3 pb at the 95% C.L. This measurement allows a gain of 4% in expected sensitivity for the observation of single top production when combining it with electron+jets and muon+jets channels already published by the D0 collaboration with 2.3 fb^{-1} of data.

605

Search for Flavor Changing Neutral Currents in Single Top final states with D0

We present a search for flavor-changing neutral currents in the single top final state using 2.3 fb^{-1} of lepton plus jets data collected with the D0 experiment. We apply the same event selection as for the single top observation analysis and improve the signal sensitivity using Bayesian Neural Networks. We find consistency between the background expectation and the observed data and set limits on the flavor-changing neutral current couplings of the top quark to the up quark (K_u) and the charm quark (K_c).

606

Measurement of the Wtb Coupling and the W Boson Helicity in Top Quark Decays with the D0 Detector

We present the simultaneous measurement of the ratio of branching fractions, $R=B(t \rightarrow Wb)/B(t \rightarrow Wq)$, with q being a d, s, or b quark, and the top quark pair production cross section $\sigma(t\bar{t})$ in the lepton plus jets channel using data at $\sqrt{s}=1.96 \text{ TeV}$ collected with the D0 detector. We extract R and $\sigma(t\bar{t})$ by analyzing samples of events with 0, 1 and > 2 identified b jets. We also report on a model-independent measurement of the helicity of W bosons produced in top quark decays based on a 4 fb^{-1} sample of $t\bar{t}$ events in the dilepton and lepton+jets channels. W boson helicity fractions are sensitive to the ratios of different anomalous Wtb couplings as well as single top production. We set simultaneous limits on left-handed vector and right-handed vector, and left-handed vector and right-handed tensor Wtb couplings measured using the single top selection. We combined this analysis with the W boson helicity measurement to set direct upper limits on a right-handed vector coupling as well as a left-handed tensor coupling.

607

Search for $t\bar{t}$ Resonances in the Lepton+Jets Final State in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV

A search for a narrow-width heavy resonance decaying into top quark pairs ($X \rightarrow t\bar{t}$) in $p\bar{p}$ collisions at $\sqrt{s}=1.96$ TeV has been performed using data collected with the D0 detector at the Fermilab Tevatron collider. This analysis considers $t\bar{t}$ candidate events in the lepton+jets channel with identified b-jets and the $t\bar{t}$ invariant mass distribution to search for evidence of resonant production. The analyzed dataset corresponds to an integrated luminosity of 4 fb⁻¹. We find no evidence for a narrow resonance X decaying to $t\bar{t}$. Therefore we set upper limits on $\sigma \cdot B(X \rightarrow t\bar{t})$ for different hypothesized resonance masses using a Bayesian approach. Within a topcolor-assisted technicolor model, the existence of a leptophobic Z' boson with mass $M_{Z'} < 820$ GeV and width $\Gamma_{Z'} = 0.012 M_{Z'}$ can be excluded at 95% C.L.

608

Search for the Standard Model Higgs boson in the $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$ channel

We present a search for the Standard Model Higgs boson produced in association with top anti-top quark pairs. This analysis considers samples of lepton+jets events with one, two or three b-tagged jets and four, five or more jets in total collected with the D0 detector, corresponding to an integrated luminosity of 4 fb⁻¹. Kinematical differences between $t\bar{t}$ and $t\bar{t}H$ events are exploited and limits are set on the $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$ production cross section. An enhanced production cross section can theoretically be achieved if a t' quark is produced via a heavy G' boson (vector color octet) instead via a Standard Model gluon. An example for such a model is analysed here leading to exclusion limits on the Higgs mass.

609

Search for fourth generation t' quarks that decay to Wb

We present a search for pair-production of a fourth generation t' quark with its antiparticle, followed by their decay to Wb, based on 5 fb⁻¹ of data. We set upper limits on the t' pair production cross section which can be translated into limits on the t' mass.

610

Measurement of the forward-backward charge asymmetry in top quark pair production

We present a new measurement of the integrated forward-backward charge asymmetry in top-antitop quark pair ($t\bar{t}$) production in proton-antiproton collisions in the lepton plus jets final state. Using a b-jet tagging algorithm and kinematic reconstruction assuming $t\bar{t}+X$ production and decay, collected by the D0 experiment at the Fermilab Tevatron Collider, is used to measure the asymmetry for different jet multiplicities. The result is also used to set upper limits on $t\bar{t}+X$ production via a Z' resonance.

611

Search for Charged Higgs Bosons in ppbar collisions at $\sqrt{s}=1.96$ TeV

We report on a search for charged Higgs bosons in the mass range $80 < m_{H^\pm} < 155$ GeV in decays of top quark pairs in ppbar collisions at $\sqrt{s}=1.96$ TeV. It has been performed using ~ 1 fb⁻¹ of data collected with the D0 detector at the Fermilab Tevatron collider. The search is based on the analysis of ttbar production rates in the final states with two isolated leptons (electrons or muons) and jets, one isolated lepton (electron or muon) and jets and isolated lepton (electron or muon) and tau decaying hadronically. We find no evidence for signal. The results are interpreted within a tauonic Higgs model where the charged Higgs is assumed to decay exclusively to taunu and in a leptophobic model where the charged Higgs is assumed to decay exclusively to csbar. We set upper limits on the branching fractions $B(t \rightarrow H^+ b \rightarrow \text{taubar neutrino } b)$ and $B(t \rightarrow H^+ b \rightarrow c \text{ sbar } b)$ for low charged-Higgs masses. We also use ratios of ttbar cross sections in different final states to set upper limits on those branching fractions.

Furthermore, we describe a search for quark fusion production $qq' \rightarrow H^+$ of the charged Higgs boson reconstructed in the tb final state for a mass range $180 < m_{H^+} < 300$ GeV. We find no evidence for heavy charged Higgs production and set limits on the production cross-section for a variety of theoretical models.

613

Determination of the width of the top quark

We extract the total width of the top quark from the partial decay width and the branching fraction $B(t \rightarrow Wb)$. The partial width is obtained from the measured t-channel cross section for single top quark

production in 2.3 fb⁻¹ of ppbar data from the D0 collaboration, and the branching fraction is extracted from a measurement of the ratio $R = B(t \rightarrow Wb)/B(t \rightarrow Wq)$ in ttbar events in lepton+jets channels

with 0, 1 and 2 b-tags in 1 fb⁻¹ of integrated luminosity. Assuming $B(t \rightarrow Wq) = 1$, where q includes any kinematically accessible quark, the result is: 2.1 ± 0.6 GeV which translates to a top quark lifetime of $(3 \pm 1) \cdot 10^{-25}$ s.

614

Spin correlations in ttbar events at D

Since the top quark decays before it hadronizes, the spin of the top quark is reflected by its decay products. A measurement of the correlation between the spin of the top and the spin of the anti-top quark produced in proton anti-proton scattering at a center of mass energy of 1.96 TeV is presented using a double differential angular distribution.

616

Search for W' bosons decaying to a top quark and a bottom quark

We search for the production of a heavy W' gauge boson that decays to third generation quarks in 2.3 fb⁻¹ of ppbar collisions at $\sqrt{s} = 1.96$ TeV, collected with the D0 detector at the Fermilab Tevatron collider. We analyze the final-state invariant mass distribution and set upper limits on the production cross section times branching fraction. We set lower mass limits for a left-handed W' boson with SM couplings and for right-handed W' bosons decaying to both leptons and quarks and decaying only to quarks. We also set limits on the coupling of the W' boson to fermions as a function of its mass.

617

Search for Anomalous Top Quark Couplings at D0

Anomalous Wtb couplings modify the angular correlations of the top quark decay products and change the single top quark production cross section. We present limits on anomalous top quark couplings by combining information from W boson helicity measurements in top quark decays and anomalous coupling searches in the single top quark final state. We set limits on right-handed vector couplings as well as left-handed and right-handed tensor couplings based on data collected by the D0 experiment.

618

Neutrino beam for the first super-beam experiment, T2K

T2K (Tokai to Kamioka) is an accelerator based long baseline neutrino oscillation experiment. The experiment aims to discover the electron neutrino appearance mode and precisely measure the muon neutrino disappearance mode. A high intensity muon neutrino beam is produced at J-PARC (Japan Proton Accelerator Research Complex) and measured with a 50 kt water Cherenkov detector, Super-Kamiokande, 295 km from J-PARC. A 2.5-degree off-axis beam is used to produce a narrow energy band beam and reduce background to achieve high sensitivity.

The proton beam is extracted from the accelerator and transported to a graphite target to produce pions. These pions are focused with three electro-magnetic horns and decay into muons and muon neutrinos. The neutrino beam direction and stability can be determined from proton beam parameters. To measure these parameters and protect the beam line components from high intensity beam, four kinds of proton beam monitors are used: intensity, position, profile and loss monitors. The muons which are generated with muon neutrinos also monitored to confirm the neutrino beam direction. The neutrino beam properties are measured with the neutrino detectors which are located at the 280m downstream from the target.

Operation of the neutrino facility started from April 2009. Following beam tuning and performance studies, the data taking for the search for the oscillation from muon neutrino to electron neutrino started from January 2010. An overview of the neutrino facility, results of performance studies, beam parameters measured with beam monitors and prospects for higher intensity operation will be given in this presentation.

624

Searches for Dielectron and Diphoton Resonances with the D0 Detector

The results of searches for dielectron and diphoton resonances with the D0 detector are reported. These searches use 5.4fb^{-1} of data from $p\bar{p}$ collisions at a center-of-mass energy of 1.96 TeV, collected by the D0 detector at the Fermilab Tevatron between October 2002 and Summer 2009. We search for resonances in the invariant mass spectrum of two electromagnetic (EM) objects from the decay of new Z' bosons or Randall-Sundrum gravitons to electron-positron and/or photon pairs.

625

Searches for WZ Resonances with the D0 Detector

5.4fb^{-1} of data from $p\bar{p}$ collisions at a center-of-mass energy of 1.96 TeV, collected by the D0 detector at the Fermilab Tevatron collider between October 2002 and Summer 2009, are used to search for resonances decaying to a WZ pair. Both fully leptonic and lepton(s) plus jets channels are used to set the most stringent limits to date on the existence of such resonances.

628

Searches for R-Parity Violating Supersymmetry with the D0 Detector

In supersymmetry R-parity is used to distinguish particles from their supersymmetric partners. We search for signals of possible non-conservation of R-parity in 5.4fb^{-1} of data collected with the D0 detector at the Fermilab Tevatron collider through resonant production of supersymmetric neutrinos which decay to a pair of leptons. Improved limits are set on R-parity violating couplings.

629

Searches for Gauge-Mediated Supersymmetry with the D0 Detector

We report the result of a search for new physics in events with two photons and large missing transverse energy collected with the D0 Detector at the Fermilab Tevatron Collider. Several models of physics beyond the Standard Model motivate a search in this final state, such as supersymmetry (SUSY) with gauge-mediated supersymmetry breaking and universal extra dimensions (UED) with gravity-mediated Kaluza-Klein excitation decays. In these models, two heavy neutral particles are produced, such as the lightest neutralino in the SUSY case or the first Kaluza-Klein excitation of the photon in the UED case. These particles decay to a photon and another neutral particle, such as the gravitino or graviton, and in this analysis the decay is assumed to be prompt. With 5.4 fb⁻¹ of data collected at the Fermilab Tevatron collider between 2002 and 2009, we present the result of the most sensitive search in the di-photon and large missing transverse energy final state to date.

631

Searches for Leptoquarks with the D0 Detector

Leptoquarks arise naturally in all models of unification of leptons and quarks, and might have masses close to the electroweak scale. In this case, to avoid flavor-changing neutral currents, leptoquarks cannot mix generations and separate searches are performed in separate final states for first, second and third generation leptoquarks. Result from searches using up to 5.4 fb⁻¹ of data collected at the Fermilab Tevatron collider are presented.

632

Searches for Signals from Hidden Valleys with the D0 Detector

In hidden valley scenarios, new particles with relatively light masses are hypothesized to exist in a "potential valley" separated from the standard model by a high potential barrier. At high energy colliders, this barrier could be crossed leading to the production of hidden valley particles which could decay to standard model particles after moderately short lifetimes. Results from multiple searches for hidden valley particles in ppbar collisions at a center-of-mass energy of 1.96 TeV, collected by the D0 detector at the Fermilab Tevatron collider are reported.

633

Searches for Charged Massive Long-Lived Particles with the D0 detector

In many new physics scenarios, some of the postulated new particles can have lifetimes that allow them to escape typical particle detectors before decaying. If these particles are charged, they would lead to tracks with characteristic dE/dx and v/c . We present the results of searches for such particles in 5.4 fb⁻¹ of data collected by the D0 detector at the Fermilab Tevatron collider.

635

Searches for Technicolor with the D0 Detector

Technicolor models postulate the existence of new (techni-)fermions bound into (techni-)hadrons by a new confining interaction with characteristic energy scale close to the electroweak scale. At the Tevatron collider, technirho and techniomega vector mesons could be produced with their subsequent decays likely to contain weak bosons. Searches for evidence for technicolor particle production using 5.4 fb⁻¹ of data collected at the Fermilab Tevatron collider are described, and new constraints on their existence are given.

638

Measurement of D^0 - D^0 bar mixing parameters using $D^0 \rightarrow K^0_S \pi^+ \pi^-$ and $D^0 \rightarrow K^0_S K^- K^+$ decays

We report a direct measurement of D^0 - D^0 bar mixing parameters through a time-dependent amplitude analysis of the Dalitz plots of $D^0 \rightarrow K^0_S \pi^+ \pi^-$ and, for the first time, $D^0 \rightarrow K^0_S K^- K^+$ decays. The low-momentum pion π^0 in the decay $D^0 \rightarrow K^0_S \pi^+ \pi^-$ identifies the flavor of the neutral D^0 meson at its production. Using 468.5 /fb of e^+e^- colliding-beam data recorded near $\sqrt{s} = 10.6$ GeV by the Babar detector at the PEP-II asymmetric-energy collider at SLAC, we measure the mixing parameters x and y . These results provide the best measurement to date of x , of importance in determining the source of mixing.

639

Measurement of the Absolute Branching Fractions of Leptonic D_s^+ Decays and a Determination of $f_+(D_s^+)$

We present a measurement of the absolute branching fraction $\mathcal{B}(D_s \rightarrow \mu \nu)$ and $\mathcal{B}(D_s \rightarrow \tau \nu)$ and of the D_s decay constant, $f_+(D_s)$, using 521 /fb of data collected by the BABAR detector at the PEP-II storage rings at SLAC. We also obtained an upper limit on $\mathcal{B}(D_s \rightarrow e \nu)$. D_s events are detected by reconstructing the recoiling system, $D K X \gamma$, in events of the type $e^+e^- \rightarrow D K X D_s^*$, where $D_s^* \rightarrow D_s \gamma$ and X represents additional pions from fragmentation. For $D_s \rightarrow \mu \nu$ and $D_s \rightarrow \tau \nu$, we reconstruct the neutrino candidate mass as the mass recoiling against a $D K X \gamma \mu/e$ system. This full-event-reconstruction method provides high resolution in the neutrino mass and thus good background separation. For $D_s \rightarrow \tau \nu$ we tag the signal events by requiring an additional e or μ from the τ decay and we extract the signal yield using the extra neutral energy in the event.

640

Search for CP Violation in the decay $D^+ \rightarrow K^0_S \pi^+$

We report a search for CP violation in the decay $D^+ \rightarrow K^0_S \pi^+$. In the Standard Model, direct CP violation in charm meson decays is predicted to occur at the level of 10^{-3} or below. In the decay $D^+ \rightarrow K^0_S \pi^+$, a direct CP asymmetry, at the level of 0.33%, is expected from K^0/\bar{K}^0 mixing in the final state. However, new physics affecting the doubly Cabibbo-suppressed Feynman diagrams in this decay might either cancel this asymmetry or enhance it up to the percent level. This measurement uses 478 /fb of data collected with the BaBar detector at the PEP-II asymmetric e^+e^- collider at SLAC.

641

Dalitz plot analysis of $D_s^+ \rightarrow K^+ K^- \pi^+$

We perform a Dalitz plot analysis of $\sim 10^5$ $D_s^+ \rightarrow K^+ K^- \pi^+$ decays. Events are selected from continuum e^+e^- annihilations using 384/fb of data collected with the BaBar detector at PEP-II. A model-independent partial wave analysis is performed in the low K^+K^- mass region which allows to extract the S and P-wave amplitudes and their relative phase. We also measure relative branching fractions of $D_s^+ \rightarrow K^+ K^- K^+$ and $D_s^+ \rightarrow K^+ K^+ \pi^-$.

642

Study of the Exclusive Initial-State-Radiation Production of the $D_s^+D_s^-$, $D_s^*+D_s^-$, and $D_s^*+D_s^*-$ Systems

A search for charmonium and other new states is performed in a study of exclusive initial-state-radiation production of $D_s^+D_s^-$, $D_s^*+D_s^-$, and $D_s^*+D_s^*-$ events from electron-positron annihilations at a center-of-mass energy of 10.58 GeV. The data sample corresponds to an integrated luminosity of 525 /fb recorded by the BaBar experiment at the PEP-II storage ring. The $D_s^+D_s^-$, $D_s^*+D_s^-$, and $D_s^*+D_s^*-$ mass spectra show evidence of several ψ resonances. Limits on the production of $Y(4260)$ are computed.

643

Search for CP violation using T-odd correlations in $D^+ \rightarrow K^0_s K^+ \pi^+ \pi^-$ and $D^+_s \rightarrow K^0_s K^+ \pi^+ \pi^-$ decays

We search for CP violation in Cabibbo suppressed $D^+ \rightarrow K^0_s K^+ \pi^+ \pi^-$ decays and allowed $D^+_s \rightarrow K^0_s K^+ \pi^+ \pi^-$ decays. Events are selected from continuum e^+e^- annihilations using 525 fb^{-1} of data recorded by the BaBar detector at the PEP-II asymmetric-energy storage rings running at center-of-mass energies near 10.6 GeV. CP violation is searched for in the difference between the T-odd asymmetries, obtained using triple product correlations, measured for $D^+(s)$ and $D^-(s)$ decays.

644

High precision measurement of the $D_{s1}(2536)^+$ meson mass and width

For a comprehensive understanding of the D_{s1} meson spectrum, the precise measurement of all experimentally confirmed states is mandatory. In this analysis, the decay width and the mass of the $D_{s1}(2536)$ meson have been measured with high precision via the decay channel $D_{s1}(2536) \rightarrow D^{*+} K^0_S$ using 384 fb^{-1} of data recorded by the BABAR experiment at the electron-positron storage ring PEP-II. The mass difference between $D_{s1}(2536)$ and D^{*+} has also been measured and, based on a decay angle analysis, unnatural spin-parity assignment for the $D_{s1}(2536)$ meson is confirmed.

645

Study of the inclusive production of the $D \pi$ and $D^* \pi$ final states

We present a study of the mass spectra of the $D^{*+} \pi^-$, $D^{*0} \pi^+$, and $D^0 \pi^+$ final states in search for unobserved excited states of the D mesons. We use a dataset corresponding to $\sim 454 \text{fb}^{-1}$ of e^+e^- collisions collected by the BABAR detector at center-of-mass energies near 10.58 GeV. The final states are reconstructed inclusively in reactions of the kind $e^+e^- \rightarrow c\bar{c} \rightarrow D^{(*)} \pi X$ where X is any additional system. The $c\bar{c}$ events are selected through a cut on the center-of-mass momentum of the $D^{(*)} \pi$ system.

646

Precision Measurements of the Angular Momentum Excited Charmed Baryon $\Lambda_c(2880)^+$ decaying to the $\Lambda_c^+ \pi^+ \pi^-$ state

We report results on the measurements of the charmed baryon $\Lambda_c(2880)^+$ decaying to the $\Lambda_c^+ \pi^+ \pi^-$ state using approximately 354 fb^{-1} of BaBar data. We reconstruct the Λ_c^+ candidates in the decay mode $p K \pi$ with a goal of measuring the mass, intrinsic width, cross section and momentum spectra of the resonances decaying into $\Lambda_c^+ \pi^+ \pi^-$ final states. We also report the first measurements on the relative branching fractions of the $\Lambda_c(2880)^+$ decaying to the states $\Sigma_c^+(2455) \pi^+$, $\Sigma_c^{*+}(2455) \pi^+$, $\Sigma_c^{*+}(2520) \pi^+$, $\Sigma_c^+(2520) \pi^+$ and the non resonant $\Lambda_c^+ \pi^+ \pi^-$ mode.

