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Prospects of Neutrino mass ordering with supernova neutrinos in the upcoming long-baseline experiments

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In this paper we study the possibility of determining the neutrino mass ordering sensitivity from the future supernova neutrino events at the DUNE and T2HK detectors. We estimate the expected neutrino event rates from a future supernova explosion assuming GKVM flux model corresponding to different processes that are responsible for detecting the supernova neutrinos at these detectors. We present our results in the form of χ^2, as a function of supernova distance. For a systematic uncertainty of 5\%, our results show that, the neutrino mass ordering can be determined at 5 σ C.L. if the supernova explosion occurs at a distance of 44 kpc for T2HK and at a distance of 6.5 kpc for DUNE. Our results also show that the sensitivity of T2HK gets affected by the systematic uncertainties for the smaller supernova distances. Further, we show that in both DUNE and T2HK, the sensitivity gets deteriorated to some extent due to presence of energy smearing of the neutrino events. This occurs because of the reconstruction of the neutrino energy from the energy-momentum measurement of the outgoing leptons at the detector.

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