

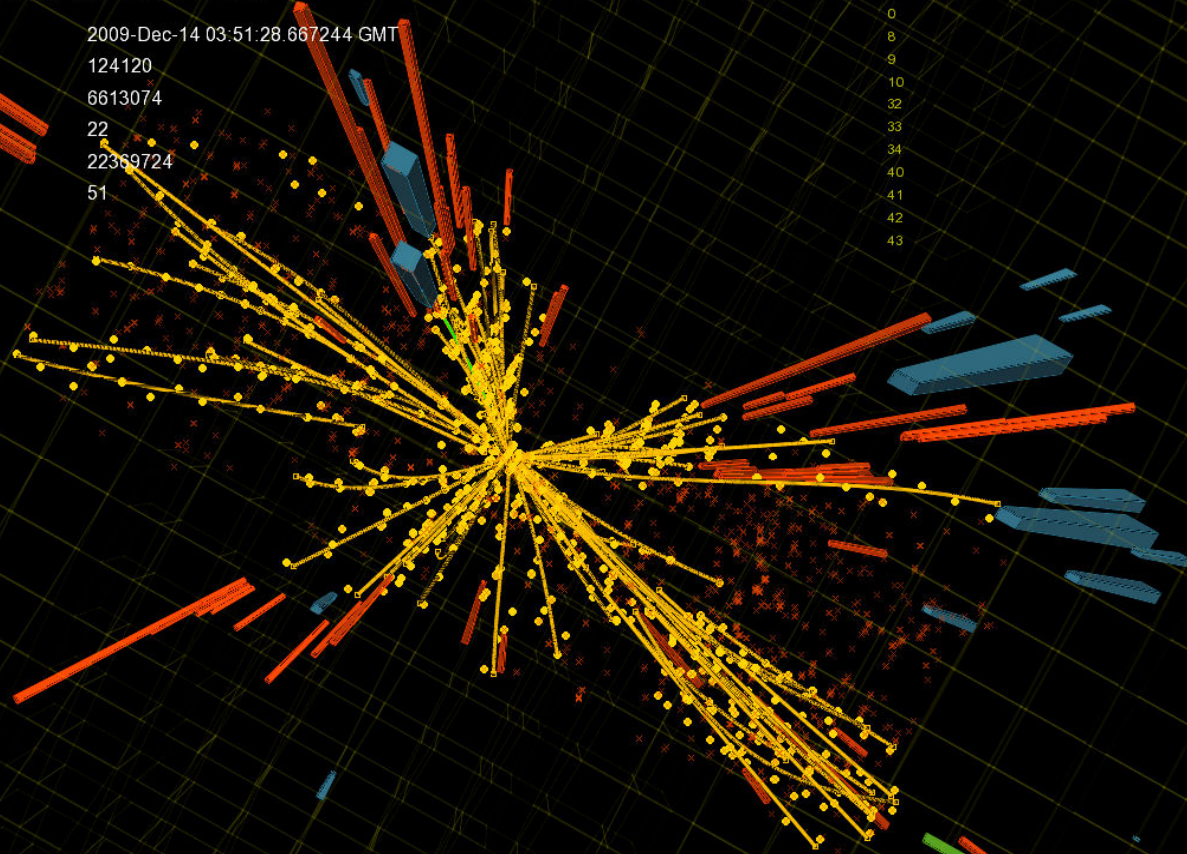


CMS Experiment at the LHC, CERN

Data recorded: 2009-Dec-14 03:51:28.667244 GMT
Run: 124120
Event: 6613074
Lumi section: 22
Orbit: 22369724
Crossing: 51

Tech Triggers:

0
8
9
10
32
33
34
40
41
42
43



Candidate Multi Jet Event at 2.36 TeV

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<http://iguana.cern.ch/ispy>

CMS
2nd LHC Status
Report
CERN 18 Dec'09

Compact Muon Solenoid

T. Virdee
On Behalf of the CMS Collaboration



Summary

CMS has started taking collision data

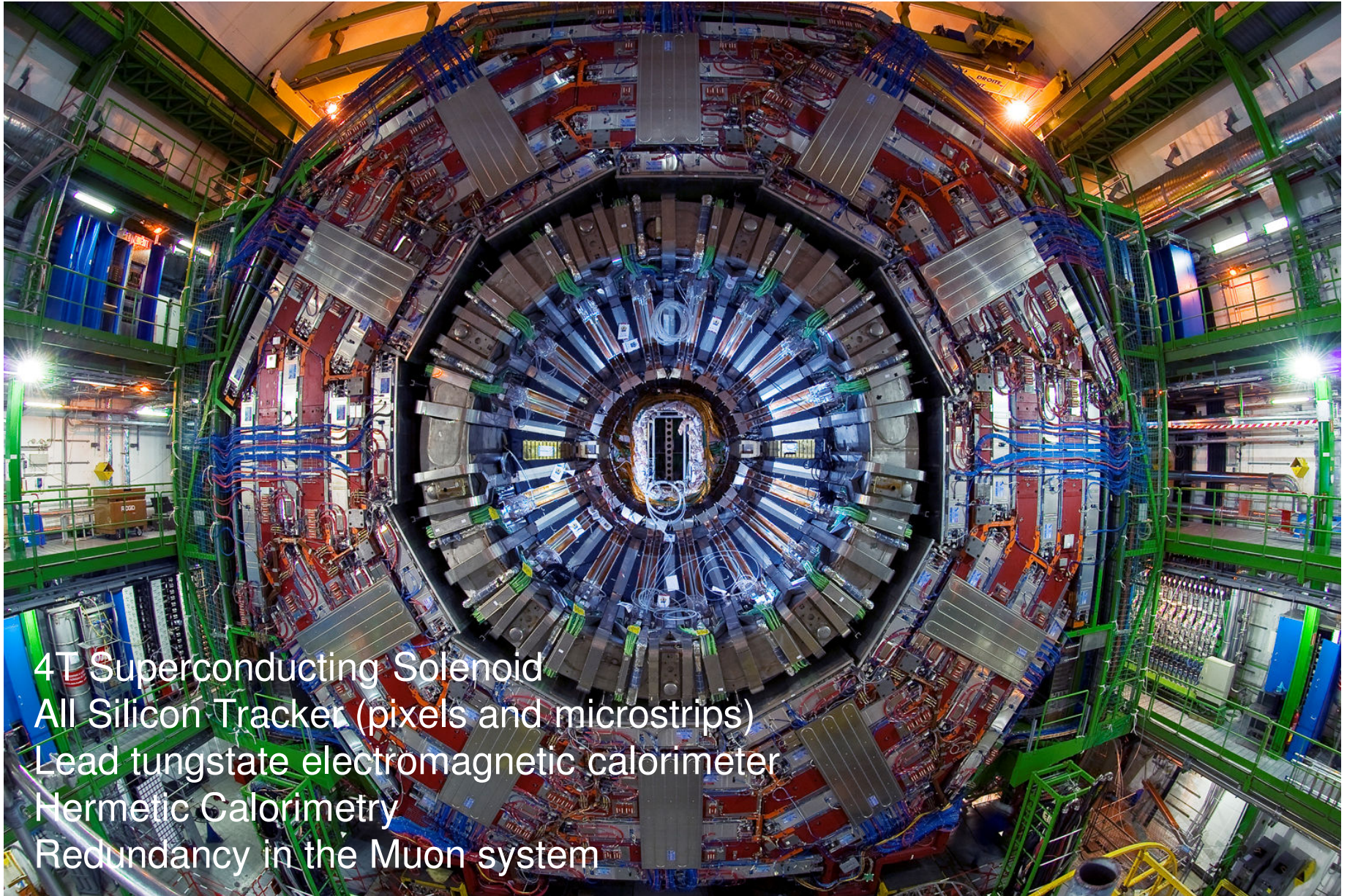
On the average more than 99% of the sub-detector electronic channels are operational. High data-taking efficiency (> 80% for “quiet” or “stable beam” flag (all CMS ON))

All indications are that:

- **data can be analysed rapidly – all chains are working well,**
- **the performance is according to design (almost all distributions agree well with the simulations at the fine level),**
- **CMS is starting to produce results from collision data.**



