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Theia Physics Program

Wednesday, 22 March 2023 17:00 (5 minutes)

Theia is a proposed many-ktonne scale "hybrid" optical neutrino detector with the potential for a broad physics program. Hybrid detectors leverage advancing technology in fast-timing photon sensors, chromatic photon sorting, and new scintillating materials, such as water-based liquid scintillator, in order to simultaneously distinguish both the Cherenkov and scintillation signals. Using the scintillation light, Theia can achieve excellent vertex and energy reconstruction and sub-Cherenkov thresholds, while the ring imaging from the Cherenkov signal provides directionality and enhanced particle identification. This technology enables a broad physics program including world-class measurements of low- and high-energy solar neutrinos, sensitive searches for nucleon decay, observation of the diffuse supernova background, a sensitive probe of geo and reactor neutrinos, and ultimately a search for neutrinoless double beta decay. Theia can provide a complementary measurement, using a low-Z target material, of δ_{cp} and the neutrino mass ordering if deployed as a far detector module as part of Phase II of DUNE. Overall, Theia provides a uniquely broad program and presents an exciting opportunity for the future of neutrino physics.

Please select if remarks will be in person or on zoom

On zoom

Do you describe your self as early career?

yes

Please add details of experiment/project that this abstract corresponds to?

Theia

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