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Model analysis of transverse momentum fluctuations in NICA and SPS energy range

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Experimentally, correlations between multiplicity of charge particles and the mean transverse momentum were seen in $p + p$ collisions from the highest SPS energy to the LHC energy. The extension of the experimentally established pattern of the change from negative correlations at energies $\sqrt{s}$ = 17–40 GeV by measurements at lower energies is particularly significant [1]. This set of results can make a significant contribution to the development of theoretical models and approaches. It was shown that the average transverse momentum is sensitive to changes in bulk viscosity, so experimental data on the study of correlations between mean transverse momentum and multiplicity of charge particles may impose significant restrictions on the relativistic hydrodynamic model [2]. Previously, in the SMASH and EPOS models, a non-trivial dependence of strongly intensive variables on the collision energy was shown, namely, for the $\Delta[p_t, N]$ [3] and $\langle N \rangle D[p_t, N]$ [4] (two-particle pt correlation). It was also shown that the second and third moments of the transverse momentum deviate from the picture of independent sources, which is confirmed by experimental data obtained from the collision of $Au + Au$ at an energy of 200 MeV [5]. Between the EPOS and SMASH models, a discrepancy was found in the third order cumulant pt (skewness) dependency on collision energy. In this investigation, for a more complete study of correlations, we will analyze the dependence of strongly intensive quantities and second and third moments on energy using PHSD[6] and UrQMD[7] models which combines the string model and resonances.

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