CMS Detector



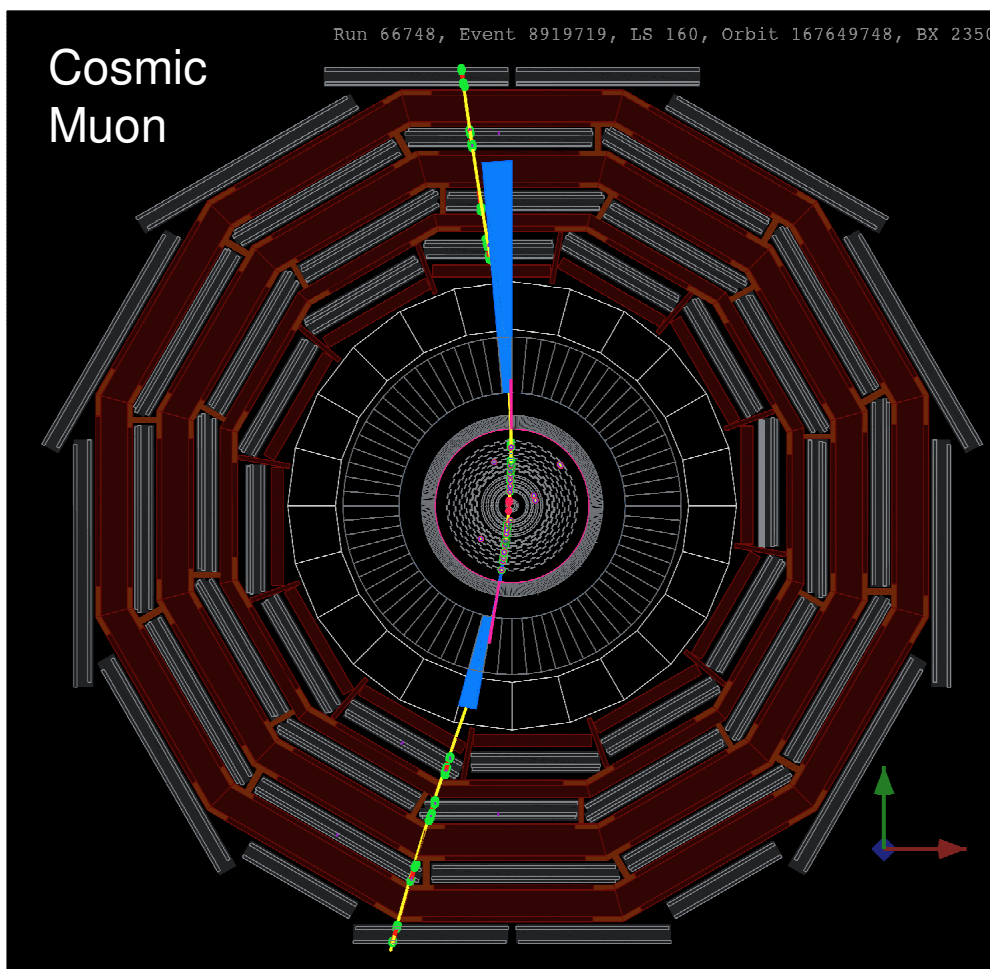
4T Superconducting Solenoid
All Silicon Tracker (pixels and microstrips)
Lead tungstate electromagnetic calorimeter
Hermetic Calorimetry
Redundancy in the Muon system



Prologue

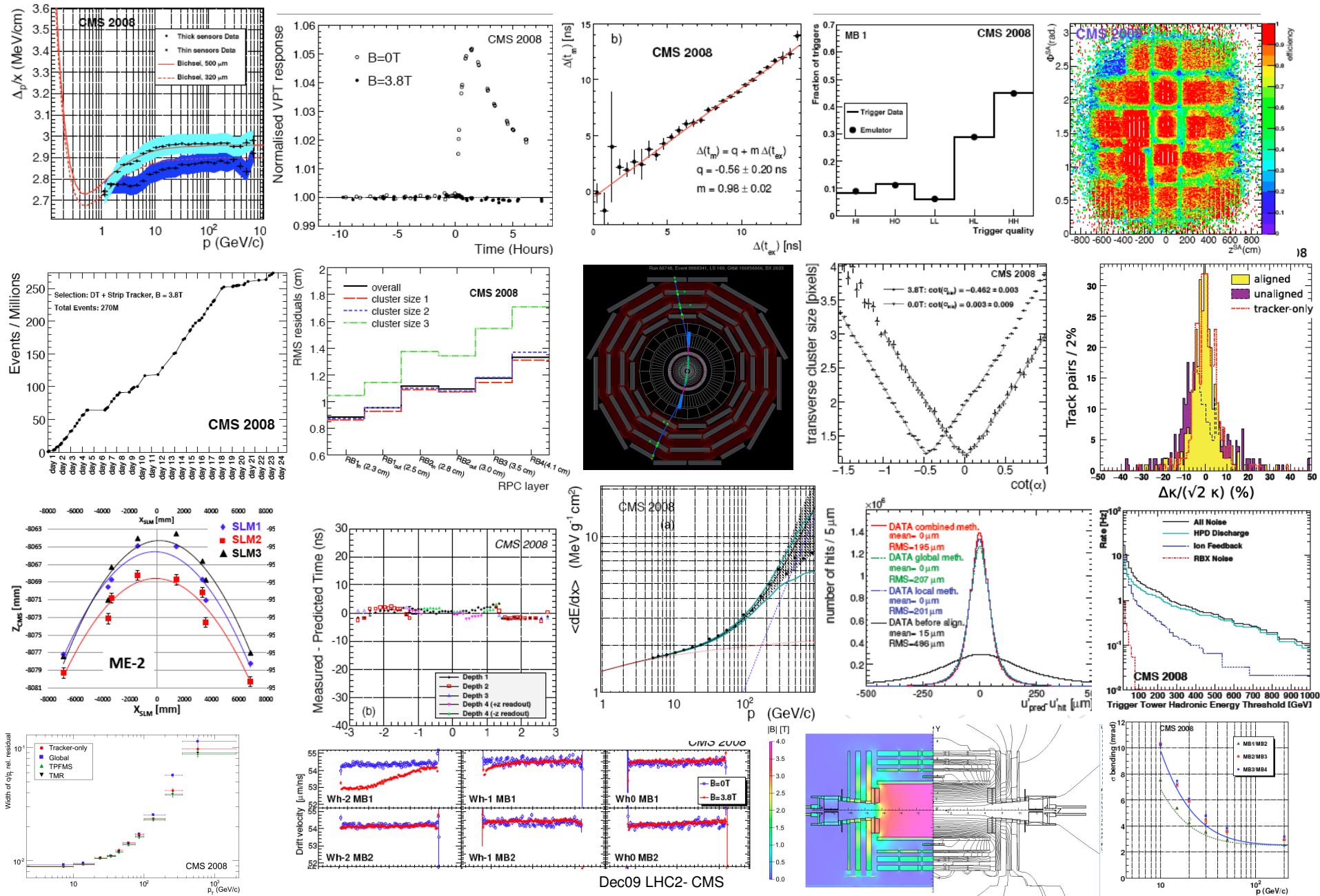
Since Sept. '08 – extensive tests

- Cosmics data taking in Oct'08 and Aug'09 (CRAFT),
- Offline and Computing tests,
- Prompt physics analysis exercise in Oct'09.