650

Initial State Radiation Physics Studies at BABAR

We present recent results obtained at BABAR from low energy e^+e^- annihilations, produced via initial state radiation. Low energy hadronic cross sections provide essential experimental input for calculating hadronic corrections to the muon anomalous magnetic moment, while studies of final states and intermediate structures with unprecedented accuracy can reveal new bound states and help elucidate their properties. We present new measurements of $e^+e^- \rightarrow K^+K^-\pi^+\pi^-$, $K^+K^-\pi^0\pi^0$, $2(K^+K^-)$ based on the full data set including investigations of signals from $\phi(1020)2\pi$ and $\phi(1020)f_0(980)$ intermediate states. The evaluation of $Y(2175) \rightarrow \phi f_0(980)$ parameters are presented along with measurements of the J/ψ and $\psi(2S)$ BFs to these final states. The BaBar measurement of $\pi^+\pi^-$ and other channels important for calculating the hadronic contribution to the muon magnetic moment anomaly will be discussed.

651

Searches for High-Mass Diphoton States at CDF

A potential signature for new, heavy particles is a narrow mass resonance decaying to two energetic photons. Such a signature could arise from extra spatial dimensions, as in the Randall-Sundrum (RS) model. We present the results of the search for this signature in 5.4fb⁻¹ p-pbar collision data collected by the CDF II detector. We find the diphoton mass spectrum to be in agreement with the standard model expectation. We set lower limits on the RS graviton mass for various coupling parameters.

652

Searches for Scalar Leptoquarks at CDF

We report on searches for scalar Leptoquarks performed using data from p-pbar collisions collected at the Fermilab Tevatron. Among the wide possibilities of exotic particles, leptoquarks are of special interest as they could be the mediator of a new kind of lepton-quark force, justified by the clear symmetry existing between leptons and quarks. Leptoquarks would have both lepton and quark properties and at the Tevatron they would be pair produced, each decaying into a lepton and a quark of the same generation. These searches focus on pair-produced leptoquarks in the signature consisting of two high pT charged leptons and two jets, using a data sample up to 6/fb of integrated luminosity.

654

Search for Heavy 4th-Generation Down-Type Quarks in the Same-Charge Dilepton Signature at CDF

Using data collected at the CDF detector in Run II at the Tevatron we present a search for pair production of heavy down-type quarks, each of which decay to a top quark and a W boson yielding a b+bbar+W+W+W+W final state. The mode in which two same-charge leptons are produced is very sensitive because while the signal branching ratio is reasonable, same-charge dilepton events are rare in the standard model. The backgrounds are further reduced by imposing missing transverse energy and b-tag requirements. The results are also interpreted in the context of exotic top quark partner models.

655

Gauge Mediated Supersymmetry Breaking Models with Photons at CDF

Models of supersymmetry predict new heavy, neutral particles known as neutralinos that can decay to a photon and the lightest supersymmetric particle, which is the gravitino in GMSB scenarios. We present a search for these particles in proton-antiproton collisions at $\sqrt{s}=1.96$ TeV at the Collider Detector at Fermilab. In data samples corresponding to integrated luminosities of up to 2.6/fb we find no evidence for this process and set the world's best limits on models of Gauge Mediated Supersymmetry Breaking.

656

Signature-Based Searches for New Physics Involving Photons at CDF

We present a variety of model-independent studies of final states involving photons in combination with other objects. These include charged leptons (including taus), jets (including b-tagged jets), additional photons, and missing energy. Several kinematic distributions are examined in each final state considered to search for discrepancies from the standard model. One of the final states examined, involving a photon, a charged lepton, a b-tagged jet, and missing energy, is employed to study standard model production of t-tbar-gamma in addition to potential new physics. The results use data collected at the Tevatron corresponding to up to 2/fb of integrated luminosity.

657

Searches in Same-Charge Dilepton Events at CDF

We study same-charge dilepton events in the CDF Run II data sample using up to 5/fb of integrated luminosity collected at the Fermilab Tevatron. These events are rare in the standard model and could indicate new physics processes such as chargino-neutralino production in supersymmetric models. We adopt a model-independent approach and compare the yields and kinematics of events containing an electron or muon and another charged lepton (including taus) to the standard model.

658

Searches for High-Mass Resonances Decaying to Dilepton Pairs at CDF

Using up to 5/fb of data collected at the CDF detector in Run II at the Tevatron we report on searches for high-mass resonances decaying into a pair of leptons. The leptons can be of the same flavor as in Z' searches, or of different flavors which is a possible signature in R-parity-violating supersymmetric scenarios. The mass spectra of the dilepton pairs are examined for any excesses over the standard model predictions and the results interpreted in several new physics models.

660

Searches for Supersymmetry Using the Trilepton Signature at CDF

The production of chargino-neutralino pairs and their subsequent leptonic decays is one of the most promising supersymmetry (SUSY) signatures at the Tevatron proton-antiproton collider. We present here the most recent results on searches for the three-lepton and missing-transverse-energy SUSY signature using data collected with the CDF II detector. The results are interpreted within the minimal supergravity (mSUGRA) scenario.

663

Muon Collider Physics and Detectors

Physics results obtained from CERN's Large Hadron Collider are expected to determine the desired energy for the next lepton collider and refine our knowledge of the required luminosity. Whatever discoveries are made at the LHC, a multi-TeV lepton collider will eventually be needed in order to fully study that new physics. A muon collider presents a possible means to realize a multi-TeV lepton collider. This talk will give an overview of the facility and its physics capabilities. The machine-detector interface, background issues and detector performance requirements will be addressed.

664

Measurement of the Inclusive Jet Cross Section in ppbar Collisions at $\sqrt{s} = 1.96$ TeV

We give a detailed description of the measurement of the inclusive jet cross section in ppbar collisions at a center-of-mass energy $\sqrt{s} = 1.96$ TeV using data collected by the D0 experiment at the Fermilab Tevatron Collider corresponding to an integrated luminosity of 0.7 fb⁻¹. We describe the extraction of the jet energy scale correction directly from data. The method to extract the jet cross section is discussed in detail and a description is given of the main uncertainties which are predominantly related to jet energy scale. The results cover jet transverse momenta from 50 GeV to 600 GeV, jet rapidities in the range -2.4 to 2.4 and are compared to recent parton distribution functions in the proton. Detailed studies of correlations between systematic uncertainties in transverse momentum and rapidity are presented.

665

Measurement of $\gamma + b + X$ and $\gamma + c + X$ Production Cross Sections in ppbar Collisions at $\sqrt{s} = 1.96$ TeV

First measurements of the differential cross sections for the inclusive production of a photon in association with a heavy quark (b, c) jet are presented, covering photon transverse momenta 30-150 GeV, photon rapidities $|\gamma^{\text{rap}}| < 1.0$, jet rapidities $|\gamma^{\text{rap}}| < 0.8$ and jet transverse momenta $p_T^{\text{jet}} > 15$ GeV. The results are based on an integrated luminosity of 1fb⁻¹ in ppbar collisions at $\sqrt{s}=1.96$ TeV recorded with the D0 detector at the Fermilab Tevatron Collider. The results are compared with next-to-leading order perturbative QCD predictions.

666

Measurement of Differential $Z/\gamma^* + \text{jet} + X$ Cross Sections in pp Collisions at $\sqrt{s} = 1.96$ TeV

We present measurements of differential cross sections for $Z/\gamma^*(\rightarrow\mu\mu)+\text{jet}+X$ production in a 1 fb⁻¹ data sample collected with the D0 detector in proton anti-proton collisions at $\sqrt{s}=1.96$ TeV. Results include the first measurements differential in the Z/γ^* transverse momentum and rapidity, as well as new measurements differential in the leading jet transverse momentum and rapidity. Next-to-leading order perturbative QCD predictions are compared to the measurements, and reasonable agreement is observed, except in the region of low Z/γ^* transverse momentum. Predictions from two event generators based on matrix elements and parton showers, and one pure parton shower event generator are also compared to the measurements. These show significant overall normalization differences to the data and have varied success in describing the shape of the distributions.

667

Measurements of Differential Cross Sections of $Z/\gamma^*+\text{jets}+X$ Events in ppbar Collisions at $\sqrt{s} = 1.96$ TeV

We present cross section measurements for $Z/\gamma^*+\text{jets}+X$ production, differential in the transverse momenta of the three leading jets. The data sample was collected with the D0 detector at the Fermilab Tevatron proton anti-proton collider at a center-of-mass energy of 1.96 TeV and corresponds to an integrated luminosity of 1 fb⁻¹. Leading and next-to-leading order perturbative QCD predictions are compared with the measurements, and agreement is found within the theoretical and experimental uncertainties. We also make comparisons with the predictions of four event generators. Two parton-shower-based generators show significant shape and normalization differences with respect to the data. In contrast, two generators combining tree-level matrix elements with a parton shower give a reasonable description of the the shapes observed in data, but the predicted normalizations show significant differences with respect to the data, reflecting large scale uncertainties. For specific choices of scales, the normalizations for either generator can be made to agree with the measurements.

669

Determination of the strong coupling constant from the inclusive jet cross section in ppbar collisions at $\sqrt{s}=1.96$ TeV

We determine the strong coupling constant α_s and its energy dependence from the p_T dependence of the inclusive jet cross section in ppbar collisions at $\sqrt{s}=1.96$ TeV. The strong coupling constant is determined over the transverse momentum range $50 < p_T < 145$ GeV. Using perturbative QCD calculations to order $O(\alpha_s^3)$ combined with $O(\alpha_s^4)$ contributions from threshold corrections, we obtain $\alpha_s(M_Z) = 0.1161 \pm 0.0041 \mp 0.0048$. This is the most precise result obtained at a hadron-hadron collider.

670

Measurement of dijet angular distributions at $\sqrt{s}=1.96$ TeV and searches for quark compositeness and extra spatial dimensions

We present the first measurement of dijet angular distributions in ppbar collisions at $\sqrt{s}=1.96$ TeV at the Fermilab Tevatron Collider. The measurement is based on a dataset corresponding to an integrated luminosity of up to 0.7fb⁻¹ collected with the D0 detector. Dijet angular distributions have been measured over a range of dijet masses, from 0.25TeV to above 1.1TeV. The data are in good agreement with the predictions of perturbative QCD and are used to constrain new physics models including quark compositeness, large extra dimensions, and TeV-1 scale extra dimensions. For all models we set the most stringent direct limits to date.

671

Double parton interactions in photon+3 jet events in ppbar collisions at $\sqrt{s}=1.96$ TeV.

We have used a sample of photon+3-jet events collected by the D0 experiment with an integrated luminosity of about 1 fb^{-1} to determine the fraction of events with double parton scattering f_{DP} in a single ppbar collision at $\sqrt{s}=1.96$ TeV. The DP fraction and effective cross section σ_{eff} , a process-independent scale parameter related to the parton density inside the nucleon, are measured in three intervals of the second (ordered in pT) jet transverse momentum $p_{\text{T_jet2}}$ within the range $15 < p_{\text{T_jet2}} < 30$ GeV. In this range, f_{DP} varies between $0.23 < f_{\text{DP}} < 0.47$, while σ_{eff} has the average value $\sigma_{\text{eff}}^{\text{ave}} = 16.4 \pm 0.3(\text{stat}) \pm 2.3(\text{syst})$ mb.

672

Measurement of Direct Photon Pair Production Cross Sections in ppbar Collisions at $\sqrt{s}=1.96$ TeV

We present a measurement of direct photon pair production cross sections using 4.2 fb^{-1} of data collected with the D0 detector at the Fermilab Tevatron ppbar Collider. We measure single differential cross sections as a function of the diphoton mass, the transverse momentum of the diphoton system, the azimuthal angle between the two photons, and the polar scattering angle of the photons, as well as the double differential cross sections considering the last three kinematic variables in three diphoton mass bins. The results are compared with different perturbative QCD predictions.

673

Measurement of the dijet mass cross section in ppbar collisions at $\sqrt{s}=1.96$ TeV.

The inclusive dijet production double differential cross section as a function of dijet invariant mass and the largest absolute rapidity of the two leading jets is measured in ppbar collisions at $\sqrt{s}=1.96$ TeV using 0.7 fb^{-1} of data collected with the D0 detector at the Fermilab Tevatron Collider. The measurement is performed in six rapidity (y) regions up to $|y| = 2.4$ for the two jets with the largest transverse momentum in an event. Next-to-leading order perturbative QCD predictions are found to be in agreement with the data.

674

Measurement of multi-jet cross section ratios in ppbar collisions at $\sqrt{s}=1.96$ TeV

We present the first measurement of ratios of multijet cross sections in ppbar collisions at $\sqrt{s}=1.96$ TeV at the Fermilab Tevatron Collider. The measurement is based on a dataset corresponding to an integrated luminosity of up to 0.7 fb^{-1} collected with the D0 detector. The ratio of inclusive three-jet and two-jet cross sections is measured as a function of transverse jet momentum. The results are compared to next-to-leading order (NLO) perturbative QCD predictions as well as model predictions using different approximations of QCD.

675

Measurement of the pT and rapidity dependence of dijet azimuthal decorrelations in ppbar collisions at $\sqrt{s}=1.96$ TeV

We present a new measurement of dijet azimuthal decorrelations in ppbar collisions at $\sqrt{s}=1.96$ TeV at the Fermilab Tevatron Collider. The measurement is based on a dataset corresponding to an integrated luminosity of up to 0.7 fb^{-1} collected with the D0 detector. Dijet azimuthal decorrelations are measured as a function of transverse jet momentum and rapidity. The results are compared to model predictions using different approximations of QCD.

676

Inclusive Three-Jet Cross Section at D0

We analyze multijet production in a dataset corresponding to an integrated luminosity of 0.7 fb⁻¹ collected with the D0 detector at the Fermilab Tevatron Collider. Thus far, all jet-only tests of QCD at a collision energy of 1.96 TeV use either inclusive jet or dijet final states. We extend this effort by investigating the inclusive three-jet final state. Fully describing the three-jet final state requires eight variables. In this analysis, we present the measurement of the inclusive three-jet cross section as a function of three-jet invariant mass in bins of softest jet transverse momenta and in bins of jet rapidities.

677

Measurement of production cross section ratio $\sigma(\text{Z}+\text{b jet})/\sigma(\text{Z}+\text{jet})$ at D0

The inclusive Z+b jet production is an important background to searches for the Higgs boson in associated ZH production at the Fermilab Tevatron collider. We present measurements of the ratio of inclusive cross sections for ppbar \rightarrow Z+b-jet to ppbar \rightarrow Z+jet production. The measurement uses a data sample from ppbar collisions at $\sqrt{s}=1.96$ TeV corresponding to an integrated luminosity of 5.4 fb⁻¹ collected by the D0 detector at the Tevatron. Z bosons are selected in the electron and muon decay modes. The measurements are compared with the next-to-leading order theoretical predictions.

678

Measurement of the ZZ Cross Section and constraints on fourth generation fermion models at CDF at the Tevatron

We present a measurement of the ZZ production cross section at $\sqrt{s}=1.96$ TeV using approximately 6 fb⁻¹ of data accumulated with the CDF-II detector. We select event where one Z decays to two charged leptons and the other Z into two neutrinos and events where both Zs decay to charged leptons. The measured cross section provides a test of Standard Model predictions to Next-To-Leading Order (NLO). The ZZ sample is used also to search for $gg \rightarrow H \rightarrow ZZ$ to constrain fourth generation fermion models.

679

W+jets differential cross sections at D0

We present a measurement of $W \rightarrow \text{lnu}$ production in association with 1, 2, 3 or 4 jets, inclusively, in p-pbar collisions at $\sqrt{s}=1.96$ TeV. Differential cross sections are measured as a function of the softest (ordered in transverse momentum) jet pT and rapidity, and lepton pT and pseudorapidity. The measurements are unfolded to particle level to account for detector effects and compared to next-to-leading order (NLO) theoretical predictions, as well as a number of leading order (LO) matrix element plus parton shower programs as well as pure parton shower programs.

680

Observation of WW and WZ Production in the Charged Lepton Neutrino plus Jet final state at CDF

We present an observation of WW and WZ production in proton-antiproton collisions using the charged lepton + missing energy + jets signature using approximately 4 fb⁻¹ of data collected with the CDF II detector at the Fermilab Tevatron collider. A cross section of 18.1 ± 3.3 (stat.) ± 2.5 (syst.) pb is measured using the invariant mass of the two leading jets to identify the signal. The techniques developed in the analysis are valuable in their application to the search for the Standard Model Higgs boson in association with a W boson which shares a similar final state.

681

Angular correlations in minimum bias events at D0.

We present results of a study of minimum bias events using data collected by the D0 experiment at the Fermilab Tevatron Collider corresponding to an integrated luminosity of 1 fb^{-1} during RunIIa. Using angular correlations between charged tracks in the event, we can construct very robust variables such as the difference in azimuthal angle $\Delta\phi$ between the highest p_T track in the event and all other hard tracks. We compare the distribution of these variables to those predicted by various multiple parton interaction models and tunes.

682

Limits on Anomalous $Z\gamma$ Gauge Couplings from CDF

Tri-linear gauge couplings are fundamental predictions of the Standard Model, and studying these couplings is a sensitive test for beyond-Standard-Model interactions. We compare Standard-Model predictions and models containing neutral anomalous couplings to CDF measurements from 5 fb^{-1} of proton-antiproton collisions at $\sqrt{s}=1.96 \text{ TeV}$ produced by the Fermilab Tevatron. The data agree with the Standard Model predictions and are used to set limits on anomalous $Z\gamma$ couplings.

683

Evidence for high mass exclusive dijet production in the D0 experiment

We present evidence for exclusive dijet production in $p\bar{p}$ collisions, in a little explored region of high invariant dijet masses ($M_{jj} > 100 \text{ GeV}$). The data set used corresponds to 30 pb^{-1} collected with the D0 detector at $\sqrt{s}=1.96 \text{ TeV}$. The exclusive events are identified by a set of cuts based on calorimeter information, resulting in 26 events observed with 5.2 ± 4.3 expected background events.

684

Measurement of the proton anti-proton $\rightarrow WZ$ production cross section at $\sqrt{s}=1.96 \text{ TeV}$ using a final state of 3 charged leptons and a neutrino.

We present a measurement of the WZ production cross section in proton anti-proton collisions at $\sqrt{s}=1.96 \text{ TeV}$. The measurement explores decays of the W and Z bosons into a final state of 3 charged leptons and a neutrino, where a charged lepton is an electron or a muon. It is performed using $\sim 5.5 \text{ fb}^{-1}$ of data collected by the CDFII detector at the Fermilab Tevatron collider. With the total uncertainty of approximately 20%, the result significantly improves the accuracy of the existing measurements of the WZ production cross section.

685

Measurement of the elastic $p\bar{p}$ differential cross section in the range $0.25 < |t| < 1.2 \text{ GeV}$ at $\sqrt{s}=1.96 \text{ TeV}$.

The elastic proton-antiproton scattering process is studied as a function of the four-momentum transfer squared $|t|$ at a center-of-mass energy of 1.96 TeV . Scattered protons and antiprotons are selected by using forward roman pot detectors that were installed around the D0 interaction point of the Tevatron. The data presented correspond to a dedicated period of low luminosity running of the D0 experiment. Comparison to data from other experiments at lower energies is presented.

686

Measurement of $d\sigma/dy$ of Drell-Yan e^+e^- pairs in the Z Mass Region from proton anti-proton collisions at $\sqrt{s}=1.96$ TeV

We report on a CDF measurement of the total cross section and rapidity distribution of e^+e^- events in the Z boson mass region $66 < M_{ee} < 116$ GeV/c² from 2.1 fb⁻¹ of proton anti-proton collisions at $\sqrt{s}=1.96$ TeV. The measured cross section of 257 ± 16 pb and $d\sigma/dy$ distribution are compared with Next-to-Leading-Order(NLO) and Next-to-Next-to-Leading-Order(NNLO) QCD theory predictions with CTEQ and MRST/MSTW parton distribution functions (PDFs). Good agreement is obtained between the experimental total cross section and $d\sigma/dy$ measurements with theoretical calculations using the most recent NNLO PDFs.

687

Angular correlations in photon+2jet and photon+3jet events

We present a new measurement of azimuthal correlations in photon+2jet and photon+3jet produced in $p\bar{p}$ collisions at $\sqrt{s}=1.96$ TeV at the Fermilab Tevatron Collider. The measurement is based on a dataset corresponding to an integrated luminosity of up to 1.1 fb⁻¹ collected with the D0 detector. The azimuthal distributions are measured as a function of the 2nd (ordered in p_T) jet transverse momentum. The results are compared with different event generators and multiple parton interaction models and NLO QCD.

688

Inclusive Jet Production in Z+jets final states at CDF

We present preliminary results on inclusive Z-boson plus jets production in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV, with the Z-boson decaying in the muon or electron channels, and based on ~ 5 fb⁻¹ of data collected by the CDF detector in Run II. Jet cross sections are measured as a function of jet transverse momentum, jet rapidity, and inclusive jet multiplicity, and the results are compared to next-to-leading order perturbative QCD predictions.

