Contribution ID: **45** Type: **not specified**

The QCD chiral phase transition from non-integer numbers of flavors

Thursday, 14 December 2017 15:50 (20 minutes)

Attempts to extract the order of the chiral transition of QCD at zero chemical potential, with two dynamical flavors of massless quarks, from simulations with progressively decreasing pion mass have remained inconclusive because of their increasing numerical cost.
In an alternative approach to this problem, we consider the path integral as a function of continuous number N_f of degenerate quarks.
If the transition in the chiral limit is first-order for $N_f \geq 3$, a second-order transition for $N_f = 2$ then requires a tricritical point in between. This in turn implies tricritical scaling of the critical boundary line between the first-order and crossover regions as the chiral limit is approached.
Non-integer numbers of fermion flavors are easily implemented within the staggered fermion discretization. Exploratory simulations at $\mu = 0$ and $N_f = 2.8, 2.6, 2.4, 2.2, 2.1$, on coarse $N_\tau = 4$ lattices, indeed show a smooth variation of the critical mass mapping out a critical line in the (m, N_f)-plane.
For the smallest masses the line appears consistent with tricritical scaling, allowing for an extrapolation to the chiral limit.

Primary authors: Dr SCIARRA, Alessandro (J.W.Goethe Universität (Frankfurt am Main)); Dr CUTERI, Francesca (Goethe Universität - Frankfurt am Main); Prof. PHILIPSEN, Owe (University of Frankfurt)

Presenter: Dr CUTERI, Francesca (Goethe Universität - Frankfurt am Main)

Session Classification: Session 7