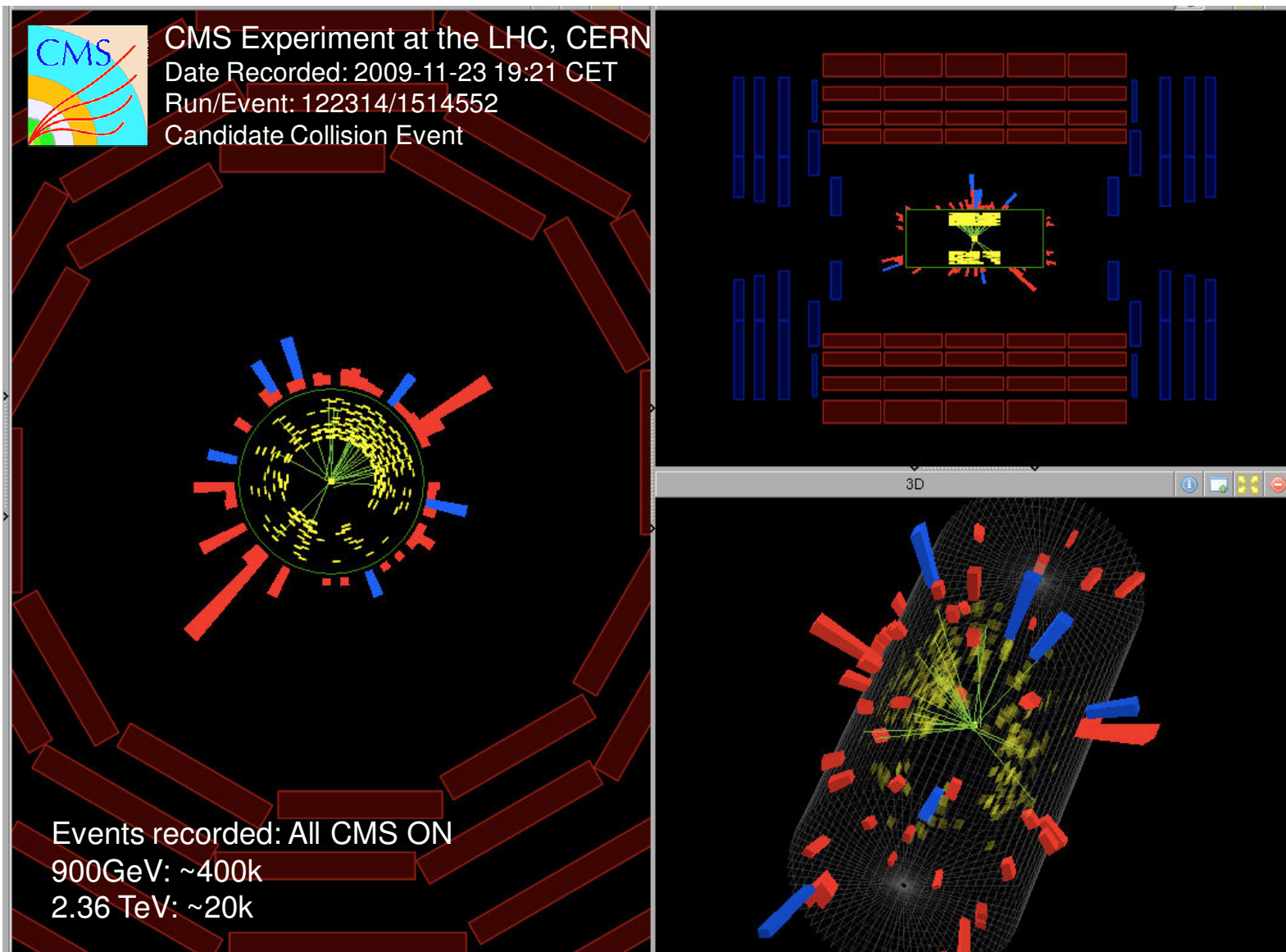
CRAFT: 23 Papers Submitted to JINST





Start of the LHC: First Collisions

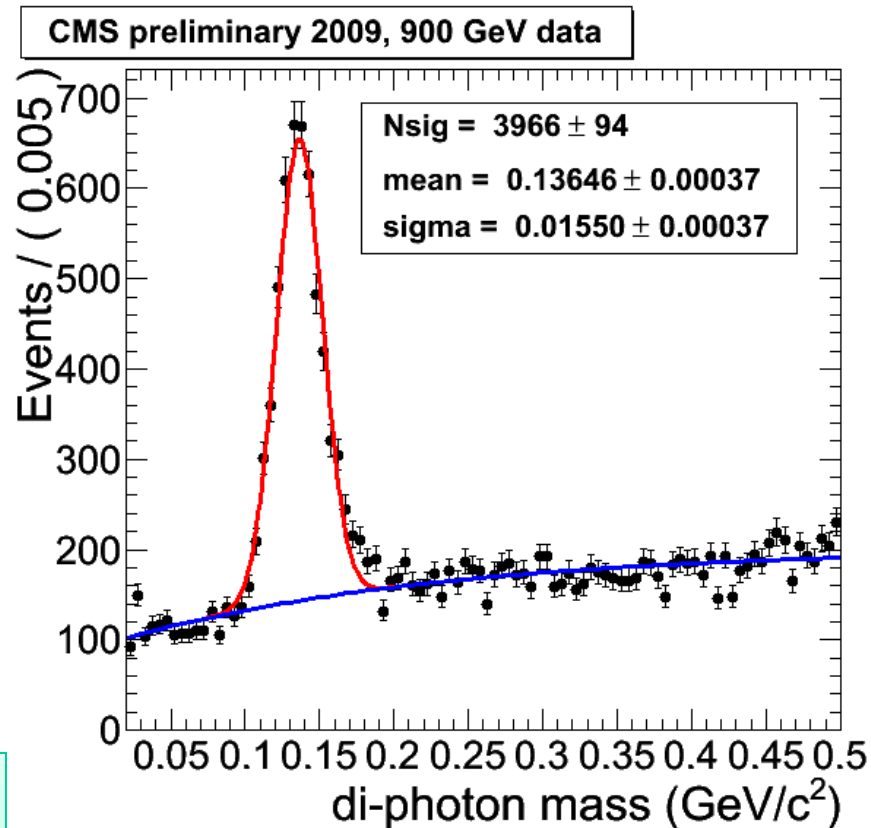
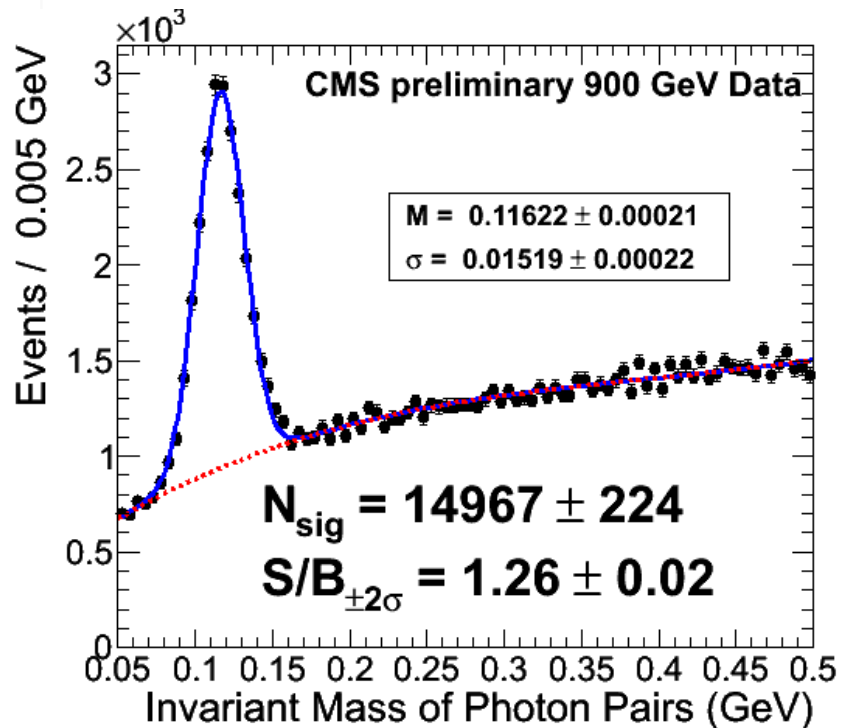
Monday 23rd November





First Di-photon Distribution in CMS

First shown on Thur 27th Nov, Today's distributions shown below



- Data and MC comparison (uncorrected distributions)
- Almost identical S/B, mass and width compatible
- $M(\pi^0)$ is low in both data and MC - Mostly due to the readout threshold (100 MeV/Crystal) and conversions

Using “out of the box” corrections



Rapid Analysis

Sunday 6th Early Morning: First "Physics" Fill

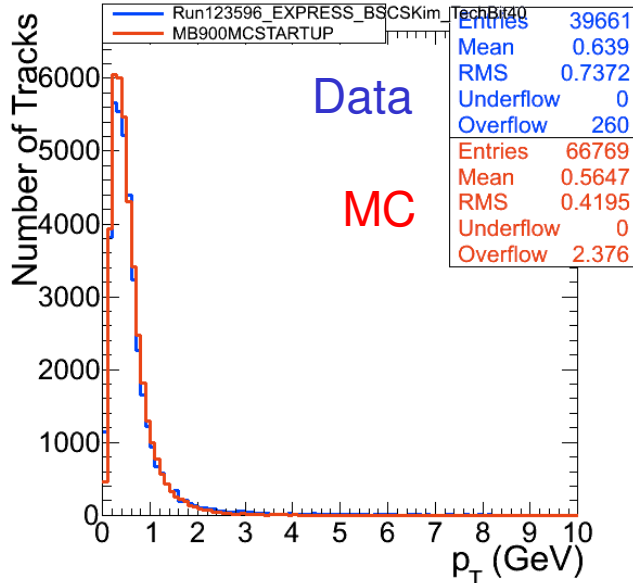
4x4 bunches, $\Sigma \sim e10$ protons, Stable Beam Flag set for the first time

