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Sensitivity study of next generation neutrino detectors to supernova neutrinos with varied flux models

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Supernova neutrinos are weakly interacting particles which are produced when a massive star collapses to form a compact object losing 99% of the gravitational binding energy of the remnant in the form of neutrinos with energies of a few tens of Mev in a few tens of seconds. Supernova neutrinos have promising potential to address particularly interesting HEP and astrophysics issues , and provide insights into phenomena such as neutrino mass hierarchy, the dynamics of the collapsing core, the mechanism of the supernova explosion as well as to probe BSM physics. There are various flux models available that describe the flux (rate and energy distribution) of neutrinos produced in supernovae. Each model may have different assumptions about the physics of supernova explosions, the behavior of neutrinos within the collapsing star, and their interactions as they propagate through space. In this work, we are using 3 such flux models namely Bollig, Tamborra and Nakazato for big future detectors like Hyper-Kamiokande (Hyper-K), Deep Underground Neutrino Experiment (DUNE), and Jiangmen Underground Neutrino Observatory (JUNO) to evaluate the sensitivity of these detectors to the supernova neutrinos for the mass hierarchy.

Track type

Neutrino Physics

Author: GABA, Riya (Panjab University, Chandigarh(IN))

Co-authors: MUKHERJEE, Maitreyee (Panjab University (IN)); BHATNAGAR, Vipin (Panjab University (IN))

Presenter: GABA, Riya (Panjab University, Chandigarh(IN))

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