Contribution ID: **208**   Type: **Parallel Talk**

Detecting Lee Yang/Fisher singularities by multi-point Padè

Monday, 31 July 2023 17:20 (20 minutes)

The Bielefeld Parma Collaboration has in recent years put forward a method to probe finite density QCD by the detection of Lee Yang singularities. The location of the latter is obtained by multi-point Padè approximants, which are in turn calculated matching Taylor series results obtained from Monte Carlo computations at (a variety of values of) imaginary baryonic chemical potential. The method has been successfully applied to probe the Roberge Weiss phase transition and preliminary, interesting results are showing up in the vicinity of a possible QCD critical endpoint candidate.

In this talk we will be concerned with a couple of significant aspects in view of a more powerful application of the method. First, we will discuss the possibility of detecting finite size scaling of Lee Yang/Fisher singularities in finite density (lattice) QCD. Secondly, we will discuss our attempts at detecting both singularities in the complex chemical potential plane and singularities in the complex temperature plane. The former are obtained from rational approximations which are functions of the chemical potential at given values of the temperature; the latter are obtained from rational approximations which are functions of the temperature at given values of the chemical potential.

Topical area

QCD at Non-zero Density

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Session Classification: QCD at Non-zero Density