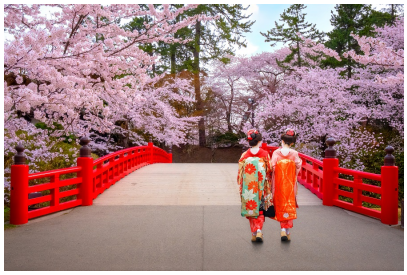

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Detecting Supernova neutrino bursts in Super-Kamiokande

mercredi 29 mars 2023 09:45 (15 minutes)

The Super-Kamiokande experiment, with its 50 ktons gadolinium-loaded water Čerenkov detector, is expected to be one of the main neutrino detectors for the detection of neutrino bursts from galactic supernovae (SN). Main signals from SN neutrino bursts in a water Čerenkov detector are for ~90% inverse β decay (IBD) reactions, and for ~5% electron scattering (ES) interactions, which provides the direction toward the SN. In Super-Kamiokande, the presence of gadolinium (Gd), increasing the detectability of neutron production, allows to improve the identification of IBD reactions. This provides a clear signature of a SN burst event and allows to increase the purity of an ES selection, enhancing the performance of the SN direction reconstruction. Due to the presence of Gd, we will detect anti-neutrino interactions from the Si-layer burning in progenitor stars before the SN, if the progenitor is close enough. Such a detection will indicate an imminent SN core collapse a few hours before it happens.

In this presentation, we will report the recent progresses achieved by the Super-Kamiokande collaboration to improve its supernova monitoring capabilities.

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