690

Study of Z boson production in association with b jets at CDF

We present preliminary results on bottom quark jet production in association with a Z boson in the final state in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV, based on 5 fb⁻¹ of data collected by the CDF experiment in Run II. The measurements are carried out in events for which the Z boson decays into muons, and the results are compared to theoretical predictions. The analysis is performed in the context of studies on irreducible backgrounds in searches for new physics

691

Measurement of W+charm production cross section at CDF

We present a measurement of the production cross section of a W boson and a single charm quark using soft electron and muon tagging. We trigger on high PT leptons and reconstruct 'lepton+jets' events. Approximately 4.3/fb of data is analyzed. We use soft electron and muon tagging to identify heavy flavor jets. The W+c signal is produced mainly by strange quark-gluon fusion. The signal is evinced through an excess of events in which the charge of the lepton from the W boson decay and the charge of the soft lepton are opposite in sign.

693

Prompt di-photon production at CDF

We report a measurement of the prompt di-photon production cross section using of 5.3 fb⁻¹ of CDF Run II data. The measured cross section spectra, differential in kinematic variables sensitive to the creation mechanism, are compared with the results from LO, NLO fixed-order, and NLO re-summed theoretical calculations. Significant disagreements between data and theory are observed locally, suggesting the need of further theoretical studies of the di-photon production process.

694

Minimum Bias and Underlying Event Studies at CDF

The CDF Collaboration is working on a systematic study of the Underlying Event, Minimum Bias events, and other non-perturbative observables. Such measurements have a two-fold goal of increasing our understanding of soft QCD - mainly through comparison with MC generators - and of reducing the uncertainties on backgrounds for many high-pt analyses. We review the latest measurements and discuss the associated problematics with the idea of establishing a solid baseline for the LHC experiments.

695

Diffraction Studies at CDF

We present recent results on diffraction obtained by the CDF collaboration in $p\bar{p}$ collisions at the Fermilab Tevatron collider at $\sqrt{s}=1.96$ TeV. The single-diffractive dijet and W/Z production are discussed. The first experimental observation of exclusive dijets, exclusive χ_{c0} mesons, and search for exclusive diphotons are discussed. We also present results from a study of central rapidity gap production in soft and hard diffractive events.

696

First Study of Boosted Jet Substructure at CDF

We report preliminary results from a study of the properties of highly boosted and massive jets produced at the Tevatron and recorded by the CDF II Detector. The data consist of several thousand jets with transverse momenta greater than 400 GeV/c collected in a data sample of 5 fb⁻¹. The detailed properties of these jets have been measured, including the mass of the jet and several variables such as angularity and planar flow that have been proposed for studies of QCD in the perturbative region and its showering mechanism, as well as discriminants between massive jets produced via QCD radiation and those arising from the decay of massive particles. We also examine these jets for evidence of high transverse momentum top quark production.

697

Search for sterile neutrino mixing in the MINOS long-baseline experiment

MINOS is a two detector long-baseline neutrino experiment. The near detector located at Fermilab near the neutrino production point is used to characterize the neutrino beam, while the far detector is used to measure the changes in the neutrino spectrum. Experiments, like MINOS, which report muon neutrino disappearance favor oscillations to other active neutrino flavors (namely the tau and electron neutrino). However, more exotic scenarios in which one or more sterile neutrinos mix with the active flavors remain viable alternatives. Since all active neutrino flavors interact via the neutral-current (NC) comparing the NC rate at the MINOS near and far detectors allows us to test these alternatives. In this talk I will present the latest MINOS results on two of these models (a) active neutrinos oscillating to sterile neutrinos, and (b) neutrino decay in conjunction with oscillations.

698

Recent results on two-photon physics at BABAR

Two-photon processes, studied at e^+e^- colliders via the reaction $e^+e^- \rightarrow e^+e^- \gamma \gamma^* \rightarrow e^+e^-$ Pseudoscalar, provide an approach to a number of important QCD tests. We discuss the recent BABAR measurements of $\gamma \gamma^* \rightarrow \pi^0$ transition and $\gamma \gamma^* \rightarrow \eta_c$ transition form factors. We also report on a new measurement of the $\gamma \gamma^* \rightarrow \eta$ and $\gamma \gamma^* \rightarrow \eta'$ transition form factors for the momentum transfer range $Q^2=4-40$ GeV².

699

Search for $f_J(2220)$ Production in Radiative J/psi Decays

We present a search for $f_J(2220)$ production in radiative $J/\psi \rightarrow \gamma f_J(2220)$ decays using 460 fb⁻¹ of data collected with the BaBar detector at the PEP-II storage rings. The $f_J(2220)$ is reconstructed in the decays $f_J(2220) \rightarrow K^+K^-$ and $f_J(2220) \rightarrow K^0_S K^0_S$. No evidence of this resonance is observed and 90% confidence level upper limits on the $J/\psi \rightarrow \gamma f_J(2220)$, $f_J(2220) \rightarrow K^+K^-$ and $J/\psi \rightarrow \gamma f_J(2220)$, $f_J(2220) \rightarrow K^0_S K^0_S$ branching fractions are set at the level of 10^{-5} .

700

Searches for Lepton Flavor Violation in the Decays $\tau \rightarrow e \gamma$ and $\tau \rightarrow \mu \gamma$

Searches for lepton-flavor-violating decay of a tau lepton to a lighter mass lepton and a photon have been performed with the entire dataset of $(963 \pm 7) \times 10^6$ tau decays collected by the BaBar detector near the Upsilon(4S), Upsilon(3S) and Upsilon(2S) resonances. The searches yield no evidence of signals and we set upper limits on the branching fractions of $BR(\tau \rightarrow e \gamma) < 3.3 \times 10^{-8}$ and $BR(\tau \rightarrow \mu \gamma) < 4.4 \times 10^{-8}$ at 90% confidence level.

701

Measurements of Charged Current Lepton Universality and $|V_{us}|$ Tau Lepton Decays to $e \nu_{\bar{\nu}}$, $\mu \nu_{\bar{\nu}}$, $\pi \nu$ and $K \nu$

Using 467 inverse fb of e^+e^- annihilation data collected with the BaBar detector, we measure the ratios of branching fractions: $B(\tau \rightarrow \mu \nu_{\bar{\nu}}) / B(\tau \rightarrow e \nu_{\bar{\nu}}) = (0.9796 \pm 0.0016 \pm 0.0036)$ $B(\tau \rightarrow \pi \nu) / B(\tau \rightarrow e \nu_{\bar{\nu}}) = (0.5945 \pm 0.0014 \pm 0.0061)$ $B(\tau \rightarrow K \nu) / B(\tau \rightarrow e \nu_{\bar{\nu}}) = (0.03882 \pm 0.00032 \pm 0.00057)$ where the uncertainties are statistical and systematic, respectively. From these precision measurements we test the Standard Model assumption of mu-e and tau-mu charged current lepton universality and provide a determination of $|V_{us}|$ experimentally independent of the decay of a kaon and which we compare with the value predicted from the unitarity of the Cabibbo-Kobayashi-Maskawa matrix.

703

Measurement of muon charge asymmetry

We present a measurement of the muon charge asymmetry from W boson decays using 4.9 fb⁻¹ of data collected at $\sqrt{s}=1.96$ GeV with the D0 detector at the Fermilab Tevatron Collider. Our results are compared with next-to-leading-order calculations performed using modern parton distribution functions. Our findings can be used to constrain future parton distribution function fits.

704

Measurement of Z/gamma* boson forward-backward charge asymmetry and extraction of weak mixing angle

We present a measurement of the Z/gamma* boson forward-backward charge asymmetry (AFB) distribution in electron channel using data collected by the D0 detector at the Fermilab Tevatron collider. The AFB distribution around the Z pole is sensitive to the effective weak mixing angle and the Z-light quark couplings, the AFB distribution above the Z pole is sensitive to the new physics beyond the SM. We use the measured AFB distribution to extract the effective weak mixing angle.

705

Search for Second Class Currents in Tau Decays and Measurements of the Mass Difference of the tau+ and tau-

Using several hundred million tau+tau- pairs produced in electron-positron annihilation data collected with the BaBar detector at the PEP-II asymmetric-energy B Factory near a center-of-mass energy of 10.58 GeV, we search for second class currents in $\tau^+ \rightarrow \pi^- \eta$ ν_{τ} , where the eta decays into $\pi^+\pi^-\pi^0$ and charge conjugate modes are implied.

We also present the result from a precision measurement of the mass of the tau lepton, M_{τ} , based on 423 fb⁻¹ of data recorded at the Y(4S) resonance with the BaBar detector. Using a pseudomass endpoint method, we determine the mass to be $M_{\tau} = 1776.68 \pm 0.12$ (stat) ± 0.41 (syst) MeV. We also measure the mass difference between the tau+ and tau- masses, and obtain $(M^+ - M^-) / M_{\text{average}} = (-3.4 \pm 1.3$ (stat) ± 0.3 (syst)) $\times 10^{-4}$, where M_{average} is the average value of M^+ and M^- .

706

Measurement of $WZ \rightarrow \nu \nu$ cross section and limits on the anomalous triple gauge couplings

We present the recent results of studying WZ production using 4.1 fb⁻¹ of integrated luminosity collected with the D0 detector at the Fermilab Tevatron collider. Using fully leptonic decays of the weak bosons we measure the WZ production cross section and set the limits on anomalous triple gauge couplings within different parametrization. These are the best limits to date obtained from the direct measurement of the WWZ couplings.

707

Measurement of $ZZ \rightarrow \ell \ell \ell \ell$ cross section and limits on the anomalous triple gauge couplings

We present a measurement of ZZ production in four lepton final state ($ZZ \rightarrow \ell \ell \ell \ell$, $\ell, \ell' = e, \mu$) using data collected with the D0 detector at the Fermilab Tevatron collider. We also derive limits on anomalous neutral trilinear ZZZ and $ZZ\gamma^*$ couplings within different parametrization.

708

Limits on tau Lepton-Flavor Violating Decays in three charged leptons

A search for the neutrinoless, lepton-flavor violating decay of the tau lepton into three charged leptons has been performed using an integrated luminosity of 468 fb⁻¹ collected with the BABAR detector at the PEP-II collider. In all six decay modes considered, the numbers of events found in data are compatible with the background expectations. Upper limits on the branching fractions are set in the range $(1.8-3.3) \times 10^{-8}$ at 90% confidence level.

709

W boson mass and width measurements at D0

We present a precise measurement of W boson mass measurement in electron decay channel using data collected by the D0 detector at the Fermilab Tevatron collider. A binned likelihood fit method is used to extract the mass information from the transverse mass, the electron transverse momentum and missing transverse energy distributions. We also present a precise direct measurement of W boson width using the events with large transverse mass. The W mass result can be used to put stringent indirect limits on the SM Higgs boson mass.

710

Measurements of multihadronic decays of the tau lepton

We present the preliminary result of branching fraction measurements of the τ -lepton decays $\tau^{\pm} \rightarrow K^{\pm} n \pi^0 \nu_{\tau}$ with $n = 0, 1, 2, 3$ and $\tau^{\pm} \rightarrow \pi^{\pm} n \pi^0 \nu_{\tau}$ with $n = 3, 4$, which is based on 435 million τ^{\pm} pairs produced in electron-positron annihilation data collected with the BaBar detector at the SLAC PEP-II e⁺e⁻ collider. We also report on the measurements of the branching fractions and hadronic mass distributions of $\tau^- \rightarrow K_S^0 \pi^- \nu_{\tau}$, $\tau^- \rightarrow K_S^0 \pi^- \pi^0 \nu_{\tau}$, $\tau^- \rightarrow K_S^0 \pi^- K^0_L \nu_{\tau}$. The measured strange branching fractions can be combined with other tau strange decay results and used to determine the Cabibbo-Kobayashi-Maskawa matrix element $|V_{us}|$.

711

Measurement of Z/γ^* boson transverse momentum distribution

We present measurements of the Z/γ^* boson transverse momentum distribution in both electron and muon channels using data collected with the D0 detector at the Fermilab Tevatron collider. Results are compared to next-to-leading-order predictions from different event generators.

712

Search for a Light Scalar in Radiative Transitions $\Upsilon \rightarrow \gamma A^0$

We search for evidence of a light scalar (e.g. a Higgs boson) in the radiative decays of the narrow $\Upsilon(1S)$, $\Upsilon(2S)$, and $\Upsilon(3S)$ resonances: $\Upsilon(nS) \rightarrow \gamma A^0$. Such an object appears in extensions of the Standard Model, where a light CP-odd Higgs boson naturally couples strongly to b -quarks. We investigate several possible decay modes of A^0 , including both visible and invisible final states, in the samples of 99×10^6 $\Upsilon(2S)$ and 122×10^6 $\Upsilon(3S)$ decay data collected with the BABAR detector at the PEP-II B-factory.

713

Search for Lepton-Flavor Violating Υ Decays

Charged lepton-flavor violating (CLFV) processes are extremely rare in the Standard Model, but they may occur in various beyond-the-Standard Model (BSM) theories, including SUSY or models with leptoquarks or compositeness. We present a search for CLFV decays $\Upsilon \rightarrow e^+ \tau^-$ and $\Upsilon \rightarrow \mu^+ \tau^-$ in the data samples of 99×10^6 $\Upsilon(2S)$ and 122×10^6 $\Upsilon(3S)$ decays collected with the Babar detector at the PEP-II B-factory. We observe no positive signal and place limits on the CLFV decays of $\Upsilon(2S)$ and $\Upsilon(3S)$ which probe BSM contributions at the TeV mass scales.

714

Searches for Dark Sector Gauge Bosons in Multi-lepton Final States

We present searches for narrow di-lepton resonances in e^+e^- annihilation into 4-lepton final states with and without a photon. These searches are motivated by the recent proposals involving a hidden "dark sector" with a set of new gauge bosons in GeV range, weakly coupled to the Standard Model particles. The searches use the dataset of 536 fb^{-1} collected with the Babar detector at the SLAC PEP-II B-factory at the center-of-mass energy near the $\Upsilon(4S)$.

715

Test of Lepton Universality in $\Upsilon(1S)$ decays at BaBar

The ratio $R_{\tau\mu}(\Upsilon(1S)) = \frac{\Gamma_{\Upsilon(1S) \rightarrow \tau^+ \tau^-}}{\Gamma_{\Upsilon(1S) \rightarrow \mu^+ \mu^-}}$ is measured using a sample of $(121.8 \pm 1.2) \times 10^6$ $\Upsilon(3S)$ events recorded by the BaBar detector. This measurement is intended as a test of lepton universality and as a search for a possible light pseudoscalar Higgs boson. In the standard model (SM) this ratio is expected to be close to 1. Any significant deviations would violate lepton universality and could be introduced by the coupling to a light pseudoscalar Higgs boson. The analysis studies the decays $\Upsilon(3S) \rightarrow \Upsilon(1S) \pi^0$, $\Upsilon(1S) \rightarrow \ell^+ \ell^-$, where $\ell = \mu, \tau$. The result, $R_{\tau\mu}(\Upsilon(1S)) = 1.005 \pm 0.013(\text{stat.}) \pm 0.022(\text{syst.})$, shows no deviation from the expected SM value, while improving the precision with respect to previous measurements.

716

Measurement of $B \rightarrow X_s \gamma$ Branching Fraction and CP asymmetry

We report on a study of the radiative penguin decay $B \rightarrow X_s \gamma$ at BABAR using lepton-tagging to identify $B\bar{B}$ events. We present new results on the $B \rightarrow X_s \gamma$ branching fraction and direct CP asymmetry, based on a sample of 380 million $B\bar{B}$ pairs collected at the BaBar experiment at PEP-II at SLAC. This data sample represents a four-fold increase in statistics over that used for our previous lepton-tagged result.

717

Study of $B \rightarrow X_d \gamma$ Decays and Determination of $|V_{td}/V_{ts}|$

We present new results of a search for $B \rightarrow X_d \gamma$ decays based on an analysis of 471 million $B\bar{B}$ events collected by the BaBar experiment at PEP-II at SLAC. We consider seven final states with up to four charged pions and one neutral pion or η , which correspond to about 50% of the total X_d fragmentation in the mass range investigated. We observe for the first time a significant $b \rightarrow d$ gamma transition in the hadronic mass range $M(X_d) > 1$ GeV, resulting in a significant improvement in the determination of $|V_{td}/V_{ts}|$ via the ratio of inclusive widths.

718

Measurement of Angular Observables in the Radiative Electroweak Decays $B \rightarrow K^{*0} l^+ l^-$

We use the full Upsilon(4S) dataset collected with the Babar detector at the PEP-II asymmetric e^+e^- storage ring to study the flavor-changing neutral current decays $B \rightarrow K^{*0} l^+ l^-$, where $l^+ l^-$ is either e^+e^- or $\mu^+\mu^-$. We present new results for the lepton forward-backward asymmetry AFB and K^{*0} longitudinal polarization fraction FL, along with other angular observables.

719

Search for $B^0 \rightarrow \gamma \gamma$ at Babar

We present a search for the double-radiative rare decay $B^0 \rightarrow \gamma \gamma$ using an integrated luminosity of 426 fb^{-1} collected with the Babar detector at the SLAC National Accelerator Laboratory. This decay has a clean experimental signature and proceeds through effective FCNC transitions involving vertical or annihilation penguin diagrams. Since the two-photon system can be in a CP-even or CP-odd state, this decay permits non-standard searches for CP-violating effects, while the non-hadronic final state with its two-body kinematics allows sensitive probes of QCD dynamics in B decay. The expected SM branching fraction is $O(10^{-8})$. Observation of a significant signal at the existing B Factories would be indicative of physics beyond the SM.

721

Multipurpose Detector (MPD) at the NICA Collider

A conceptual design of the MultiPurpose Detector (MPD) is proposed for a study of hot and dense baryonic matter in collisions of heavy ions over the atomic mass range $A = 1-197$ at a centre-of-mass energy up to $\sqrt{s_N} = 11$ GeV (for Au^{79+}). The MPD experiment is foreseen to be carried out at a future JINR accelerator complex facility for heavy ions – the Nuclotron-based Ion Collider fAcility (NICA) which is designed to reach the required parameters with an average luminosity of $L = 10^{27} \text{ cm}^{-2} \text{ s}^{-1}$.
(for the MPD Collaboration)

723

Neutrino astrophysics with the ANTARES Telescope

The ANTARES high-energy neutrino telescope is a three-dimensional array of photomultipliers distributed over 12 lines installed deep in the Mediterranean Sea and completed in May 2008. The main goal of the experiment is the search for high-energy neutrinos from astrophysical sources. The detector is optimized for the detection of muon neutrinos at energies above 1 TeV.

The results of the first searches for point-like neutrino sources will be presented. The detection of signals from individual extragalactic point sources is limited by the detector effective area given the expected fluxes; however, it is expected that the addition of fluxes from many sources can produce an excess of very-high energy ($E > 100$ TeV) events over the expected atmospheric neutrino background. The result of the search for this diffuse flux of VHE neutrinos using data from Dec. 2007 to Dec. 2009 will be reported.

724

Hybrid Measurements of the Telescope Array Experiment

The Telescope Array (TA) is a hybrid detector consisting of an array of surface detectors (SD) and three air fluorescence detectors (FD) to explore the origin of ultra high energy cosmic rays. The hybrid operation of TA started in March, 2008. The TA/SD is composed of plastic scintillator, the energy measurement by which is only moderately sensitive to the choice of hadron interaction models and mass composition. Hybrid measurement is a key for cross-checking the energy scales of two complementary methods of energy determination by SDs and FDs. The hybrid technique also provides an improved reconstruction than that obtained by either detector alone. We developed a hybrid analysis method, in which the timing of SD data is applied to the monocular reconstruction of FD. Here we present the energy spectrum obtained using the hybrid technique together with its performance.

728

Measurement of $|V_{cb}|$ and the Form-Factor Slope in $B \rightarrow D l \nu$ Decays in Events Tagged by a Fully Reconstructed B Meson

We present a measurement of the Cabibbo-Kobayashi-Maskawa matrix element $|V_{cb}|$ and the form-factor slope ρ^2 in $B \rightarrow D l \nu$ decays based on 460 million BB events recorded at the $Y(4S)$ resonance with the BABAR detector. $B \rightarrow D l \nu$ decays are selected in events in which a hadronic decay of the second B meson is fully reconstructed. We measure $B(B \rightarrow D l \nu)/B(B \rightarrow X l \nu) = (0.255 \pm 0.009 \pm 0.009)$ and $B(B \rightarrow D l \nu)/B(B \rightarrow X l \nu) = (0.230 \pm 0.011 \pm 0.011)$, and the differential decay distribution in $B \rightarrow D l \nu$ decays. We then determine $G(1)|V_{cb}| = (42.3 \pm 1.9 \pm 1.4) \times 10^{-3}$ and $\rho^2 = 1.20 \pm 0.09 \pm 0.04$, where $G(1)$ is the hadronic form factor at the point of zero recoil.

