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QCD Phase Diagram from the Lattice at Strong Coupling: Staggered vs. Wilson Fermions.

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We compare two different approaches to strong coupling lattice QCD which are suited to study the phase diagram in the $\mu - T$ plane: The first is based on staggered fermions, the second is based on Wilson fermions. Since in both formulations the gauge links are integrated out analytically, the sign problem is much milder than in conventional lattice QCD. The resulting dual representation in terms of color singlets allows to better understand the nature of nuclear interactions. Since both fermion discretizations have different lattice artifacts, a comparison is instructive to isolate the physical content which persists as one aims for the continuum limit, in particular the existence of the critical end point.

The strong coupling limit of staggered fermions is well established, recent results on the corresponding $\mu - T$ phase diagram and its corrections to the strong coupling limit are presented. For Wilson fermions, no such results have been obtained yet for QCD, only the Schwinger model has been addressed so far. We present the status and prospects to extend this approach to SU(3) in four dimensions.

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