

## Hadron Physics results at KLOE-2

Tuesday, 27 June 2023 12:00 (30 minutes)

KLOE and KLOE-2 data are the largest dataset ever collected at an electron-positron collider operating at the  $\phi$  resonance peak (almost  $8 \text{ fb}^{-1}$ ).

The data corresponds to the production of about 24 billion of  $\phi$  mesons, namely 8 billion pairs of neutral K mesons and 300 million  $\eta$  mesons.

A wide hadron physics program, investigating rare meson decays,  $\gamma\gamma$  interaction, and dark forces, is being carried out by the KLOE-2 Collaboration.

The  $\eta$  decay into  $\pi^0\gamma\gamma$  is a test bench for various models and effective theories, like VMD (Vector Meson Dominance) or ChPT (Chiral Perturbation Theory, which predict branching ratio (BR) far from the experimental value. KLOE-2, with its highly pure  $\eta$  sample produced in  $\phi \rightarrow \eta\gamma$  process, performed a new precise measurement of this BR.

KLOE-2 is currently probing a complementary model to the U boson or “dark photon”, where the dark force mediator is a hypothetical leptophobic B boson that could show up in the  $\phi \rightarrow \eta B \rightarrow \eta\pi^0\gamma, \eta \rightarrow \gamma\gamma$  channel. The preliminary upper limit on the dark  $\alpha_B$  coupling constant will be shown.

The High Energy Tagger detectors of KLOE-2 open the possibility to investigate  $\pi^0$  production from  $\gamma\gamma$  scattering by tagging final-state leptons from  $e^+e^- \rightarrow \gamma^*\gamma^*e^+e^- \rightarrow \pi^0e^+e^-$  in coincidence with the  $\pi^0$  in the barrel calorimeter. The preliminary measurement of the  $\gamma^*\gamma^* \rightarrow \pi^0$  counting obtained by using single tagged events will be reported.

Moreover, the search for the double suppressed  $\phi \rightarrow \eta\pi^+\pi^-$  and the conversion  $\phi \rightarrow \eta\mu^+\mu^-$  decays are being performed at KLOE-2 with both  $\eta \rightarrow \gamma\gamma$  and  $\eta \rightarrow 3\pi^0$ . Clear signals are seen for the first time.

Finally, preliminary and promising results on the  $\omega$  cross-section measurement in the  $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma_{\text{ISR}}$  channel using the Initial State Radiation (ISR) method will be also presented.

### Collaboration

KLOE-2

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