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Optimizing the Timing Resolution for the NEXT Array[1] A. ENGELHARDT, S. SHADRICK, M. RAJABALI, Tennessee Tech University, K. SCHMITT, R. GRZYWACZ, University of Tennessee Knoxville — In nuclear physics studies there are very few detectors capable of measuring neutron energies in the 0.1-10 MeV energy range with a reasonable resolution. The VANDLE array is the premier detector array for these measurements, yet VANDLE is limited by the its thickness (2.9 cm minimum).The Neutron dEtector with Tracking (NEXT) array would be capable of surpassing the limitations caused by the large size of VANDLE bars. A proposed configuration of each neutron detector consists of ten 3-mm thick plastic scintillators with two or more silicon photomultipliers (SiPMs) attached at each end. To achieve the desired energy resolution for neutron energy measurements through time of flight, the timing resolution between these SiPMs needs to be below 200 ps. A SiPM was placed on each end of a plastic scintillator inside a light-tight electrical box along with a ^{137}Cs source. An analog circuit was designed in order to measure the timing difference between the two SiPMs. Different configurations of SiPM sizes, scintillator sizes, and wrappings were tested in order to determine the configuration that yields the best timing resolution. Details of the testing procedures and results will be presented.

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