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CALCULATIONS AND MEASUREMENTS OF NEUTRON ARRIVAL TIME DISTRIBUTIONS FOR NEUTRON DETECTORS AT SLAC*

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ABSTRACT

CALCULATIONS AND MEASUREMENTS OF NEUTRON ARRIVAL TIME DISTRIBUTIONS FOR NEUTRON DETECTORS AT SLAC.

by Rupinder Kaur

The distributions of neutron arrival time (the time between the neutron being generated in a target and the time it is detected by the sensor) are important for the dead time corrections of the neutron detectors in pulsed radiation field. Calculations using MCNP and measurements of the neutron arrival time distributions were made for the moderated BF_3 detector, Anderson-Braun remmeter, and Bonner Sphere LiI detectors. Neutron sources defined in these calculations include monoenergetic neutrons from a few eV to 20 MeV, giant resonance neutrons, and the measured 'equilibrium' neutron spectrum of Final Focus Test Beam (FFTB) at SLAC. The results show an exponential behavior of the neutron arrival time distributions. Comparisons between calculations and measurements show close agreement for 10″ Bonner Sphere detector and a maximum difference of about 20% for moderated BF_3 detector and AB remmeter. The cause of the discrepancy for 2″ Bonner Sphere detector is also explained.

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