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The Theia Detector

Tuesday, May 14, 2024 5:00 PM (20 minutes)

Theia is a proposed large-scale neutrino detector designed to discriminate between Cherenkov and scintillation signals in order to facilitate a rich program of precision and rare-event physics. The baseline design consists of a tank filled with a novel scintillator, such as water-based liquid scintillator (WbLS), along with fast, spectrally-sensitive photon detection, in order to leverage both the Cherenkov signal's direction sensitivity and the remarkable energy resolution and low threshold of a scintillator detector. This talk will present the physics reach of a 25 kTon Theia detector deployed at the far detector site in the LBNF neutrino beam, as well as its complementarity to the DUNE LArTPC program. This includes sensitivity to CP violation and neutrino mass ordering, as well as a broad program of other physics topics, such as the measurement of solar, geo-, supernova burst, and diffuse supernova background neutrinos alongside the potential to search for neutrinoless double-beta decay, with a sensitivity reaching the normal ordering regime of neutrino mass phase space. The rapid progress already made in the R&D required to realize Theia will be presented.

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