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Time-over-Threshold Method for the BM@N Highly-Granular Neutron Detector

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A highly-granular neutron detector is currently being developed for the BM@N experiment at JINR, Dubna, Russia, aimed at measuring neutrons produced in nuclear collisions within the energy range of 1-4 AGeV. The detector consists of alternating layers of scintillators and absorbers, with silicon photomultipliers used to capture light signals. Data readout is handled by a single-threshold multichannel TDC. This work presents an analytical approach to characterizing the signals from plastic scintillator detectors read out by SiPMs, which is fundamental to understanding the relationship between Time-over-Threshold (ToT) and signal amplitude. The analysis addresses slewing corrections essential for improving the detector's time resolution and the time calibration procedure.

Primary author(s) : KARPUSHKIN, Nikolay (INR RAS); GUBER, Fedor (INR); FINOGEEV, Dmitry; MOROZOV, Sergey (INR/MEPhI); MAKHNEV, Aleksandr (INR of RAS); SEREBRYAKOV, Dmitry (INR RAS); IZVESTNYY, Alexander (Institute for Nuclear Research of the Russian Academy of Sciences); Mr. LYAPIN, Daniil (INR of RAS)

Presenter(s) : KARPUSHKIN, Nikolay (INR RAS)

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