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Exploring new physics effects of scalar NSI at Long Baseline Experiments

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The discovery of the phenomena of neutrino oscillations have opened a new window to probe physics beyond Standard Model (SM). In this precision era of neutrino physics, experiments around the world are trying to measure the oscillations parameters with ever increasing accuracy. This makes the ongoing and proposed neutrino experiments sensitive to the subdominant effects of neutrinos like Non Standard Interactions (NSIs).The NSIs [1,2] often comes in various extensions of SM and can significantly impact the sensitivities of different neutrino experiments. In this work we have explored a new type of NSI which is mediated by a scalar termed as scalar NSI [3,4]. The effect of this kind of coupling appears as a medium dependent perturbation to the neutrino mass term, which makes it interesting to probe. Also the effect of scalar NSI scales linearly with matter density and hence it makes LBL experiments one of the suitable candidate to study its effects.

In this study, we have explored the effects of scalar NSI on the sensitivities of various Long Baseline experiments viz. DUNE [5], T2HK [6] and T2HKK [7]. We found that, the presence of scalar NSI poses various degeneracy is measurement of the δ CP phase apart from having significant impact on the oscillation probabilities. We have also performed a sensitivity analysis of these experiments towards finding these scalar NSI elements. Finally we have checked the effect of scalar NSI on the CPV sensitivity at these experiments.

Attendance type

Virtual presentation

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