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The sign problem and the Lefschetz thimbles in two dimensional Hubbard model

Monday, 24 June 2019 17:00 (20 minutes)

In the talk we discuss the sign problem and the possibility to alleviate it with the help of methods related to Lefschetz thimbles in the space of complexities field variables. In particular, we consider two-dimensional Hubbard model at finite density. We analyze the model on the square lattice combining semi-analytical study of saddle points and thimbles on a small lattice and results of test Monte-Carlo simulations. We investigate different representations of the path integral and find a particular representation which supposedly leads to the presence of a single dominating thimble even for large lattices. Finally, we derive a novel non-Gaussian representation of the four-fermion interaction term, which also exhibits decreased number of Lefschetz thimbles.

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