Identified hadron production at mid-rapidity in Au+Au collisions at $\sqrt{s_{NN}}$ = 54.4 GeV at STAR

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Abstract

Quantum Chromodynamics (QCD) predicts that at sufficiently high temperature (T) and/or baryon chemical potential (μ_B), the state of matter is in the form of quarks and gluons, which are no longer confined withins hadrons. This deconfined state of matter is known as the Quark-Gluon Plasma (QGP). The goal of relativistic heavy-ion collision experiments is to create such a hot and dense state of matter and study its properties. Measurements of identified particle spectra in Au+Au collisions provides the information on the bulk properties, such as integrated yield (dN/dy), average transverse momenta ($\langle p_T \rangle$), particle ratios, and freeze-out parameters of the medium produced. The systematic study of bulk properties sheds light on the particle production mechanism in these collisions. Also, the centrality dependence of the freeze-out parameters provides an opportunity to explore the QCD phase diagram.

In this talk, we will present the transverse momentum spectra of identified hadrons ($\pi^{\pm}$, $K^{\pm}$, p, and $\bar{p}$) at mid-rapidity ($|y|$ <0.1) in Au+Au collisions at $\sqrt{s_{NN}}$ = 54.4 GeV. The centrality dependence of dN/dy, particle ratios, and kinetic freeze-out parameters will also be presented, and their physics implications will be discussed. In addition, we will compare our results with previously published results at other collision energies.