

New Technologies for Gadolinium loading Super Kamiokande

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After more than 20 years of data taking and analysis, Super-Kamiokande (SK) will undergo a major upgrade through the addition of 0.2% gadolinium sulfate by mass to its ultra-pure water. This will allow the efficient detection of neutrons, giving access to new physics signals while improving sensitivity to existing ones.

While this upgrade promises many improvements, there were several technical challenges to overcome before its implementation. To address these challenges a dedicated 200-ton gadolinium test facility, EGADS (Evaluating Gadolinium's Action on Detector Systems), was constructed in the Kamioka mine. EGADS has now been stably taking data at the target 0.2% loading for over two years. During this period it has maintained SK levels of water transparency with no detectable loss of gadolinium, successfully proving the concept of gadolinium-doped water Cherenkov technology. With this demonstration complete, EGADS itself is currently undergoing an upgrade and re-branding to EGADS (Employing Gadolinium to Autonomously Detect Supernovae). This upgrade will see new electronics and DAQ installed and real-time reconstruction implemented so that EGADS can autonomously detect and announce a galactic supernova should one occur.

This talk will discuss new technologies developed for EGADS and a gadolinium loaded SK.

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