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Status of Super-Kamiokande gadolinium project

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In the universe, there exist supernova relic neutrinos (SRN) which have been released from all past supernova explosions. Super Kamiokande (SK) has conducted search for these SRN events via inverse beta decay interaction in the detector, and it is about to reach the SRN signals with sensitivity of about a factor of 2. But, it is still difficult to observe them since the search is limited by background. The addition of gadolinium (Gd) compound in the SK was proposed. Gd has the largest thermal neutron capture cross-section among all stable nuclei and gives total 8 MeV gamma cascade in the capture process. By coincidental tagging of positron and gamma-rays from Gd neutron capture, we can identify the SRN inverse beta decays signal.This technique can lead us to the first observation of a SRN signal in SK. We will demonstrate the principle of a Gd-doped water Cherenkov detector (transparency of the Gd-doped water, Gd-doped water circulation method), neutron capture efficiency, etc) with test dedicate facility called EGADS. EGADS consists of 200 ton water Cherenkov detector, a Gd mixing pre-treatment device, Gd-doped water circulation system, and water transparency measurement device. We have checked Gd-doped water circulation with EGADS purification system since 2012. The PMTs and DAQ are ready and these performances have been studied. The evaluation of the overall performance of EGADS will start in 2013 after the PMT installation. The current status of the EGADS will be shown.

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neutrino physics

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