



Contribution ID: 99

Type: **Talk**

## **\*Leading Talk\* Form factor in $V\rho\gamma$ transitions and study of the $\eta \rightarrow \pi^+\pi^-\pi^0$ Dalitz plot at KLOE**

*Tuesday, June 30, 2015 4:20 PM (30 minutes)*

The KLOE experiment has collected 2.5 fb<sup>-1</sup> at the peak of the  $\phi$  resonance at the e<sup>+</sup>e<sup>-</sup> collider DAPHNE in Frascati.

The  $V \rightarrow \rho\gamma$  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  $M_{ee}$  invariant mass distribution on the basis of 213 events. At KLOE, a detailed study of this decay has been performed using  $\eta \rightarrow \pi^0 \pi^0 \pi^0$  final state. We obtain the 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 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 ~20%, leading to ~4000 signal events in the whole KLOE data set.

We have also obtained a new, precise results on the isospin-violating decay  $\eta \rightarrow \pi^+\pi^-\pi^0$ , sensitive to the light-quark mass ratio. This study, overcoming in precision previous results published by KLOE in 2008, was suggested by the theoretical work: Leutwyler, Mod.Phys.Lett. A28 (2013) 1360014, aiming to a better determination of the light-quark mass ratio through the dispersive analysis of the  $\eta \rightarrow 3\pi$  decay. The new analysis, performed with an independent and larger data set (1.7 fb<sup>-1</sup>) and a new analysis scheme and improved Monte Carlo simulation, determines with very good accuracy the parameters of the decay matrix element.

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**Session Classification:** Parallel Session 4 - Goldstone Boson WG

**Track Classification:** Goldstone Boson Working Group