Abstract Submitted
for the APR21 Meeting of
The American Physical Society

A novel nonperturbative renormalization scheme for local operators CHRISTOPHER MONAHAN, William Mary, ANNA HASENFRATZ, University of Colorado Boulder, MATTHEW RIZIK, ANDREA SHINDLER, Michigan State University, OLIVER WITZEL, Siegen — Lattice quantum chromodynamics (QCD) provides the only systematic nonperturbative approach to calculating the properties of the strong nuclear force at low energies. Lattice calculations discretize spacetime on a Euclidean lattice and sample the path integral stochastically to obtain Monte Carlo estimates of QCD correlation functions. One common challenge for lattice calculations is constructing nonperturbative renormalization schemes and relating those schemes to the standard MS-bar scheme typically used in perturbative calculations. The gradient flow, which exponentially suppresses ultraviolet field fluctuations and removes ultraviolet divergences (up to a multiplicative fermionic wavefunction renormalization), can be used to describe real-space Wilsonian renormalization group transformations and determine the corresponding beta function. We propose a new nonperturbative renormalization scheme for local operators that uses the gradient flow and is amenable to lattice QCD calculations, and present some preliminary results for quark bilinear operators.

Christopher Monahan
William
Mary

Date submitted: 08 Jan 2021 Electronic form version 1.4