

QPT 2019

Enshi, China

Contribution ID: 5

Type: **not specified**

Probing QCD critical fluctuations from intermittency analysis in relativistic heavy-ion collisions

Summary

It is shown that intermittency, a self-similar correlation with respect to the size of the phase space volume, is sensitive to critical density fluctuations in a system belonging to the three-dimensional (3D) Ising universality class. The relation between intermittency index and relative density fluctuation is derived. We thus suggest that measuring the intermittency in relativistic heavy-ion collisions could be used as a good probe of large density fluctuations associated with the QCD critical phenomena. From recent preliminary results on baryon density fluctuations in central Au + Au collisions at $\sqrt{s_{NN}} = 7.7, 11.5, 19.6, 27, 39, 62.4$ and 200 GeV at RHIC/STAR, the collision energy dependence of intermittency index is extracted and shows a non-monotonic behavior with a peak at around 20 - 27 GeV, indicating that the strength of intermittency becomes the largest in this energy region. The transport UrQMD model without implementing critical physics cannot describe the observed behavior.

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