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Long time supernova simulation and supernova burst search at Super-Kamiokande

There are several problems facing future supernova detection with neutrinos. On the theoretical side, many simulations concentrate only on the first second of the explosion, although SN1987a revealed supernovae release neutrinos for more than 10s. On the observational side, if a supernova is detected at Super-Kamiokande its entire inner volume and not just its fiducial volume should be used to extract the most information. However, so far there has been no study of the entire inner volume for these events. Two topics will be reported to address these problems. The first describes a long-time (20s) supernova simulation that considers general relativity and neutrino transport in one dimension. The second reports an evaluation of background rates in the entire Super-Kamiokande inner volume. Finally, the results of a search for distant supernova bursts using an expanded fiducial volume and optimized with this new simulation will be reported.

Mini-abstract

The supernova simulation and burst search with an expanded fiducial volume will be reported.

Experiment/Collaboration

Super-Kamiokande

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