Contribution ID : **352** Type : **Talk in parallel session**

A deuterated liquid scintillator for supernova neutrino detection

Wednesday, 1 September 2021 17:45 (15)

For the next galactic supernova, operational neutrino telescopes will measure the neutrino flux several hours before their optical counterparts. Existing detectors, relying mostly on charged current interactions, are mostly sensitive to $\bar{\nu}_e$ and to a lesser extent to ν_e. In order to measure the flux of other flavors (ν_μ, $\bar{\nu}_\mu$, ν_τ, and $\bar{\nu}_\tau$), we need to observe their neutral current interactions with the detector. Such a measurement is not only crucial for overall normalization of the supernova neutrino flux but also for understanding the intricate neutrino oscillation physics. A deuterium based detector will be sensitive to all neutrino flavors. In this talk, I will present our proposal for a 1\,kton deuterated liquid scintillator (DLS) based detector that will see about 435 neutral current events and 170 (108) charged current ν_e ($\bar{\nu}_e$) events from a fiducial supernova at a distance of 10 kpc from Earth. We explore the possibility of extracting spectral information from the neutral current channel ${}^{(-)}\nu d \rightarrow {}^{(-)}\nu np$ by measuring the quenched kinetic energy of the proton in the final state, where the neutron in the final state is tagged and used to reduce backgrounds.

Reference to paper (DOI or arXiv)

arXiv:2106.10927

Your gender (free text)

Primary author(s) : CHAUHAN, Bhavesh (Tata Institute of Fundamental Research, India)

Co-author(s) : Prof. DASGUPTA, Basudeb (Tata Institute of Fundamental Research, Mumbai, India); Prof. DATAR, Vivek (The Institute of Mathematical Sciences, Chennai, India)

Presenter(s) : CHAUHAN, Bhavesh (Tata Institute of Fundamental Research, India)

Session Classification : Discussion Panel Neutrinos 5

Track Classification : Neutrino physics and astrophysics