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New approaches to the study of BSM models at DUNE Near and Far Detectors

DUNE is one of the most promising future neutrino oscillation

experiments and it is expected to be very sensitive to new physics in neutrino oscillations.

In our analysis we showed that the $\nu_\mu \rightarrow \nu_\tau$ appearance channel with the subsequent decay $\tau \rightarrow e$ can improve significantly the DUNE sensitivity to the propagation Non Standard Interactions (NSI) parameter $|\varepsilon_{\mu\tau}|$ and to the mixing angle θ_{34} in the 3+1 sterile neutrino model. In addition, we studied the neutrino invisible decay model, in which the third mass eigenstate can decay into a sterile one. We found that the Neutral Current channel is able to significantly improve the current bound on the third neutrino lifetime. Finally, we investigated the capability of the Near Detector to constrain the source and detector NSI parameters, showing that a large portion of the currently allowed parameter space can be ruled out.

Mini-abstract

New constraints on new physics parameters using DUNE Near and Far detectors

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