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Hadron physics results at KLOE-2

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KLOE and KLOE-2 collected the largest dataset at an electron-positron collider operating at the ϕ resonance peak ($\sim 8 \text{ fb}^{-1}$), corresponding 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 under investigation 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 performed a new precise measurement of this BR, by using its highly pure η sample produced in $\phi \rightarrow \eta\gamma$ process, .

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 α_B coupling constant will be shown.

The KLOE-2 High Energy Tagger detectors allow the possibility to investigate π^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 π^0 in the barrel calorimeter. A preliminary measurement of the $\gamma^*\gamma^* \rightarrow \pi^0$ counting obtained by using single tagged events will be reported.

Finally, 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.

Collaboration / Activity

KLOE-2

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