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Exploring neutrino oscillations in curved spacetime in long-baseline experiments

Thursday 10 July 2025 18:00 (15 minutes)

In this presentation we discuss the effect of neutrino oscillation in presence of curved spacetime. The influence of curvature on fermionic fields is described by the spin connection, which consists of two components: a universal gravitational term and a non-universal contorsion term. The contraction of contorsion with tetrad fields, which serves as a link between the internal flat space metric and the curved spacetime metric, gives rise to torsion. The presence of torsion induces a nonzero effect on neutrino oscillation appearance and disappearance probabilities, leading to modifications in all aspects of physics sensitivities related to neutrino oscillations. In this study, we explore the role of torsion in future long-baseline neutrino oscillation experiments, specifically DUNE and P2SO, and establish constraints on the torsional couplings within these experimental setups. Our findings illustrate how physics sensitivities like mass hierarchy, CP violation, and octant sensitivity are altered in the presence of nonzero torsional couplings.

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