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Spacetime symmetry tests with neutrinos

Wednesday, 10 December 2025 14:30 (30 minutes)

Lorentz symmetry, a foundational principle in both the Standard Model of particle physics and general relativity, is challenged by certain quantum gravity models that predict possible violation. Detecting these tiny Lorentz symmetry violation, or Lorentz violation, has become a global scientific interest, with interference experiments and other precise systems offering the sensitivity needed for such tests. Neutrino oscillations, which act as natural interferometers, provide an ideal framework for investigating Lorentz violation.

In this talk, I will begin by introducing Lorentz violation and the theoretical framework to look for Lorentz violation, known as the Standard Model Extension (SME). Then I will discuss Lorentz violating neutrino oscillations that might explain existing data anomalies and conclude with prospects for one of the most precise Lorentz symmetry tests using astrophysical high-energy neutrinos at neutrino telescopes.

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