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Stochastic Quantization with Colored Noise

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Studying the topological properties of the QCD vacuum on the lattice, observables such as the gauge action density are blurred by short distance fluctuations at scales of the order of the lattice spacing.
To extract the physical content from the mentioned configurations, those have to be treated using smoothing methods such as cooling or the Wilson flow which have been investigated extensively over the past years.
We present an alternative method based on stochastic quantization with UV regulated noise enabling a direct control of the quantum fluctuations at all lattice momentum scales. Our particular interest is to investigate the correspondence between the flow time and the associated physical scale of the system. Thereto observables depending on the long-range physics such as topological quantities are investigated.
The method is tested on a real scalar field theory as well as on pure SU(2) gauge theory. Effects of colored noise
on observables are analyzed. Moreover, we investigate whether physical quantities become insensitive to UV fluctuations above a characteristic momentum scale.
The suitability and efficiency of the method regarding the generation of smoothed fields in a Monte Carlo simulation is probed. We present and discuss our recent results.

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