Sunday 6th : 9am
LHC Run Meeting

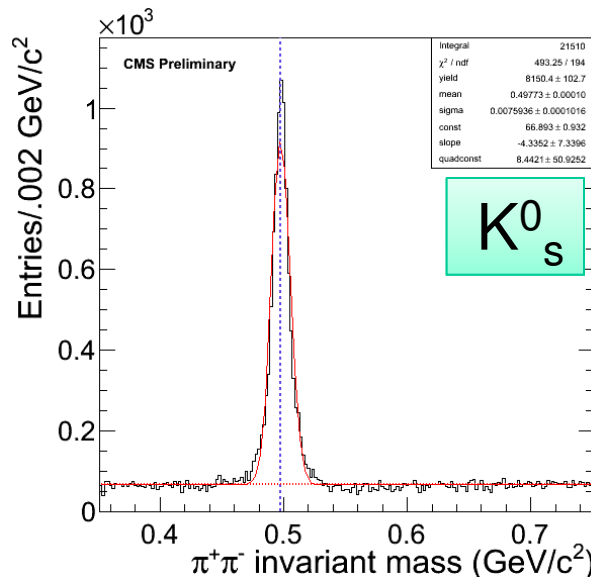
All of CMS was Switched ON

Monday 7th : First K^0_S & Λ

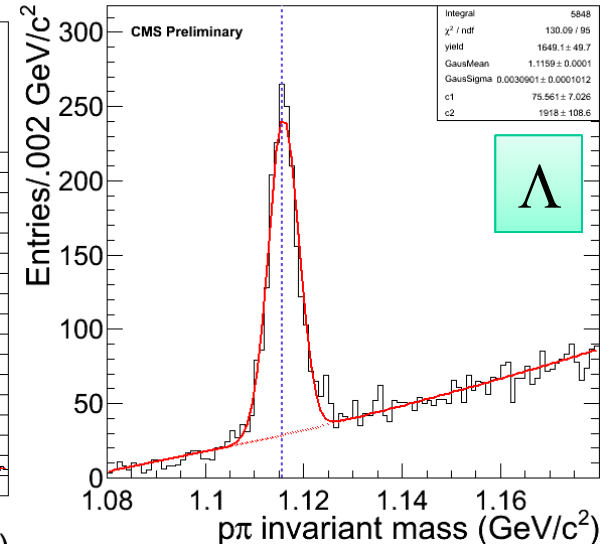
CMS 2009 Preliminary



Charged particle
 p_T spectrum



$M=497.7 \text{ MeV}/c^2, \sigma=7.6 \text{ MeV}/c^2$

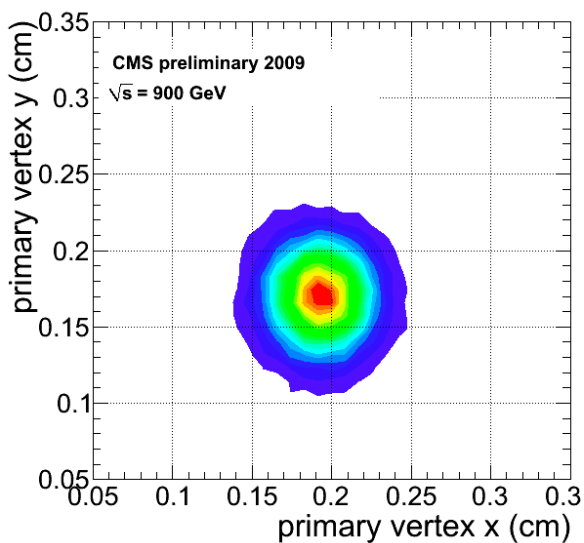
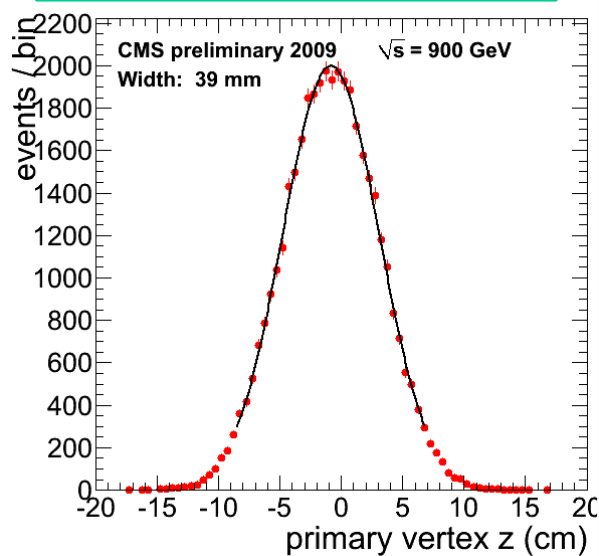


$M=1.116 \text{ GeV}/c^2, \sigma=3.1 \text{ MeV}/c^2$

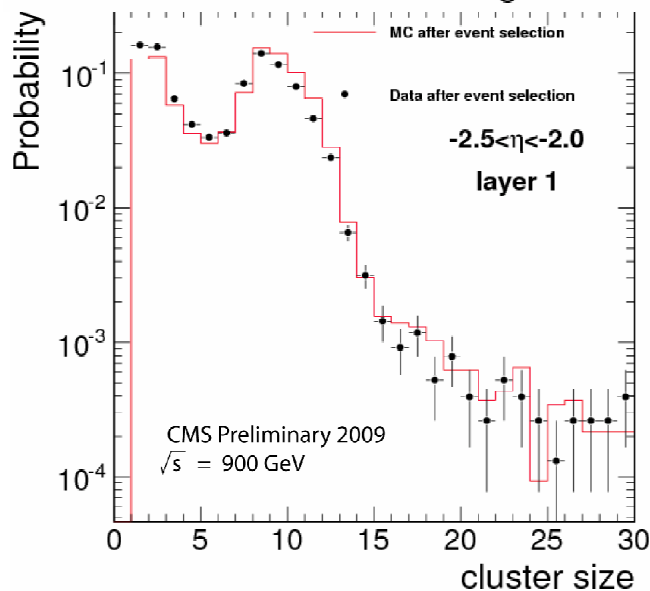
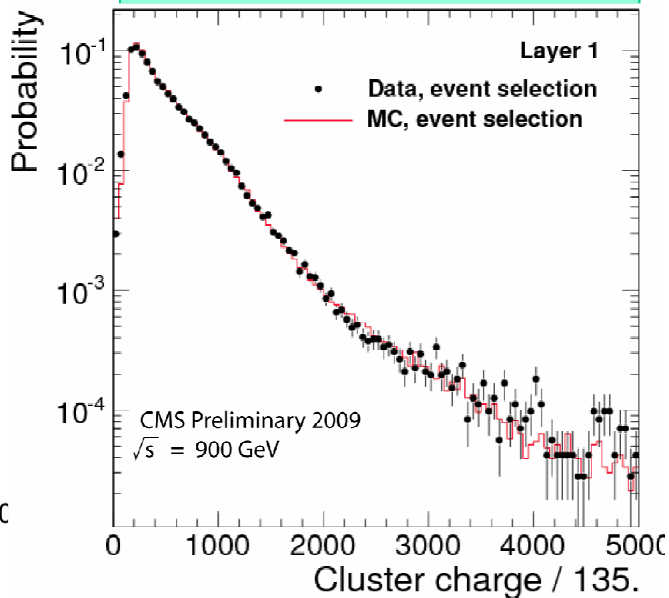


Detector Performance : Tracking

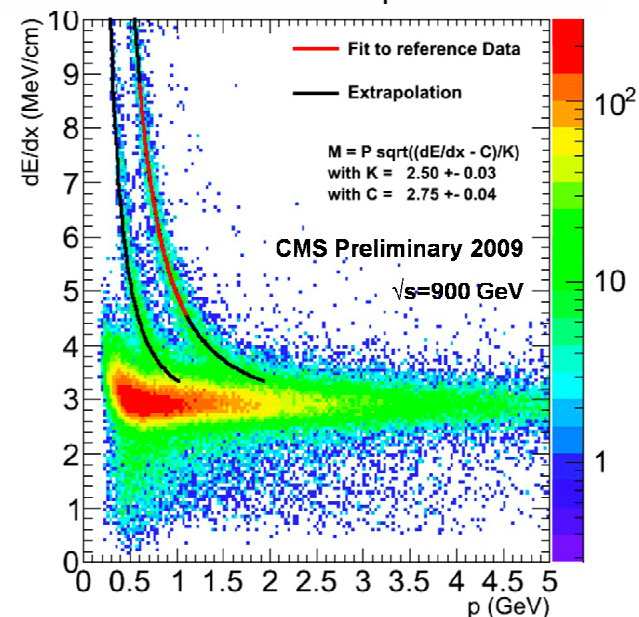
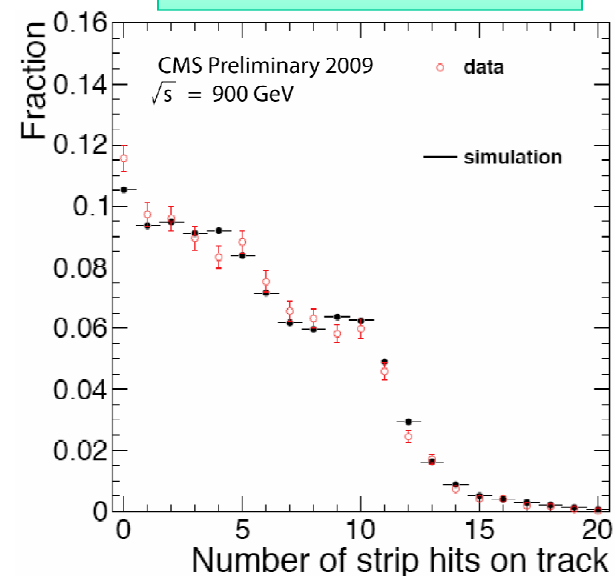
Primary Vertex



