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Search for a First-Order QCD Phase Transition

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The Beam Energy Scan (BES) program at the Relativistic Heavy-Ion Collider has several physics goals, all related to understanding the phase diagram for QCD matter. One of these goals is to search for signatures of a first-order phase transition from a hadron gas to quark gluon plasma. It is generally accepted that QGP is produced at the top RHIC energies (and at the LHC), and there is much evidence from both theory and experiment that the hadron to QGP transition at these energies, where the baryon chemical potential is near zero, is a smooth crossover. Lower beam energies probe larger values of the baryon chemical potential, and there are predictions that signatures of a first-order phase transition might be observed in this region. This talk will focus on a search based on directed flow of identified particles, especially baryons like protons and Lambda hyperons, produced in AuAu collisions at BES energies.

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