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Precision measurements of kaon radiative decays in NA48

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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, the CP violating asymmetry between K^+ and K^- has been obtained to be less than 103 in this channel.

We also 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.

Finally, 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.

Primary author: PEPE, Monica (INFN Perugia)

Presenter: PEPE, Monica (INFN Perugia)

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