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Recent developments on real-time simulations of non-abelian gauge theories using complex Langevin

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Computations within theories with complex actions are generally inaccessible by standard numerical techniques as they typically suffer from the numerical sign problem. The complex Langevin (CL) method aims to resolve this problem. In recent years CL has been successfully applied to various problems, e.g. the QCD equation of state for finite chemical potential, and therefore also may represent a promising method in other applications with similar numerical issues. However, CL in its original formulation is numerically unstable and therefore needs to be artificially stabilised to avoid wrong attractors of the distribution function as well as runaway instabilities.
In this work, we study the application of modern stabilisation techniques such as dynamical stabilisation and gauge cooling to CL simulations of real-time SU(2) Yang-Mills theory. We present preliminary numerical results demonstrating that stabilisation techniques may extend the applicability of CL in real-time gauge theories.

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