

KLOE measurements of the BR(Ks into gamma gamma) and direct search for Ks into e+e-

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A precise measurement of the $K_S \rightarrow \gamma\gamma$ rate is an important test of Chiral Perturbation Theory predictions. The decay amplitude can be evaluated at the leading p^4 order providing an estimate of the BR for this decay of $(2.1 \pm 0.1) \times 10^{-6}$. The latest experimental determination of $BR(K_S \rightarrow \gamma\gamma)$ is a precise measurement from NA48, $(2.78 \pm 0.07) \times 10^{-6}$, which differs from χ PT p^4 prediction of about 30%. This seems to indicate the presence of important contributions from higher order corrections. KLOE analysis on 1.6 fb^{-1} of data acquired during years 2001-2002 and 2004-2005 benefits from the tagging technique, which allows for the first time this decay to be identified with a pure K_S "beam", without the background from $K_L \rightarrow \gamma\gamma$ decay, and with completely different systematics respect to fixed target experiments. Event counting is performed from a fit to the bidimensional distribution of the two-photon invariant mass versus the angle between photon momenta in the K_S rest frame. In this plane the best separation is achieved between the signal and the main source of background, which is represented by $K_S \rightarrow \pi^0\pi^0$ events with two missing photons. The result of this analysis is presented, which is competitive with present measurements.

$K_S \rightarrow e^+e^-$ decay is a $\Delta S = 1$ weak neutral current process. The Standard Model expectation for its BR is 1.6×10^{-15} , which has been evaluated by Chiral Perturbation Theory with 10% error. The best experimental limit on this decay, achieved by CPLEAR experiment, is $BR < 1.4 \times 10^{-7}$ at 90% CL. We performed a direct search of $K_S \rightarrow e^+e^-$ decay by analysing 1.3 fb^{-1} of data. The analysis exploits the excellent KLOE drift chamber momentum resolution to identify the signal through e^+e^- invariant mass reconstruction. Further background rejection comes from calorimeter particle identification, which is based on time of flight, shower longitudinal profile and E/p . The result of this search is presented, which improves on the previous experimental limit by a factor of 10.

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