

Measurement of cumulants of net-proton, net-kaon and net-charge distributions in Au+Au collisions at $\sqrt{s_{NN}} = 54.4$ GeV from the STAR experiment at RHIC

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Abstract

Higher-order cumulants of conserved charges in high-energy heavy-ion collisions are excellent probes of phase structure in the QCD phase diagram, nature of quark-hadron phase transition and freeze-out dynamics. The cumulants and their ratios are related to the correlation length of the system and the susceptibilities that are also calculable in various QCD-based models.

In this poster, we present the first results of cumulants (C_n ; $n= 1-4$) of net-particle distributions from a high statistics (1.3 billion events) Au+Au collisions at $\sqrt{s_{NN}} = 54.4$ GeV recorded by the STAR detector at RHIC. Cumulants and ratios of cumulants of net-proton, net-kaon and net-charge distributions measured within the kinematic region of $|y|<0.5$ and $p_T<2.0$ GeV/c will be presented as a function of collision centrality. The results will be compared with model calculations. The energy dependence of the cumulant ratios will also be presented. Finally the status and prospects of such measurements in the phase II of the STAR beam energy scan program at RHIC will be discussed.