Pixels Clusters



Strip Tracker

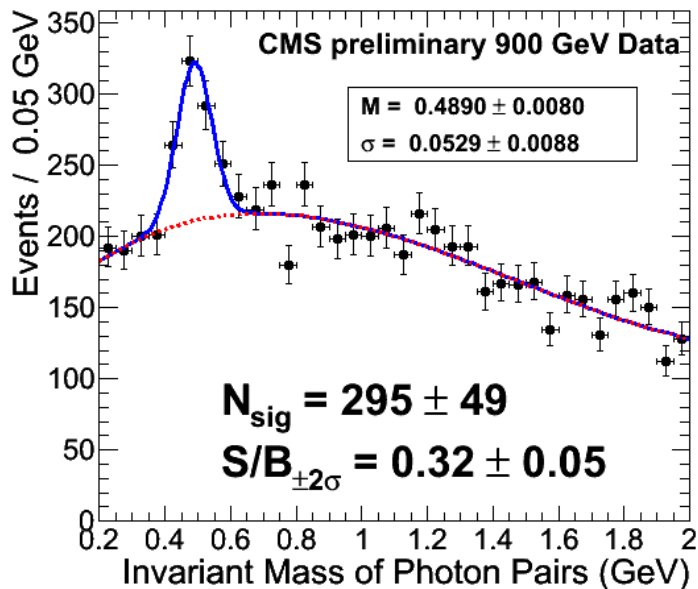




Eta and Phi

η

CMS 2009 Preliminary
Uncorrected



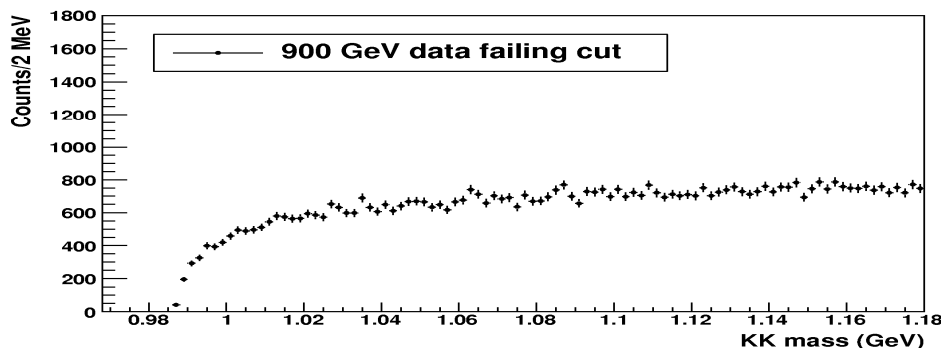
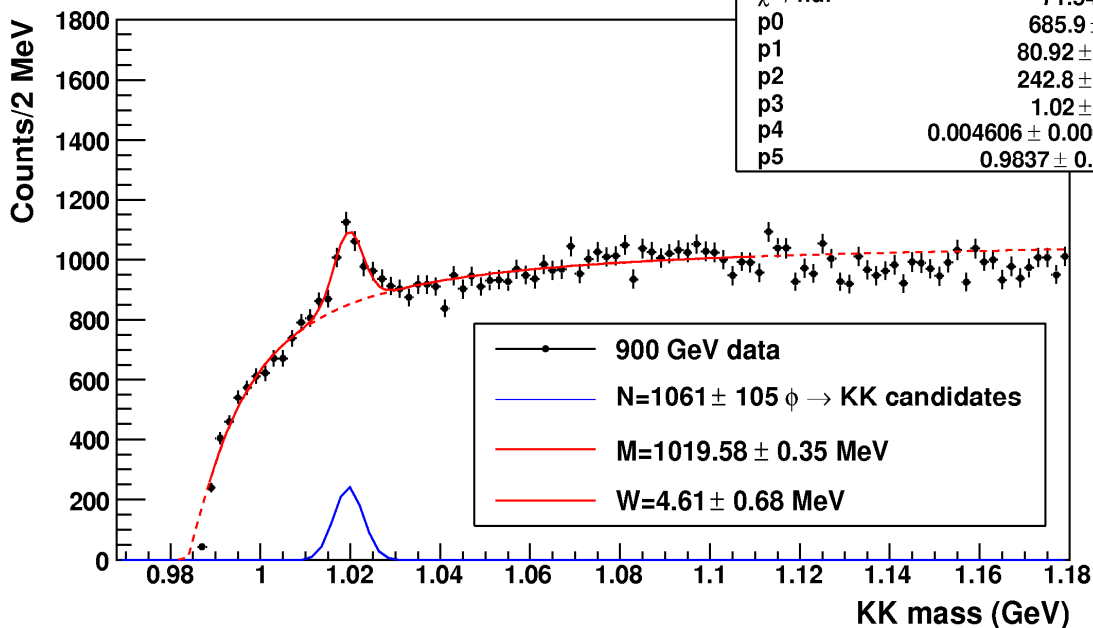
Data: $N(\eta)/N(\pi^0) = 0.020 \pm 0.003$

