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Fundamental symmetry violations in charged-lepton flavor-changing processes

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In this talk, I describe how worldwide experimental searches for charged-lepton flavor-changing processes also provide new opportunities for discovering violations of Lorentz and CPT invariance. Model-independent effective interactions describing perturbative Lorentz and CPT violation have been investigated in electromagnetic muon and tau decays, and coherent muon-to-electron conversion in nuclei. Results from the MEG, BaBar, and SINDRUM II experiments have enabled hundreds of first constraints on coefficients parametrizing time-independent signals of Lorentz and CPT violation. Future experiments, including MEG II, COMET, and Mu2e, are projected to increase these constraints by up to two orders of magnitude. I also outline how time-dependent modulations of transition rates, which remain completely unexplored and are uniquely characteristic of Lorentz and CPT violation, can be probed.

Muon dipole moments (magnetic and electric): theory, experiments and future perspectives

Charged lepton flavor violation: theory, experiment and future perspectives

none

New Physics opportunities with low and high energy muon beams

Neutrino physics with muon beams: theory, experiments and future perspectives

Muons beams technologies: production, cooling and acceleration at different energy

Advancements in Muon-based Facilities and Broader Applications

Muons in other fields: muography, muon spin spectroscopy, muon-catalyzed fusion

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