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Investigating Lorentz Invariance Violation with the long baseline experiments P2O and DUNE

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One of the basic foundations of quantum field theory is Lorentz invariance. The spontaneous breaking of Lorentz symmetry at a high energy scale can be studied at low energy extensions like the Standard model in a model-independent way through effective field theory (EFT). The present and future Long-baseline neutrino experiments can give a scope to observe such a Planck-suppressed physics of Lorentz invariance violation (LIV). In this talk, I will discuss how two future long baseline proposals DUNE and P2O can explore the LIV physics efficiently. We illustrate how the individual LIV parameters affect neutrino oscillations at P2O and DUNE baselines at the level of probability and derive analytical expressions to understand interesting degeneracies and other features. we estimate constraints on the individual LIV parameters at 95% confidence level (C.L.) intervals stemming from the combined analysis of simulated P2O and DUNE datasets, and highlight the improvement over the existing constraints.

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