Measurement of the sixth-order cumulant of net-proton multiplicity distributions 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 calculations, at vanishing baryon chemical potential (μ_B) a "smooth crossover" for the transition from quark-gluon plasma to hadronic system occurs in heavy-ion collisions [1]. One of the possible experimental ways to search for the evidence is to analyze the higher-order cumulant ratios of net-baryon distributions from high-energy nuclear collisions. The sixth-order (C_6) to second-order (C_2) cumulant ratio of baryon number fluctuations is predicted to be negative at the freeze-out temperature if it is close to the chiral transition temperature [2]. Net-proton multiplicity distributions can be studied as a reasonable proxy for net-baryon distributions [3, 4]. In this poster, we present the centrality dependence of net-proton C_6/C_2 at $\sqrt{s_{\mathrm{NN}}} = 54.4$ and 200 GeV from a high statistics Au+Au collisions data set in the STAR experiment. The transverse momentum and rapidity dependence of C_6/C_2 for net-proton distributions will be also discussed.

References

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