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## Finite temperature QCD phase transition with 3 flavors of Mobius domain wall fermions

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We investigate the phase structure of QCD with three degenerate quark flavors at finite temperature using Mobius domain wall fermions. To locate the critical endpoint and explore the order of phase transition on the diagonal line of the Columbia plot, we performed simulations at temperatures 131 and 196 MeV with lattice spacing  $a \sim 0.12$  fm corresponding to temporal lattice extent  $N_\tau = 8, 12$  with varying quark mass for two different volumes with aspect ratios  $N_\sigma/N_\tau$  ranging from 2 to 3. By analyzing the volume and mass dependence of the chiral condensate, disconnected chiral susceptibility and Binder cumulant we find that there is a crossover at  $m_q^{\overline{\text{MS}}}(2 \text{ GeV}) \sim 40$  MeV for  $T_{\text{pc}} \sim 196$  MeV and a transition point at  $m_q^{\overline{\text{MS}}}(2 \text{ GeV}) \sim 4$  MeV for  $T \sim 131$  MeV on  $24^3 \times 12$  lattices. The  $36^3 \times 12$  lattices are being investigated for the finite size scaling, we will present its result and discuss the nature of transition for  $T \sim 131$  MeV.

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