Review of Kaon physics at CERN and in Europe

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The Kaon physics program at CERN and in Europe will be presented.

I will first give a short review of recent results form the NA48/2 and NA62 experiments, with special emphasis to the measurement of R_K, the ratio of Kaon leptonic decays rates, $K^+ \to e^+\nu$ and $K^+ \to \mu^+\nu$, using the full minimum bias data sample collected in 2007-2008.

The main subject of the talk will be the study of the highly suppressed decay $K^+ \to \pi^+\nu\overline{\nu}$. While its rate can be predicted with minimal theoretical uncertainty in the Standard Model ($BR \sim 8 \times 10^{-11}$), the smallness of BR and the challenging experimental signature make it very difficult to measure. The branching ratio for this decay is thus a sensitive probe of the flavour sector of the SM.

The aim of NA62 is the measurement of the $K^+ \to \pi^+\nu\overline{\nu}$ BR with $\sim$ 10% precision in two years of data taking. This will require the observation of $10^{13} K^+$ decays in the experiment's fiducial volume, as well as the use of high-performance systems for precision tracking, particle identification, and photon vetoing. These aspects of the experiment will also allow NA62 to carry out a rich program of searches for lepton flavour and/or number violating K^+ decays. Data taking will start in October 2014. The physics prospects and the status of the construction and commissioning of the NA62 experiment will be presented.

In the last part of the talk I will report on Kaon physics results and prospects from other experiments at CERN (e.g. LHCb) and in Europe (e.g. KLOE and KLOE-2) and briefly mention the status in US.