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Liquid Scintillator Development Facility for Large-scale Neutrino Experiment

The BNL Neutrino and Nuclear Chemistry group is well-known for its world-leading expertise in metal-doped and water-based liquid scintillator (a novel development that has been initiated since 2009) and has the state-of-art scintillator development facility that is capable of formulating various scintillator detectors for different nuclear and particle physics experiments. Different chemical elements doped in various organic scintillators have a variety of applications in neutrino detection. On the other hand, the newly developed, water-based liquid scintillator is a new cost-effective detection medium for future massive detectors with the unique capability of exploring physics below the Cherenkov threshold and has the ability of loading any (hydrophilic) metallic ions of interest for neutron tagging or other physics enhancements. The same water-based detector could also serve as the near detector for long baseline neutrino beam monitoring or be used for detection of diffuse neutrino flux from distant past supernovae. The applications of liquid scintillator to a variety of future experiments including double-beta decay, dark matter search, reactor neutrino and beam physics will be presented.

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