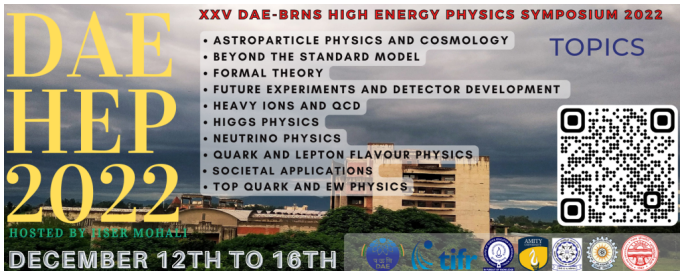

Contribution ID: **83** Type: **Talk**

Investigating Lorentz Invariance Violation with the long baseline experiment P2O

Thursday 15 December 2022 11:30 (15 minutes)

One of the basic propositions of quantum field theory is Lorentz invariance.
The spontaneous breaking of Lorentz symmetry at a more fundamental theory at high energy scale can manifest itself at the low energy extension of standard model perturbatively via
effective field theories.
The present and future Long-baseline neutrino experiments can give a scope to observe such a Planck-suppressed physics of Lorentz Invariance Violation.
The proposed long baseline experiment P2O extending from Protvino to ORCA with a baseline of 2595 km, is expected to provide good sensitivities to unresolved issues, especially neutrino mass ordering.
P2O can offer good statistics even with a moderate beam power and runtime, owing to the very large ($\sim$ 6 Mt) detector volume at ORCA.
Here we discuss in detail how the individual LIV parameters affect neutrino oscillation at the P2O and DUNE baseline at the level of probability and derive analytical expressions to understand interesting degeneracies and other features.
We estimate $\Delta\chi^2$ sensitivities to the LIV parameters, analyzing their correlations among
each other, and also with the standard oscillation parameters.
We calculate these results for P2O alone and also carry out a combined analysis of P2O with DUNE.
We point out crucial features in the sensitivity contours and explain them qualitatively with the help of the relevant probability expressions derived here.
Finally, we estimate constraints on the individual LIV parameters at a confidence level (C.L.) of 95% with the combined (P2O+DUNE) analysis and highlight the improvement over the existing
constraints.
We also find out that the additional degeneracy induced by the LIV parameter a_{ee}
around -22×10^{-23} GeV is lifted by the combined analysis at 95% C.L.

Session

Neutrino Physics

Primary authors: Mrs FIZA, Nishat; MASUD, Mehedi; KHAN CHAOWDHURY, Nafis Rezwan

Presenter: Mrs FIZA, Nishat

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