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Probing U(1) Lmu- Ltau Extra-Dimensional Model via electron-neutrino Elastic Scattering

Extra dimensions (ED) offer a valuable tool for constructing intricate models and exploring potential new physics phenomena. Our focus is to extand Standard Model (SM) by introducing an U (1) Lμ –Lτ gauge group in the framework of ED, which serves as a compelling initiative aimed at addressing the muon (g - 2) anomaly. In this model, only the Kaluza-Klein (KK) modes of the extra dimensional gauge boson traverse the bulk, while Standard Model particles remain localized on the SM brane assuming a
compactification ‘radius’of order Rˆ–1 form 1 to 1000 MeV. We present constraints on the mnKK – g ′ , where mnKK is the mass of the extra-dimensional gauge boson for a particular KK mode, and g ′ is the interaction coefficient between the extra-dimensional gauge boson and SM fermions. These constraints are derived from ν – e elastic scattering measurements at DUNE ND (Future based experiment) and compare them with those from other ν – e elastic scattering experiments, CHARM II, TEXONO and BOREXINO. Our results indicate that the DUNE Near Detector can provide the most stringent bounds for extra-dimensional gauge boson masses in the range of 1 to 1000 MeV.

Track type

Authors: KAUSHIK, Ayushi (SHIV NADAR INSTITUTION OF EMENENCE, GREATER NOIDA); Mr CHAKRABORTY, DIBYENDU (SHIV NADAR INSTITUTION OF EMENENCE, GREATER NOIDA)

Co-authors: Mr CHATTERJEE, ARINDAM (SHIV NADAR INSTITUTION OF EMENENCE, GREATER NOIDA); Dr NISHIWAKI, KENJI (SHIV NADAR INSTITUTION OF EMENENCE, GREATER NOIDA)

Presenter: KAUSHIK, Ayushi (SHIV NADAR INSTITUTION OF EMENENCE, GREATER NOIDA)

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