

XXV International Baldin Seminar on High Energy Physics Problems
"Relativistic Nuclear Physics and Quantum Chromodynamics"



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Time-over-threshold method based on the time properties of plastic scintillators equipped with silicon photomultipliers for the BM@N High-Granular Neutron detector

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A new high-granular neutron detector is under development for the BM@N experiment, JINR, Dubna, Russia. Its task is to measure the anisotropic collective neutron flow in the energy range of 1-4 AGeV. This measurement is crucial for studying the symmetry energy term in the equation of state of strongly interacting hadronic matter. The detector is designed with a high-granular structure, incorporating approximately 2000 plastic scintillators organized into layers, situated between absorber plates. Detection of light from each scintillation detector is achieved using a single silicon photomultiplier with the data being gathered using a single-threshold multichannel TDC. This report is focused on analytical description of signals from plastic scintillator detectors captured by silicon photomultipliers. This description, based on physical principles, is essential for understanding the Time-over-Threshold (ToT) and amplitude relationship and applying slewing correction techniques to improve the detector's time resolution.

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