729

Measurement and Interpretation of Moments in Inclusive Decays $B \rightarrow X c l \nu$

We present results for the moments of observed spectra in inclusive semileptonic B-meson decays to charm hadrons $B \rightarrow X c l \nu$. Moments of the hadronic-mass and the combined mass-and-energy spectra for different minimum electron or muon momenta between 0.8 and 1.9 GeV/c are obtained from a sample of 232E6 BB events recorded at the Upsilon(4S) resonance with the BABAR detector. We also present a re-evaluation of the moments of electron-energy spectra and partial decay fractions $B(B \rightarrow X c l \nu)$ for minimum electron momenta between 0.6 and 1.5 GeV/c based on a sample of 51E6 BB events. The measurements are used for the extraction of the total decay fraction, the Cabibbo-Kobayashi-Maskawa (CKM) matrix element $|V_{cb}|$, the quark masses m_b and m_c , and four heavy-quark QCD parameters in the framework of a Heavy Quark Expansion (HQE). We find $B(B \rightarrow X c l \nu) = (10.64 \pm 0.17 \pm 0.06)\%$ and $|V_{cb}| = (42.05 \pm 0.45 \pm 0.70) \times 10^{-3}$.

730

Measurement of the $B \rightarrow \eta' l \nu$ and $B \rightarrow \pi l \nu$ Form-Factor Shapes and Branching Fractions, and Determination of $|V_{ub}|$

We report the results of a study of the exclusive charmless semileptonic decays, $B \rightarrow \eta' l \nu$ and $B \rightarrow \pi l \nu$, undertaken with approximately 464 million BB pairs collected at the Upsilon(4S) resonance with the BaBar detector. The analysis uses events in which the signal B decays are reconstructed with a loose neutrino reconstruction technique. We obtain partial branching fractions for $B \rightarrow \eta' l \nu$ and $B \rightarrow \pi l \nu$ in three and twelve bins of q^2 , respectively, from which we extract the $f_+(q^2)$ form-factor shapes and the total branching fractions $BF(B \rightarrow \eta' l \nu)$ and $BF(B \rightarrow \pi l \nu)$. Based on a recent unquenched lattice QCD calculation of the form factor, we also report the magnitude of the CKM matrix element $|V_{ub}|$.

733

Measuring KS and KL lifetimes at KLOE

A phi-factory offers the possibility to select pure kaon beams: neutral kaons from $\phi \rightarrow K_S K_L$ are in fact produced in pairs and the detection of a K_S (K_L) tags the presence of a K_L (K_S). This allows to perform precise measurement of kaon properties. We are presently finalizing new determinations of the K_L and K_S lifetimes using the whole KLOE data set, consisting of more than 10^9 $\phi \rightarrow K_S K_L$ decays. Both determinations benefit from a precise knowledge of kaon momenta. The K_L lifetime, which has been already measured by KLOE with 0.6% accuracy using 20% of the total data sample (PLB 626, 2005, 15), will be extracted from the proper time distribution of $K_L \rightarrow 3\pi^0$ decays, tagged by a $K_S \rightarrow \pi^+\pi^-$ decay on the opposite hemisphere of the apparatus. A competitive measurement of the K_S lifetime is obtained from the proper time distribution of $K_S \rightarrow \pi^+\pi^-$ decays.

735

Precise measurement of K_{l2} decay at KLOE and constraints on LFV

The K_{e2} amplitude, helicity suppressed within the SM, is sensitive to contributions from new physics. Deviations of up to few percent from the SM value of $R_K = \Gamma(K_{e2})/\Gamma(K_{\mu 2})$, predicted with very high precision, are expected within MSSM with lepton flavor changing processes mediated by the charged Higgs. Bounds on new physics extensions of the SM can be set using kaon decays and are complementary to those from B meson decays. A measurement of the ratio R_K with 1.3% accuracy has been performed with the KLOE experiment together with the measurement of the differential width $d\Gamma(K \rightarrow e \nu \gamma)/dE_\gamma$ for photon energies $10 < E_\gamma < 250$ MeV. The results (EPJC 64, 2009, 627) are based on the complete data set of 2.2 fb^{-1} collected at the Frascati e^+e^- collider DAFNE. The measurement will be described, and its theoretical implications will be discussed.

737

Search for $B \rightarrow \Lambda_c X l \nu$ Decays in Events Tagged by a Fully Reconstructed B Meson

Search for $B \rightarrow \Lambda_c X l \nu$ Decays in Events Tagged by a Fully Reconstructed B Meson

We present a search for semi-leptonic B decays to the charmed baryon Λ_c based on 420 fb^{-1} of data collected at the Upsilon ($4S$) resonance with the BABAR detector at the PEP-II e^+e^- storage rings. By fully reconstructing the recoiling B in a hadronic decay mode, we reduce non-B backgrounds, and determine the flavor of the signal B, modulo the effect of B^0 mixing, and we measure the relative branching fraction $B(B \rightarrow \Lambda_c X l \nu)/B(B \rightarrow \Lambda_c X)$.

738

Measurement of the $B \rightarrow \omega l \nu$ branching fraction

We measure the branching fraction of the exclusive charmless semileptonic decay $B \rightarrow \omega l \nu$, where l is either an electron or a muon, with the charged B meson recoiling against a tag B meson decaying in the charmed semileptonic modes $B \rightarrow D X l \nu$. The measurement is based on a dataset of 426.1 fb^{-1} of e^+e^- collisions at a CM energy of 10.58 GeV recorded with the BaBar detector at the PEP-II asymmetric B Factory located at the SLAC National Accelerator Laboratory.

742

KLOE results on light meson spectroscopy

The KLOE experiment has collected 2.5 fb⁻¹ at the peak of the ϕ resonance at the e⁺e⁻ collider DAPHNE in Frascati. The whole data set includes 100 million η 's produced through the radiative decay $\phi \rightarrow \eta \gamma$ and tagged by means of the monochromatic recoil photon. With this sample, we are studying η rare decays. We have a final result for the BR measurement of the $\eta \rightarrow \pi^+\pi^-e^+e^-$ decay, with a sample of 1600 signal events, 100 times larger than today best measurement. These events are also used to measure the asymmetry between the $\pi^+\pi^-$ and the e⁺e⁻ decay planes in the η rest frame, whose observation could test unexpected mechanism of CP violation, thus providing an hint of new physics beyond the Standard Model. The same data set has been also used to extract the BR for the never observed before $\eta \rightarrow e^+e^-e^+e^-$ decay channel. We have studied the dynamics of the $\eta \rightarrow \pi^0\pi^0\pi^0$ decay using the Dalitz plot technique, obtaining a new determination of the quadratic slope. The result is consistent with the present world data and with current chiral perturbation theory calculations within the unitary approach. In the $\eta \rightarrow \pi^+\pi^-\gamma$ decay a significant contribution from chiral anomaly is expected. The distribution of the invariant mass of the pions allows to disentangle this contribution from resonant intermediate processes. Old measurements from the '70s with data samples of the order of 10^4 events provided contradicting results. KLOE data contains about 3.5×10^6 $\eta \rightarrow \pi^+\pi^-\gamma$ decays. With this statistics it is possible to investigate in detail the pion invariant mass distribution and to search for C violation signature in the left-right charge asymmetry. Currently we have used 1.2 fb⁻¹ to perform a preliminary measurement of the branching ratio and to tune the analysis for the study of the $\pi^+\pi^-$ invariant mass. From a sample of 240 pb⁻¹ taken off the ϕ resonance, a preliminary analysis of the $e^+e^- \rightarrow e^+e^-\eta$ process, without tagging e⁺e⁻ in the final state and identified through the $\eta \rightarrow \pi^+\pi^-\pi^0$ channel, is presented. The same data set has been used to search for the $f_0(600)$ that can be produced in $\gamma\gamma$ interactions and observed in the reaction $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$. The preliminary $\pi^0\pi^0$ mass spectrum show an excess of events with respect to the expected background in the $f_0(600)$ mass region. From the process $e^+e^- \rightarrow \pi^+\pi^-\gamma$ it is possible to test scalar meson contribution using the interference among final state radiation, scalar and vector meson exchanges. This interference produces a forward backward asymmetry as a function of the $\pi^+\pi^-$ invariant mass. Preliminary results are presented both for on-peak and off-peak data, showing a good agreement with MC expectations containing scalar and VMD contributions extracted from KLOE data.

743

KLOE Measurement of $\sigma_{\pi^+\pi^-(\gamma)}$ with ISR and $\pi^+\pi^-$ contribution to the muon anomaly

The KLOE experiment, operating at the Frascati ϕ -factory DAΦNE, has measured the differential cross section for the process $e^+e^- \rightarrow \pi^+\pi^-\gamma$ as a function of the $\pi^+\pi^-$ invariant mass, $M_{\pi^+\pi^-}$, using two different configurations: (a) a non-observed photon, emitted at small angle (SA), whose energy is obtained by kinematics; (b) a photon emitted at large angle and detected in the calorimeter (LA) where its energy is measured. With the two samples the $M_{\pi^+\pi^-}$ range $0.1 < M_{\pi^+\pi^-} < 0.95$ GeV² is covered. The measurement of the $\pi^+\pi^-$ cross section at SA, normalized to the integrated luminosity has been published recently. We present the final results of a new independent measurement at LA using data taken in 2006 at a collision energy of 1 GeV, 20 MeV below the ϕ -peak. We will discuss also the impact of these measurement on the evaluation of the hadronic contribution to the muon anomaly, and the results on the extraction of the pion form factor from the ratio of $\sigma(e^+e^- \rightarrow \pi^+\pi^-\gamma)$ to $\sigma(e^+e^- \rightarrow \mu^+\mu^-\gamma)$.

745

Inclusive-jet cross sections in photoproduction at HERA and a comparison of the kt, anti-kt and SIScone jet algorithms

Differential inclusive-jet cross sections have been measured in photoproduction using the anti-kt and SIScone algorithms. The measurements were made for boson virtualities $Q^2 < 1$ GeV² with the ZEUS detector at HERA using an integrated luminosity of 82 pb⁻¹ and the jets were identified in the laboratory frame. The performance and suitability of the jet algorithms for their use in hadron-like reactions were investigated by comparing the measurements to those performed with the kt algorithm. Next-to-leading-order QCD calculations were compared to the measurements. Measurements of the ratios of cross sections using different jet algorithms are also presented. Values of $\alpha_s(M_Z)$ were extracted from the data.

747

Subjet distributions in deep inelastic scattering at HERA

Subjet distributions were measured in neutral current deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 81.7 pb^{-1} . Jets were identified using the kT cluster algorithm in the laboratory frame. Subjets were defined as jet-like substructures identified by a reapplication of the cluster algorithm at a smaller value of the resolution parameter y_{cut} . Measurements of subjet distributions for jets with exactly two subjets for $y_{\text{cut}}=0.05$ are presented as functions of observables sensitive to the pattern of parton radiation and to the colour coherence between the initial and final states. Perturbative QCD predictions give an adequate description of the data.

748

Three-subjet distributions in neutral current deep inelastic scattering at HERA

Three-subjet distributions were measured in neutral current deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 299 pb^{-1} . Jets were identified using the kt cluster algorithm in the laboratory frame. Subjets were defined as jet-like substructures identified by a reapplication of the cluster algorithm at a smaller value of the resolution parameter y_{cut} . Measurements of subjet distributions for jets with exactly three subjets at $y_{\text{cut}} = 0.01$ are presented as functions of observables sensitive to the pattern of parton radiation and to the colour coherence between the initial and final states. Measurements are also presented as functions of angular correlations between the three subjets which provide a stringent test of perturbative QCD and show sensitivity to the contributions from different colour configurations. Perturbative QCD predictions give an adequate description of the data.

749

Mass Composition of UHECRs Observed by Telescope Array Observatory

The Telescope Array (TA) experiment, located in the west desert of Utah, USA, observes ultra-high energy cosmic rays (UHECRs) with energy above 100 EeV .

Origin of UHECRs with such high energy, not available by artificial accelerators, is not clarified, yet.

Though mass composition of UHECRs is essential for the clarification of UHECRs origin, there are contradiction between the results of HiRes and AUGER.

TA is the hybrid detector consisting of a ground surface particle detector array and fluorescence detectors (FDs) to measure cosmic-ray air showers.

FD can observe longitudinal developments of air showers which strongly depend on particle type of primary cosmic rays; therefore air shower measurement by FD is powerful strategy.

For the determination of UHECRs mass composition, air shower data observed stereoscopically by FDs from Nov. 2007 to Oct. 2009 are used to be compared with the Monte-Carlo air shower library under the assumption of purely proton or iron model for mass composition.

In this presentation, we will report the result of mass composition analysis for the UHECRs with energy of $10^{18.5-19.3} \text{ eV}$.

750

Dijet cross sections in neutral current deep inelastic scattering at HERA

Single- and double-differential inclusive dijet cross sections in neutral current deep inelastic ep scattering have been measured with the ZEUS detector at HERA using a data sample corresponding to an integrated luminosity of 374 pb^{-1} . The measurement was performed at values of the photon virtuality, Q^2 , between 125 and 20000 GeV^2 ; the jets were reconstructed with the kT cluster algorithm in the Breit reference frame and selected by requiring their transverse energies in the Breit frame to be larger than 8 GeV . In addition, the invariant mass of the dijet system was required to exceed 20 GeV . The cross sections are well described by perturbative QCD predictions at next-to-leading order in collinear factorisation.

752

Inclusive-jet production in NC DIS with HERA II

Differential inclusive-jet cross sections have been measured in neutral current deep inelastic ep scattering for boson virtualities $Q^2 > 125 \text{ GeV}^2$ with the ZEUS detector at HERA using an integrated luminosity of 300 pb^{-1} . Jets were identified in the Breit frame using the kt cluster algorithm in the longitudinally inclusive mode. Single-differential cross sections are presented as functions of Q^2 , the jet pseudorapidity, η_{tjb} , and the jet transverse energy, η_{tjb} . In addition, measurements of double-differential inclusive-jet cross sections are presented as functions of η_{tjb} in different regions of Q^2 . Next-to-leading-order QCD calculations give a good description of the measurements. A value of $\alpha_s(M_Z)$ has been extracted from the measurements of the single-differential cross-section $d\sigma/dQ^2$ for $Q^2 > 500 \text{ GeV}^2$. The double-differential cross sections have the potential to constrain the gluon density in the proton when included as input to fits to extract the proton parton distribution functions.

753

Inclusive-jet production in photoproduction with HERA II

Differential inclusive-jet cross sections have been measured in photoproduction for boson virtualities $Q^2 < 1 \text{ GeV}^2$ with the ZEUS detector at HERA using an integrated luminosity of 300 pb^{-1} . Jets were identified in the laboratory using the kt cluster algorithm in the longitudinally inclusive mode. Single-differential cross sections are presented as functions of the jet pseudorapidity, η_{tjet} , and the jet transverse energy, E_{tjet} . Next-to-leading-order QCD calculations give a good description of the measurements. A value of $\alpha_s(M_Z)$ has been extracted from the measurements.

754

Dijet cross sections in photoproduction at HERA

Single- and double-differential inclusive dijet cross sections in photoproduction have been measured with the ZEUS detector using a data sample corresponding to an integrated luminosity of 300 pb^{-1} . The measurement was performed for photon virtuality $Q^2 < 1 \text{ GeV}^2$; the jets were reconstructed with the kT cluster algorithm in the laboratory frame. Next-to-leading-order QCD calculations give a good description of the measurements. The double-differential cross sections have the potential to constrain the gluon density in the proton when included as input to fits to extract the proton parton distribution functions.

755

Isolated-photon production in ep collisions at HERA

Isolated-photon production has been measured in ep collisions at a centre-of-mass energy of 318 GeV with the ZEUS detector at HERA using an integrated luminosity of 320 pb^{-1} . Measurements of inclusive prompt-photon cross sections are presented as functions of the photon transverse energy and pseudorapidity in a wide range of exchanged-photon virtuality. In addition, differential gamma+jet cross sections are presented as functions of the jet transverse energy and pseudorapidity. Leading-logarithm parton-shower Monte Carlo predictions and perturbative QCD calculations are compared to the data.

759

Scaled momentum distributions of charged particles in dijet photoproduction at HERA

The scaled momentum distributions of charged particles in jets have been measured for dijet photoproduction with the ZEUS detector at HERA using an integrated luminosity of 359 pb^{-1} . The distributions are compared to predictions based on perturbative QCD carried out in the framework of the modified leading-logarithmic approximation (MLLA) and assuming local parton-hadron duality (LPHD). The universal MLLA scale, Λ_{eff} , and the LPHD parameter, κ^{ch} , are extracted.

760

Scaled Momentum Spectra in deep inelastic Scattering at HERA

Charged particle production has been studied in neutral current deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 0.44 fb^{-1} . Distributions of scaled momenta in the Breit frame are presented for particles in the current fragmentation region. The evolution of these spectra with the photon virtuality, Q^2 , is described in the kinematic region $10 < Q^2 < 41000 \text{ GeV}^2$. Next-to-leading-order and modified leading-log-approximation QCD calculations as well as predictions from Monte Carlo models are compared to the data. The results are also compared to e^+e^- annihilation data. The dependences of the pseudorapidity distribution of the particles on Q^2 and on the energy in the p system, W , are presented and interpreted in the context of the hypothesis of limiting fragmentation.

761

Scaled momentum spectra of identified particles in the Breit frame at HERA

Scaled momentum distributions of identified particles, K0S and Lambda, have been measured in deep inelastic ep scattering with the ZEUS detector at HERA using an integrated luminosity of 290 pb^{-1} . The evolution of these distributions with the photon virtuality, Q^2 , are studied in the kinematic region $10 < Q^2 < 40000 \text{ GeV}^2$. The distributions have been measured in the current fragmentation region of the Breit frame. Next-to-leading-order QCD calculations including hadron-mass effects are compared to the data. The calculations reproduce the trends of the measured distributions as functions of Q^2 and the scaled momentum variable reasonably well.

762

Deep inelastic scattering with leading protons or large rapidity gaps at HERA

The dissociation of virtual photons, $\gamma^* p \rightarrow X p$, in events with a large rapidity gap between X and the outgoing proton, as well as in events in which the leading proton was directly measured, has been studied with the ZEUS detector at HERA. The data cover photon virtualities $Q^2 > 2 \text{ GeV}^2$ and $\gamma^* p$ centre-of-mass energies $40 < W < 240 \text{ GeV}$, with $M_X > 2 \text{ GeV}$, where M_X is the mass of the hadronic final state, X . Leading protons were detected in the ZEUS leading proton spectrometer. The cross section is presented as a function of t , the squared four-momentum transfer at the proton vertex and Φ , the azimuthal angle between the positron scattering plane and the proton scattering plane. It is also shown as a function of Q^2 and x_{IP} , the fraction of the proton's momentum carried by the diffractive exchange, as well as β , the Bjorken variable defined with respect to the diffractive exchange.

764

Diffractive PDF fits at HERA

ZEUS inclusive diffractive cross-section measurements have been used in a DGLAP next-to-leading-order QCD analysis to extract the diffractive parton distribution functions. Data on diffractive dijet production in deep inelastic scattering have also been included to constrain the gluon density. Predictions based on the extracted parton densities are compared to diffractive charm and dijet photoproduction data.

765

A measurement of the Q^2 , W and t dependences of deeply virtual Compton scattering at HERA

Deeply virtual Compton scattering, $\gamma^* p \rightarrow \gamma p$, has been measured in $e+p$ collisions at HERA with the ZEUS detector using an integrated luminosity of 61.1 pb^{-1} . Cross sections are presented as a function of the photon virtuality, Q^2 , and photon-proton centre-of-mass energy, W , for a wide region of the phase space, $Q^2 > 1.5 \text{ GeV}^2$ and $40 < W < 170 \text{ GeV}$. A subsample of events in which the scattered proton is measured in the leading proton spectrometer, corresponding to an integrated luminosity of 31.3 pb^{-1} , is used for the first direct measurement of the differential cross section as a function of t , where t is the square of the four-momentum transfer at the proton vertex.

766

Measurement of the longitudinal diffractive structure function at HERA

The reduced cross section in diffractive deep inelastic scattering events, $ep \rightarrow eXp$, was measured with the ZEUS detector at HERA, using three different centre-of-mass energies, 318, 252 and 225 GeV. The diffractive sample was selected by requiring a large rapidity gap between the hadronic system X and the outgoing proton. The longitudinal component of the diffractive structure function of the proton was extracted.

768

Measurement of the total γ - p cross section at a centre-of-mass energy of 320 GeV

The energy dependence of the total photon-proton cross-section is determined using data of three different proton beam energies collected with the ZEUS detector at HERA. These measurements correspond to centre-of-mass energies of 225 GeV, 250 GeV and 320 GeV.

769

Unitarity Triangle Analysis within the SM

We present updated results for the Standard Model analysis of the unitarity triangle (UT) performed by the UTfit Collaboration using the latest experimental and lattice QCD inputs. The UT turns out to be over-constrained in a consistent way, with some tension due to the contributions recently included in the theoretical prediction of ϵ_K and the updated lattice average for B_K .

