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String melting scenario of hadron production and fractal SePaC-analysis of AMPT AuAu events at energy 200 GeV

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The search for extreme states associated with changes in the phase of nuclear matter is one of the key tasks of high-energy heavy-ion physics. It is known that systems exhibit fractal behavior near phase transitions. The fractality (intermittency) of identified charged hadrons in the pseudorapidity range $|\eta| < 0.5$ and the transverse momentum range $0.2 < p_T < 2.0$ GeV/c was studied in the STAR experiment at RHIC in Au+Au interactions at energies $\sqrt{s_{NN}} = 7.7-200$ GeV [1]. In the present work, the effect of the string melting scenario on the characteristics of fractal and non-fractal events is studied. Au+Au events at the energy $\sqrt{s_{NN}} = 200$ GeV were obtained by using a Multi-Phase Transport (AMPT) generator [2,3]. Events of several centrality classes (0–5%, 5–10%, 10–20%, and 30–40%) were analyzed. An event-by-event fractal analysis carried out by using the SePaC method [4–7] allowed us to divide the events into fractal and non-fractal ones. It was established that the p_T -spectrum of fractal events has a kink, whereas that of non-fractal events is fitted with an exponent at $p_T > 2.0$ GeV/c. The slope of the non-fractal p_T -spectra depends on the string melting scenario. The kink position of the fractal p_T -spectra and the behavior of the fractal dimension (DF) spectra depend on the event centrality. The established patterns are applicable for comparison with experimental data.

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