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MODEL ANALYSIS OF TRANSVERSE MOMENTUM AND MULTIPLICITY CORRELATIONS IN THE NICA RANGE IN Bi+Bi COLLISIONS AS A FUNCTION OF CENTRALITY CLASS

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One of the key issues in modern physics is understanding strong interactions and, in particular, studying the properties of strongly interacting matter in equilibrium. Strongly interacting matter at extreme densities and temperatures is expected to be in the state of quasi-free quarks and quark-gluon plasma (QGP) [1]. This hypothesis motivates the study of phases (QGP and hadron gas) and transitions between them as a result of particle and nucleus collisions at high energies. Previously, non-trivial dependences of strongly intense variables on the collision energy were obtained in the SMASH, EPOS, UrQMD and PHSD models for p+p and Bi+Bi collisions, namely for Δ[pt,N] [2], Σ[pt, N] [2] and <N>D [pt,N] [3]. The analysis also included the study of second- and third-order cumulants for the transverse momentum. The experimental data show a significant deviation from the basic independent source picture and are supported by experimental data obtained from Au+Au collisions at 200 MeV, indicating the presence of long-range collective correlations and strong final state effects [4]. For UrQMD, PHSD and EPOS in p+p collisions, a smooth change in energy is revealed, but SMASH gives a sharp jump around 3.5-4 GeV. PHSD qualitatively and quantitatively coincides with what the UrQMD model shows in the energy range from 6.3 to 17.3 GeV for the second-order cumulant. In this paper, the energy dependences of highly intense variables and cumulants in Bi+Bi collisions will be investigated depending on the centrality class. Two methods will be proposed for studying highly intense variables and cumulants: a direct method for studying correlations and a subevent method depending on the centrality class. The sub-event method is intended to analyze highly intensive variables and second- and third-order cumulants in two different rapidity intervals, as well as their dependence on the distance between these two intervals, which will allow us to estimate the contribution of short-range correlations depending on the centrality class. A comparison of these two methods will be presented for all four models: SMASH [5], EPOS [6], UrQMD [7], and PHSD [8].

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