

Detectability of neutrinos from supernova bursts in PandaX-4T

Thursday 18 July 2024 20:40 (20 minutes)

Core-collapse supernova bursts are among the most energetic phenomena known in the universe. PandaX-4T, a dark matter and neutrino experiment that employs a dual-phase xenon TPC as the detector, has the ability to detect neutrinos from supernova bursts via the coherent elastic neutrino-nucleus scattering process. In this study, the total number of supernova neutrino events in PandaX-4T is estimated to be from 6.6 to 13.7 at 10 kpc over 10-second duration with negligible backgrounds, dependent on the properties of the supernova progenitors of different masses. Two specialized triggering alarms, golden and silver, for monitoring supernova burst neutrinos are built, with false alert rates of around one per month and one per week, respectively. These alarms will soon be implemented in the real-time supernova monitor system of PandaX-4T to provide supernova early warnings for the astronomy community.

Alternate track

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Session Classification: Poster Session 1

Track Classification: 02. Neutrino Physics