

# Measurement of the transition form factor in $\phi \rightarrow \eta e^+ e^-$ and $\phi \rightarrow \pi^0 e^+ e^-$ decays at KLOE

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## Collaboration

KLOE-2

## Abstract content

The KLOE experiment has collected  $2.5 \text{ fb}^{-1}$  at the peak of the phi resonance at the  $e^+e^-$  collider DAPHNE in Frascati. A new beam crossing scheme, allowing for a reduced beam size and increased luminosity, is operating at DAPHNE. The upgraded KLOE-2 detector is successfully rolled in inside this new interaction region and is ready to acquire collision data. The  $V \rightarrow P\gamma$  Dalitz decays, associated to internal conversion of the photon into a lepton pair, are not well described by the Vector Meson Dominance (VMD) models, as in the case of the process  $\omega \rightarrow \pi^0 \mu^+ \mu^-$ , measured by the NA60 collaboration. The only existing data on  $\phi \rightarrow \eta e^+ e^-$  come from the SND experiment, which has measured the  $Me e$  invariant mass distribution on the basis of 213 events. At KLOE, a detailed study of this decay has been performed using both  $\eta \rightarrow \pi\pi\pi$  final states. Simple analysis cuts provide clean signal events, with a residual background contamination of 2-3%. With the fully neutral  $\eta$  decay channel, we obtain a preliminary measurement of the branching fraction for the process  $\phi \rightarrow \eta e^+ e^-$ , with an accuracy improved by a factor of five with respect to the previous most precise measurement, and of the slope of the transition form factor, which is in agreement with VMD expectations. We have also studied the decay  $\phi \rightarrow \pi^0 e^+ e^-$ , where no data are available on transition form factor. Dedicated analysis cuts strongly reduce the main background component of Bhabha events to  $\sim 20\%$ , leading to  $\sim 4000$  signal events in the whole KLOE data set.

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