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Li6-doped plastic scintillators for reactor antineutrino detectors
VIACHESLAV LI, OLUWATOMI AKINDELE, NATHANIEL BOWDEN, JASON BRODSKY, TIMOTHY CLASSEN, STEVEN DAZELEY, Lawrence Livermore National Laboratory, MARK DUVALL, University of Hawaii at Manoa, IGOR JOVANOVIC, University of Michigan, ANDREW MABE, MICHAEL MENDENHALL, EDWARD REEDY, Lawrence Livermore National Laboratory, FELICIA SUTANTO[1], University of Michigan, XIANYI ZHANG, Lawrence Livermore National Laboratory — In recent years, significant progress has been made at LLNL in synthesizing a new class of plastic scintillators that support Pulse Shape Discrimination (PSD) and Li-6 doping. Two distinct chemistries have been developed to solubilize Li-6 compounds in organic solvents, in which they are typically insoluble. Elements as large as 40cm have been produced, with efforts continuing to improve manufacturing procedures for larger components. These developments open new opportunities in fast and thermal neutron detection, as well as for reactor antineutrino detectors. Plastic PSD scintillator materials can enable new detector geometries, potentially reduce system complexity, and are straightforward to handle and transport. In this presentation, we will describe the materials and performance metrics. Material performance will be described in the context of a 64-segment Li6-doped plastic scintillator detector with SiPM readout which would have otherwise been difficult or impossible to realize.

[1]also at Lawrence Livermore National Laboratory

Viacheslav Li
Lawrence Livermore National Laboratory

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