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Prospects for Detecting the Diffuse Supernova Neutrino Background with JUNO

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As an underground multi-purpose neutrino detector with 20 kton liquid scintillator, Jiangmen Underground Neutrino Observatory (JUNO) has great potential to detect the diffuse supernova neutrino background (DSNB). Depending on the latest knowledge about the average supernova neutrino spectrum, the star-formation rate, and the ratio of the failed black-hole-forming supernovae, it is predicted to have about 4-8 events per year within the optimal observation window from 12 MeV to 30 MeV.

We employ the latest information on the DSNB flux predictions, and investigate in detail the background and its reduction for the DSNB search at JUNO. The dominant background is from the neutral-current (NC) interaction of atmospheric neutrinos with ^{12}C nuclei, whose uncertainty is carefully evaluated from both the spread of model prediction and an envisaged in situ measurement. We also make a careful study on the background suppression with the pulse shape discrimination (PSD) and triple coincidence (TC) cuts. Finally, we present the latest evaluation of the DSNB sensitivity with JUNO.

In-person participation

No

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