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Fully neutral final states at KLOE/KLOE-2

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In March 2018, the KLOE-2 experiment completed its data-taking at the e^+e^- DAPHNE collider in Frascati, collecting more than 5 fb^{-1} at the ϕ peak, thus extending the KLOE physics program with an upgraded detector. The KLOE detector is well suited for the study of fully neutral final states due to its large radius and a hermetic electromagnetic calorimeter, providing excellent timing and position resolution (50 ps and $\mathcal{O}(\text{cm})$, respectively, at 1 GeV). The calorimeter energy resolution ($5\%/\sqrt{E}$) is greatly improved when kinematic constraints are applied. The upgraded KLOE-2 detector extends its acceptance coverage thanks to the new small angle calorimeters placed near the interaction region.

The latest results on prompt neutral final states will be presented, with particular emphasis on five photon final state, which is used to study the $\eta \rightarrow \pi^0 \gamma \gamma$ decay. This process provides an important test of ChPT because of its sensitivity to the p^6 term on both the branching ratio and the $M(\text{gg})$ spectrum. A preliminary KLOE measurement, based on 450 pb^{-1} , provided a much lower BR value than the most accurate determination 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 also used to search for the B boson, a postulated leptophobic mediator of dark forces.

Summary

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