Rapidity Dependence of $\pi^{\pm}$, $K^{\pm}$, p, and $\bar{p}$ Production in BES-II $\sqrt{s_{NN}} = 7.7$ to 27 GeV Au+Au Collisions at STAR

Matthew Harasty For the STAR Collaboration

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Abstract

The first phase of the Beam Energy Scan (BES-I) at the Relativistic Heavy Ion Collider (RHIC) covered a range of energies from $\sqrt{s_{NN}}$ = 7.7 to 62.4 GeV, which ended in 2014. The success of the BES-I justified a new energy scan (BES-II) with higher statistics and detector upgrades. This BES-II analysis will extend the $m_T - m_0$ spectra and dN/dy yields of $\pi^{\pm}$, $K^{\pm}$, p, and $\bar{p}$ beyond the mid-rapidity results of BES-I. The transverse mass spectra are crucial to pin down the location of each collision energy at chemical freeze-out on the QCD phase diagram. We will also present a study of the relative particle yields in different rapidity regions, which will be used to investigate how the chemical freeze-out temperature and chemical potentials vary with rapidity. Our results indicate that we can sample an area of the QCD phase diagram in temperature and baryon chemical potential by varying not only the collision energy, but also rapidity and centrality, which will aid in the search for the critical point.