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Theia: An advanced optical detector concept

The Theia concept proposes a next-generation optical detector with broad physics capabilities. Advances in detector technology including water-based liquid scintillator targets, photon detectors with fast timing and spectral sensitivity, and novel reconstruction approaches enable a multi-kiloton scale detector with the ability to resolve Cherenkov and scintillation signals, providing a powerful means of event identification across a broad energy range. We review the detector concept and enabling technologies; potential for physics opportunities including long-baseline neutrino oscillations, solar and supernova neutrinos, and baryon and lepton number violation searches; and discuss the current status of R&D towards realizing this concept.

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