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Development of New High Resolution Neutron Detector L. D. MOSTELLA III, M. RAJABALI, Tennessee Technological University, D. P. LOUREIRO, R. GRZYWACZ, University of Tennessee Knoxville — Beta-delayed neutron emission is a prevalent form of decay for neutron-rich nuclei. This occurs when an unstable nucleus undergoes beta decay, but produces a daughter nucleus in an excited state above the neutron separation energy. The daughter nucleus then de-excites by ejecting one or more neutrons. We wish to map the states from which these nuclei decay via neutron spectroscopy using NEXT, a new high resolution neutron detector. NEXT utilizes silicon photomultipliers and 6 mm thick pulse-shape discriminating plastic scintillators, allowing for smaller and more compact modular geometries in the NEXT array. Timing measurements for the detector were performed and a resolution of 893 ps (FWHM) has been achieved so far. Aspects of the detector that were investigated and will be presented here include scintillator geometry, wrapping materials, fitting functions for the digitized signals, and electronic components coupled to the silicon photomultipliers for signal shaping.

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