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Hadron physics at KLOE/KLOE-2, results and perspectives (12'+3')

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The KLOE-2 experiment, at the e^+e^- DAΦNE collider in Frascati, acquired an integrated luminosity of about 5 fb^{-1} with an upgraded KLOE apparatus. The whole KLOE/KLOE-2 data sample corresponds to $2.4 \times 10^{10} \phi$ and $3.1 \times 10^8 \eta$ meson events allowing to develop a wide hadron physics program from rare meson decays to $\gamma\gamma$ fusion and dark forces.

KLOE-2 investigates the $\eta \rightarrow \pi^0 \gamma\gamma$ decay, an important test of ChPT because of its sensitivity to the p^6 term on both the branching ratio and the $M(\gamma\gamma)$ spectrum. A preliminary KLOE measurement, based on 450 pb^{-1} , provided a 4 sigma's lower value w.r.t. the most accurate determination of the BR from the Crystal Ball experiment. The new KLOE measurement performed with a larger data sample statistics will be presented.

By using the same five photon final state and following the many KLOE-2 contributions to Dark Matter (DM) searches, an alternative model, where the dark force mediator is an hypothetical leptophobic B boson, is exploited in the ϕ decay to η -B where B will decay in $\pi^0 \gamma$.

Moreover, KLOE-2 has the possibility to investigate π^0 production from $\gamma\gamma$ fusion thanks to two scintillator hodoscopes installed in the DAΦNE beam pipe to tag final-state leptons from $e^+e^- \rightarrow \gamma^* \gamma^* e^+e^- \rightarrow \pi^0 e^+e^-$. The aim is to perform the high precision measurement of the π^0 width to test low-energy QCD dynamics. The status of the $\gamma^* \gamma^* \rightarrow \pi^0$ analysis will be reported.

KLOE-2 searches also the

$\phi \rightarrow \eta \pi^+ \pi^-$, $\mu^+ \mu^-$ decays with $\eta \rightarrow \gamma\gamma$ and $\eta \rightarrow 3\pi^0$. $\phi \rightarrow \eta \pi^+ \pi^-$ is double suppressed by G-parity and the OZI rule, with an expected BR around 0.35×10^{-6} , while for the $\phi \rightarrow \eta \mu^+ \mu^-$ decay an upper limit was set as 0.94×10^{-5} . By analyzing those decays with KLOE/KLOE-2 data clear signals are seen for the first time.

Collaboration / Activity

KLOE-2 collaboration

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