

GADZOOKS!

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The neutrinos which have been released from all past supernova explosions are called supernova relic neutrinos (SRN). While Super-Kamiokande has not yet observed the SRN, it has set the world's best upper limit on the flux. This limit is within a factor of 2-3 of the theoretical SRN flux predictions. GADZOOKS! is proposed as an upgrade project for Super-Kamiokande with gadolinium-loaded water. Gadolinium has a large thermal neutron capture cross-section and emits a total 8MeV gamma cascade in the capture process. This delayed gamma ray signal by free neutron captured on gadolinium, in coincidence with a prompt positron signal, can drastically reduce backgrounds and identify electron antineutrinos interacting via inverse beta decay. This project is expected to make the first observation of SRN.

A dedicated test facility, called EGADS, is now operating in the Kamioka mine in close proximity to the Super-Kamiokande detector. The purpose is a demonstration that adding gadolinium is safe for the detector and it is capable of delivering the good physics results. EGADS houses a stainless steel tank filled with 200 tons of gadolinium-loaded water and lined with 232 20-inch photomultiplier tubes (PMTs), special water circulation system for filtration, gadolinium dissolution and recovery, and several devices for evaluating the water quality. Up to now, we successfully operated all the system and keep enough quality of gadolinium-loaded water without PMTs. In this summer, we will install PMTs into the tank and start full detector commissioning.

The current status and plan of this future project will be presented.

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