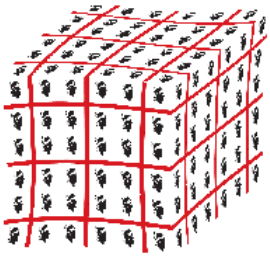

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Curvature of the QCD phase transition line in a finite volume

Tuesday, 15 June 2010 14:50 (20 minutes)

The curvature which characterizes the QCD phase transition at finite temperature and small values of the chemical potential is accessible to lattice simulations. The results for this quantity which have been obtained by several different lattice simulation methods differ due to different numbers of flavors, different pion masses and different sizes of the simulations volumes. In order to reconcile these results, it is important to investigate finite-volume effects on the curvature.

We investigate the curvature of the chiral phase transition line at finite temperature and chemical potential in a finite volume. We use a phenomenological model for chiral symmetry breaking and apply non-perturbative Renormalization Group methods which account for critical long-range fluctuations at the phase transition.

We find that there is an intermediate volume region in which the curvature of the phase transition line is actually reduced relative to its infinite-volume value, provided periodic spatial boundary conditions are chosen for the quark fields. Size and position of this region depend on the value of the pion mass. Such an effect could account for differences in the curvature between lattice simulations in differently sized volumes.
We discuss implications of our results for the QCD phase diagram.

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talk

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