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Experimental study of fast neutron detectors with a pulse shape discrimination

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The performance of a single fast neutron detector was studied. Two different scintillators were evaluated, namely stilbene crystal and liquid EJ-301 (NEDA) scintillators. The efficiency and the calibration of each detector were done. Gamma rays and neutrons are well separated with both pulse shape discrimination (in single mode) and Time of Flight measurement of neutron-gamma particles (coincidence mode). Number of detected neutrons obtained in NEDA were ~3 times higher than stilbene due to the bigger active volume of ~3.15 liters liquid scintillator with 20 cm height compared to 8 cm in diameter and 5 cm long of stilbene at the same distance from the source.

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