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Modeling the Hydrodynamical Properties of the QGP at RHIC
IRAKLI GARISHVILI, Lawrence Livermore National Laboratory, RON SOLTZ, SCOTT PRATT, MICAEL CHENG, ANDREW GLENN, JASON NEWBY, LOREN LINDEN-LEVY, BETTY ABELEV — Comparisons of the RHIC data to various theoretical models suggest that the evolution of the QGP, a state of matter believed to be created in early stages of heavy ion collisions at RHIC, is qualitatively well described by hydrodynamics. However, the key properties of the QGP, such as initial temperature, T_{init}, and the ratio of shear viscosity to entropy density of matter, η/s, are not precisely known. To constrain these properties we have developed a multi-stage hydrodynamics/hadron cascade model of heavy ion collisions which incorporates Glauber initial state conditions, pre-equilibrium flow, the UVH2+1 viscous hydro model, Cooper-Frye freezeout, and the UrQMD hadronic cascade model. To test the sensitivity of the observables to the equation of state (EoS), we use several different EoS in the hydrodynamic evolution, including those derived from the hadron resonance gas model and lattice QCD. This framework has an ability to predict key QGP observables, such as, elliptic flow, spectra, and HBT radii for various particle species. For each set of model's input parameters (T_{init}, η/s and initial flow) we perform a simultaneous comparison to spectra, elliptic flow, and HBT measured at RHIC. Based on this analysis the determinations of T_{init} and η/s will be presented.

Irakli Garishvili
Lawrence Livermore National Laboratory

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