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Critical endpoints in (2+1)- and 4-flavor QCD with Wilson-Clover fermions

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We report our study on critical endpoints of finite temperature phase transitions in (2+1)- and 4-flavor QCD with Wilson-Clover fermions. As an extension of our previous calculations on coarser lattices, we performed our simulations on lattices with temporal extents of 8 and 10 for 2+1 and 4 flavors, respectively, to carry out continuum extrapolations more precisely. For the calculation in (2+1)- flavor QCD, as a first step, we fixed β and κ_s values to 1.75 and 0.133000, respectively, and varied κ_l, where we found that the phase transition seems to be of first order. In 4 flavor QCD we tried to determine a location of the critical endpoint from calculations at various combinations of β and κ values with three different spatial volumes. The finite size scaling of chiral susceptibility under the assumption of three-dimensional Z(2) universality suggests that the critical endpoint exists around β = 1.65.

Primary authors: Dr OHNO, Hiroshi (Center for Computational Sciences, University of Tsukuba); KU-RAMASHI, Yoshinobu (University of Tsukuba); NAKAMURA, Yoshifumi; TAKEDA, SHINJI (Kanazawa university)

Presenter: Dr OHNO, Hiroshi (Center for Computational Sciences, University of Tsukuba)

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