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Many flavor approach to study the nature of chiral phase transition of two-flavor QCD

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We perform lattice numerical simulations to study the phase transition of QCD at finite temperature and the vanishing chemical potential with intent to clarify the nature of the transition of massless two flavor QCD.

We investigate QCD with two light and N_f heavy quarks instead of two-flavor QCD, and focus on the light quark mass dependence of the critical heavy mass below which the transition is of first order.

The nature of the transition is identified by the shape of the constraint effective potential, constructed from the histogram of the generalized plaquette, at the critical temperature.

The heavy quark effects are incorporated in the form of the hopping parameter expansion through the re-weighting technique.

Our result indicates that the critical heavy mass remains finite in the chiral limit of the two flavors of light quarks, suggesting the phase transition of massless two-flavor QCD is of second order.

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