

Pre-Supernova Silicon Burning Neutrinos at Super-Kamiokande

SK-Gd is the next phase of the Super-Kamiokande (SK) experiment. Gadolinium (Gd) sulphate will be dissolved at 0.2% by mass, enriching the detector medium to contain 0.1% Gd. Gd's extremely high capture cross-section for thermal neutrons, which is followed by an energetic gamma cascade, will make neutron tagging in the detector more than 80% efficient. Prior to a core collapse supernova (SN), silicon burning emits anti-neutrinos which will be detectable at SK-Gd if the star is close enough. A rapid increase in event rate would warn SK-Gd hours or days in advance of a nearby SN, and would probe late stellar burning, on which data is scarce. Detection is through inverse beta decay, and is challenging due to relatively low rates and low positron energies, so gadolinium doping is required. Event candidates are low energy positrons in coincidence with neutron capture, and neutron captures on their own. Sensitivity studies for silicon burning neutrinos at SK-Gd are shown.

Authorship annotation

for the Super-Kamiokande collaboration

Session and Location

Wednesday Session, Poster Wall #15 (Robert-Schumann-Room)

Poster included in proceedings:

yes

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