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Constraints on the percolation model from anomalous centrality evolution of two-particle correlations in Au-Au collisions at √sNN = 62 and 200 GeV

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Some sudden change in two-dimensional two-particle angular correlations (i.e. the onset of a so-called near-side «ridge» structure, localized in azimuth and extended in pseudorapidity) was observed by STAR collaboration at RHIC in AuAu collisions at 62 and 200 GeV [1]. It was shown for the first time that this change occurs at a specific Au-Au centrality, common to both energies. These results motivated the study [2] where the hypothesis of string percolation phase transition was used as a natural explanation of the conditions of the given onset. More
detailed experimental data analysis appeared recently and the obtained centrality trends of Au-Au angular correlations were compared in [3] to generic models of nucleus-nucleus collisions including Glauber linear superposition of N-N collisions, parton/hadron rescattering in a dissipative medium and a locally thermalized "opaque» medium.
In the present work we continue studies started in [2] focusing at the onset and the more accurate determination of the string percolation model parameters by using the data [3]. String percolation model was successfully used recently in [4] to qualitatively explain the dependence of the pseudorapidty and azimuthal widths of ridge structure on multiplicity and energy.
Our approach developed previously in [2] is briefly described. Modified Bjorken formula calculations are performed for the local energy densities in AA collisions at different impact-parameters (centralities) and with account of the latest data available on the charged particles densities at midrapidity. Finally we compare variations of mean local energy and of string densities and match the occurrence of the critical percolation phenomenon with the critical energy density value, considering them at the same values of centrality. The condition of the onset of the near-side ridge in AA collisions, that happens at some definite ("critical") number of participating nucleons, is found to be consistent with the hypothesis of the string percolation phase transition. Extrapolations of model results to the other colliding systems and energies are discussed.

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- List item

Summary

The condition of the onset of the near-side ridge in AA collisions, that happens at some definite ("critical") number of participating nucleons, is found to be consistent with the hypothesis of the string percolation phase transition. Extrapolations of model results to the other colliding systems and energies are discussed.

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