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Observifolds: Taming the observable signal-to-noise problem via path integral contour deformations

Tuesday 27 July 2021 13:30 (15 minutes)

Complex contour deformations of the path integral have previously been shown to mitigate extensive sign problems associated with non-zero chemical potential and real-time evolution in lattice field theories. This talk details recent extensions of this method to observables affected by signal-to-noise problems in theories with real actions. Contour deformations are shown to result in redefinitions of observables which do not affect their expectation value and do not modify the Monte Carlo sampling weights. The choice of contour does, however, affect the variance and can be optimized to maximize the signal-to-noise ratio. Families of contour deformations are defined for SU(N) variables and optimized deformations are shown to give exponential improvements in the signal-to-noise ratio of Wilson loops in proof-of-principle applications to U(1) and SU(N) lattice gauge theories.

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