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Centrality and spectators properties measurements with hadron calorimeter in MPD/NICA experiment

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At present, the heavy-ion accelerator complex NICA is being built at JINR (Dubna). One of the experimental facilities, MPD at NICA was designed to investigate the properties of the strongly interacting matter. The centrality of the ion collisions is the most significant parameter for the global event characterization. In general, a few methods can be used for centrality determination. The first one is the fit of produced particles multiplicity distributions based on the Glauber model. This approach allows estimation of participant nucleons number in the ion collision. The second option considers the energy depositions in the forward calorimeters to measure the number of spectators, i.e. number of non-interacting nucleons.
In this work, we will discuss the second approach, namely, the measurements of spectator's energy in Forward Hadron Calorimeter (FHCal) at MPD. Unfortunately, due to the beam hole in the centre of FHCAL, the heavy non-interacting fragments fly in this hole. Therefore, the energy depositions in FHCal for central and peripheral events are similar. To resolve this ambiguity, a few physical observables were constructed and are used for centrality determination. The calculations of the transverse and longitudinal components of the energy, as well as subtraction of the pion contamination in the FHCal energy, allow identification the central and peripheral events and, hence, to measure their centrality. Based on the obtained observables, one can determine some properties of the spectators such as transverse momentum.

Primary author: VOLKOV, Vadim (INR RAS)

Presenter: VOLKOV, Vadim (INR RAS)

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