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Probing the second oscillation maximum at DUNE

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After the successful experimental confirmation of the phenomenon of neutrino oscillation, the major goal of the neutrino experiments has mainly shifted to the search for leptonic CP-violation (CPV), determination of neutrino mass ordering and the precision measurement of the oscillation parameters.

Leptonic CPV, if it can be established, can offer a crucial ingredient in explaining the puzzle of the baryon asymmetry in the observed universe through an elegant mechanism called leptogenesis. Determination of mass ordering and precision measurements will shed light on the plausible set of models for neutrino mass generation. All these require the investigation of neutrino oscillation over a wide range of the ratio (L/E) of neutrino propagation length L and neutrino beam energy E . This will help in gathering information over several oscillation maxima to search for the physics issues

mentioned above. Deep Underground Neutrino Experiment (DUNE) is a next generation long baseline experiment that is expected to see the second oscillation maximum (SOM) in addition to the first oscillation maximum (FOM). We discuss how at the SOM, the CP sensitivity can potentially become larger compared to that of FOM. We write a new $\Delta\chi^2$ code that estimates, for the first time in literature, the sensitivity of DUNE to probe the SOM in its projected data.

Collaboration name

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