770

Unitarity Triangle Analysis beyond the SM

We present the update of the Unitarity Triangle (UT) analysis beyond the Standard Model (SM), performed by the UTfit Collaboration.

Generalizing the UT analysis to investigate NP effects, constraints on $b \rightarrow s$ transitions are also included and both CKM and NP parameters are fitted simultaneously. The most interesting result in this analysis is the hint of NP found in the B_s - \bar{B}_s mixing at the level of more than 2σ , confirmed by using the recently available CDF/D0 combined likelihood.

771

Leading proton production in deep inelastic scattering at HERA

The semi-inclusive reaction $e+p \rightarrow e+Xp$ was studied with the ZEUS detector at HERA using an integrated luminosity of 12.8 pb^{-1} . The final state proton, which was detected with the ZEUS leading proton spectrometer, carried a large fraction of the incoming proton energy, $x_L > 0.32$, and its transverse momentum squared satisfied $p_{T2} < 0.5 \text{ GeV}^2$; the exchanged photon virtuality, Q^2 , was greater than 3 GeV^2 and the range of the masses of the photon-proton system was $45 < W < 225 \text{ GeV}$. The leading-proton production cross section and rates are presented as a function of x_L , p_{T2} , Q^2 and the Bjorken scaling variable, x .

773

Measurement of dijet photoproduction for events with a leading neutron at HERA

Differential cross sections for dijet photoproduction in association with a leading neutron, $e+p \rightarrow e+jet+jet+X(+n)$, have been measured with the ZEUS detector at HERA using an integrated luminosity of 40 pb^{-1} . The fraction of dijet events with a leading neutron was studied as a function of different jet and event variables. Single- and double-differential cross sections are presented as a function of the longitudinal fraction of the proton momentum carried by the leading neutron, x_L , and of its transverse momentum squared, p_{T2} . The dijet data are compared to inclusive DIS and photoproduction results; they are all consistent with a simple pion exchange model. The neutron yield as a function of x_L was found to depend only on the fraction of the proton beam energy going into the forward region, independent of the hard process. No firm conclusion can be drawn on the presence of rescattering effects.

774

Exclusive photoproduction of Upsilon mesons at HERA

The exclusive photoproduction reaction $\gamma p \rightarrow \text{Upsilon} p$ has been studied with the ZEUS detector in ep collisions at HERA using an integrated luminosity of 468 pb^{-1} . The measurement covers the kinematic range $60 < W < 220 \text{ GeV}$ and $Q^2 < 1 \text{ GeV}^2$, where W is the photon-proton centre-of-mass energy and Q^2 is the photon virtuality. The γ -p cross section for Upsilon photoproduction is presented as a function of W and $|t|$, where t is negative transverse momentum square at the proton vertex. These results, which represent the analysis of the full ZEUS data sample for dimuon decay channel, are compared to predictions based on perturbative QCD.

775

Measurement of J/psi photoproduction at large momentum transfer at HERA

The proton-dissociative diffractive photoproduction of J/psi mesons has been studied in ep collisions with the ZEUS detector at HERA using an integrated luminosity of 112 pb . The cross section is presented as a function of the photon-proton centre-of-mass energy and of the squared four-momentum transfer at the proton vertex. The results are compared to perturbative QCD calculations.

776

Two pion diffractive electro-production

Diffractive electroproduction of pion pairs at HERA has been studied with the ZEUS detector. The analysis was carried out in the kinematic range of photon virtuality $2 < Q^2 < 80 \text{ GeV}^2$, γ^*p center-of-mass energy $40 < W < 180 \text{ GeV}$ and two-pion invariant mass $0.28 < M(\text{pipi}) < 2.3 \text{ GeV}$. The pi^+pi^- invariant-mass distribution was analyzed in terms of three isovector resonances: ρ , ρ' and ρ'' . Masses and widths as well as relative amplitudes were obtained using a fit to the pion electromagnetic form factor. The Q^2 dependence of the pion form factor was studied.

778

Measurement of J/psi helicity distributions in inelastic photoproduction at HERA

The J/Psi decay angular distributions have been measured in inelastic photoproduction in ep collisions with the ZEUS detector at HERA, using an integrated luminosity of 468 pb⁻¹. The range in photon-proton centre-of-mass energy, W, was 50 < W < 180 GeV. The J/Psi mesons were identified through their decays into muon pairs. The polar and azimuthal angles of the muon+ were measured in the J/Psi rest frame and compared to theoretical predictions at leading and next-to-leading order in QCD.

779

Measurement of D⁺- and D⁰ Production in Deep Inelastic Scattering Using a Lifetime Tag at HERA

The production of D⁺- and D⁰ mesons has been measured with the ZEUS detector at HERA using an integrated luminosity of 133.6 pb⁻¹. The measurements cover the kinematic range 5 < Q² < 1000 GeV², 0.02 < γ < 0.7, 1.5 < p_T(D) < 15 GeV and |η(D)| < 1.6. Combinatorial background to the D meson signals is reduced by using the ZEUS microvertex detector to reconstruct displaced secondary vertices. Production cross sections are compared with the predictions of next-to-leading-order QCD which is found to describe the data well. Measurements are extrapolated to the full kinematic phase space in order to obtain the open-charm contribution, F₂(c \bar{c}), to the proton structure function, F₂.

780

Measurement of charm and beauty production in deep inelastic ep scattering from decays into muons at HERA

The production of charm and beauty quarks in ep interactions has been measured with the ZEUS detector at HERA for squared four-momentum exchange Q² > 20 GeV², using an integrated luminosity of 126 pb⁻¹. Charm and beauty quarks were identified through their decays into muons. Differential cross sections were measured for muon transverse momenta p_T^{mu} > 1.5 GeV and pseudorapidities -1.6 < η^{mu} < 2.3, as a function of p_T^{mu}, η^{mu}, Q² and Bjorken x. The charm and beauty contributions to the proton structure function F₂ were also extracted. The results agree with previous measurements based on independent techniques and are well described by QCD predictions.

781

Measurement of D⁺ and Lambda_c⁺ production in deep inelastic scattering at HERA

Charm production in deep inelastic scattering has been measured with the ZEUS detector at HERA using an integrated luminosity of 120 pb⁻¹. The hadronic decay channels D⁺ → K⁰S π⁺, Lambda_c⁺ → p K⁰S and Lambda_c⁺ → Lambda π⁺, and their charge conjugates, were reconstructed. The presence of a neutral strange hadron in the final state reduces the combinatorial background and extends the measured sensitivity into the low transverse momentum region. The kinematic range is 0 < p_T(D⁺, Lambda_c⁺) < 10 GeV, |η(D⁺, Lambda_c⁺)| < 1.6, 1.5 < Q² < 1000 GeV² and 0.02 < γ < 0.7. Inclusive and differential cross sections for the production of D⁺ mesons are compared to next-to-leading-order QCD predictions. The fraction of c quarks hadronising into Lambda_c⁺ baryons is extracted.

782

Measurement of D^{*+} production and F_2^c extraction in deep inelastic scattering at ZEUS

The production of charm quarks in deep inelastic ep scattering has been measured with the ZEUS detector at HERA using an integrated luminosity of 323 pb⁻¹. Charm events were identified through the $D^{*+} \rightarrow K^- \pi^+ \pi^+$ (+cc) decay channel. A lifetime tag based on decay length significance was applied to improve the signal to background ratio. The kinematic region was $1.5 < p_T(D^{*+}) < 15$ GeV, $|\eta(D^{*+})| < 1.6$, $5 < Q^2 < 1000$ GeV² and $0.02 < y < 0.7$. Total and differential cross sections for D^{*+} production were measured and compared to next-to-leading-order QCD calculations and published ZEUS results. The charm contribution to the proton structure function, F_2^c , was extracted. The results agree with previous measurements and are well described by QCD predictions.

783

D^{*} production in deep inelastic ep scattering at HERA

Inclusive production of $D^{*}(2010)$ mesons in deep inelastic ep scattering was studied in the $D^{*0} \pi_s$ decay channel with the ZEUS detector at HERA using an integrated luminosity of 360 pb⁻¹. Differential D^{*} cross sections are presented as functions of the D^{*} transverse momentum, $P_t(D^{*})$, and pseudorapidity, $\eta(D^{*})$, for $1.5 < P_t(D^{*}) < 15$ GeV and $|\eta(D^{*})| < 1.5$ in the kinematic region of photon virtuality $5 < Q^2 < 1000$ GeV² and inelasticity $0.02 < y < 0.7$. In addition, differential cross sections for D^{*} production as functions of Q^2 and Bjorken x are presented. Next-to-leading-order (NLO) QCD predictions give an adequate description of the data. The measured cross section was extrapolated using these predictions to the full kinematic region in y , $P_t(D^{*})$ and $\eta(D^{*})$ to determine the open charm contribution to the proton structure function, F_2^{cc} . Predictions from NLO QCD fits to inclusive data describe well the extracted F_2^{cc} from D^{*} production.

784

Charm and beauty production in deep inelastic scattering from inclusive secondary vertexing at ZEUS

Charm and beauty production in deep inelastic scattering has been measured with the ZEUS detector using the full HERA II data set. The charm and beauty contents in events with a jet have been extracted using the decay length significance and invariant mass of secondary decay vertices. Differential cross sections as a function of Q^2 , Bjorken x , $p_T(\text{jet})$ and $\eta(\text{jet})$ were measured and compared to theoretical predictions. The open charm and beauty contributions to the proton structure function F_2 are extracted.

785

Measurement of beauty production in DIS and F_2^b extraction at ZEUS

Beauty production in deep inelastic scattering with events in which a muon and a jet are observed in the final state has been measured with the ZEUS detector at HERA using an integrated luminosity of 114 pb⁻¹. The fraction of events with beauty quarks in the data was determined using the distribution of the transverse momentum of the muon relative to the jet. The cross section for beauty production was measured in the kinematic range of photon virtuality, $Q^2 > 2$ GeV², and inelasticity, $0.05 < y < 0.7$, with the requirement of a muon and a jet. Total and differential cross sections are presented and compared to QCD predictions. The beauty contribution to the structure function F_2 was extracted and is compared to theoretical predictions.

786

Measurement of beauty production from dimuon events at HERA

Beauty production in events containing two muon in the final state has been measured with the ZEUS detector at HERA using an integrated luminosity of 114 pb⁻¹. A low transverse-momentum threshold for muon identification, in combination with the large rapidity coverage of the ZEUS muon system, gives access to a very large fraction of the phase space for beauty production. The total cross section for beauty production in ep collisions at $\sqrt{s}=318$ GeV has been measured to be $\sigma_{\text{tot}}(\text{ep} \rightarrow \text{b} \bar{\text{X}}) = 13.9 \pm 1.5$ (stat.) ± 4.0 – 4.3 (syst.) nb. Differential cross sections and a measurement of bbar correlations are also obtained, and compared to other beauty cross-section measurements, Monte Carlo models and next-to-leading-order QCD predictions.

787

Measurement of charm and beauty photoproduction from inclusive secondary vertexing at HERA-II

Photoproduction of beauty and charm quarks in events with two jets has been measured with the ZEUS detector at HERA using an integrated luminosity of 130 pb⁻¹. The beauty and charm content was extracted using the decay-length significance of the b and c hadrons and the invariant mass of the decay vertices. Differential cross sections as functions of $p_T(\text{Jet})$ and $\eta(\text{Jet})$ are compared with the Pythia leading order plus parton shower (LO+PS) Monte Carlo and QCD predictions calculated at next-to-leading order.

788

Charm and beauty production with semi-leptonic decay into electrons in DIS and PHP at ZEUS

The production of heavy quarks in ep interactions has been studied with the ZEUS detector at HERA in the photoproduction and DIS regimes using an integrated luminosity of 360 pb⁻¹. The heavy flavour events were identified using electrons with a transverse momentum of at least $p_T(e) > 0.9$ GeV in the range $\eta(e) < 1.5$. The fractions of events containing the heavy quarks were extracted from a likelihood fit using variables sensitive to electron identification as well as to semileptonic decays. Total and differential cross sections for beauty, and in the case of photoproduction also for charm, were measured and compared with next-to-leading-order QCD calculations and Monte Carlo models. For squared four-momentum exchange of $10 < Q^2 < 1000$ GeV² the beauty contribution to the proton structure function, F_2^b , was extracted from the double differential cross section as a function of x and Q^2 .

790

Combined Measurement of Neutral and Charged Current Cross Sections at HERA

A combination is presented of the inclusive cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current deep-inelastic ep scattering at HERA. The combination uses data from unpolarised ep scattering taken during the HERA-I phase as well as measurements with longitudinally polarised electron or positron beams from the HERA-II running period. The combination method takes the correlations of systematic uncertainties into account. The inclusion of the large HERA-II data set leads to an improved uncertainty especially at large four momentum transfer squared Q^2 .

791

Combination of F_2^{cc} from DIS measurements at HERA

The charm contribution F_2^{cc} to the proton structure function F_2 is determined. The results of D meson production cross section measurements are combined with the measurements using semi-leptonic decays into muons as well as inclusive track measurements. The correlations of the systematic uncertainties between different measurements are taken into account. The data cover the kinematic range of photon virtuality $2 < Q^2 < 1000$ GeV² and Bjorken scaling variable $10^{-5} < x < 10^{-1}$.

792

PDF fits including F2cc data

The combined H1 and ZEUS data on inclusive ep cross-sections together with the combined data on the semi-inclusive structure function F2(charm) are used to extract the parton densities of the proton at NLO. The inclusion of the F2(charm) data allows detailed tests of the heavy flavour treatment in various QCD calculations.

793

Combined measurement of the Inclusive e+p Scattering Cross Sections at HERA for Reduced Proton Beam Energy Runs and Determination of the Structure Function F_L

A combination of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations for ep scattering with nominal and reduced proton-beam energies, $E_p=920$ GeV, $E_p=460$ GeV and 575 GeV, is presented. The combination method used takes the correlations of systematic uncertainties into account, resulting in improved accuracy. From the combined data the proton structure function, F_L , is extracted in the region of $2.5 < Q^2 < 800$ GeV².

794

Measurement of the charm fragmentation function in D* photoproduction at HERA

The charm fragmentation function has been measured in D* photoproduction with the ZEUS detector at HERA using an integrated luminosity of 120 pb⁻¹. The fragmentation function is measured versus z , the ratio of $E+p_{\text{parallel}}$ for the D* meson and that for the associated jet, where E is the energy and p_{parallel} the longitudinal momentum relative to the jet axis. Jets were reconstructed using the k_T clustering algorithm and required to have transverse energy greater than 9 GeV. The D* meson associated with the jet was required to have a transverse momentum greater than 2 GeV. The measured function is compared to different fragmentation models incorporated in leading-logarithm Monte Carlo simulations and a next-to-leading-order calculation. The results are similar to those from e+e- experiments.

795

Excited charm meson production at HERA

The production of the excited charm mesons D1(2420)⁰ and D2*(2460)⁰ in inelastic ep scattering was studied with the ZEUS detector at HERA using an integrated luminosity of 372 pb⁻¹. Masses and widths were determined and a helicity analysis was performed. The results are compared with previous measurements and with theoretical expectations.

796

PDF fits including HERA data with reduced proton beam energy

A QCD fit analysis to the combined HERA-I inclusive deep inelastic cross sections measured by the H1 and ZEUS collaborations for ep scattering, including the HERA-II measurements with reduced proton-beam energies, $E_p = 460$ GeV and $E_p = 575$ GeV, is presented. The effect of including the new data on the determination of HERA parton distribution functions is analysed, using fits similar to those performed for HERAPDF1.0. Some tension of the QCD fit with respect to the data is identified in the kinematic region of low Q^2 and low x . Furthermore, the data show sensitivity to various schemes of treating heavy flavours

797

Measurement of High- Q^2 Neutral Current Deep Inelastic e- Scattering Cross Sections with a Longitudinally Polarised Electron Beam at HERA

Measurements of the neutral current cross sections for deep inelastic scattering in e-p collisions at HERA with a longitudinally polarised electron beam are presented. The single-differential cross-sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ and the double-differential cross sections in Q^2 and x are measured in the kinematic region $y < 0.9$ and $Q^2 > 185 \text{ GeV}^2$ for both positively and negatively polarised electron beams and for each polarisation state separately. The measurements are based on an integrated luminosity of 169.9 pb^{-1} taken with the ZEUS detector in 2005 and 2006 at a centre-of-mass energy of 318 GeV. The structure functions xF_3 and $xF_3^{\{\gamma Z\}}$ are determined by combining the e-p results presented in this paper with previously measured e+p neutral current data. The asymmetry parameter A_- is used to demonstrate the parity violating effects of electroweak interactions at large spacelike photon virtuality. The measurements agree well with the predictions of the Standard Model.

798

Combined Measurement and QCD Analysis of the Inclusive ep Scattering Cross Sections at HERA

A combination is presented of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current unpolarised ep scattering at HERA during the period 1994-2000. The data span six orders of magnitude in negative four-momentum-transfer squared, Q^2 , and in Bjorken x . The combination method used takes the correlations of systematic uncertainties into account, resulting in an improved accuracy. The combined data are the sole input in a NLO QCD analysis which determines a new set of parton distributions, HERAPDF1.0, with small experimental uncertainties. This set includes an estimate of the model and parametrisation uncertainties of the fit result.

799

Measurement of Charged Current Deep Inelastic Scattering Cross Sections with a Longitudinally Polarised Electron Beam at HERA

Measurements of the cross sections for charged current deep inelastic scattering in e-p collisions with longitudinally polarised electron beams are presented. The measurements are based on a data sample with an integrated luminosity of 175 pb^{-1} collected with the ZEUS detector at HERA at a centre-of-mass energy of 318 GeV. The total cross section is given for positively and negatively polarised electron beams. The differential cross-sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ are presented for $Q^2 > 200 \text{ GeV}^2$. The double-differential cross-section $d^2\sigma/dxdQ^2$ is presented in the kinematic range $280 < Q^2 < 30000 \text{ GeV}^2$ and $0.015 < x < 0.65$. The measured cross sections are compared with the predictions of the Standard Model.

800

Measurement of high- Q^2 charged current deep inelastic scattering cross sections with a longitudinally polarised positron beam at HERA

Measurements of the cross sections for charged current deep inelastic scattering in e+p collisions with a longitudinally polarised positron beam are presented. The measurements are based on a data sample with an integrated luminosity of 132 pb^{-1} collected with the ZEUS detector at HERA in 2006 and 2007 at a centre-of-mass energy of 318 GeV. The total cross section is presented at positive and negative values of the longitudinal polarisation of the positron beams. The single-differential cross sections $d\sigma/dQ^2$, $d\sigma/dx$ and $d\sigma/dy$ are presented for $Q^2 > 200 \text{ GeV}^2$. The reduced double-differential cross section is presented in the kinematic range $280 < Q^2 < 30000 \text{ GeV}^2$ and $0.0078 < x < 0.42$. The cross section measurements agree well with the predictions of the Standard Model. In addition, a linear fit is applied to the total cross section as a function of polarisation. The fit is extrapolated to determine the upper limit on the cross section for a fully left-handed positron beam. The lower limit on the mass of a hypothetical W boson which couples to right-handed particles is then extracted.

801

Measurement of electron-proton neutral current cross sections at high Bjorken-x with the ZEUS detector at HERA

A new method is employed to measure the neutral current cross section up to Bjorken-x values of one with the ZEUS detector at HERA using an integrated luminosity of 187 pb⁻¹ of e-p collisions at $\sqrt{s} = 318$ GeV. Cross sections have been extracted for $Q^2 \geq 575$ GeV². A much improved precision with respect to the previous ZEUS publication, which only used 16.7 pb⁻¹ of e-p collisions, is achieved, owing to the larger data sample and improved kinematic reconstruction methods. The measurement is well described by predictions based on the CTEQ6D PDFs.

804

Search for contact interactions in ep collisions with ZEUS experiment at HERA

A search for physics beyond the Standard Model is performed with high-Q² neutral current deep inelastic scattering events recorded with the ZEUS detector at HERA. Complete data on scattering of polarized electrons and positrons from HERA II running are combined with electron and positron data from HERA I, resulting in a total luminosity of 0.44 fb⁻¹. No significant deviations from the Standard Model predictions are observed. Limits are derived on the effective mass scale in eeq contact interactions, on the mass to the Yukawa coupling ratio for heavy-leptoquark models, on the effective Planck-mass scale in models with large extra dimensions and on the quark charge radius.

805

Isolated Leptons and Missing Transverse Momentum and Measurement of W Production at HERA

A search for events containing an isolated electron or muon and missing transverse momentum produced in e±p collisions is performed with the H1 and ZEUS detectors at HERA. The data were taken in the period 1994-2007 and correspond to an integrated luminosity of 0.98 fb⁻¹. The observed event yields are in good overall agreement with the Standard Model prediction, which is dominated by single W production. In the e+p data, at large hadronic transverse momentum $P_T(X) > 25$ GeV, a total of 23 events are observed compared to a prediction of 14.0 ± 1.9 . The total single W boson production cross section is measured as 1.06 ± 0.16 (stat.) ± 0.07 (sys.) pb, in agreement with an SM expectation of 1.26 ± 0.19 pb.

