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Applying the Worldvolume Hybrid Monte Carlo method to the complex ϕ^4 theory at finite density

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The sign problem has been an obstacle to first-principles calculations based on the Monte Carlo method. The Worldvolume Hybrid Monte Carlo (WV-HMC) method [Fukuma-Matsumoto 2020] is an efficient method to reduce the sign problem with low cost. In this talk, I apply the WV-HMC to the complex ϕ^4 theory at finite density, and show that the computational cost is proportional to the degrees of freedom, N, in contrast to the N^3 scaling for other Lefschetz thimble methods.

Topical area

QCD at Non-zero Density

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