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Evaluating Gadolinium's Action on Detector Systems

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The proposed introduction of a soluble gadolinium [Gd] compound into water Cherenkov detectors can result in a high efficiency for the detection of free neutrons capturing on the Gd. The delayed 8 MeV gamma cascades produced by these captures in coincidence with a prompt positron signal serve to uniquely identify electron anti-neutrinos interacting via inverse beta decay. Such coincidence detection greatly reduces backgrounds, which should allow a large Gd-enhanced water Cherenkov detector to make the first observation of the diffuse supernova neutrino background and high precision measurements of Japan's reactor anti-neutrino flux, while still allowing for all current physics studies to be continued. Now a dedicated Gd test facility is operating in the Kamioka Mine, home of the Super-Kamiokande [SK] detector. This new facility houses a stainless steel tank, capable of holding 200 tons of water and lined with 240 50-cm photomultiplier tubes connected to a functioning data acquisition system, a specially designed water system for filtration and gadolinium recovery, and multiple devices for evaluating the quality of the water in the tank. Successful running of this new facility will demonstrate that adding Gd salt to SK is both safe for the detector and is capable of delivering the expected physics benefits.

Summary

The poster will give an update of the EGADS R&D experiment run by the Low Energy group of the Super-Kamiokande Collaboration.

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