

Exploring the phase diagram of finite density QCD at low temperature by the complex Langevin method

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Monte Carlo studies of QCD at finite density suffer from the notorious sign problem, which becomes easily uncontrollable as the chemical potential increases for a moderate lattice size. In this work, we attempt to approach the high density low temperature region by the complex Langevin method (CLM). Simulations are performed on an $8^3 \times 16$ lattice using four-flavor staggered fermions with reasonably small quark mass. Unlike previous work with a $4^3 \times 8$ lattice, the criterion for correct convergence is satisfied in the nuclear matter phase without using the deformation technique. In this phase the baryon number density has a plateau with respect to the chemical potential, and it starts to grow rapidly at some point.

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