



Contribution ID: 108

Type: Parallel Talk

## Exploring the QCD phase diagram with three flavors of Möbius domain wall fermions

Monday, 31 July 2023 14:30 (20 minutes)

The order of finite temperature QCD phase transition on the lower left corner of Columbia plot is yet to be determined, and the current studies show that the bound of critical mass has a strong cutoff and discretization scheme dependence. We present an update on the QCD phase transition with 3 flavors of Möbius domain wall fermions at zero chemical potential. We performed simulations on lattices of size  $36^3 \times 12 \times 16$ ,  $24^3 \times 12 \times 32$  and  $36^3 \times 14 \times 16$  with a variety of quark masses at lattice spacing  $a = 0.1361(20)$  fm. Our previous study with one volume ( $24^3 \times 12 \times 16$ ) appeared to be consistent with a crossover at quark mass around 4 MeV ( $\overline{MS}$ , 2 GeV) for temperature 121 MeV by investigating the Binder cumulant [1]. Now we add the larger volume ( $36^3 \times 12 \times 16$ ) computation to investigate the volume dependence towards the thermodynamic limit for this temperature. In this talk, we will show the results of such analyses to discuss the nature of transition there. Besides that, with the newly generated lattices  $24^3 \times 12 \times 32$ , we will show the effects of residual chiral symmetry breaking on the observables by using different  $L_s$ .

[1] Finite temperature QCD phase transition with 3 flavors of Möbius domain wall fermions, Yu Zhang et al., PoS LATTICE2022 (2023) 197

### Topical area

QCD at Non-zero Temperature

**Primary author:** ZHANG, Yu (RIKEN)

**Co-authors:** AOKI, Yasumichi (RIKEN R-CCS); HASHIMOTO, Shoji (KEK); KANAMORI, Issaku (Hiroshima University); KANEKO, Takashi (KEK); NAKAMURA, Yoshifumi (Riken)

**Presenter:** ZHANG, Yu (RIKEN)

**Session Classification:** QCD at Non-zero Temperature