Contribution ID: **151** Type: **Talk**

QCD constraints on isospin-dense matter and the nuclear equation of state

Thursday, 1 August 2024 10:00 (20 minutes)

Lattice QCD calculations of many-meson systems at multiple volumes and lattice spacings and at quark masses above and below the physical values are used to compute the QCD equation of state for isospin-dense matter over a wide range of isospin chemical potentials at zero temperature. Agreement is seen with chiral perturbation theory predictions for small chemical potentials and comparison to perturbative QCD calculations for large chemical potentials allows for an estimate of the gap in the superconducting phase. Combining LQCD with chiral perturbation theory and perturbative QCD leads to a complete determination of the low temperature equation of state of isospin-dense matter. The partition function for an isospin chemical potential, μ_I, bounds the partition function for a baryon chemical potential $\mu_B = 3\mu_I/2$, through QCD ineqaulities. Consequently, the LQCD calculations provide rigorous bounds on the nuclear equation of state over a wide range of baryon densities for the first time.

Primary author: DETMOLD, William (MIT)

Presenter: DETMOLD, William (MIT)

Session Classification: QCD at non-zero density

Track Classification: QCD at Non-zero Density