EGADS Gets Going

Mark Vagins

IPMU Professor

In the EGADS underground laboratory. From left to right: Roy Hall, Erin O'Sullivan, Masayuki Nakahata, Jeff Griskevich, Mark Vagins

Several years ago, IPMU Professor Mark Vagins and theorist John Beacom suggested adding 100 tons of gadolinium sulfate to Super-Kamiokande as a way - among other benefits - to detect the diffuse flux of supernova neutrinos produced by all the core collapse explosions since the onset of star formation. These ancient supernova neutrinos could provide a steady stream of information about not only stellar collapse and nucleosynthesis but also on the evolving size, speed, and nature of the cosmos itself. This ambitious plan is called GADZOOKS!, for Gadolinium Antineutrino Detector Zealously Outperforming Old Kamiokande, Super!

In order to demonstrate the safety and effectiveness of this approach, a new, dedicated gadolinium test facility has been constructed underground in the Kamioka mine near Super-K. Led by Vagins and IPMU PI Masayuki Nakahata, this large-scale R&D project is called EGADS: Evaluating Gadolinium's Action on Detector Systems. It includes a 200 ton scale model of Super-K complete with 240 50-cm phototubes, and a novel selective water filtration system.

The system became operational in early 2011, first running with pure water. In August, once it was shown that the filtered water in EGADS was equal in quality to that in Super-K, the first gadolinium sulfate - 28 kg - was dissolved, allowing studies of gadolinium filtration and transparency to begin. By September, the EGADS selective filtration system had achieved a gadolinium retention rate of 99.97% per pass, while simultaneously cleaning unwanted impurities from the water: a major achievement.

EGADS is scheduled to run through 2013, providing key input to the ultimate decision regarding adding gadolinium to Super-K.