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Lattice QCD with 8 and 12 Degenerate Quark Flavors

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We summarize our study of QCD with 8 and 12 flavors of degenerate quarks at zero temperature, using the DBW2 gauge action and naive staggered fermions, along with the rational hybrid Monte Carlo algorithm. From measurements of hadron masses, decay constants and other low energy observables, we conclude that such a system with 8 and 12 flavors breaks chiral symmetry and exhibits confinement, although for 12 flavors we see a rapid evolution from strong to weak coupling in hadronic observables, which makes further simulations on large volumes desirable. We report on preliminary results from further simulations of the same systems at finite temperatures, to address the existence of the finite temperature phase transition and to probe the nature of such phase transition at large number of quark flavors.

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