

Study of the influence of ADC sampling rate on the efficiency of neutron-gamma discrimination by the pulse shape

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There is a number of applications where fast neutron detection in presence of gamma radiation is required: 1) control of neutron and gamma background in underground low-frequency experiments (neutrino and Dark matter detectors), 2) measurement of fast neutron yield from neutron generators, 3) control of spent nuclear fuel, 4) environmental monitoring. Such studies use scintillation detectors with organic crystals, plastic and liquid scintillators. The shape of the output pulses from such detectors depends on the particle type. In the present experiment, Pu-Be neutron source and two types of digitizers (CAEN DT5730 (500 MHz) and CAEN DT5743 (3.2 GHz)) were used. Both digitizers allow to store sequences of waveforms obtained from the detector. In the report, functional features of the CAEN DT5730 and CAEN DT5743 are described, and the experimental characteristics of their operation are compared. Experimental values of the efficiency of neutron/gamma signal separation using two ADCs with different sampling frequencies are presented.

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