

QCD Chiral Crossover Line from Lee–Yang Edge Singularities

Saturday, 10 October 2026 17:00 (15)

We propose a universality-based reconstruction of the QCD chiral crossover line from Lee–Yang edge singularities in the complex baryon chemical potential plane[1]. The framework maps lattice-extracted complex Lee–Yang-zero estimates, treated as proxies for edge singularities, to the universal chiral Lee–Yang edge and thereby determines the μ_B dependence of both the chiral critical line in the light-quark chiral limit and the pseudo-critical crossover line at physical quark masses. As an illustration, we apply the framework to Lee–Yang-zero estimates recently obtained by the Wuppertal–Budapest collaboration from high-statistics lattice QCD simulations. Without imposing the previously determined small- μ_B expansion of the crossover line as input, the reconstructed curvature is consistent with existing continuum lattice-QCD results at small μ_B . The fitted chiral-limit transition temperature is also compatible with existing chiral-scaling analyses. These results demonstrate that lattice information on Lee–Yang singularities, combined with universal chiral scaling, provides a quantitatively consistent constraint on the QCD crossover line within the present temperature window and establishes a framework that can be systematically improved with future Lee–Yang-zero determinations.

[1] H.-T. Ding, S. Mukherjee, P. Petreczky, and K.-F. Ye, QCD Chiral Crossover Line from Lee-Yang Edge Singularities, arXiv:2608.05752 [hep-lat] (2026).

Primary author(s) : DING, Heng-Tong (Central China Normal University); Prof. MUKHERJEE, Swagato (Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA); PETRECZKY, Peter (Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA); Mr 田, 田 (Central China Normal University, Institute of Particle Physics)

Presenter(s) : Mr 田, 田 (Central China Normal University, Institute of Particle Physics)

Session Classification : Section 9