



**UNIVERSITÄT
BIELEFELD**

Fakultät für Physik

Simran Singh **Università di Parma**

Probing Complex Singularities in LQCD à la Padè and Aspects of Thimble Regularisation of Yang-Mills

In the first part of the talk I will present our (Bielefeld-Parma collaboration) recent work based on arXiv:2110.15933. The idea is to probe complex singularities of the baryon number density function in 2+1 flavor QCD in the complex chemical potential plane using rational approximations à la Padè. The motivations for using a rational ansatz and its scope of validity will be discussed in detail. Following this, the simulation setup and results of our analysis, obtained with (2+1)-flavor of highly improved staggered quarks (HISQ) on lattices with temporal extent of $N_{\tau}=4, 6$ will be discussed. Then we present results of the location of the closest singularities in the complex chemical potential plane, now verified by using some conformal mappings. We show that their temperature scaling is in accordance with the expected scaling of the Lee-Yang edge singularities in the vicinity of the Roberge-Weiss transition. Finally, some issues related to "rooting" in the staggered formulation will be discussed along with future directions.

In the second part of the talk, I will briefly discuss our (Parma) ongoing work in understanding how to regularise Yang-Mills theories (YM) using Lefschetz thimbles. Preliminary results from our thimble code for YM (SU(2) in 2D) will be displayed amongst other things. Also, as an invitation, motivations to study YM with a θ term will be discussed.

**Thursday, November 25, 2021,
14:15 in D6-135**

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