

Pre-supernova neutrino observation in JUNO

Jiangmen Underground Neutrino Observatory (JUNO) is one of the next-generation neutrino experiments under construction, designed with a 20 kt large liquid scintillator detector. Prior to the core-collapse of the massive stars with mass larger than 8 solar mass, the increasing sub-MeV neutrinos produced through thermal and weak nuclear processes enables their observation in JUNO. In this talk, we explore the observable signals of these pre-supernova (pre-SN) neutrinos with the inverse beta decay (IBD) and the neutrino-electron elastic scattering reactions in JUNO. The sensitivity to pre-SN neutrinos as well as the pre-SN pointing ability in JUNO is quantified with the IBD events. Throughout, the well-known possible supernova candidate, Betelgeuse, is taken as the reference astrophysical object. For the next nearby galactic SN, the pre-SN detection could act as the early alert for the imminent core-collapse SN, reserving time for the follow-up multi-messenger observation.

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