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Measurement of lepton universality at the NA62 experiment

Kaon physics has played a key role in the development of the Standard Model. Today, high-precision studies of rare kaon decays are sensitive to new physics processes in a complementary way to the direct searches of LHC.

The NA62 experiment, based at CERN SPS accelerator has been designed to collect a very large sample of K^+ decays with a sensitivity to branching fractions smaller than 10^{-10} .

In particular, NA62 will measure the branching fraction of the rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$. This branching fraction is predicted precisely by the Standard Model and a significant deviation of the measured value will provide evidence of physics beyond the Standard Model. The measurement of its branching ratio with 10 % accuracy will be reached by collecting 100 signal events in 2 - 3 years of data taking.

Another challenging measurement is the helicity suppressed ratio $R_K = \text{BR}(K^+ \rightarrow e^+ \nu (\gamma)) / \text{BR}(K^+ \rightarrow \mu^+ \nu (\gamma))$, which is a sensitive test of lepton universality. The analysis of ~ 150 000 reconstructed $K^+ \rightarrow e^+ \nu (\gamma)$ candidates from a dedicated run in an earlier stage of the experiment in 2007 has led to a measurement : $R_K = (2.488 \pm 0.010) \times 10^{-5}$. This value is compatible with the Standard Model but the experimental uncertainty is still an order of magnitude higher than the theoretical uncertainty. With the current run of NA62, this measurement will be improved by a factor 2.

The poster will review the NA62 experimental setup and its physics prospects. Special emphasis will be given to the lepton universality measurement and the preliminary analysis of the 2014-2015 data.

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