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Recent achievements in the hybrid detector development program for THEIA

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New developments in liquid scintillators, high-efficiency, sub-nanosecond photon sensors, and chromatic photon sorting have opened up the possibility to realize large-scale neutrino detectors that can discriminate between Cherenkov and scintillation signals. A hybrid detector could exploit the two distinct signals to reconstruct particle direction and species using Cherenkov light while also having the excellent energy resolution and low threshold of a scintillator detector. Situated in a deep underground laboratory, and utilizing new techniques in computing and reconstruction techniques, a hybrid detector could achieve unprecedented levels of background rejection, thus enabling a rich physics program in long-baseline neutrino oscillations and the observation of astrophysical neutrinos.

This talk describes Theia, a detector design that incorporates these new technologies in a practical and affordable way. Moreover, it highlights the most recent achievements in the development of suitable scintillation materials and novel photo sensors.

Collaboration name

THEIA Proto-Collaboration

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