Abstract

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Proton light yield of water-based liquid scintillator

Future neutrino detectors, whether answering questions of fundamental physics or exercising nuclear monitoring techniques, will require advanced technologies for optimal performance. One such candidate technology is water-based liquid scintillator (WbLS), a material for which Cherenkov and scintillation light may be discriminated and examined independently. We present a measurement of the relative proton light yields of WbLS and an LAB-based liquid scintillator, using a broad-spectrum neutron source at the 88-Inch Cyclotron at Lawrence Berkeley National Laboratory. A double-time-of-flight technique was employed, which allows for relatively pure selection of proton recoil events over a continuous energy range. We also present a characterization of the nonlinearity in photomultiplier tube response over the full dynamic range of the electronics system.