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What we can learn about Lee-Yang zeros from lattice simulations of QCD

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Understanding phase transitions from limited data generated from finite volume simulations is one of the important challenges one faces today. Analysis of Lee Yang zeros in finite volumes has recently re-emerged as a promising tool in addressing this challenge. In this talk we will see two methods of extracting these zeros from lattice simulations of QCD, the Ising model and O(N) theories. The first method uses Pade approximants (rational functions) to approximate thermodynamic functions with the goal of understanding the singularity structure of these observables. It will be shown that the closest stable pole of such functions can be interpreted as being related to the Lee-Yang edge singularity (LYE). On the other hand there is another way in which the LYE can be estimated from lattice data. In this, a continuum extrapolation of lattice data is performed for 3d O(N) models (done in : F. Karsch et. al, *Phys.Rev.D* 108 (2023)). The goal is to extract the LYEs directly from parameterisations of the scaling function. Agreement of results with FRG, corresponding to the universal location of LYEs is observed.

Primary author: SINGH, Simran (Bielefeld U)

Presenter: SINGH, Simran (Bielefeld U)