

Sign problem and the tempered Lefschetz thimble method

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Tempered Lefschetz thimble method (TLTM) [Fukuma-Umeda(1703.00861)] is an algorithm towards solving the numerical sign problem. There, the integration region is deformed into the complex space following the antiholomorphic gradient flow equation, and the system is parallel-tempered using the flow time as a tempering parameter so as to solve both sign and ergodicity problems simultaneously. In this talk, I explain the basics of the algorithm, and discuss its application to various models, including the Thirring model, the Hubbard model away from half filling, and the theta vacuum with finite theta. An application to a chiral matrix model (a toy model of finite density QCD) will be discussed by Nobuyuki Matsumoto in his talk.

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