MC: $N(\eta)/N(\pi^0) = 0.021 \pm 0.003$

ϕ

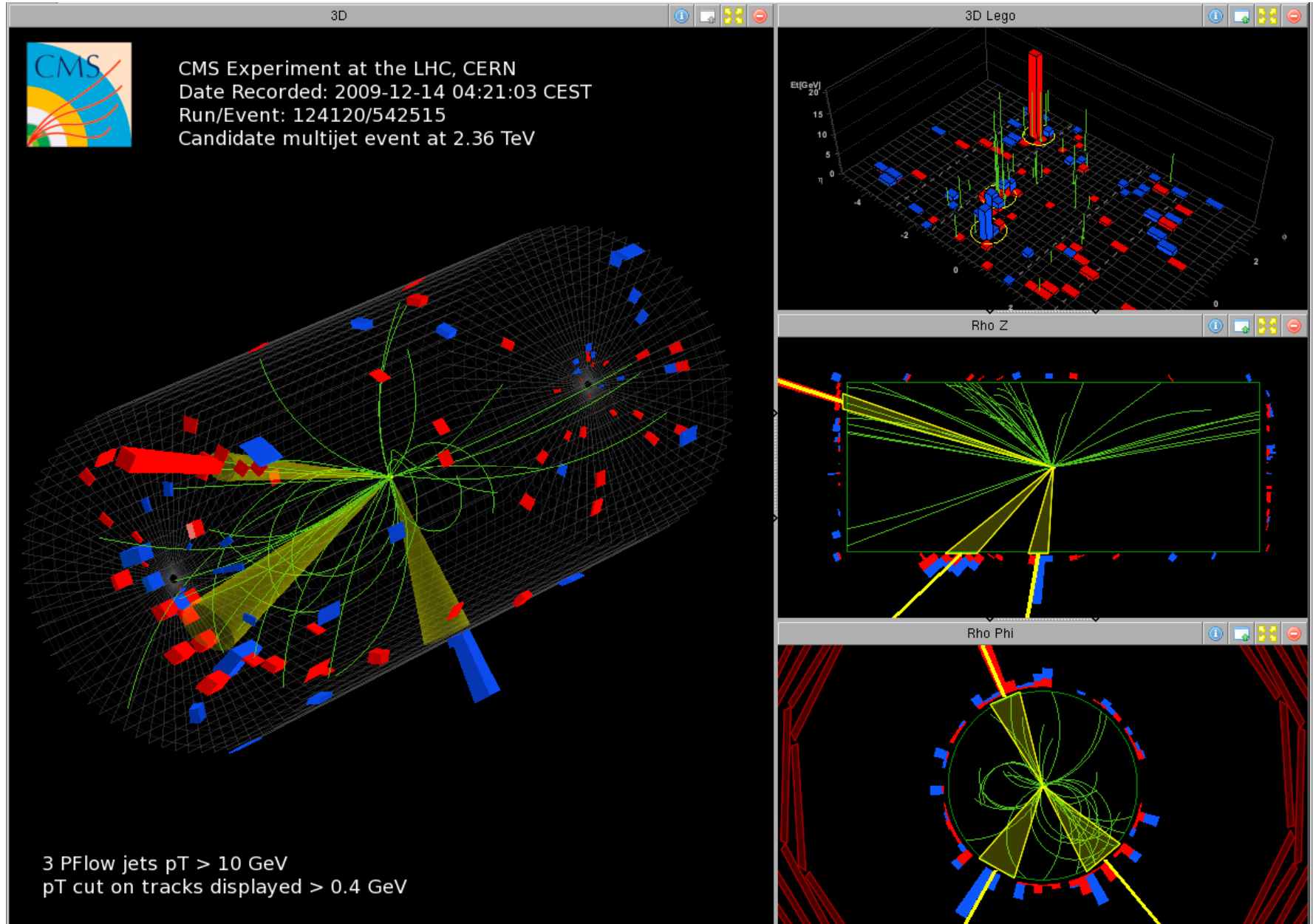
CMS 2009 Preliminary

Phi Candidates passing dE/dx cut





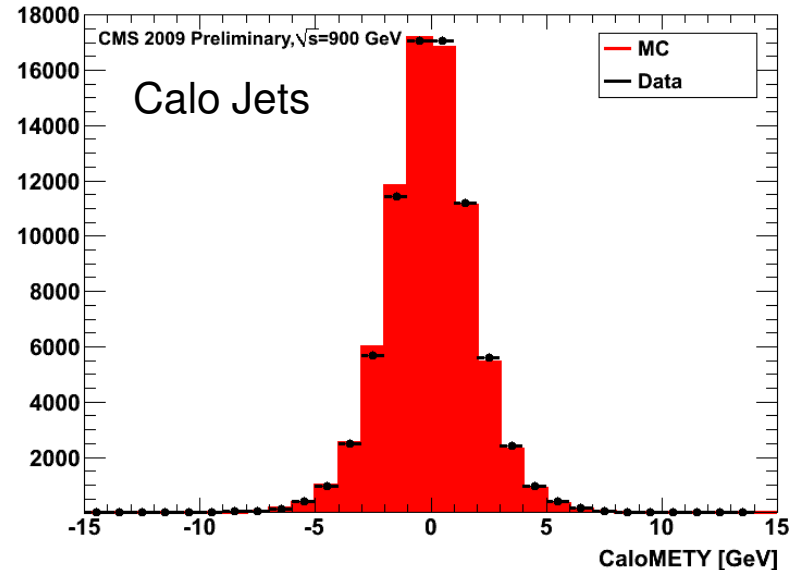
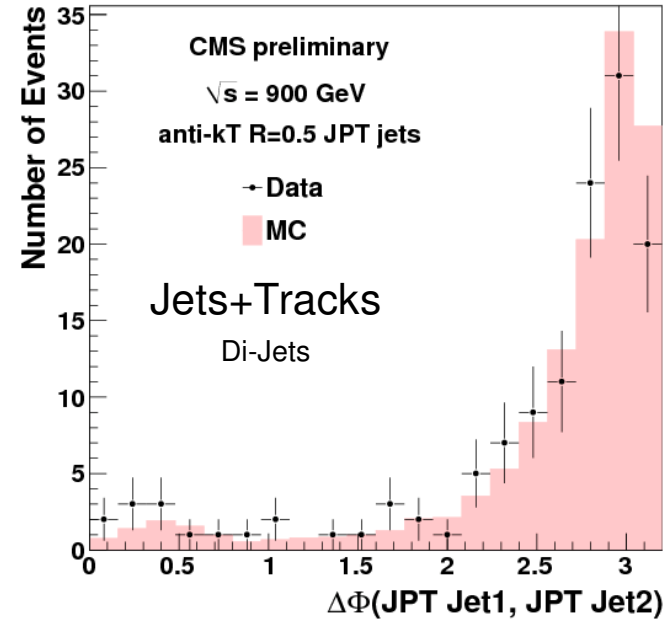
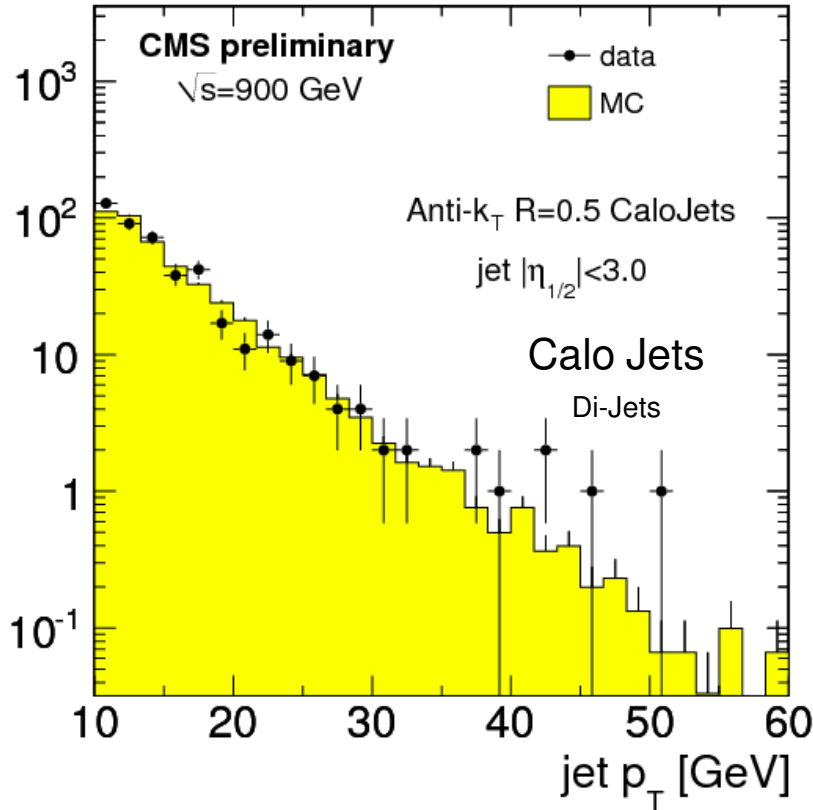
Calorimeters





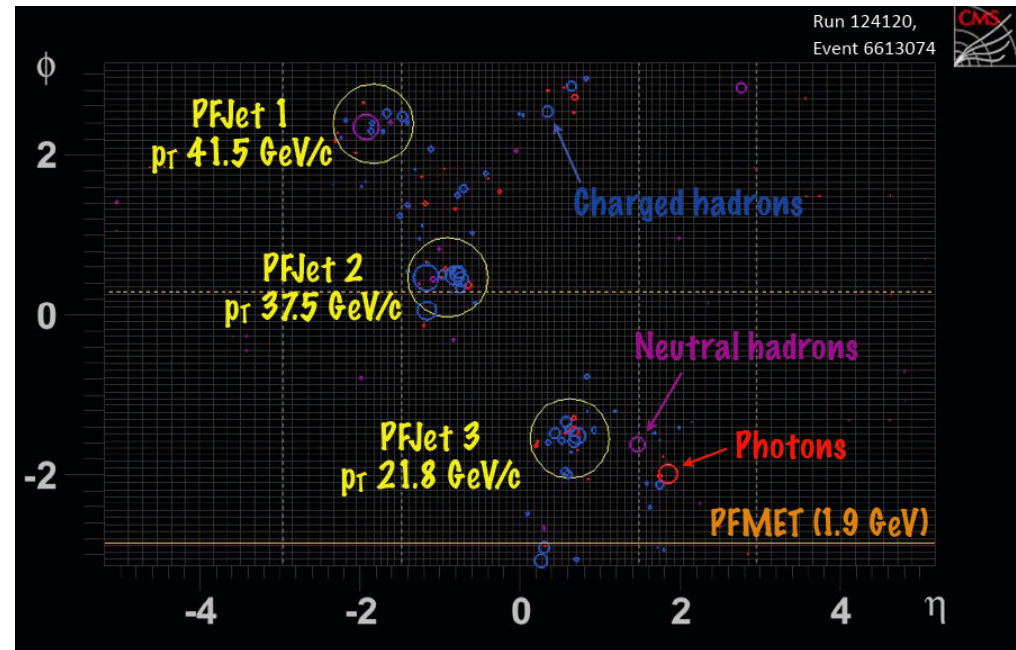
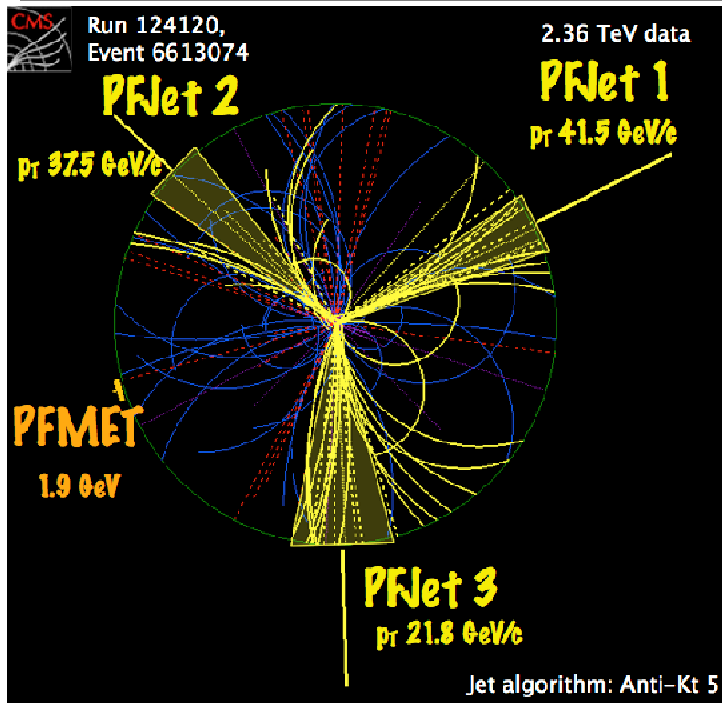
Detector Performance : Calorimetry

