

Precision Measurement of $\Gamma(\text{Ke}2)/\Gamma(\text{K}\mu2)$ Ratio Using Stopped Positive Kaons at J-PARC

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The J-PARC E36 experiment aims at a precise measurement of $R_K = \Gamma(\text{K}^+ \rightarrow \text{e}^+ \nu) / \Gamma(\text{K}^+ \rightarrow \mu^+ \nu)$ ratio to test lepton universality. This experiment will be performed with a stopped K^+ technique using the TREK detector system based on the 12-sector iron-core toroidal superconducting spectrometer and the CsI(Tl) calorimeter[1]. They have been developed for the experiment to search for T-violating transverse muon polarization in the $\text{K}^+ \rightarrow \pi^0 \mu^+ \nu$ decay at KEK-PS. The Standard Model (SM) prediction for the R_K value is highly precise ($\delta R_K / R_K = 0.5 \times 10^{-3}$), and a deviation from this value can very clearly indicate the existence of New Physics beyond the SM [2]. A possible mechanism how SUSY Lepton Flavor Violation can affect lepton universality has been discussed [3]. The non-vanishing e- τ lepton mixing can change the R_K value from the SM prediction at the percent level.

We expect to achieve an uncertainty for R_K of better than $\delta R_K / R_K = 2.5 \times 10^{-3}$, which is 60% of the current uncertainty determined from the NA62 and KLOE experiments. Since the NA62[4,5] and KLOE[6] groups adopted an in-flight-kaon decay method, it is worth checking the R_K value using a different kinematical approach. Such independent measurements are complementary, and comprehensive studies are very important to increase the experimental reliability. In this talk, an overview of the R_K determination, detector performance of each component, the current project status, and future perspective will be presented.

References

- [1] J. A. Macdonald et al., Nucl. Instrum. and Meth. **A506** (2003) 60.
- [2] Vincenzo Cirigliano and Ignasi Rosell, Phys. Rev. Lett. **99** (2007) 231801.
- [3] A. Masiero, P. Paradisi, and R. Petronzio, Phys. Rev. **D74** (2006) 011701(R).
- [4] M. Moulson et al., in Proceedings of CIPANP-2012.
- [5] C. Lazzeroni et al., Phys. Lett. **B698** (2011) 105-114.
- [6] F. Ambrosino et al., Eur. Phys. J. **C64** (2009) 627-636.