Contribution ID: **651** Type: **Parallel session talk**

Advances in radiation detectors based on finely-segmented PSD plastic scintillator: from fast neutrons to reactor antineutrinos

Thursday 27 May 2021 08:42 (18 minutes)

Pulse-shape discrimination between nuclear and electronic recoil is a powerful technique to improve background rejection in scintillation detectors.
Until recently, only the liquid form of PSD organic scintillators has been available. The invention of stable plastic PSD scintillators at LLNL made it possible to envision a new class of radiation detectors. The plastic form is advantageous over liquid as one can machine segments into any shape without the need for any non-scintillating containment material. We have been designing and testing a variety of thin segmented detectors, utilizing silicon photomultiplier (SiPM) arrays as an optical readout. If doped with Li-6, the scintillator becomes sensitive to thermal neutrons; thus, capable of detecting reactor antineutrinos via the inverse-beta-decay (IBD) reaction. This has been the primary focus of our research, to develop the Segmented AntiNeutrino Directional Detector (SANDD).

TIPP2020 abstract resubmission?

No, this is an entirely new submission.

Funding information

LLNL-ABS-819231. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Session Classification: Sensors: Light-based detectors

Track Classification: Sensors: Sensors: Light-based detectors