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Locating the QCD critical point from the universal scaling of the Lee-Yang edge

We discuss a new numerical method for the determination the QCD critical point from first principle lattice QCD calculations. The analysis exploits the universal scaling of the Lee-Yang edge that has been obtained from lattice QCD calculations of cumulants of the baryon number density at imaginary chemical potentials. Using a multi-point Pade approximation [1] we identify the closest pole of the approximation in the complex chemical potential plane, which is identified with the Lee-Yang edge. Compared to our previous analysis [2], we have doubled the number of simulation points in the imaginary chemical potential direction for our Nt=6 calculations and added one new Nt=8 calculation at T=120 MeV. In this talk we discuss the systematic and statistical error budget of the analysis. We also comment on a new strategy to perform the analytic continuation of the baryon number density and higher cumulants to the real domain by using a numerical version of the Cauchy integration formula.

Referenzes:

1. P. Dimopoulos, L. Dini, F. Di Renzo, J. Goswami, G. Nicotra, C. Schmidt, S. Singh, K. Zambello and F. Ziesché, *"Contribution to understanding the phase structure of strong interaction matter: Lee-Yang edge singularities from lattice QCD,"* Phys. Rev. D **105** (2022) 034513 [arXiv:2110.15933 [hep-lat]].
2. D.A. Clarke, P. Dimopoulos, F. Di Renzo, J. Goswami, C. Schmidt, S. Singh and K. Zambello, *"Searching for the QCD critical endpoint using multi-point Padé approximations,"* [arXiv:2405.10196 [hep-lat]].

Category

Theory

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