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**Search for New Physics with Experiment E36 at J-PARC**[1]
DONGWI H DONGWI, Hampton Univ, TREK COLLABORATION — We are potentially standing at the precipice in searching for New Physics (NP) beyond the Standard Model (SM) by performing a precision test of lepton universality - a basic assumption of the SM that assigns an identical coupling constant to $e$, $\mu$ and $\tau$. Experiment E36 conducted at J-PARC in Japan will test lepton universality in the $R_K = \Gamma(K_{e2})/\Gamma(K_{\mu 2})$ ratio. The SM prediction of leptonic $K^+$ decays is highly precise with an uncertainty of $\triangle R_K/R_K = 4 \cdot 10^{-4}$. Any observed deviation from the SM prediction would break the universality of the lepton couplings and provide clear indication of NP beyond the SM. Although a successful description of the basic building blocks of matter, the SM is incomplete, falling short to describe dark matter, baryogenesis, neutrino masses and much more. The E36 detector apparatus allows sensitivity to search for light $U(1)$ gauge bosons and sterile neutrinos, which could be associated with dark matter or explain established muon-related anomalies such as the muon g-2 value, and perhaps the proton radius puzzle. A scintillating fiber target was used to stop $K^+$ beam. The $K^+$ products were detected with large-acceptance toroidal spectrometer. Status of data analysis will be presented.

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