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Characterization of a Silicon Photomultiplier Detector Array for Measurements of Neutron Yield and Spectrum Using Time-of-Flight Technique[1] JACQUELYNNE VAUGHAN, UC San Diego, Q. LOOKER, G. CHANDLER, J. L. PORTER, Sandia National Laboratory, M. BAILLY-GRANDVAUX, F. N. BEG, UC San Diego — A short pulse high intensity generated neutron source has applications in fusion research, security, and industrial scanning. It is important to know the source neutron yield and spectrum for applications. This information could be obtained by fielding an array of neutron detectors operated in pulse-counting mode. This detection scheme was implemented at the LaNSA at the Nova Laser Fusion Facility in the 1990's with a detector 4 meters in diameter. The development of Silicon photomultipliers (SiPM) has now enabled the development of a miniature version of LaNSA. This new device was calibrated at the Ion Beam Laboratory at Sandia, using a 300 kV Cockroft-Walton generator that accelerated a D+ beam into an ErT_2 target. Ensuing D-T fusion reactions produced 3.5 MeV alpha particles and 14 MeV neutrons. Neutron detectors characterized included an EJ232Q coupled to a single PMT, and an EJ228 coupled to a SiPM array. The data from these detectors were correlated using the associated particle method and analyzed to produce absolute yields and energy spectra.

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