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Finite density lattice QCD without extrapolations

Finite density lattice QCD usually relies on extrapolations in baryon chemical potential (μ_B), be it Taylor expansion, T' expansion or analytical continuation. However, their range of validity is difficult to control. In the canonical formulation, the baryon density is the parameter of the system, not μ_B .

Here we demonstrate that we can access finite density QCD in the canonical formulation with physical quark masses along the strangeness neutral line.

We present first results with both the strangeness (n_S) and baryon (n_B) densities as parameters. Specifically, we compute the QCD pressure and chemical potentials as functions of n_B and n_S and construct an equation of state. Our computations rely on high-statistics simulations with 2+1 4HEX-staggered fermions.

Category

Theory

Collaboration (if applicable)

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