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Identified Hadron Production from the RHIC Beam Energy Scan Program in the STAR experiment

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The current focus at RHIC is the Beam Energy Scan (BES) program to study the QCD phase diagram – temperature (T) vs. baryon chemical potential (μ_B). The BES program aims to verify some predictions from QCD: that a cross-over occurs at $\mu_B = 0$, and that there exists a first-order phase transition at large μ_B and a critical point at an intermediate μ_B . The spectra and ratios of produced particles can be used to extract T and μ_B in different energies and system sizes.

The Solenoidal Tracker At RHIC (STAR) experiment has collected data for Au+Au collisions at $\sqrt{s_{NN}} = 7.7$ GeV, 11.5 GeV, and 39 GeV in year 2010. One of the advantages during the BES program was the enhanced particle identification with availability of full Time-Of-Flight detector. In addition, STAR collected Cu+Cu collisions at 22.4 GeV in year 2005.

We present mid-rapidity spectra (p_T or $m_T - m_0$), rapidity density, average transverse mass, and particle ratios for identified hadrons from the STAR experiment. The centrality and transverse momentum dependence of the particle yields and ratios will be compared to existing data at lower and higher beam energies and to various transport models like AMPT and UrQMD. Collision dynamics are studied systematically in the framework of chemical and kinetic freeze-out and their properties extracted from the particle ratios and spectra.

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