Hadron Production in Au+Au Collisions from STAR Fixed-Target Experiment

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Hadrons have been suggested as sensitive probes for the medium properties of nuclear matter created in heavy-ion collisions. A dense baryon-rich medium is formed during collisions at center-of-mass energies of a few-GeV. Since (anti-)strange hadrons and anti-protons are produced near or below the threshold, their phase space distribution and yield ratios may provide strong constraints on the equation of state (EoS) of high baryon density matter.

In this presentation, the recent results on $\pi^{\pm}$, $\mathrm{K}^{\pm}(\mathrm{K}^{0}_{\mathrm{S}})$, ϕ, $p(\overline{p})$, $\Lambda(\overline{\Lambda})$ and $\Xi^{-}(\overline{\Xi}^{+})$ production at $\sqrt{s_{\mathrm{NN}}}$ = 3.0 - 7.7 GeV in Au + Au collisions with fixed-target mode from the STAR experiment will be presented. The transverse momentum spectra (p_{T}), rapidity density distributions (dN/dy) and their yield ratios as a function of centrality and collision energy are able to provide unique information about QCD phase structure. The p_{T} spectra and dN/dy ratios of baryon to anti-baryon will provide important input to differentiate between hadron production via quark coalescence and hadronic scattering. Enhancement of baryon to meson ratio hints at an onset of deconfinement in this energy range. We will also explore the centrality dependence of hadron yields, and the evolution of the chemical and kinetic freeze-out temperature, baryon chemical potential and average radial expansion flow in the reported energy range, which can give insights on the EoS of the created medium. These results will be compared with those from higher collision energies and the physics implications will be studied by comparing to the model calculations.