806

Multi-Leptons with High Transverse Momentum at HERA

Events with at least two high transverse momentum leptons (electrons or muons) are studied using the H1 and ZEUS detectors at HERA with an integrated luminosity of 0.94 fb⁻¹. The observed numbers of events are in general agreement with the Standard Model predictions. Seven di- and tri-lepton events are observed in e+p collision data with a scalar sum of the lepton transverse momenta above 100 GeV, while 1.94 ± 0.17 events are expected. Such events are not observed in e-p collisions for which 1.19 ± 0.12 are predicted. Total visible and differential di-electron and di-muon photoproduction cross sections are extracted in a restricted phase space dominated by photon-photon collisions.

807

Multi-lepton production at high transverse momentum at HERA

A search for events containing two or more high-transverse momentum isolated leptons has been performed in ep collisions with the ZEUS detector at HERA using the full collected data sample, corresponding to an integrated luminosity of 480 pb⁻¹. The number of observed events has been compared with the prediction from the Standard Model, searching for possible deviations, especially for multi-lepton events with invariant mass larger than 100 GeV. Good agreement with the Standard Model has been observed. Total and differential cross sections for di-lepton production have been measured in a restricted phase space dominated by photon-photon collisions.

808

Study of tau-pair production with the ZEUS detector at HERA

A search for events containing two high-transverse-momentum tau leptons has been performed with the ZEUS detector at HERA, using the data sample collected between 2004 and 2007, corresponding to an integrated luminosity of 0.36 fb⁻¹. At least one of the tau candidates is required to decay hadronically, while the second tau is required to decay either into an electron or into hadrons. The number of observed tau pairs is compared to the predictions from the Standard Model, where the largest contribution is expected from Bethe-Heitler interactions.

809

Search for single-top production in ep collisions at HERA

A search for single-top production, $ep \rightarrow etX$, has been performed with the ZEUS detector at HERA using an integrated luminosity of 277 pb⁻¹. Events from muonic and electronic decay channels of the W boson resulting from the decay of the top quark have been investigated. The search has been made for events with isolated high-energy leptons and high missing transverse momentum. No evidence for top production has been found. The results have been used to constrain single-top production via flavour changing neutral current (FCNC) transitions.

811

Measurement of the longitudinal proton structure function at HERA

The reduced cross sections for ep deep inelastic scattering have been measured with the ZEUS detector at HERA at three different centre-of-mass energies, 318, 251 and 225 GeV. From the cross sections, measured double differentially in Bjorken x and the virtuality, Q², the proton structure functions F_L and F₂ have been extracted in the region 0.0005 < x < 0.007 and 20 < Q² < 130 GeV².

815

Measurement of the neutral current deep inelastic scattering cross-sections at high γ and low Q²

The measurements of the reduced cross sections for e+p deep inelastic scattering at high inelasticities γ for three different centre-of-mass energies, 318, 251 and 225 GeV have been extended to lower momentum transferred squared, Q². The analysis of satellite vertex events allows to extend the cross section measurement at high γ down to Q² = 5 GeV², substantially lower than the previously published cross section measurements from which the longitudinal structure function, F_L, was extracted.

817

PDF fits including HERA-II high Q² data

The QCD fit analysis of the combined HERA-I inclusive deep inelastic cross sections has been extended to include combined HERA II measurements at high Q². The effect of including these data on the determination of parton distribution functions is analysed, using fits similar to those performed for HERAPDF1.0. The precision of the PDFs at high-x is considerably improved- particularly in the valence sector.

818

CMS Offline Project: Operational aspects

The LHC Collider in Geneva has started colliding 7 TeV proton-proton beams at the end of March 2010, and is currently delivering data with increasing luminosity to the CMS Detector. The Offline Software is one of the key ingredient for the success of the CMS Experiment. The Offline Project is coordinating the planning, development and operations of most of the software used in the experiment; in its realm Simulation, Reconstruction, Alignment and Calibration, Databases, Generators, Framework, Data Management and Workload Management projects are harmonized and deployed. The talk will report about the general status of the Offline Project, with the current understanding of problems and features to be expected in the 2010-2011 run. Operational aspects, like Tier0 processing, reprocessing steps on Data and fast turn-around Calibrations will also be reported.

820

Luminosity measurement at CMS

Measurement of the luminosity at CMS is based on signals extracted in real time from the forward hadronic calorimeter (HF). The system provides information on instantaneous luminosity on line and also logs this information for use in normalizing physics samples off line. Checks based on off-line event-counting methods agree well with the on-line measurements. An overall scale calibration for the luminosity is obtained from Van der Meer scans.

821

Commissioning of b-jet identification with pp collisions at $\sqrt{s} = 7\text{TeV}$

The identification of jets containing the weak decay of a B-hadron is an essential tool for a wide range of analyses in the context of the Standard Model and beyond. A variety of algorithms exploit the long lifetime and the presence of soft leptons to discriminate these jets from those associated to light quarks. The distributions of the corresponding observables - track impact parameters, secondary vertices and lepton momenta - were measured in pp collisions at $\sqrt{s} = 7\text{TeV}$ and compare well to the predictions of Monte Carlo simulation. First results on efficiencies and mis-identification rates are shown.

823

JET performance at CMS

Data from pp collisions have been used to study jets in the CMS experiment at the Large Hadron Collider. Results are presented for three different approaches to reconstruct jets in The CMS detector: calorimeter-only based jet reconstruction; the "Jet-Plus-Track" algorithm, which improves the measurement of calorimeter jets by exploiting the associated tracks; and the "Particle Flow" method, which aims to reconstruct each particle in the event based on information from all sub-detectors, prior to the clustering of jets. The data-based results are compared to those from fully simulated Pythia events. The dijet p_T balance method is used to measure the jet response as function of pseudorapidity, relative to the central region ($|\eta| < 1.3$). The p_T balance method in photon+jet events is used to measure the jet response in the central region as a function of jet p_T . Jet energy resolutions are derived from both dijet and photon+jet samples based on the widths of the p_T balance distributions. Further, we present measurements of single particle response in the CMS calorimeter, and the offset energy from noise and pile-up in a jet. Finally, we also present results for jets reconstructed from tracks, only. Using events with more than one reconstructed primary vertex we demonstrate that track-jets are not affected by interaction pile-up.

827

Performance of Missing Transverse Energy reconstruction with the CMS detector in pp collisions at $\sqrt{s}=7\text{TeV}$

We present commissioning studies of several algorithms used by the CMS collaboration for the calculation of missing transverse energy. These are algorithms that use only calorimeter-based information and a calibration based on electrons, photons, and 50 GeV pions that are minimum ionizing in the electromagnetic calorimeter, algorithms that use calorimeter energies corrected for the nonlinear response to jets, approaches based on reconstructed jets, algorithms that correct the calorimeter-based algorithm using information from the charged particles reconstructed in the tracking system, and a full Particle-Flow-based technique. The performance is studied using inclusive pp interactions and also exclusive states such as events containing two high transverse momentum jets, W bosons, Z bosons or isolated, high transverse momentum photons in 7-TeV proton-proton collisions.

829

First CMS results on QCD jet physics in pp Collisions at $\sqrt{s}=7\text{TeV}$

We present an overview of first results on QCD jet physics in proton-proton collisions at $\sqrt{s}=7\text{TeV}$, recorded with the CMS experiment at the LHC.

830

First CMS results on particle production in pp Collisions at $\sqrt{s}=7$ TeV

We present an overview of first results on particle production in proton-proton collisions at $\sqrt{s}=7$ TeV, recorded with the CMS experiment at the LHC.

831

First CMS results on b-quark and quarkonia production in pp Collisions at $\sqrt{s}=7$ TeV

We present an overview of first results on b-quark and quarkonia production in proton-proton collisions at $\sqrt{s}=7$ TeV, recorded with the CMS experiment at the LHC.

835

Measurement of forward jets, forward energy flow and diffractive events with CMS at highest energies

We report on a first measurement of forward jet production and forward energy flow in pp collisions up to highest energies of $\sqrt{s}=7$ TeV. Inclusive spectra of jets are presented with $p_t > 20$ GeV in the region of $3 < |\eta| < 5$. The energy flow in the forward region is measured for minimum bias events and for events with a high p_t dijet in the central region. In addition, the absence of energy deposition in the forward region is used to observe diffractive events. We compare our results with predictions from Monte Carlo event generators including a simulation of multi-parton scattering.

838

Studies of the Underlying Event in pp collisions at the LHC

The underlying event in pp interactions, recorded by the CMS detector, is studied measuring the charged multiplicity density and the charged energy density in a region perpendicular to the plane of the hard 2-to-2 scattering. Two different methodologies are adopted to identify the direction and the energy scale of the hard scattering in Minimum Bias events that rely on the leading charged track and on the leading charged jet. The study allows to discriminate between various QCD Monte Carlo models with different multiple parton interaction schemes. In addition, we present the measurement of the underlying event using the jet-area/median approach. We demonstrate its sensitivity to different underlying event scenarios and tunes on generator level after applying detector specific cuts and thresholds.

846

Observation of top quark production at CMS in pp collisions at $\sqrt{s}=7$ TeV

The top quark is a fundamental building block of the standard model. Due to the large cross section, top-antitop pairs will be copiously produced in high energy proton-proton collisions at the Large Hadron Collider (LHC). We present the first results of a selection of top-quark pair production events in the dilepton channel, where both W-bosons from the top quarks decay leptonically into either an electron or a muon, plus a neutrino. We use LHC collision data at 7 TeV centre-of-mass energy collected with the CMS experiment during the period of April to July 2010. Events with two isolated, prompt leptons with high energy, at least two jets with high transverse momentum, and significant missing transverse energy are selected. Several background contributions from other standard model processes, most importantly Drell-Yan and W+jets, are estimated in a data-driven way. Results obtained from data are compared with the simulation and a first estimate of the top-antitop cross section at $\sqrt{s} = 7$ TeV is given, including systematic uncertainties. Similarly, first results are reported for the lepton+jets channel, where one W-boson from the top decays leptonically into a muon (or electron) and a neutrino, while the other one decays into a quark-antiquark pair.

848

Performance of Methods for Data-Driven Background Estimation and Prospects for SUSY Searches with the CMS Experiment

We present preliminary results on the performance and behavior of data-driven background determination methods for supersymmetric particle searches with the CMS detector at the LHC, using a data sample of proton-proton collisions at $\sqrt{s}=7$ TeV. These initial studies focus on understanding the contribution of QCD backgrounds to these searches, both in hadronic and leptonic channels. We also give prospects for the CMS SUSY reach for the LHC run in 2010 and 2011, with an expected integrated luminosity of 1 fb^{-1} .

850

Search for Leptoquarks at CMS in pp collisions at $\sqrt{s}=7$ TeV

We present the preliminary results of a search for leptoquarks (LQ) in pp collisions at $\sqrt{s} = 7$ TeV collected with the CMS detector at the CERN LHC. The number of observed events is in good agreement with the predictions for standard model background processes, and we consequently set limits on the cross section times branching fraction as a function of LQ mass. For LQ's with a branching fraction to a lepton and a quark of 1, we set a 95% confidence level limit on the mass of a scalar LQ of $M(\text{LQ})$. Finally, we present the CMS prospects for these searches with the further data to be collected in 2010 and 2011.

852

Experience with CMS Computing from Commissioning to Collisions

In this presentation we will discuss the early experience with the CMS computing model from the last large scale challenge activities through the early collisions runs. Between the initial definition of the CMS Computing Model in 2004 and the start of high energy collisions in 2010, CMS exercised the infrastructure with numerous scaling tests and service challenges. We will discuss how those tests have helped prepare the experiment for operations and how representative the challenges were to the early experience with data taking. We will outline how the experiment operations has evolved during the first few months of operations. The current state of the Computing system will be presented and we will describe the initial experience with active analysis users and real data. We will address the issues that worked well in addition to identifying areas where future development and refinement are needed.

853

Single Particle Response in the CMS Hadron Calorimeters

The response of single particles in the prototype CMS calorimeters was measured in the test beam environment using hadron beams over a large range of energy. These measurements were used to tune CMS simulation software. Measurements of the single particle response from collision data at the Large Hadron Collider will be useful for calibrating the hadron calorimeters, improving measurements of jet and missing energies, and further tuning of the simulation software. Strategies for measuring the response for isolated charged hadrons have been developed. Dedicated high level trigger algorithms for the selection of collision events with isolated charged tracks have been developed and tested. The signal and isolation requirements in the calorimeter are optimized in view of containment of the signal and contamination from other sources. The response functions are measured in the real detector environment using collision data at centre of mass energies of 900 GeV and 7 TeV. These measurements are compared with Monte Carlo predictions tuned to the test beam data.

855

Performance of Track and Vertex Reconstruction with CMS in pp collisions at $\sqrt{s}=7$ TeV

First 7 TeV proton-proton collisions produced by the Large Hadron Collider at CERN have been recorded by the CMS experiment in 2010. The ability to accurately and efficiently reconstruct the trajectories of charged particles produced in these collisions is a critical component in the measurements that will be presented at this conference. We present several methods for determining the efficiency of track reconstruction in CMS using the first data collected by the detector. Finally, identifying genuine collisions and precise determination of the position are vital ingredients of the event reconstruction but also monitoring of detector and accelerator. We present results on the performance of tracking, vertex- and beamspot-reconstruction using the CMS silicon tracker.

856

Track Momentum Scale Determination and Tracker Material Studies in CMS

The momentum measurement of charged tracks in the CMS detector is affected by systematic uncertainties due to the imperfect knowledge and modeling of the detector material, of the magnetic field, the sub-detectors alignment and their software description and the reconstruction algorithms used to fit the track trajectory. In this paper it is shown that studying the mass of the resonances and its possible biases, improvement in the modeling of the detector and in the track reconstruction could be achieved. Moreover a novel method to correct the track momentum measurement and to determine with precision its resolution is presented. The method is based on a multidimensional likelihood fit that uses as input the decay of well known resonances to pairs of tracks. Finally, a first attempt to estimate the tracker material based on the counting experiments of photon conversions and nuclear interactions is presented. Alternative methods based on the study of multiple scattering and energy loss of charged tracks are also described.

858

First Results of Searches for New Physics at $\sqrt{s}=7$ TeV with the CMS detector

We discuss the very first preliminary results of searches for various new physics phenomena with the early 7 TeV pp-collision LHC data with the CMS detector. While the sensitivity of these very early searches is yet to supersede current limits on these new physics phenomena, we demonstrate good understanding of the detector and backgrounds in a variety of channels, which is a fundamental component of successful searches. With more data being delivered by the machine the expected sensitivity of these searches should exceed the current limits before the end of 2010.

861

First measurement of the W charge and polarization asymmetry at CMS

The sample of W boson candidates collected by the CMS experiment in the electron and muon channels is used for a first measurement of the W lepton charge asymmetry in pp collisions at a center-of-mass energy of 7 TeV. The lepton charge asymmetry results are compared to predictions with standard sets of parton distribution functions. The sub-sample of highly-boosted W candidates is exploited to determine the fractions of W polarization amplitudes with a precision allowing for a first test of the polarization-asymmetry predictions for W-bosons produced in pp collisions in association with hadronic jets. Together with other kinematical distributions obtained with the same W sample, charge and polarization asymmetry distributions probe the dynamics of vector boson production in fundamental parton interactions.

863

Deeply Virtual Compton Scattering at HERA

Deeply virtual Compton scattering (DVCS) production in ep collisions at HERA was studied with the ZEUS detector using an integrated luminosity of 0.5 fb⁻¹. New measurements of cross sections as functions of the photon virtuality, Q², and the photon-proton centre-of-mass energy, W are presented. In addition, differential cross sections as functions of the square of the four-momentum transfer at the proton vertex, t, are also shown.

868

ANTARES status report

The ANTARES telescope is the largest underwater neutrino telescope existing at present. It is based on the detection of Cherenkov light produced in sea water by neutrino-induced muons. The detector, consisting of a tri-dimensional array of 885 photomultipliers arranged on 12 vertical lines, is located at a depth of 2475 m in the Mediterranean Sea, 40 km off the French coast. It is mostly sensitive to neutrinos in an energy range from a few hundred GeV up to 1 PeV, and it has an effective area for upward muon detection which reaches 0.05 km² at the highest energies.

The main goal of the experiment is to probe the Universe by means of neutrino events in an attempt to investigate the nature of high energy astrophysical sources, to contribute to the identification of cosmic ray sources, and to explore the nature of dark matter. In this talk we will review the status of the detector, illustrate its operation and performance, and present the first results from the analyses carried out on atmospheric muons, atmospheric neutrinos, as well as from the search for astrophysical neutrino sources.

878

Hadron Physics with KLOE-2

Experiments at the Phi-factory can shed light on many aspects of hadron physics. A new beam crossing scheme allowing for a reduced beam size and increased luminosity is operating at DAΦNE. The KLOE-2 detector is successfully rolled in this new interaction region and is ready to acquire collision data. At the moment, the detector is being upgraded with small angle tagging devices, to detect both high and low e^+e^- energy in $e^+e^- \rightarrow e^+e^-X$ events, namely $\gamma\gamma$ processes. The following perspectives are presented: $\gamma\gamma \rightarrow \pi^0\pi^0$ for probing light scalar meson dynamics, and $\gamma\gamma \rightarrow \eta$, $\gamma\gamma \rightarrow \pi^0$ for the determination of transition form factors.

The inner tracker and small angle calorimeters are scheduled to be installed in a subsequent step, providing with larger acceptance for both charged particles and photons. We present perspectives derived using these upgrades together with increased statistics: rare η decays, accurate study of the dominant η decays (e.g. $\eta \rightarrow \eta\pi\pi$, to constrain scalar meson exchange) and the limit on the $\phi \rightarrow K_S K_S \gamma$ branching ratio, relevant for the scalar meson structure. One possible solution to the Dark Matter problem, allowing also to interpret the positron excess measured by the satellite Payload experiment PAMELA, suggests a Hidden Sector that can be constrained by KLOE-2 at DAΦNE: possible channels and impacts on the parameters space are discussed. Improvements on hadronic cross section at an energy-upgraded DAΦNE are addressed, needed to understand the 3-sigma effect on $(g-2)_\mu$ and for precision determination of α_{em} at the TeV scale.

879

Search for the Upsilon(³1D_J) bottomonium State in decays to pi pi Upsilon(1S) at BABAR

We present an observation of the Upsilon(³1D_J) state of bottomonium in the reaction Upsilon(3S) → gamma gamma Upsilon(³1D_J), Upsilon(³1D_J) → pi pi Upsilon(1S) with a significance of 6.2 standard deviations. The results of an angular analysis aimed at spin-parity assignments will be shown.

880

The search for new X(3872) decay modes and for the Z1 and Z2 states in chi_{c1} pi

We present a search for the X(3872) produced in $B \rightarrow \psi \pi^+ \pi^- K$ and $B \rightarrow \psi \pi^+ \pi^- \pi^0 K$ ($\psi = J/\psi$ or $\psi(2S)$) using 427 fb⁻¹ of BaBar data. We also report on a search for the Z1 and Z2 states in the chi_{c1} pi invariant-mass distribution at BaBar. We perform a study of charged and neutral B decays to chi_{c1} K pi. The aim is to search for the two resonance-like structures, the Z1 and Z2, first observed by the Belle experiment in the chi_{c1} pi+ invariant-mass distribution near 4.1 GeV in exclusive $B^0 \rightarrow \chi_{c1} K \pi^+$.

881

Observation of inclusive D^{*+} production in the decay of Upsilon(1S)

We present a study of the decay $\text{Upsilon}(1S) \rightarrow D^{*+} + X$ produced in the decay $\text{Upsilon}(2S) \rightarrow \pi^+ \pi^- \text{Upsilon}(1S)$ using a sample of 98.6 million $\text{Upsilon}(2S)$ events. We measure the $\text{Upsilon}(1S) \rightarrow D^{*+} + X$ branching fraction and the momentum distribution of the D^* in the $\text{Upsilon}(1S)$ rest-frame. We find evidence for an excess of D^{*+} production over the expected rate from the virtual photon annihilation process $\text{Upsilon}(1S) \rightarrow \gamma^* \rightarrow c \bar{c} \rightarrow D^{*+} X$.

882

Search for CP violation in semileptonic B^0_s decays

We have performed a search for CP violation in a sample of $B^0_s \rightarrow \mu^+ D^-_s X$ decays corresponding to 5 fb^{-1} of proton-antiproton collisions collected by the D0 detector in Run II at the Fermilab Tevatron collider. New physics in B^0_s mixing could contribute a significant CP violating weak phase which would be observed as a difference in the decay-time distribution for $B^0_s \rightarrow \bar{B}^0_s$ oscillated states versus that for $\bar{B}^0_s \rightarrow B^0_s$. A fit to the decay-time distribution of the B^0_s / \bar{B}^0_s candidates yields the flavor-specific asymmetry $A_{\text{fs}} = [-1.7 \pm 9.1 (\text{stat}) \pm 1.4_{-1.5} (\text{syst})] \times 10^{-3}$ which excludes CP violation due to new physics within the experimental sensitivity.

