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Centrality determination methods in heavy-ion collisions at the BM@N experiment

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One of the current tasks being carried out at the BM@N experiment involves categorizing event based on their centrality by using the energy of projectile spectators as measured by the FHCal. A precise procedure for determining the centrality allows estimating the initial geometry of the heavy ion collision and also gives the possibility to compare the results with model data and other experiments. Determination of centrality using the energy of the spectators can suppress the autocorrelation effect and also become a new alternative way of centrality determination. The purpose of the new method is also related to the large uncertainty of the impact parameter in Glauber model at small multiplicity of charged particles at NICA energy range. A new approach, based on Bayes' theorem and two-dimensional Gamma distribution, for centrality determination with FHCal is proposed. The performance of the proposed approach has been tested on simulation data from the DCM-QGSM-SMM model for Xe+CsI collisions at a beam energy of 3.8A GeV.

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