Meson Production in Au+Au Collisions at $\sqrt{s_{NN}} = 3.0$ GeV at STAR

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Abstract

Particle production has been used to investigate the properties of the produced QCD matter in heavy-ion collisions. The RHIC Beam Energy Scan (BES) programs cover a wide range of energies, including the transition from a hadronic dominated medium to a partonic dominated one. The BES-II program currently under way is designed to improve and extend upon the results from the BES-I program. Of particular interest is the high baryon density region which is accessible through the STAR fixed-target program, which has extended the energy reach from $\sqrt{s_{NN}} = 7.7$ GeV to $\sqrt{s_{NN}} = 3.0$ GeV. This presentation will report on the first measurements of charged particle and ϕ-meson production in Au + Au collisions at $\sqrt{s_{NN}} = 3.0$ GeV. After being corrected for the detector acceptance and tracking efficiencies, invariant yields and rapidity density distributions of $\pi^{\pm}$, $K^{\pm}$, and ϕ-mesons as well as the π^+/π^-, K^-/K^+, K^+/π^+, and ϕ/K^- ratios will be presented. The charged particle results are analyzed with a thermal model to study the chemical temperature and potential at freeze-out. The ϕ/K^- result are also compared to the thermal model predictions as well as transport model calculations to study the strangeness production in this high baryon density region. Comparisons to measurements from other experiments at similar energies will also be discussed.