

Abstract Submitted
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Advances in Neutron Spectroscopy with Deuterated Organic Scintillators MICHAEL FEBBRARO, Oak Ridge National Laboratory, Oak Ridge, TN, USA 37831, STEVE PAIN, Oak Ridge National Laboratory, FREDERICK BECCHETTI, University of Michigan, Ann Arbor, MI, USA 48109 — Deuterated organic scintillators have shown promise as neutron detectors for nuclear science as well as applications in nuclear non-proliferation and safeguards. In particular, they can extract neutron spectra without the use of neutron time-of-flight measurement (n-ToF) utilizing spectrum unfolding techniques. This permits the measure of cross sections of bound and unbound states with high efficiency and angular coverage. In the case of measurements with radioactive ion beams where low beam intensities limit long path n-ToF, short path n-ToF can be used to discriminate neutrons of interest from room return and background neutrons. This presentation will provide recent advances with these types of detectors. Digital pulse-shape discrimination using fast waveform digitizers, spectrum unfolding methods for extraction of neutron spectra, and a new safer deuterated-xylene formulation EJ-301D will be discussed. In addition, experimental results from measurements of discrete and continuous neutron spectra which illustrate the advantage of these detectors for certain applications in nuclear physics research and nuclear security will be shown. This work is supported by NSF and DOE.

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