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Measurement of the sixth order cumulant of net-proton multiplicity distribution in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV from the STAR experiment

Cumulants of conserved quantities is one of the powerful tools to study the QCD phase structure.
According to the Lattice Gauge Theory calculation, at small μ_B a "smooth cross-over" for the transition from QGP to hadronic system occurs in heavy-ion collisions [1].
Experimentally, however, there is still no evidence for the predicted "smooth cross-over".
One of the possible ways to test the prediction is to measure the higher order cumulants of net-baryon or net-charge multiplicity distribution [2].

The STAR experiment measured the fouth order cumulant ratio ($\kappa\sigma^2 = C_4/C_2$) of net-proton multiplicity distribution in Au+Au collisions and its value was ~ 0.92 at $\sqrt{s_{NN}} = 200$ GeV, which is consistent with hadronic gas [3].
Generally the higher order the cumulant, the more sensitve it is to the correlation length. Thus we might observe the signature with measurements of the sixth order cumulant.
In this poster, we present the centrality, rapidity and transverse momentum dependence of the sixth order cumulant and its ratio $(C_6, C_6/C_2)$ of net-proton multiplicity distribution
in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, and compare with Lattice QCD calculations.

[1] Y. Aoki, G. Endrodi, Z. Fodor, S. D. Katz and K. K. Szabo, Nature, 675(2006).

[2] B. Friman, F. Karsch, K. Redlich, V. Skokov, Eur. Phys. J. C (2011) 71:1694

[3] Xiaofeng Luo (for the STAR collaboration), Proceedings, 9th International Workshop on Critical Point and Onset of Deconfinement (CPOD 2014), Vol. CPOD2014 (2015)

Preferred Track

Correlations and Fluctuations

Collaboration

STAR

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