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

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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.

Session

Heavy Ions and QCD

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