Particle Identification performance for Γ(Ke2)/ Γ (Kμ2) measurement at J-PARC

S. Shimizu
on behalf of the J-PARC TREK-E36 collaboration

Department of Physics, Osaka University, Toyonaka, Osaka, 560-0043, Japan

A corresponding author: E-mail suguru@phys.sci.osaka-u.ac.jp

The J-PARC E36 experiment aims at a precise measurement of $R_K=\Gamma(K^+\rightarrow e^+\nu)/\Gamma(K^+\rightarrow\mu^+\nu)$ 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 $K^+\rightarrow\pi^0\ \mu^+\ \nu$ decay at KEK-PS. The Standard Model (SM) prediction for the R_K value is highly precise ($\delta R_K/R_K = 0.5\times10^{-3}$), 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.

Since the R_K value is expected to be about 10^{-5}, the e^+/μ^+ separation is very important to improve the sensitivity. In particular, muon mis-identification probability as positron has to be suppressed to level of better than 10-6 to reduce systematic uncertainty from this mis-identification. In the E36 experiment, three independent detectors: TOF, aerogel Cherenkov (AC), and lead-glass Cherenkov (PGC) are adopted to achieve the required PID performance. In this talk, some details of the three detector system will be explained, and the overall PID performance will be presented.