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Low energy hadron physics at KLOE/KLOE-2

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The KLOE-2 experiment completed its data-taking at the $e+e-$ DAPHNE collider in Frascati, achieving the integrated luminosity goal of more than 5 fb^{-1} at the ϕ peak. KLOE-2 represents the continuation of KLOE with an upgraded detector and an extended physics program, which includes the study of light meson properties and decay dynamics with unprecedented statistics. The new data sample, together with the KLOE one, corresponds to more than 3×10^8 η meson events. This statistics has been used to search for the P, CP violating decay $\eta \rightarrow \pi^+\pi^-$, obtaining the most stringent upper limit for this decay.

The $\eta \rightarrow \pi^0 \gamma \gamma$ decay is an important test of ChPT because of its sensitivity to the ϕ^6 term on both the branching ratio and the $M(\gamma\gamma)$ spectrum. A preliminary KLOE measurement, based on 450 pb^{-1} , provided a 4σ 's lower value w.r.t. the most accurate determination of the BR from Crystal Ball. A new analysis with a larger data sample is in progress to confirm this result. The same five photon final state is used to search for the B boson, a postulated leptophobic mediator of dark forces.

The new four stations installed in KLOE-2 to tag electrons and positrons from the reaction $e+e^- \rightarrow e+e^- \gamma\gamma \rightarrow e+e^- X$, will give the opportunity to investigate $\gamma\gamma$ physics at the ϕ resonance. Single pseudoscalar production will improve the determination of the two-photon decay widths of these mesons. The analysis for the π^0 final state is in progress, aiming to achieve an accuracy of $O(1\%)$. Preliminary results will be presented.

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