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Core-Collapse Supernova Neutrinos in JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) will play an essential role in detecting neutrinos from core-collapse supernova (CCSN). Designed with a 20 kt liquid scintillator detector, JUNO has capability to register all flavors of $O(10\text{MeV})$ supernova burst neutrinos with several channels. Even the $O(1\text{ MeV})$ pre-supernova neutrinos from the advanced stages of stellar evolution are detectable for the nearby progenitors, thanks to the low energy threshold of the liquid scintillator detector. For the next CCSN in the Galaxy and its vicinity, a real-time monitor system with supernova burst neutrinos and pre-supernova neutrinos as diagnostics is currently under development in JUNO, to provide early alerts for its multi-messenger follow-up observations. Besides, JUNO's sensitivity to the neutrino flux from all the supernovae occurred in the Universe in aggregate (Diffuse Supernova Neutrino Background, DSNB) is competitive to that of the Super-K with gadolinium phase, and will be discussed as well.

Collaboration name

JUNO

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