Centrality Determination in the Forward Region in the RHIC Beam Energy Scan at STAR

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Abstract

The quark gluon plasma (QGP) is a state of matter in which quarks and gluons are not confined into nucleons. A primary goal of the Beam Energy Scan (BES) at the Relativistic Heavy Ion Collider (RHIC) is to uncover information about the transition between QGP and ordinary matter by analyzing heavy-ion collisions at a variety of energies. The centrality of high energy nucleus nucleus collisions is typically measured in the midrapidity range, which can lead to autocorrelations that affect the observables measured at mid-rapidity. One way to minimize these autocorrelations is to use a forward detector such as the Event Plane Detector (EPD) to determine centrality. However, the centrality resolution of the EPD may be impacted by spectator protons from the collisions. An alternate approach to interpreting the measurements from the EPD is to consider each EPD ring separately, rather than summing the contribution of the particles over the entire EPD. This talk will attempt to determine the effectiveness of this method using data from Au + Au collisions with center of mass energy $\sqrt{s_{NN}} = 19.6$ GeV, with an outlook to performance at other BES energies.