Contribution ID: **125** Type: **Poster Presentation**

Bulk properties of QCD matter using S-matrix based hadron resonance gas model

Monday, 4 November 2019 17:40 (20 minutes)

Ideal Hadron Resonance Gas (HRG) model is a well-known tool to describe hadron multiplicities in relativistic nuclear collisions and for modelling hadronic equation of state. The model relies on the assumption that all hadronic resonances are free particles, which is valid, given that their decay widths are negligible. However, when the temperature is close to the crossover region, the model does not agree with lattice QCD data for observables like second order charge susceptibility (χ_Q^2), the difference between second and fourth order baryon susceptibility ($\chi_B^2 - \chi_B^4$) and the baryon-strange correlator (C_{BS}). Interaction among constituent hadrons is expected to affect these observables. We have implemented interactions among hadrons in the HRG model using S-matrix framework. The elements of S-matrix are related to the two body scattering phase shifts of interacting hadrons. The positive phase shifts, related to attractive interactions are calculated using K-matrix formalism while the negative phase shift, related to repulsive interactions are obtained from experimentally measured phase shifts. We observe a good agreement between results from our S-matrix formalism and lattice QCD data for the aforementioned higher order susceptibilities along with bulk properties like the speed of sound and interaction measure etc. Further, we use the S-matrix formalism to calculate the temperature (T) and baryon chemical potential (μ_B) dependence of transport coefficients (shear viscosity, bulk viscosity, heat conductivity and diffusion coefficient) for the multi-component system of hadrons. Our calculation predicts lower values of shear viscosity coefficient as a function of temperature as compared to previous results in the literature.

Primary author: DASH, Ashutosh

Co-authors: Dr SAMANTA, SUBHASIS (National Institute of Science Education and Research); MOHANTY, Bedangadas (National Institute of Science Education and Research, India)

Presenter: DASH, Ashutosh

Session Classification: Poster Session

Track Classification: QCD at finite temperature and baryon density