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Fluctuation effects on QCD phase diagram at strong coupling

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We investigate QCD phase diagram at strong coupling based on strong coupling expansion in auxiliary field Monte-Carlo (AFMC) method. The strong coupling expansion is one of the ways to reduce the sign problem since the effective action is described in hadronic degrees of freedom via analytic integration over link variables.

We have found that hadron phase is compressed (extended) at low (high) chemical potential [1] as shown in monomer-dimer-polymer simulation [2] in the strong coupling limit (SCL). We need to consider finite coupling effects to know the influence on phase diagram and the sign problem. The AFMC is a natural extension to the mean field method, which let us include finite coupling and fluctuation effects straightforwardly.

In the presentation, we will give some results on QCD phase diagram in SCL. We will also discuss next-to-leading order effects in the strong coupling expansion.

[1] T. Ichihara, A. Ohnishi, T. Z. Nakano, arXiv:1401.4647 [hep-lat]. [2] W. Unger, P. de Forcrand, J. Phys. G38 (2011) 124190.

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