

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

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Cumulants of conserved quantities are 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]. 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]. Net-proton multiplicity distributions can be studied as a reasonable proxy for net-baryon distributions [3].

The STAR experiment measured the fourth 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 the model prediction of a hadronic gas [4].

Generally the higher order cumulant is measured, the more sensitive it is to the correlation length. Thus one might observe the fluctuations caused by the smooth crossover through the measurements of higher order cumulants. In this talk, we present the centrality, rapidity and transverse momentum dependencies of the sixth order cumulant ratio (C_6/C_2) of net-proton multiplicity distribution in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV.

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[3] M. Kitazawa, M. Asakawa, *Phys. Rev. C* 86, 024904 (2012)

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

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Charge fluctuations, correlations and balance functions

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