

Theia: A Multi-Purpose Water-Based Liquid Scintillator Detector

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Recent developments in the field of liquid scintillator chemistry and fast-timing photosensors paved the way for a new generation of large-scale detectors capable of tackling a broad range of physics issues. Water-based Liquid Scintillator (WbLS) is a novel detection medium that combines the advantages of pure water, including low attenuation, accurate direction reconstruction, and low cost, and those of liquid scintillator, including high light yield and low-threshold detection. When coupled with high efficiency, fast-timing photosensors, such as Large Area Picosecond PhotoDetectors (LAPPDs), WbLS exhibits an immense potential for neutrino physics and BSM searches. Theia is a 50-kiloton multi-purpose neutrino detector that aims to jointly deploy these two technologies in order to fulfill its physics program objectives, including the determination of the neutrino mass hierarchy and the CP violation phase in the leptonic sector, the detection of solar, reactor, and supernova neutrinos, and the search for neutrinoless double beta decay and proton decay.

This presentation will describe the physics potential and the experimental setup of the Theia detector.

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Collaboration name

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