Contribution ID : **771** Type : **Poster**

Identification of neutrons and gamma rays using a combination of three algorithms for separating signals of the scintillation detector

Monday, 5 October 2020 17:30 (150)

Scintillation detectors with organic scintillators are widely used for fast neutrons detection in high gamma ray background. This is a way to solve the problem of measuring the combined gamma-neutron background in a large number of studies: registration of backgrounds near accelerators; monitoring of spent nuclear fuel; monitoring of neutron flux in nuclear fusion installations; measurement of neutron yield from neutron generators. Scintillation detectors with organic crystals or liquid scintillators are used for this purposes. The peculiarity of this type of detector is that the pulse shape depends on the type of the detected particle. Traditionally, the Pulse Shape Discrimination (PSD) histogram is used to determine the number of detected neutrons. The PSD parameter is calculated from the shape of the detector pulse and assigned to each pulse. A typical PSD histogram contains two peaks corresponding to neutrons and gamma rays that overlap in the region between the peaks. With this approach, it is impossible to identify each individual signal in the area between the peaks. Therefore, it is not possible to calculate the overall signal identification coefficient. We have proposed a new method for the identification of neutrons and gamma quanta, which includes a combination of three signal separation algorithms: the traditional histogram PSD, the dependence of the area of signals on their amplitude, Tau histogram (tau means the fall constant of the detector pulses). This combination of three algorithms makes it possible to calculate the value of the signal identification coefficient. To test a new method for identifying neutrons and gamma quanta, we used a Pu-Be neutron source, a scintillation detector with a p-terphenyl crystal and a CAEN DT5730 Digitizer (14 bit, 500 MHz). When a scintillation detector registered neutrons from a Pu-Be source, the signal identification coefficient was 89.8%. A new method for identifying signals from a scintillation detector is used to register neutrons at the light ion accelerator.

Primary author(s) : Dr. KLIMANOV, Sergey (National Research Nuclear University "MEPhI",)

Co-author(s) : KIRSANOV, Mikhail; Dr. CHEPURNOV, Alexander

Presenter(s) : Dr. KLIMANOV, Sergey (National Research Nuclear University "MEPhI",)

Session Classification : Poster session

Track Classification : Facilities and advanced detector technologies