

# 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

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## Abstract

1        The first phase of the Beam Energy Scan (BES-I) at the Relativis-  
2        tic Heavy Ion Collider (RHIC) covered a range of energies from  $\sqrt{s_{NN}}$   
3         $= 7.7$  to 200 GeV, which ended in 2014. The success of the BES-I  
4        program justified a new energy scan (BES-II) with higher statistics  
5        and detector upgrades. This BES-II analysis will extend the measure-  
6        ments of transverse mass spectra and production yields of  $\pi^\pm$ ,  $K^\pm$ ,  
7        p, and  $\bar{p}$  beyond the mid-rapidity results of BES-I at  $\sqrt{s_{NN}} = 7.7$   
8        to 27 GeV. The transverse mass spectra are crucial to pin down the  
9        location of each collision energy at chemical freeze-out on the QCD  
10       phase diagram. We will also present a study of the relative particle  
11       yields in different rapidity regions, which will be used to investigate  
12       how the chemical freeze-out temperature and chemical potentials vary  
13       with rapidity. Our results indicate that we can sample an area of the  
14       QCD phase diagram in temperature and baryon chemical potential by  
15       varying not only the collision energy, but also rapidity and centrality,  
16       which will aid in the search for the critical point.