KLOE-2
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1 Goal of experiment

KLOE-2 is the continuation of the KLOE experiment which has collected data at the $\phi(1020)$ resonance in the years 2000-2006. It is a multipurpose experiment [1], whose main goal is to perform:

- Tests of discrete symmetries conservation, via both kaon quantum interferometry and measurements of K, η, η' meson decays
- Studies on hadron decays dynamics
- Precision measurements of Standard Model parameters
- Searches for low mass hidden or dark bosons, both in the continuum and in vector and pseudoscalar meson decays

2 Experimental setup

Built in the late 90's, the KLOE [2] detector is composed of a large drift chamber and a hermetic lead-scintillating fibers calorimeter.The entire apparatus is immersed in a 0.5 T magnetic field. Two stations of taggers for $\gamma\gamma$ interactions have recently been installed. Under construction are also a cylindrical GEM detector, to improve vertexing close to the IP, and new forward calorimeters, to improve acceptance for low energy photons. These new detectors will be installed in the fall of 2012.

3 Accelerator or Lab Facility

The experiment runs at the DAΦNE e^+e^- collider of the Laboratori Nazionali di Frascati of INFN, in Frascati, Italy. In the previous phase of data taking it has collected $\sim$ 2.5 fb^{-1} of data, a factor about 1000 higher than any other previous experiment at the same c.m. energy. The accelerator has been upgraded in the following years to reach a luminosity $\sim$3 times higher than in 2006, which was actually obtained in the run of the SIDDHARTA experiment (2008-2009).

4 Physics Reach

KLOE-2 can search for the existence of dark photons, in the mass range from few MeV to 1 GeV. The process to be looked at are mostly e^+e^- $\rightarrow \mu^+ mu^- \gamma, e^+e^-\gamma$ or $\phi \rightarrow \eta e^+e^-$. In this last case, a first result has been already submitted, based on the analysis of 1.5 fb^{-1} of data and using the $\pi^+\pi^-\pi^0$ decay channel of the η as a tag (figure and reference). This limit can be improved up to a factor $\sim$2, by exploiting both the foreseen increase in statistics and the usage of other η decay channels for event tagging. Other potential channels to be searched for are those involving the production of a light higgs-like particle responsible for the breaking of the hidden symmetry, via the so called higgs-strahlung process.

5 Status and Schedule

The new run has started in late 2010 but has been plagued by some major failures in the hardware of the machine. It is supposed to restart in November 2011 and to last up to 2014.

6 Future Plans

The Labooratory is deeply involved in the project of the SuperB accelerator, to be built in the newly established Nicola Cabibbo Laboratory, in Rome. It is therefore unlikely that activities at DAΦNE can continue besides to above mentioned date.

7 Collaborating Institutions and Collaborators

8 Written Materials (e.g. references)

[1, 2]

9 Any other info?

References

[1] G. Amelino-Camelia, F. Archilli, D. Babusci, D. Badoni, G. Bencivenni, et al. Physics with the KLOE-2 experiment at the upgraded DAϕNE.

Eur.Phys.J., C68:619–681, 2010.

[2] F. Bossi, E. De Lucia, J. Lee-Franzini, S. Miscetti, and M. Palutan. Precision Kaon and Hadron Physics with KLOE. *Riv.Nuovo Cim.*, 31:531–623, 2008.