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Stabilizing complex Langevin for real-time gauge theory

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Direct computations of QCD real-time observables like transport coefficients are very difficult due to the infamous sign problem. The complex Langevin (CL) method is a promising approach to overcome it by using a real-time formulation of QCD on a complex time contour. Studying SU(N_c) gauge theories with CL, we find that current stabilization techniques are insufficient to obtain correct results. Therefore, we introduce a novel anisotropic kernel that enables CL simulations on discretized time contours. Applying it to SU(2) pure gauge theory in 3+1 dimensions, we obtain unprecedentedly stable results that may allow us to calculate real-time observables from first principles in the near future.

Experiment/Theory

Theory/Phenomenology

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