

Search for dark forces with KLOE

Thursday, 2 June 2016 17:35 (0:20)

Collaboration

KLOE2

Abstract content

During the last years several Dark Sector Models have been proposed in order to address striking astrophysical observations which failed standard interpretations. In the minimal case a new vector particle, the so called dark photon or U boson, is introduced, with small coupling with Standard Model particles. Also, the existence of a dark Higgs boson h' is postulated, in analogy with the Standard Model, to give mass to the U boson through the Spontaneous Symmetry Breaking mechanism.

The experiment KLOE, working on the DAFNE e^+e^- collider in Frascati, searched for the existence of the U boson in a quite complete way, investigating three different processes and six different final states:

- in dalitz decays of the ϕ meson $\phi \rightarrow \eta U$, with $U \rightarrow e^+e^-$ and $\eta \rightarrow \pi^+\pi^-\pi^0$ and $\pi^0\pi^0\pi^0$
- in $e^+e^- \rightarrow U\gamma$ events, with U decaying to electron, muon and pion pairs
- in the dark Higgsstrahlung process, $e^+e^- \rightarrow Uh'$, $U \rightarrow \mu^+\mu^-$, h' invisible.

Tight limits on the model parameters have been set at 90% CL. Further improvements are expected in terms of sensitivity and discovery potential with the new KLOE2 detector working on the improved DAFNE e^+e^- collider.

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Session Classification : Parallel Session A2