885

A Measurement of B_s^0 Mixing Using the Flavor-tagged Decay $B_s^0 \rightarrow J/\psi \phi$

We report an improved measurement of the CP-violating phase ϕ_s , of the decay width difference for the two mass eigenstates $\Delta \Gamma_s$, of the mean B^0_s lifetime $\overline{\tau}_s$, and of magnitudes of the decay amplitudes, from the flavor-tagged decay $B_s^0 \rightarrow J/\psi \phi$ using a data sample with an integrated luminosity of 6.1 fb^{-1} collected with the D0 detector at the Fermilab Tevatron collider.

888

Combination of the D0 constraints on the CP violating phase ϕ_s

We present a combination of the D0 measurements of the B^0_s width difference, $\Delta \Gamma_s$, and of the CP-violating phase, ϕ_s . We include in this combination the measurement of the B^0_s mixing parameters obtained from flavor-tagged $B_s^0 \rightarrow J/\psi \phi$ decays, the search for CP violation in semileptonic $B^0_s \rightarrow \mu^+ D^-_s X$ decays, the measurement of the branching ratio for the decay $B^0_s \rightarrow D^{*+}_s D^{*-}_s$ and the measurement of the like-sign asymmetry for semileptonic B^0_s decays.

891

Observation of the $B \rightarrow D_s K l \nu X$ decay mode

The decay $B \rightarrow D_s K l \nu X$ has not been observed yet. Its knowledge provides input to the "1/2 vs 3/2 puzzle" of semileptonic B decays into broad D^{**} states, where there is disagreement between theoretical predictions and experimental results. Furthermore the knowledge of its branching ratio provides a better estimation of background in future studies of $B_s \rightarrow X l \nu$ decays. We present the first observation of the $B \rightarrow D_s K l \nu X$ decay, based on the analysis of the full BaBar dataset.

892

Measurement of Z^0 production in ep collisions at HERA

The production of Z^0 bosons in ep collisions at HERA has been searched for with the ZEUS detector using a data sample corresponding to a luminosity of 0.4 fb^{-1} . In the SM, this process has a very small cross section of approximately 0.3 pb. The search was done for the decays of the Z^0 to two energetic jets of hadrons. To avoid a large contribution from QCD backgrounds, the event selection was optimized for final states in which no hadronic activity is observed in the forward region of the calorimeter, thus preferentially selecting elastic and quasi-elastic interactions on the proton side. The resulting di-jet invariant mass distribution is presented for the selected event topologies.

894

A study of radiative Upsilon(2S) and Upsilon(3S) transitions using converted photons

We present a study of the radiative transitions from decays of the Upsilon(2S) and Upsilon(3S) resonances using photons that have converted into an e^+e^- pair. This study uses data collected with the BABAR detector operating at the SLAC PEP-II B-factory on the Upsilon(2S) and Upsilon(3S) resonances.

900

Associated charm baryon production in Initial State Radiation events and measurements of the $Y(4260)$ state produced in $e^+e^- \rightarrow \gamma_{ISR} J/\psi \pi^+\pi^-$

We present an analysis of a threshold enhancement observed in $(\Lambda_c^+ \text{ anti-}\Lambda_c^-)$ pairs produced in the reaction $e^+e^- \rightarrow \gamma_{ISR} \Lambda_c^+ \text{ anti-}\Lambda_c^-$. This study uses data collected with the BABAR detector operating at the SLAC PEP-II B-factory. We also report on updated mass and width measurements for the $Y(4260) \rightarrow J/\psi \pi^+\pi^-$ produced in initial state radiation events using 454 fb⁻¹ of BaBar data.

901

A study of charmonium produced in two-photon collisions at BaBar

We describe a detailed study of charmonium states produced in two-photon collisions and decaying to $K_S^0 K \pi$ and $K K \pi \pi \pi^0$. We present a high statistics measurement of the mass and width of the $\eta_c(2S)$ state.

902

Search for Invisible Decays of the Upsilon(1S)

We report on a search for invisible decays of the Upsilon(1S) meson using a sample of 9.1E6 Upsilon(3S) mesons collected at the BABAR/PEP-II B factory. We select events containing Upsilon(3S) $\rightarrow \pi^+ \pi^-$ Upsilon(1S) and search for evidence of an undetectable Upsilon(1S) decay recoiling against the di-pion system.

910

New Measurement of the Neutral Pion Life Time as a Precision Test of Chiral Anomaly

Symmetries and their spontaneous breaking effects play a fundamental role in our understanding of Nature. In particular, the three neutral light mesons, π^0 , η and η' , contain fundamental information about chiral symmetry breaking, and their radiative decays are primarily defined by the chiral anomaly.

Theoretical activities in this domain for the past several years resulted in a high precision (1% level) prediction for the decay rate of the π^0 into two photons. The present experimental uncertainty of this decay rate, according to the Particle Data Group average, is an order of magnitude greater than the theoretical

uncertainties. In the past several years, the PrimEx collaboration at Jefferson Lab

has developed and performed a new experiment to measure the π^0 lifetime with high precision, using the small angle coherent photoproduction of π^0 's in the Coulomb field of a nucleus, (i.e.), the Primakoff effect. The new level of experimental precision has been reached by implementing the new high intensity and resolution photon tagging facility in Hall B at Jefferson Lab and by developing a novel high resolution electromagnetic hybrid calorimeter (HYCAL). Two well known electromagnetic processes, the Compton scattering and the $e^+e^- \rightarrow \pi^0 \gamma$ pair production have been used to check the precision, as well as to control the long term stability of this experiment. The final results of this new measurement at the few percent level will be presented and compared with the recent predictions of chiral perturbation theory.

923

Precision Predictions for Top-Quark Pair Production at Hadron Colliders

Precision predictions for phenomenologically interesting observables such as the $t\bar{t}$ invariant mass distribution and forward-backward asymmetry in top-quark pair production at hadron colliders require control over the differential cross section in perturbative QCD. We improve existing calculations of the doubly differential cross section in the invariant mass and scattering angle by using techniques from soft-collinear effective theory to perform an NNLL resummation of threshold logarithms, which become large when the invariant mass M of the top-quark pair approaches the partonic center-of-mass energy $\sqrt{\hat{s}}$. We match our results in the threshold region with the exact results at NLO in fixed-order perturbation theory, and perform a numerical analysis of the invariant mass distribution, the total cross section, and the forward-backward asymmetry. Using MSTW2008NNLO parton distribution functions (PDFs), we obtain for the inclusive production cross sections at the Tevatron and LHC the values $\sigma_{t\bar{t}}^{\text{Tevatron}} = (6.30 \pm 0.19)_{-0.23}^{+0.31}$ pb and $\sigma_{t\bar{t}}^{\text{LHC}} = (149 \pm 7 \pm 8)$ pb, where the first error results from scale variations while the second reflects PDF uncertainties.

924

Precision Predictions for Higgs Production at Hadron Colliders

We use renormalization-group methods in effective field theory to improve the theoretical prediction for the cross section for Higgs-boson production at hadron colliders. In addition to soft-gluon resummation at $N^3\text{LL}$, we also resum enhanced contributions of the form $(C_A/\pi\alpha_s)^n$, which arise in the analytic continuation of the gluon form factor to time-like momentum transfer. This resummation is achieved by evaluating the matching corrections arising at the Higgs-boson mass scale at a time-like renormalization point $\mu^2 < 0$, followed by renormalization-group evolution to $\mu^2 > 0$. We match our resummed result to NNLO fixed-order perturbation theory and give numerical predictions for the total production cross section as a function of the Higgs-boson mass. Resummation effects are significant even at NNLO, where our improved predictions for the cross sections at the Tevatron and the LHC exceed the fixed-order predictions by about 13% and 8%, respectively, for $m_H = 120$ GeV. We also discuss the application of our technique to other time-like processes such as Drell-Yan production, $e^+e^- \rightarrow \text{hadrons}$, and hadronic decays of the Higgs boson.

926

A Time Projection Chamber based on Micro-Pattern Gas Detectors for a Future Linear Collider Detector

Time Projection Chambers (TPCs) have demonstrated very good performance in past collider experiments. To meet the physics requirements of a future Linear Accelerator, such as the International Linear Collider (ILC) or the Compact Linear Collider (CLIC), the performance of the central tracking device has to be improved by an order of magnitude in many key parameters.

This can be achieved by using Micro-Pattern Gas Detectors (MPGDs) as gas amplification and readout stages. The LCTPC collaboration studies this combination of TPCs with new readout technologies such as Gas Electron Multipliers (GEMs) or MICRO-Mesh Gaseous Detectors (Micromegas). As a new readout concept the combination of CMOS pixel readout chips (e. g. Timepix) with one of these amplification systems was proposed and is investigated as an alternative to a pad based TPC readout.

The research program of the collaboration comprises three stages: The first one is the demonstration phase where individual groups demonstrate that the various readout techniques can meet the physics requirements using small scale prototypes. Here, excellent space point resolution of down to 50 μm could be shown. The consolidation phase brings the groups together to design and construct a medium size test detector to compare the different techniques in a common test bed and to address integration issues. For this purpose the LCTPC collaboration has built the Large Prototype TPC (LP). The LP has an inner diameter of 720 mm, a length of 610 mm and allows to measure up to 125 space points per track. The setup is completed by a superconducting magnet with $B = 1.25$ T, silicon tracking detectors outside the TPC and a laser calibration system. The LP is currently operated at a 6 GeV electron test beam at DESY, Hamburg. A series of test beam campaigns have been conducted and first results with various readout techniques are available. In the design phase of the research program an engineering

design for aspects of the TPC at a Linear Collider will be addressed and a full scale prototype of such a detector is planned.

Results and future plans from all three phases will be presented at the conference.

936

A precise measurement of the tau lepton lifetime at Belle

The tau lepton lifetime is measured using the process $e^+e^- \rightarrow \tau^+\tau^-$, where both tau leptons decay to $3\pi\nu$. The obtained result is based on a large data sample collected on the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. An upper limit on the relative lifetime difference between positive and negative tau-leptons has been also obtained.

937

CP violation in $\tau \rightarrow \nu K_S \pi$

We present the results of a search for CP violation in $\tau \rightarrow \nu K_S \pi$ using a large data sample collected by the Belle experiment at the KEKB asymmetric-energy e^+e^- collider. CP violation in semileptonic tau decays is generally forbidden in the Standard Model but can be induced by the exchange of an exotic scalar such as a charged Higgs in supersymmetric models. Exploiting the large statistics of the Belle data set, we report a model-independent limit for CP violation as well as a significantly improved measurement of the CP violation parameters for specific parameterizations of the hadronic structure functions.

938

Experimental study of $\eta\eta$ production in two-photon collisions

The differential cross section for the process $\gamma\gamma \rightarrow \eta\eta$ has been measured in the kinematic range above the $\eta\eta$ threshold, $1.096 \text{ GeV} < W < 3.8 \text{ GeV}$, in almost the whole solid angle, $|\cos\theta^*| < 0.9$ or < 1.0 depending on W , where W and θ^* are the energy and η scattering angle, respectively, in the $\gamma\gamma$ center-of-mass system. This is the first measurement of the cross section for this process. The results are based on a 393 fb^{-1} data sample collected with the Belle detector at the KEKB e^+e^- collider. In the W range $1.1\text{--}2.0 \text{ GeV}$ we perform an analysis of resonance amplitudes for various partial waves; at higher energy we extract the contributions of χ_{cJ} charmonia and compare the energy and angular dependence of the cross section with the predictions of theoretical models.

940

Studies of $B^+ \rightarrow \bar{D}^{(*)0} \tau^+ \nu$ with inclusive reconstruction of the accompanying B meson

We present studies of $B^+ \rightarrow \bar{D}^{(*)0} \tau^+ \nu$ and $B^+ \rightarrow \bar{D}^0 \tau^+ \nu$ decays using a large data sample collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. The events are tagged by inclusively reconstructing the accompanying B meson. Measurements of branching fractions and distributions characterizing signal decays are presented.

941

Observation of $\eta_c(2S)$ in six-prong final states produced in two-photon collisions

We report the observation of $\eta_c(2S)$, produced in two-photon collisions, and decaying to the six-prong final states $3(\pi^+\pi^-)$, $K^+K^-2(\pi^+\pi^-)$, and $K^0_S K^+ \pi^- \pi^+ \pi^-$ (including the charge-conjugate state). This analysis is based on a large data sample accumulated by the Belle experiment at the KEKB asymmetric-energy electron-positron collider. This is the first observation of decay modes of the $\eta_c(2S)$ other than $K^0_S K^+ \pi^-$.

945

Measurement of the decay $B \rightarrow \tau \nu$ at Belle

We present a measurement of the decay $B \rightarrow \tau \nu$ in a large data sample recorded with the Belle detector at the KEKB asymmetric energy e^+e^- collider. We obtain the branching fraction for $B \rightarrow \tau \nu$ and present a direct determination of the product of the B meson decay constant f_B and the magnitude of the Cabibbo-Kobayashi-Maskawa matrix element $|V_{ub}|$. The resulting constraints on a charged Higgs boson are also discussed.

946

Search for purely leptonic decays $B^+ \rightarrow l^+ \nu$ at Belle

The purely leptonic decay $B^+ \rightarrow l^+ \nu$ ($l = e, \mu$) is highly suppressed in the Standard Model due to lepton helicity mismatch but can be strongly enhanced in New Physics scenarios. We present the results of a search for the decays $B^+ \rightarrow e^+ \nu$ and $B^+ \rightarrow \mu^+ \nu$ using a large data sample recorded by the Belle detector at the KEKB energy-asymmetric e^+e^- collider.

947

Observation of $B_s \rightarrow D_s^{*-} \pi^+$ and $B_s \rightarrow D_s^{(*)-} \rho^+$

The large data sample being recorded with the Belle detector at the $\Upsilon(5S)$ energy provides a unique opportunity to study the poorly-known B_s meson decays. Following our recent measurement of $B_s \rightarrow D_s \pi$ in a sample of 23.6 fb^{-1} , we extend the analysis to include decays with photons in the final state. Using the same sample, we report the first observation of three other dominant exclusive B_s decays, in the modes $B_s \rightarrow D_s^{*-} \pi^+$, $B_s \rightarrow D_s^{(*)-} \rho^+$ and $B_s \rightarrow D_s^{(*)-} \rho^+$. We measure their respective branching fractions and, using helicity-angle distributions, the longitudinal polarization fraction of the $B_s \rightarrow D_s^{(*)-} \rho^+$ decay.

948

Measurement of $B(B_s \rightarrow D_s^{(*)+} D_s^{(*)-})$ and Estimate of $\Delta \Gamma_{CP}$

We present a measurement of the branching fractions for the decays $B_s \rightarrow D_s^{(*)+} D_s^{(*)-}$ using a large data sample collected at the $\Upsilon(5S)$ resonance with the Belle detector at KEKB. In the heavy quark limit, this branching fraction is directly related to the width difference between the CP-odd and CP-even B_s states.

949

Measurement of Branching Fraction for $B_s \rightarrow J/\psi f_0(980)$

We present a measurement of the branching fraction for the CP eigenstate decay $B_s \rightarrow J/\psi f_0(980)$. The result is based on 23.6 fb^{-1} of data collected at the $\Upsilon(5S)$ resonance with the Belle detector at the KEKB asymmetric e^+e^- collider.

950

Measurement of $\Upsilon(5S)$ decays to B^0 and B^+ mesons

Decays of the $\Upsilon(5S)$ resonance to channels with B^+ and B^0 mesons are studied using a 23.6 fb^{-1} data sample collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. Fully reconstructed $B^+ \rightarrow J/\psi K^+$, $B^0 \rightarrow J/\psi K^0$, $B^+ \rightarrow \bar{D}^0 \pi^+$ and $B^0 \rightarrow D^- \pi^+$ decays are used to obtain the charged and neutral B production rates per $B\bar{B}$ event, $f(B^+) = (72.1^{+3.9}_{-3.8} \pm 5.0)\%$ and $f(B^0) = (77.0^{+5.8}_{-5.6} \pm 6.1)\%$. Assuming equal rates to B^+ and B^0 mesons in all channels produced at the $\Upsilon(5S)$ energy, we measure the fractions for transitions to two-body and three-body channels with B meson pairs, $f(B\bar{B}) = (5.5^{+1.0}_{-0.9} \pm 0.4)\%$, $f(B\bar{B}^* + B^* \bar{B}) = (13.7 \pm 1.3 \pm 1.1)\%$, $f(B^* \bar{B}^*) = (37.5^{+2.1}_{-1.9} \pm 3.0)\%$, $f(B\bar{B} \pi) = (0.0 \pm 1.2 \pm 0.3)\%$, $f(B\bar{B}^* \pi + B^* \bar{B} \pi) = (7.3^{+2.3}_{-2.1} \pm 0.8)\%$, and $f(B^* \bar{B}^* \pi) = (1.0^{+1.4}_{-1.3} \pm 0.4)\%$. The latter three fractions are obtained assuming isospin conservation.

951

Recent Results on Deeply Virtual Compton Scattering at HERMES

Deeply Virtual Compton Scattering is an elegant tool to investigate the angular momenta of partons inside the nucleon. Using longitudinally polarized electron and positron beams, HERMES has studied this process using various gaseous targets, in either unpolarized or longitudinal as well as transverse polarization states.

This variety of experimental setups enable the extraction of a wealth of asymmetry amplitudes, which in turn are related to Generalized Parton Distributions (GPDs).

This presentation will focus on the results obtained from a hydrogen and a deuterium target. In summary, the leading-twist asymmetry amplitudes are sizeable, while the suppressed higher twist contributions are compatible with zero.

953

Search for $B_s \rightarrow hh$ decays

We have searched for $B_{s^0} \rightarrow hh$ decays, where h stands for a charged or neutral kaon, or a charged pion. These results are based on 23.6 fb^{-1} of data collected with the Belle detector on the $\Upsilon(5S)$ resonance at the KEKB asymmetric-energy e^+e^- collider, containing 1.25 million $B_{s^0} \bar{B}_{s^0}$ events. We observe the decay $B_{s^0} \rightarrow K^+ K^-$ and measure its branching fraction, $\mathcal{B}(B_{s^0} \rightarrow K^+ K^-) = [3.8_{-0.9}^{+1.0} (\text{stat}) \pm 0.5 (\text{syst})] \times 10^{-5}$. No significant signals are seen in other decay modes, and we set upper limits at the 90% confidence level: $\mathcal{B}(B_{s^0} \rightarrow K^- \pi^+) < 1.2 \times 10^{-5}$, $\mathcal{B}(B_{s^0} \rightarrow \pi^+ \pi^-) < 2.6 \times 10^{-5}$ and $\mathcal{B}(B_{s^0} \rightarrow K^0 \bar{K}^0) < 6.6 \times 10^{-5}$.

954

Observation of an enhancement in $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$, $\Upsilon(2S)\pi^+\pi^-$, and $\Upsilon(3S)\pi^+\pi^-$ production around $\sqrt{s}=10.89 \text{ GeV}$ at Belle

We measure the production cross sections for $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$, $\Upsilon(2S)\pi^+\pi^-$, and $\Upsilon(3S)\pi^+\pi^-$ as a function of \sqrt{s} between 10.83 GeV and 11.02 GeV. The data consists of 8.1 fb^{-1} collected with the Belle detector at the KEKB e^+e^- collider. We observe enhanced production in all three final states that does not conform well with the conventional $\Upsilon(10860)$ lineshape.

955

Measurement of ϕ_3 with a Dalitz Plot Analysis of $B^+ \rightarrow D^{(*)} K^{(*)+}$ Decay

We present a measurement of the unitarity triangle angle ϕ_3 using Dalitz plot analysis of three-body neutral D decays from the $B^+ \rightarrow D^{(*)} K^{(*)+}$ process. The results are based on a large sample of $B \bar{B}$ pairs recorded at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB e^+e^- collider.

956

Improved Measurements of $B \rightarrow D_s^{(*)} \pi$ and $B \rightarrow D_s^{(*)} K$ Branching Fractions

We present improved measurements of the branching fractions for the decays $B^0 \rightarrow D_s^{(*)+} \pi^-$ and $\bar{B}^0 \rightarrow D_s^{(*)+} K^-$ using a data sample of 657×10^6 $B \bar{B}$ events collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider, operating at the $\Upsilon(4S)$ resonance. Based on these results, we determine the ratio between the amplitudes of the doubly Cabibbo suppressed decay $B^0 \rightarrow D^{(*)+} \pi^-$ and the Cabibbo favored decay $B^0 \rightarrow D^{(*)-} \pi^+$.