Jets and Missing E_T

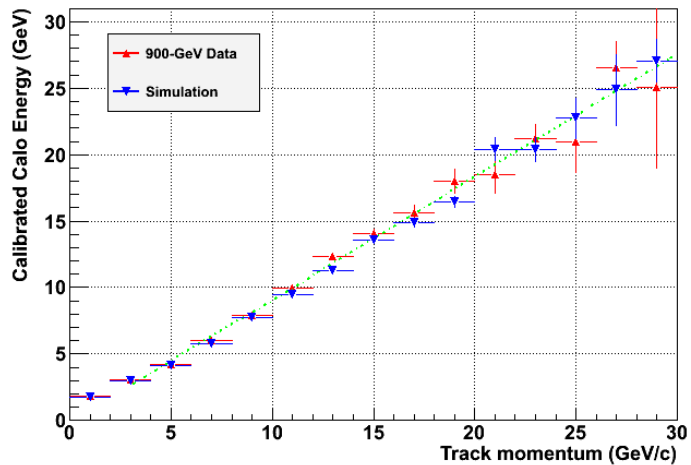




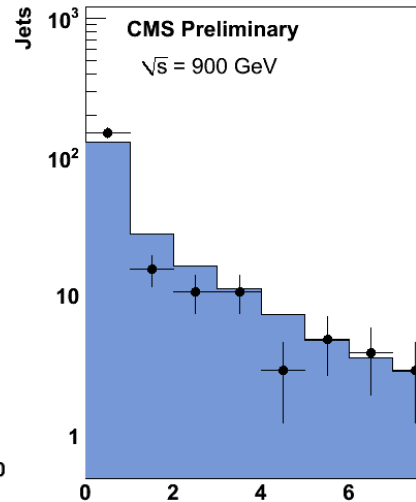
Detector Performance : Particle Flow



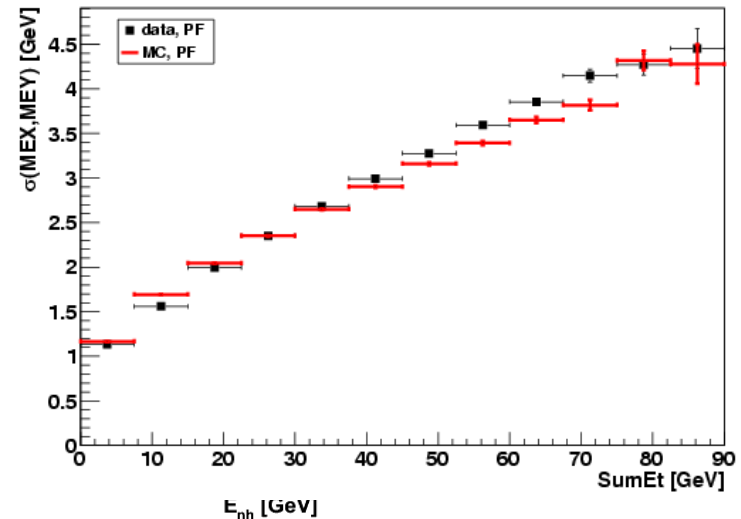
CMS Preliminary 2009



CMS Preliminary
 $\sqrt{s} = 900$ GeV

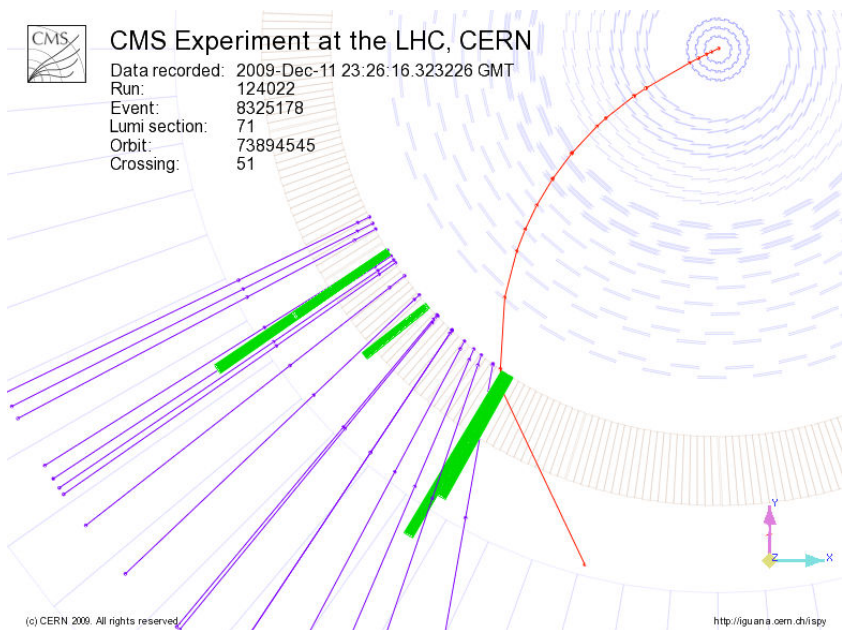


CMS Preliminary 2009, 900 GeV data

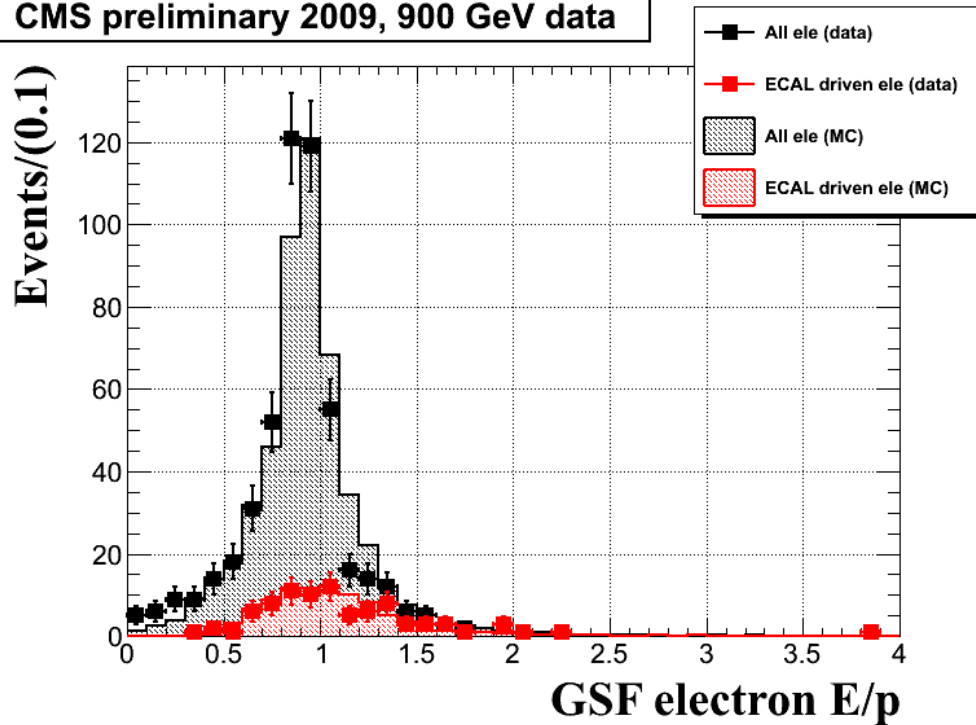




Reconstruction of Electrons



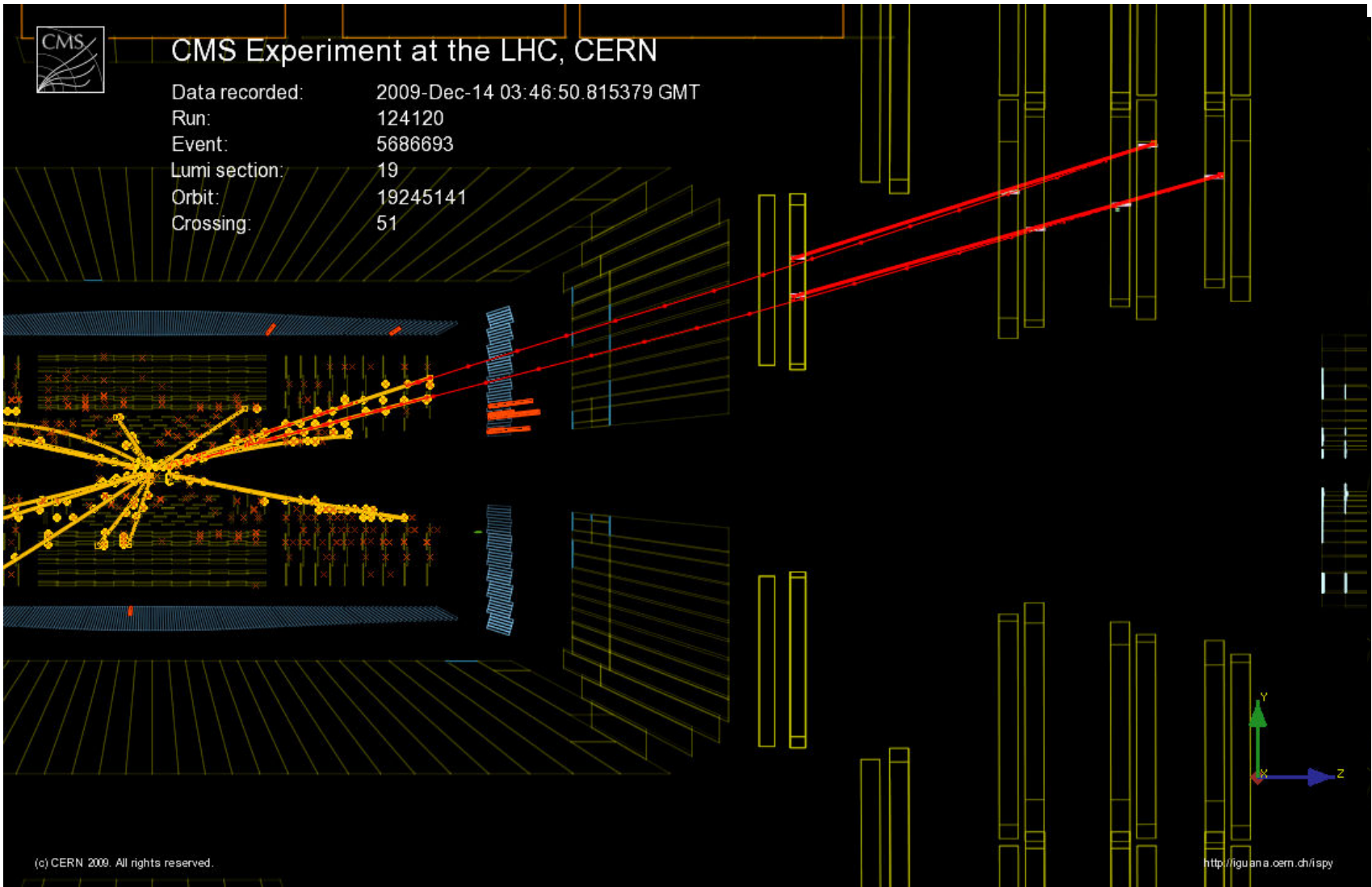
CMS preliminary 2009, 900 GeV data



2.5 GeV electron with bremstrahlung



Muons: A Dimuon Event at 2.36 TeV

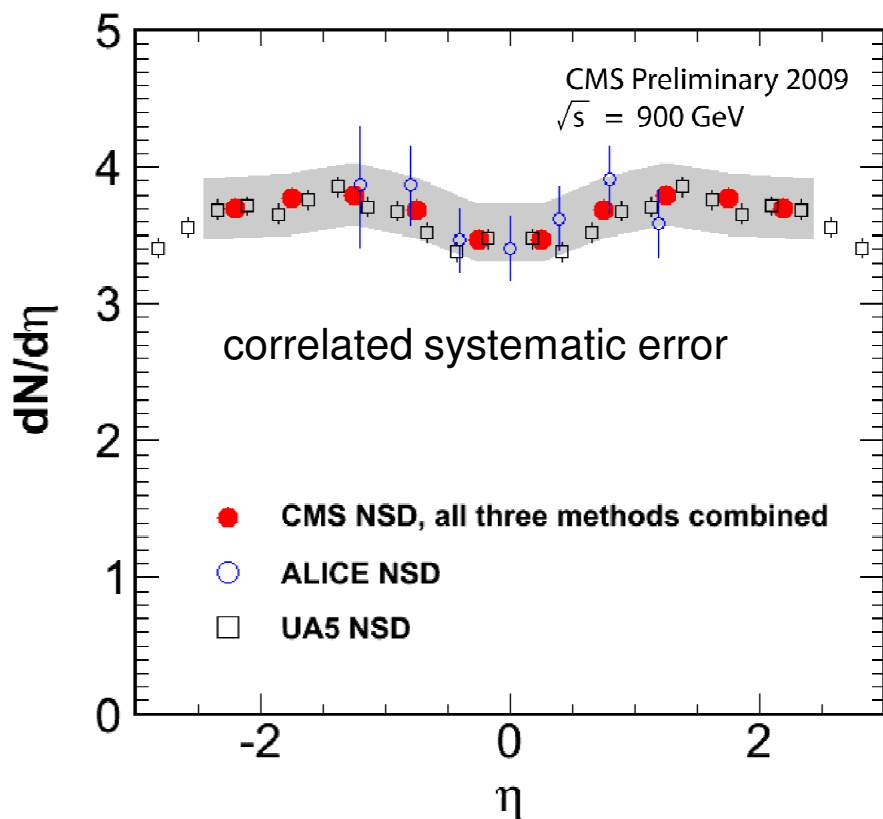


$$p_T(\mu_1) = 3.6 \text{ GeV}, \quad p_T(\mu_2) = 2.6 \text{ GeV}, \quad m(\mu\mu) = 3.03 \text{ GeV}$$

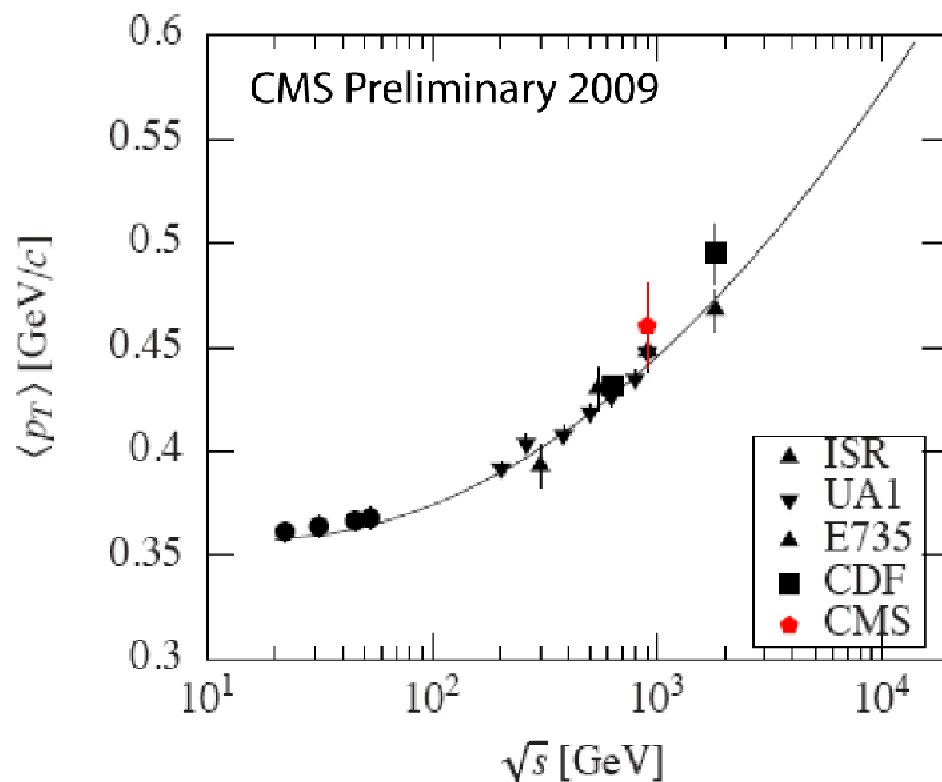


First Physics Distributions

Charged Particle Multiplicity



Average p_T





Summary Again!

CMS has started taking collisions data

On the average more than 99% of the sub-detector electronic channels are operational. High data-taking efficiency ($> 80\%$ for “quiet” or “stable beam” flag (all CMS ON))

All indications are that:

- data can be analysed rapidly – all chains are working well,
- the performance is according to design (almost all distributions agree well with the simulations at the fine level),
- CMS is starting to produce results from collision data.

**Very encouraging collision data-taking start
which augurs well for the future.**

Thanks to the LHC !!

**We have finished the year on a high note BUT
it is only the beginning of the physics exploitation
phase of the LHC.**