Baryon-Strangeness Correlations in $\sqrt{s_{NN}} = 3$ GeV Au+Au Collisions from RHIC-STAR Fixed-Target Experiment

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Fluctuations of conserved quantities are proposed as a powerful observable to search for the QCD critical point. Recently, proton cumulants from central Au+Au $\sqrt{s_{NN}} = 3$ GeV collisions were reported, which implies that hadronic interactions are dominant at 3 GeV and the QCD critical point could exist at the collision energies higher than 3 GeV. The baryon-strangeness correlation is expected to deviate from the QGP expectation for the hadronic gas at high baryon-chemical potential region, which can be used to confirm the turning-off signal of the QGP. Previously, the STAR measurement of baryon-strangeness correlation using (anti)protons and $K^{\pm}$ shows no strong signal compared with theoretical prediction. So it is suggested to include hyperons in the measurement to study QCD phase transition.

In this poster, we will report the second-order baryon-strangeness correlation using proton, $K^{\pm}$, and Λ in Au+Au collisions at $\sqrt{s_{NN}}$ = 3 GeV from the fixed-target program at the STAR experiment. Protons and $K^{\pm}$ are identified using TPC and TOF detectors, while Λ is reconstructed by the invariant mass method. Physics implications of the results as well as comparisons with model calculations will be discussed.