

Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Next-to-Next-to-Leading Order Evaluation of Effective Potential in the Strong Coupling Lattice QCD TAKASHI NAKANO, Kyoto University, AKIRA OHNISHI, KOHTAROH MIURA, Yukawa Institute for Theoretical Physics, Kyoto University — Strong Coupling Lattice QCD (SC-LQCD) is a method directly based on QCD, and has been applied to investigate the properties of QCD phase diagram in the finite chemical potential region. The previous studies in next-to-leading order (NLO) evaluation assert that the effect of NLO in the effective potential are renormalized in modification of the quark mass and chemical potential in the strong coupling limit (SCL), and two order parameters (the chiral condensate and the density) are found to appear. These studies indicate the possibility of the partially chiral restored phase as well. In this study, we evaluate the effective potential in the next-to-next-to-leading order of SC-LQCD. We also discuss the properties of QCD phase diagram from the effective potential, including the position of the critical point which will be searched for in the low energy RHIC program.

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Date submitted: 30 Jun 2009

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