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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 ϕ resonance peak (almost 8 fb^{-1}).
The data corresponds to the production of about 24 billion of ϕ mesons, namely 8 billion pairs of neutral K mesons and 300 million η 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 η 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 η sample produced
in $\phi \to \eta\gamma$ 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 $\phi \to \eta B \to \eta\pi^0\gamma\,, \eta \to \gamma\gamma$ channel. The preliminary upper limit on the dark $\alpha_{\rm B}$ coupling constant will be shown.

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

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

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

Collaboration

KLOE-2

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