Rapidity Dependence of Proton Higher-Order Cumulants in $\sqrt{s_{NN}}$ = 3.2, 3.5 and 3.9 GeV Au+Au Collisions by STAR

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Fluctuations of conserved quantities are proposed as a useful observable to study the QCD phase structure including the search for the first-order phase boundary and critical point [1]. Lattice QCD calculations have shown that there is no critical point for $\mu_B \leq 450$ MeV and few phenomenology models calculations have shown that the critical point could be at temperature of $T \sim 100$ MeV and baryonic chemical potential of $\mu_B \sim 600$ - 650 MeV [2–6].

Rapidity dependence of the higher order cumulant ratios have been argued to be sensitive to the QCD critical point [7]. In this talk, we will report rapidity dependence of both higher order cumulants and factorial cumulants of proton multiplicity distribution, up to 6^{TH} order from Au+Au collisions, at $\sqrt{s_{NN}}$ = 3.2, 3.5 and 3.9 GeV ($699 \geq \mu_B \geq 633$ MeV) from the STAR experiment at RHIC. Collision centrality dependence of these rapidity distributions and relevant ratios will be discussed. In addition, the results will be compared with the calculations from transport model UrQMD.

References

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