Contribution ID: **1125** Type: **Parallel Session Talk**

Rare and Radiative Kaon Decays from the NA48 Experiment

Friday, 23 July 2010 11:40 (18 minutes)

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 a0_0 and a2_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+- −> pi+- pi0 gamma Decays at NA48
We report our final result on the measurement of direct photon emission (DE) in the decay K+- -> pi+- pi0 gamma and its interference (INT) with the inner bremsstrahlung amplitude. For this measurement the full NA48/2 data set with about 600k reconstructed K+- -> pi+- pi0 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+- −> pi+- gamma gamma at NA48
We report on the measurement of the branching fraction of the rare decay K+- -> 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 cˆ can be extracted with unprecedented precision.

Measurement of the radiative Decay K+- −> pi0 e+- nu_e gamma at NA48
We report on the measurement of more than 200000 events of the decay K+- −> pi0 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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Session Classification: 04 - Hadronic Structure, Parton Distributions, soft QCD, Spectroscopy

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