

Complexification approach to the sign problem in chiral models

Field-complexification approaches to the sign problems in chiral models at finite chemical potential are examined analytically and numerically.

We apply the thimble integration method to the 1-dimensional Thirring model at finite chemical potential to show that the multi-thimble contributions with alternating signs are important to reproduce the crossover behavior. We also use the complex Langevin method to the same model with a modified sampling, which correctly reproduces the crossover behavior in the relevant chemical potential region.

We will also examine these complexification approaches to the chiral random model at finite temperature and chemical potential to see if the correct phase diagram can be predicted in these approaches.

[1] Monte Carlo study of Lefschetz thimble structure in one-dimensional Thirring model at finite density, H. Fujii, S. Kamata, Y. Kikukawa, JHEP 1512 (2015) 125.

[2] Lefschetz thimble structure in one-dimensional lattice Thirring model at finite density, H. Fujii, S. Kamata, Y. Kikukawa, JHEP 1511 (2015) 078.

Preferred Track

New Theoretical Developments

Collaboration

Not applicable

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