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Probing scalar non-standard interaction of supernova neutrinos in DUNE

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A new neutrino-matter interaction can potentially affect neutrino propagation through matter. In this work, we explore the impact of a flavor-conserving scalar-mediated non-standard neutrino interaction in the supernova neutrino flux. We observe that the presence of scalar interaction involving muon and tau neutrinos (parameterized as $\eta_{\mu\mu}$ and $\eta_{\tau\tau}$, respectively) can invert the neutrino mass eigenstate in which three neutrino flavor states are produced inside the Supernova core, resulting in a significant modification of the electron neutrino flux from supernova reaching the Earth. In the context of the DUNE experiment, we estimate the number of supernova neutrino events in the presence of scalar non-standard neutrino interaction $\eta_{\mu\mu}$ or $\eta_{\tau\tau}$ and contrast with the case without scalar-mediated non-standard interactions. Our results indicate that such scalar interactions introduce a new source of uncertainty in the measurement of neutrino mass ordering from supernova neutrinos.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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