Contribution ID: **360** Type: **Talk**

QCD EoS in strong magnetic fields and nonzero baryon density

Tuesday, 30 July 2024 14:45 (20 minutes)

Equilibrium properties of strongly interacting matter are typically characterized by the quantum chromodynamics (QCD) equation of state (EoS). External factors, especially magnetic fields that reach the order of the QCD scale, can significantly influence this characterization. Strong magnetic fields can be produced in the relativistic heavy-ion collisions where baryon chemical potentials can be nonzero. Therefore, understanding the QCD EoS under nonzero magnetic fields and baryon chemical potential is indispensable. To this end, we have carried out lattice simulations of $(2 + 1)$-flavor QCD using highly improved staggered quarks at the physical pion mass on $32^3 \times 8$ and $48^3 \times 12$ lattices, with magnetic field strengths ranging up to 0.8 GeV^2 and nonzero baryon chemical potentials employing the Taylor expansion framework. We present a comprehensive lattice QCD analysis, along with the hadron resonance gas comparison, for the leading order and next-to-leading order Taylor expansion coefficients for bulk thermodynamic quantities such as pressure, number density, energy density, and entropy density, focussing on the significant impact of strong magnetic fields.

Primary authors: KUMAR, Arpith (Central China Normal University); DING, Heng-Tong (Central China Normal University); GU, Jin-Biao (Central China Normal University); LI, Sheng-Tai (Central China Normal University)

Presenter: KUMAR, Arpith (Central China Normal University)

Session Classification: QCD at non-zero density

Track Classification: QCD at Non-zero Density