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WbLS results from Eos

Tuesday 7 October 2025 15:00 (15 minutes)

Hybrid neutrino detectors utilize both Cherenkov and scintillation light for event detection and reconstruction - leveraging the lower energy threshold of pure scintillation emission and the enhanced direction resolution afforded by water. The benefits of hybrid technologies provide for advancements in both fundamental physics research and in nuclear nonproliferation applications. Benchtop experiments have shown success in Cherenkov/scintillation separation. Now, a ton-scale demonstration of these technologies is needed to extrapolate the performance to larger detectors, such as Theia, with a fiducial volume of tens of kT.

Eos, constructed at UC Berkeley and Lawrence Berkeley National Laboratory, is a detector with an approximately 4-ton target fiducial volume. Featuring fast photomultiplier tubes (900 ps transit time spread), a novel water-based liquid scintillator (WbLS) target, and the first large-scale test of spectral sorting, will provide a test-bed for these emerging technologies.

This talk will present the first WbLS results of Eos, highlighting optical model verification, event detection and reconstruction capabilities. Furthermore, the extrapolation to kT-scale detectors and the adoption of these advanced techniques for nuclear non-proliferation and fundamental neutrino experiments will be discussed.

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