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Lorentz noninvariant neutrino oscillations without neutrino masses

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The bicycle model of Lorentz noninvariant neutrino oscillations without neutrino masses naturally predicts maximal mixing and a 1/E dependence of the oscillation argument for muon-neutrino to tau-neutrino oscillations of atmospheric and long-baseline neutrinos, but cannot also simultaneously fit the data for solar neutrinos and KamLAND. We search for other possible structures of the effective Hamiltonian for Lorentz noninvariant oscillations without neutrino mass that naturally have 1/E dependence at high neutrino energy. Due to the lack of any evidence for direction dependence, we consider only direction-independent models. Although a number of models are found with 1/E dependence for atmospheric and long-baseline neutrinos, none can also simultaneously fit solar, reactor and short-baseline neutrino data.

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