957

Study of the decay $B \rightarrow D^{(*)} K^{(*)}$ for the measurement of the CP-violating angle ϕ_3

The decay $B \rightarrow D^{(*)} K^{(*)}$ ($D = D^0$ or \bar{D}^0) includes the $b \rightarrow u$ transition and plays a crucial role in the measurement of the CP-violating angle ϕ_3 . We present the result of a study of the decay $B \rightarrow D^{(*)} K^{(*)}$ where the D meson is reconstructed from $K^+ \pi^-$, using a large data sample of $B\bar{B}$ events collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider operating on the $\Upsilon(4S)$ resonance.

958

Search for $1P \rightarrow 1S$ radiative transitions of D mesons

We present a search for $B^{\pm} \rightarrow \pi^{\pm} D^{*0}$, $D^{*0} \rightarrow \gamma D^0$ with a data sample from the Belle detector at the KEKB e^+e^- collider containing $771 \times 10^6 B\bar{B}$ pairs. In preliminary studies, we found that the corresponding pionic decays, $D^{*0} \rightarrow \pi^0 D^0$ are important backgrounds. These modes have not previously been studied; we measure them in the same data sample, in order to constrain the background component in the final fit to the γD^0 mass distribution.

959

Study of radiative decays of $\chi_{c1,c2}$ and $X(3872)$ at Belle

We present a study of the radiative decays of the $\chi_{c1,c2}$ and $X(3872)$, produced in B decays. The results are based on a large data sample collected at the $\Upsilon(4S)$ resonance with the Belle detector operating at the KEKB asymmetric-energy e^+e^- collider.

961

Search for CP violation in the decays $D \rightarrow K_s^0 P$

We have searched for CP violation of charmed mesons in the decays $D \rightarrow K_s^0 P$ using the KEKB asymmetric energy e^+e^- collision data collected with the Belle detector, where D denotes D^0 , D^+ and D_s^+ , and P denotes the pseudo-scalar mesons π^+ , K^+ , π^0 , η and η' . No evidence of CP violation in these decays is observed.

962

Measurement of CP asymmetry in $D_{(s)}^+ \rightarrow \phi \pi^+$ decays

We have measured the CP asymmetry difference between the Cabibbo suppressed decay $D^+ \rightarrow \phi \pi^+$ and the Cabibbo favored $D_s^+ \rightarrow \phi \pi^+$ decays. The measured asymmetry is corrected for the residual asymmetry due to detector effects, and the contributions of both CP and forward-backward asymmetries are determined. The results are obtained on a large data sample collected at and near the $\Upsilon(4S)$ resonance with the Belle detector operating at the KEKB asymmetric-energy e^+e^- collider.

963

Precise measurement of direct CP asymmetry in $B^+ \rightarrow J/\psi K^+$

We present a search for direct CP violation in $B^+ \rightarrow J/\psi K^+$ decays using a large data sample collected at the $\Upsilon(4S)$ resonance with the Belle detector operating at the KEKB asymmetric-energy e^+e^- collider. The Standard Model predicts a small direct CP asymmetry, and the experimental precision is of the same level as the expected deviation predicted by some extensions of the Standard Model.

964

Search for D^0 leptonic decays with Belle

We search for the flavor-changing neutral current decays $D^0 \rightarrow \mu^+ \mu^-$ and $D^0 \rightarrow e^+ e^-$, and for the lepton-flavor violating decays $D^0 \rightarrow e^+ \mu^-$ using 660 fb⁻¹ of data collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. We find no evidence for any of these decays. We obtain significantly improved upper limits on the branching fractions: $B(D^0 \rightarrow \mu^+ \mu^-) < 1.4 \cdot 10^{-7}$, $B(D^0 \rightarrow e^+ e^-) < 7.9 \cdot 10^{-8}$ and $B(D^0 \rightarrow e^+ \mu^-) + B(D^0 \rightarrow \mu^+ e^-) < 2.6 \cdot 10^{-7}$ at the 90% confidence level.

966

Measurement of D^0 - \bar{D}^0 mixing through time-dependent Dalitz plot analysis of three-body D^0 decays

We present a measurement of D^0 - \bar{D}^0 mixing parameters in three-body D^0 decays using a time-dependent Dalitz plot analysis. The results are obtained from a large data sample collected on the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric energy e^+e^- collider.

967

Measurement of CP violation parameters in $B^0 \rightarrow K^+ K^- K_S^0$ decays with a time-dependent Dalitz approach

We present a measurement of CP -violating parameters in B^0 decays to the $K_S^0 K^+ K^-$ final state, including $B^0 \rightarrow \phi K_S^0$, using a time-dependent Dalitz plot analysis. The results are based on a large data sample of $B \bar{B}$ pairs collected on the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider.

968

Measurement of CPT Violating Parameter

CPT is expected to be a fundamental symmetry with no significant deviations. Nonetheless we can introduce an artificial perturbation parameter to the B^0 - \bar{B}^0 mixing system that violates CPT symmetry. The CPT violating parameter, which is a complex number but expected to be zero, can be probed through proper time difference distributions in correlated B meson pair decays. We present a measurement of the CPT violating parameter using a large data sample collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB energy-asymmetric e^+e^- collider.

970

Study of $B^0 \rightarrow a_1^{\pm} \pi^{\mp}$ decays

We present measurements of the branching fraction and time-dependent CP violation parameters of $B^0 \rightarrow a_1^{\pm}(1260) \pi^{\mp}$ decays. These results are obtained from a large data sample that contains 772 million $B \bar{B}$ pairs collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider.

971

Improved measurement of CP asymmetries in $B^0 \rightarrow (c \bar{c}) K^0$ decays

We present measurements of time-dependent CP asymmetries in neutral B decays to charmonium final states using a large dataset collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider.

972

Search for charmonium and charmonium-like states in Upsilon(1S) radiative decays

Using a large sample (10^8) $\Upsilon(1S)$ events collected with the Belle detector, we present the results of a first search for charge parity even charmonium and charmonium-like states in $\Upsilon(1S)$ radiative decays. No significant χ_{cJ} , η_c , $X(3872)$, $X(3915)$, or $Y(4140)$ signal is observed, and upper limits on the production rates are determined. Furthermore, no significant evidence for excited charmonium states below $4.8 \text{ GeV}/c^2$ is observed.

973

Search for light Higgs at Upsilon(1S)

We search for light Higgs in a large sample (10^8) of $\Upsilon(1S)$ events recorded with the Belle detector at KEKB. Assuming $\Upsilon(1S) \rightarrow \gamma H$, $H \rightarrow \tau^+ \tau^-$, we determine the upper limits on the production rates for Higgs mass between the $\tau^+ \tau^-$ threshold and the $\Upsilon(1S)$ mass. This result places stringent constraint on certain theoretical models.

974

Search for $\Upsilon(2S) \rightarrow \eta_b \gamma$ and $\Upsilon(2S) \rightarrow \eta \Upsilon$

The Belle experiment has integrated a record sample of 160M $\Upsilon(2S)$ decays on the resonant peak. First results of searches for rare radiative transitions ($\Upsilon(2S) \rightarrow \eta_b(1S) \gamma$ and $\chi_{b0}(1P) \rightarrow \Upsilon(1S) \gamma$), and the hadronic transition $\Upsilon(2S) \rightarrow \eta \Upsilon$ will be presented.

975

Study of $B^+ \rightarrow p \bar{\Lambda} D^{(*)0}$ at Belle

We study the three-body baryonic B^+ decays, $B^+ \rightarrow p \bar{\Lambda} D^{(*)0}$, using a large data sample collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric energy $e^+ e^-$ collider. The branching fractions as well as the differential branching fractions as a function of the mass of the $p \bar{\Lambda}$ system are presented. These results are compared with theoretical predictions based on the generalized factorization approach.

976

Search for B Meson Decays into Invisible Final States

We present a search for B decays into invisible final states using a large data sample collected at $\Upsilon(4S)$ resonance with the Belle detector at the KEKB $e^+ e^-$ collider. The $\nu \bar{\nu}$ signal is identified by fully reconstructing the accompanying B mesons and requiring no other charged particles and no extra energy deposited in the calorimeter. The result obtained will be reported and the corresponding physics will be discussed.

977

Measurements of $B \rightarrow \phi \phi K$ decays

We present improved measurements of the charmless decay $B \rightarrow \phi \phi K$ using a large data sample at $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric energy $e^+ e^-$ collider. We update the branching fractions of $B^{\pm} \rightarrow \phi \phi K^{\pm}$ and $B^0 \rightarrow \phi \phi K^0$ decays, and the measurement of related decays such as $B^{\pm} \rightarrow \phi (K^+ K^-) K^{\pm}$ and $B^0 \rightarrow (K^+ K^-) (K^+ K^-) K^0$. In addition, we also study the charmonium decays related to the $B \rightarrow \phi \phi K$ such as $J/\psi \rightarrow \phi (K^+ K^-)$ and $\eta_c \rightarrow \phi \phi$.

978

Search for $B \rightarrow \phi \pi$

We report on a search for the charmless decays $B^{*+} \rightarrow \phi \pi^{*+}$ and $B^{*0} \rightarrow \phi \pi^{*0}$, which proceed through an external electroweak penguin diagram in the Standard Model. The analysis is based on a data sample of 657 million $B\overline{B}$ pairs collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB e^+e^- storage ring.

979

Measurement of the Branching Fraction and Direct CP asymmetry for $B \rightarrow \pi^0 \pi^0$

We present an updated measurement of the branching fraction and direct CP asymmetry for $B \rightarrow \pi^0 \pi^0$, based on a large data sample collected by the Belle experiment at the KEKB e^+e^- collider.

980

$B^{*+} \rightarrow \rho^+ \omega$ at Belle

We report the results of a search for the charmless decay $B^{*+} \rightarrow \rho^+ \omega$. The analysis is based on a large data sample recorded at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB e^+e^- storage ring.

981

Search for lepton-number-violating decay $B^{*+} \rightarrow D^{*-} \ell^+ \ell^+$ at Belle

In the Standard Model, lepton-number-violating decays such as $B^{*+} \rightarrow D^{*-} \ell^+ \ell^+$ are strictly forbidden, but they are allowed if Majorana-type neutrinos exist. In this paper, we present the results of a search for $B^{*+} \rightarrow D^{*-} \ell^+ \ell^+$ decays with a high-statistics $B\overline{B}$ event sample obtained by energy-asymmetric e^+e^- collisions at KEKB, recorded by the Belle detector.

982

Observation of inclusive $B \rightarrow X_s \eta$ at Belle

We report the first observation of inclusive $B \rightarrow X_s \eta$ decays using a sample of 657×10^6 $B\overline{B}$ pairs accumulated at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric e^+e^- collider. The X_s system is a charmless inclusive state with unit strangeness, and is reconstructed using a pseudo-inclusive technique from a kaon and up to four pions, of which at most one pion is neutral. We measure a partial branching fraction for $M_{X_s} < 2.6 \text{ GeV}/c^2$ to be $(25.5 \pm 2.7 \text{ (stat)} \pm 1.6 \text{ (syst)}^{+3.8}_{-14.1} \text{ (model)}) \times 10^{-5}$. A significant fraction of this signal occurs in the region $M_{X_s} > 1.8 \text{ GeV}/c^2$, which is beyond the range of all previously measured exclusive contributions to $B \rightarrow X_s \eta$.

985

Measurement of $B^0 \rightarrow D_s^- K^0_S \pi^+$ and $B^- \rightarrow D_s^+ K^- K^-$ branching fractions

We present a study of the exclusive decays $B^0 \rightarrow D_s^- K^0_S \pi^+$ and $B^- \rightarrow D_s^+ K^- K^-$ using 657×10^6 $B\overline{B}$ pairs collected at the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy e^+e^- collider. We use the $D_s^- \rightarrow \phi \pi^-$, $\bar{K}^*(892)^0 K^-$ and $K^0_S K^-$ decay modes for D_s reconstruction.

988

SuperNEMO - the next generation double beta decay experiment

The SuperNEMO experiment is being designed to search for neutrinoless double beta decay to test if neutrinos are Majorana particles. The unique experimental technique follows that of the currently running NEMO-3 experiment, which successfully combines tracking and calorimetry to measure the topology and energy of the final state electrons. SuperNEMO will employ about 100kg of ^{82}Se to reach sensitivity to a half-life time of about $2 \cdot 10^{26}$ years, which corresponds to Majorana neutrino masses of about 50 meV, and depends on the calculated value of the nuclear matrix element. The construction of the demonstrator module with 5kg of ^{82}Se is about to begin and, if successful, will be followed by 19 more of similar modules. We will present the current status of the SuperNEMO project including results of the R&D phase of the project.

989

The International Design Study for the Neutrino Factory

The International Design Study for the Neutrino Factory (the IDS-NF) has been established by the Neutrino Factory community to deliver the Reference Design Report (RDR) for the facility by the 2012/13 decision point identified by the Strategy Session of CERN Council. The baseline design for the facility will provide 10^{21} muon decays per year from 25 GeV stored muon beams. The facility will serve two neutrino detectors; one situated at source-detector distance of between 2000—5000km, the second at 7000—8000km. The discovery reach of the Neutrino Factory will be presented and compared with alternative techniques (beta-beam and super-beam). The motivation for measurements of the neutrino-mixing parameters with a precision approaching that with which the quark-mixing parameters are known will be reviewed briefly. The option of a 'low-energy' Neutrino Factory, which may be attractive if θ_{13} is found to be large, will be presented. Finally, the organisation of the IDS-NF and its relation to the EUROnu Design Study will be described.

990

Neutrino oscillation physics with a Neutrino Factory

We illustrate that the baseline Neutrino Factory configuration being developed within the International Design Study for the Neutrino Factory (the IDS-NF) is optimised for standard oscillation-physics measurements and for searches for new physics. The possibility that a low-energy Neutrino Factory might be an interesting alternative for large θ_{13} or, in certain physics scenarios, as part of an upgrade programme is also discussed. Finally, the crucial role played by near detectors in the determination of the standard oscillation parameters and in the search for non-standard physics at the Neutrino Factory will be presented.

994

Accelerator systems for the International Design Study of the Neutrino Factory

The Neutrino Factory produces high-energy neutrino beams with a well-defined flavour content and energy spectrum from the decay of intense, high-energy, stored muon beams. The muon storage rings include long straight sections that are directed toward neutrino detectors that are sited several thousand kilometers away. This poster defines the muon-beam requirements and describes the accelerator facility that is required to deliver them. We give a baseline specification for the accelerator facility and describe the accelerator subsystems of which it is comprised. We will briefly present some of the accelerator-physics challenges such a facility presents and alternative designs for some of the subsystems.

998

HERMES measurements of azimuthal asymmetries related to transverse-momentum dependent quark distributions

The structure of the nucleon can be parametrised in terms of eight leading-twist quark distribution functions when including the transverse momentum of quarks in the description. They embody the correlations between the spin of the nucleon, the spin of the quarks and their longitudinal and transverse momentum. Only two of them, the momentum distribution f_{1q} and the helicity distribution g_{1q} can be measured in inclusive deep-inelastic lepton-nucleon scattering, all others can only be accessed in semi-inclusive measurements where in addition to the scattered lepton also a leading hadron is detected. Examples for such transverse-momentum dependent distribution functions are the 'transversity' distribution, the 'Sivers' and the 'Boer-Mulders' function. Each of these distributions causes distinctive signatures in the hadron's azimuthal angular distribution around the direction of the exchanged virtual photon. The HERMES experiment at HERA has performed such measurements with polarized lepton beams of both helicities and unpolarised as well as longitudinally and transversely polarised targets and has determined the amplitudes of the azimuthal modulations for all leading-twist and several higher-twist contributions to the cross section. The results of these measurements will be reported.

1003

ASICs development for very forward calorimetry at the future ILC

The forward region of detectors at the future ILC accelerator consist of two subdetectors LumiCal and BeamCal. In both cases the development of readout electronic is a challenging task because it has to be fast (machine clock is around 3MHz) and low noise (resolution of 10 bit is necessary) with high input charge dynamic range. Additional challenge for the LumiCal detector is a wide range of sensor capacitances caused by radial geometry, while for the BeamCal it is the occupancy of up to 100%. In both cases the front-end electronics is based on charge-sensitive preamplifier (CSA) with subsequent filter stage increasing the signal-to-noise ratio. In the LumiCal readout electronics consist of two ASICs: the front-end and the ADC. In the BeamCal detector single ASIC contains: front-end, ADC and memory. The LumiCal front-end prototype ASIC is tested and ready for beam test. In this case the CSA is implemented using folded cascode with pole-zero cancellation (PZC) and first order filter to achieve 60 ns peaking time. The prototype ADC with pipeline architecture offers almost linear power consumption dependence on sampling frequency which makes it an attractive choice also for other detector experiments. The BeamCal prototype ASIC is ready but only preliminary results are available in the moment. The front-end CSA is implemented using switched-capacitor circuits with gated reset for fast baseline restoration. Due to high occupancy data from successive approximation ADC is collected in the on chip memory during bunch crossings train and send out in a pause between trains.

1011

Prospects for a DVCS measurement at COMPASS

The high energy polarised muon beam available at CERN with the option of using positive or negative muons with opposite polarisation gives COMPASS an excellent possibility to study generalised parton distributions via deeply virtual Compton scattering. In a first step we propose to use an unpolarised proton target to study the slope of the momentum transfer distribution as a function of x_{bj} . Furthermore, the beam charge and spin difference will be measured over a wide kinematical range to determine the Compton form factor related to the GPD H. As a second step we consider to use a transversely polarised proton target to collect data to constrain the GPD E. In preparation of the future measurements two DVCS test runs were performed in 2008 and 2009.

1019

Recent Progress of the ATLAS Planar Pixel Sensor R&D Project

LHC is planning to upgrade its design luminosity from $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ to $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ towards the end of this decade. This increase in luminosity affects the inner detector of ATLAS in two ways:

Firstly, the radiation levels are increased which requires new solutions for the pixel sensors forming the innermost layers. Especially the b-layer, being located even closer to the interaction point than currently (31 mm vs. 55 mm at current), has to endure fluences of above $10^{16} \text{ neq cm}^{-2}$ while currently, it expects to see $2 \cdot 10^{15} \text{ neq cm}^{-2}$ after 10 years of operation. The current ATLAS pixel detector was designed to sustain radiation damage of up to $1 \cdot 10^{15} \text{ neq cm}^{-2}$ without deterioration of its performance.

Secondly, the occupancy will rise significantly. The inner pixel radii would benefit from a reduction of the pixel size while at the outer layers, even rather large pixels would improve the tracking robustness compared to strip detectors due to their unambiguous track point information.

The ATLAS planar pixel sensor R&D project (PPS) [1,2] aims towards the development of improved silicon pixel sensors based on planar technology for the high-luminosity ATLAS Inner Detector Upgrades. The R&D collaboration comprises 17 institutes from 9 countries with more than 70 scientists.

The current pixel detector, which is based on planar silicon technology, has proven to be reliable, sufficiently radiation hard and being capable of handling large numbers of tracks thanks to its pixel nature. Therefore, planar pixel sensors are a good candidate for the inner part of the upgraded Tracker. Due to the more severe radiation environment, however, the upgraded Inner Detector should not contain the current pixel sensors but modified and improved devices.

First data obtained with planar pixel sensors irradiated to beyond $10^{16} \text{ neq cm}^{-2}$ will be shown indicating that successful operation is possible even for the innermost layers by using high bias voltages. TCAD simulations support the assumption that the observed amount of collected charge can only be explained by charge amplification in high field regions.

To reduce the material budget of the tracker and to enable low-profile barrels such as required for the Insertable B-Layer (IBL), a flat arrangement of sensors with no or very narrow inactive edges is desired to avoid the need for shingling. In the current ATLAS pixel detector, the inactive edges of the pixel modules measure about 1100 μm . New sensors with dedicated slim edges have been produced and dicing trials have been conducted which indicate that the inactive edges could be reduced to approx. 100-200 μm . This would result in a geometric inefficiency of below 1% which is assumed to be acceptable.

To investigate the sensor behaviour under realistic conditions, PPS testbeams have been conducted at DESY and CERN with the EUDET beam telescope; first results will be presented.

[1] <https://edms.cern.ch/document/966140>

[2] <https://twiki.cern.ch/twiki/bin/view/Atlas/PlanarPixelUpgrade>

1222

Inclusive Photoproduction of ρ^0 , K^*0 and ϕ Mesons at HERA

Inclusive non-diffractive photoproduction of $\rho(770)^0$, $K^*(892)^0$ and $\phi(1020)$ mesons is investigated with the H1 detector in ep collisions at HERA. The corresponding average gamma p centre-of-mass energy is 210 GeV. The mesons are measured in the transverse momentum range $0.5 < p_T < 7 \text{ GeV}$ and the rapidity range $|\eta_{\text{lab}}| < 1$. Differential cross sections are presented as a function of transverse momentum and rapidity, and are compared to the predictions of hadroproduction models.