

New detectors for fast neutron spectrometry using plastic scintillator and silicon photomultipliers

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Fast neutron fields, such as those present in aviation, space, and nuclear research environments, pose significant biological risk. New detectors are being developed for the purpose of monitoring these fields up to 20 MeV. The detectors are made from EJ-276 plastic scintillator in novel geometries coupled to one or more silicon photomultipliers, using digital pulse acquisition and processing. The detectors have been characterised in fast neutron fields at the UCT n-lab, IRSN AMANDE, and PTB PIAF facilities. Response functions were measured using both monenergetic beams and time-of-flight with broad energy beams. GEANT4 simulations have been verified using these measurements and were used to supplement those responses. The suitability of these devices for spectrometry has been demonstrated by unfolding analyses using those response functions to produce neutron energy spectra.

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