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Development of the method of reconstruction of neutron energy spectrum with HGND in the BM@N experiment

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The fixed-target BM@N experiment at Nuclotron (JINR, Dubna) is aimed at the study of heavy ion collisions at beam energies up to 4 A GeV. The High Granular Neutron Detector (HGND)[1] is being developed in addition to existing BM@N detectors. It provides a possibility to carry out unique measurements of direct and azimuthal flow of neutrons and measure their energy spectrum.
The HGND has two arms, each consisting of 8 layers of plastic scintillator with copper absorber plates in between. The first layer is used for rejection of the charged particles. Each scintillation layer is assembled from an 11x11 matrix of individual cells (1936 cells in total).
Neutrons must be recognized in the presence of a background of charged particles and photons. The cluster identification algorithm has been developed to differentiate neutrons from other particles. The time-of-flight technique is used to reconstruct the kinetic energy of neutrons. The efficiency corrections and background subtraction must be applied in order to reconstruct the kinetic energy spectrum of neutrons. This report is devoted to the development of a procedure for reconstruction of neutron energy spectrum in the presence of the background.
References:
1. S. Morozov et al., Nucl.Instrum.Meth.A 1072, 170152 (2025)

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