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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 $K_S \to \gamma\gamma$ 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 $BR(K_S \to \gamma\gamma)$ is a precise measurement from NA48,
$(2.78 \pm 0.07) \times 10^{-6}$, which differs from χPT 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
$K_L \to \gamma\gamma$ 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 $K_S \to \pi^0\pi^0$ events with two missing
photons. The result of this analysis is presented, which is
competitive with present
measurements.

$K_S \to e^+e^-$ 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 $K_S \to e^+e^-$ 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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