The QCD Equation of State and Implications for Heavy Ion Collisions RON SOLTZ, LLNL, HOTQCD COLLABORATION — In the chiral limit, QCD exhibits a phase transition at finite temperature. The critical temperature for this transition and its implications for the crossover transition temperature have been calculated on a lattice using several formations of staggered fermion actions and there is now good agreement among them in the continuum limit. However, it is the Equation of State (EoS) that is inserted into hydrodynamic models used to study heavy ion collisions, and for the EoS calculations there remain significant discrepancies. We present the most recent Equation of State calculations from the Highly Improved Staggered Quark action (HISQ) and explore differences with other fermion actions. The lattice calculations will be compared to the EoS for a hadron resonance gas in the temperature region below the transition. Implications for hydrodynamic models of heavy ion collisions will be discussed and quantitative comparisons to experimental data will be presented.

Ron Soltz
LLNL