

Pseudorapidity dependence of multiplicity and transverse momentum fluctuations in pp collisions at the SPS energies

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A search for the critical behavior of strongly interacting matter was done by studying the event-by-event fluctuations of multiplicity and transverse momentum of charged hadrons produced in inelastic pp collisions at 20, 31, 40, 80 and 158 GeV/c beam momentum at the NA61/SHINE experiment. Results for energy dependence of the scaled variance of the multiplicity distribution and for two families of strongly intensive measures of multiplicity and transverse momentum fluctuations $\Delta[P_T, N]$ and $\Sigma[P_T, N]$ are presented. These variables were studied in different pseudorapidity intervals, which correspond to changing the baryon chemical potential and the value of temperature at the freeze-out stage. The strongly intensive measures $\Delta[N_F, N_B]$ and $\Sigma[N_F, N_B]$ were also used in the analysis of short- and long-range multiplicity correlations. Results on multiplicity and transverse momentum fluctuations significantly depend on charges of selected hadrons and width and/or location of pseudorapidity intervals. Monte Carlo event generator EPOS does not describe the data for the $\Delta[P_T, N]$ measure. Forward-backward fluctuations also reveal discrepancy between the EPOS and the experimental results.

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