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Physics potential of a ton-scale neutrino detector based on a slow liquid scintillator

Neutrino physics using liquid scintillators as a detection medium is experiencing an increase in R&D efforts on new-generation liquid scintillator (LS) cocktails such as the slow fluors scintillators, with high light yields and decay times around tens of ns. The strength of these slow scintillators lies in the ability to separate the Cherenkov and scintillation signals based on the timing of the detected photons, thereby providing unique directional and particle identification information.

This contribution reports the potential of a ton-scale demonstrator based on slow LS to pioneer this hybrid detection method. The capability to discriminate the scintillation and Cherenkov light, and the properties of the expected signals, are analyzed by varying the experimental conditions and the detector configuration. Such a detector would help to move away from bench-top measurements and pave the way for a new generation of kiloton-scale slow LS detectors.

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