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Water-based Liquid Scintillator 30-ton Demonstration and Calorimetry Application

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The water-based liquid scintillator (WbLS) has many potential applications in nuclear and particle physics and other rare-event detections. The WbLS, as the primary detector target, allows simple detector design, minimum chemical hazard, and adjustable scintillation light yield. In addition, the separation of scintillation and Cherenkov events enables directional reconstruction and enhances low energy efficiency. WbLS also provides a new approach loading inorganic metallic ions from aqueous solution directly into the organic scintillator liquid to enhance detector sensitivity and expand physics reach for a wide range of particle interactions with adequate photon yield and high optical transparency. This talk will report on the feasibility development, in terms of formulation, characterization, and production, of kiloton-scale WbLS deployment via the study of a 30-ton Demonstrator at BNL. The use of WbLS as a highly pixelated, imaging detector to deduce event topology enhancing particle identification for calorimetry application will also be discussed. This research was funded by Brookhaven National Laboratory LDRD 12-033 and by U.S. Department of Energy Grant No. DE-SC0012704.

Early Career

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