

# Recent results from NA48/2 on $K^4$ decays and $\pi\pi$ scattering lengths

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## Summary

The NA48/2 experiment has collected an unprecedented sample of 3-pion decays of charged kaons. The high statistics and the good resolution of the detectors allow a unique investigation of the detailed phase space distributions of these decays. The effects of final state pion rescattering observed in the Dalitz plot distribution of the  $K^\pm \rightarrow \pi^\pm \pi^0 \pi^0$  decays turned out to be a powerful tool for extraction of the S-wave pion-pion scattering lengths. The recent results obtained using a number of different theoretical approaches will be discussed.

The NA48/2 experiment at the CERN SPS has also collected about  $10^{*6}$   $K^\pm$  decays into  $\pi^+ \pi^- e^\pm \nu$  ( $K^4$ ) in 2003 and 2004.

The analysis of a partial sample of  $\sim 500000$  such events allows a precise measurement of the decay parameters. The form factors of the reaction and their dependence with dipion and dilepton masses have been measured. Thanks to a sizeable acceptance at large  $M_{\pi\pi}$ , a high sensitivity to the  $\pi\pi$  scattering lengths  $a_0$  and  $a_2$  is achieved. These almost model independent measurements can be confronted with the predictions from different calculations, in particular within the framework of Chiral Perturbation Theory.

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