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Exploring the effect of chiral torsion on neutrino oscillation in long baseline experiments

In curved spacetime, neutrinos experience an extra contribution to their effective Hamiltonian coming from a torsion-induced four-fermion interaction that is diagonal in mass basis and also causes neutrino mixing while propagating through fermionic matter. This geometrical quartic interaction term appears as the modification to the neutrino mass and significantly influences both neutrino conversion and survival probabilities. Since this term varies linearly with matter density, long baseline (LBL) experiments would be a good choice to probe this effect. We put bounds on torsional coupling parameters and also see the impact of torsion on physics sensitivities (the precise determination of leptonic CP phase, mass ordering, octant of 2-3 mixing angle) in the DUNE experiment.

References :

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Field of contribution

Phenomenology

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