$\pi^{\pm}$, p production measurements in Au+Au Collisions at $\sqrt{s_{\rm NN}} = 4.5$ GeV with STAR

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Abstract

One of the main physics goals of the Beam Energy Scan (BES) program at RHIC is to study the QCD phase diagram, especially around the phase transition between the quark-gluon plasma (QGP) and hadronic matter. BES Phase-I studied Au+Au collisions from center-of-mass energy ($\sqrt{s_{\rm NN}}$) of 7.7 to 62.4 GeV. The BES Phase-II extended these measurements in several important ways, one of which was the addition of a fixed target program that pushed the collision energy reach down to 3.0 GeV (or baryon chemical potential, $\mu_{\rm B}$ up to 720 MeV). Fixed target collisions at STAR allow for a more extensive scanning of the QCD phase diagram to an important region where the QCD critical point may lie, and to a region dominated by dense baryonic matter. The production of light-flavor hadrons are sensitive to the properties and dynamic evolution of the formed hot QCD medium. Therefore, the detailed measurements of their productions can provide strong constraints on the theoretical models of QCD, and may eventually help to reveal the location of the QCD critical point. In this talk, the first steps towards a comprehensive scan of light-flavor hadron production ($\pi^{\pm}$ and p) as a function of centrality and rapidity in the fixed-target configuration at STAR is shown. Specifically, pion and proton transverse mass spectra and dN/dy measurements at $\sqrt{s_{\rm NN}} = 4.5$ GeV are presented and discussed.