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Probing Neutrino Mass Models with Tau Appearance at IceCube

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Neutrino mixing parameters receive quantum corrections and therefore evolve with energy. A mismatch between the mixing parameters at the production and detection scales can produce measurable effects in flavor transitions. We investigate an ultraviolet-complete model of neutrino mass that predicts an observable running of the mixing matrix. We evaluate the IceCube sensitivity to this effect, focusing on TeV-scale muon-to-tau neutrino oscillations, which are strongly suppressed in the standard framework. The observation of an excess in tau appearance would provide a clear signature of a running mixing matrix.

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