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Constraints on quantum spacetime-induced decoherence from neutrino oscillations

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We investigate the implications of decoherence induced by quantum spacetime properties on neutrino oscillation phenomena. We develop a general formalism where the evolution of neutrinos is governed by a Lindblad-type equation and we compute the oscillation damping factor for various models that have been proposed in the literature. Furthermore, we discuss the sensitivity to these effects of different types of neutrino oscillation experiments, encompassing astrophysical, atmospheric, solar, and reactor neutrino experiments. By using neutrino oscillation data from long-baseline reactors and atmospheric neutrino observations, we establish stringent constraints on the energy scale governing the strength of the decoherence induced by stochastic metric fluctuations.

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