Abstract Submitted
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Lattice Renormalization of the Quark Chromoelectric Dipole Moment with the Gradient Flow[1] MATTHEW RIZIK, Michigan State University, Facility for Rare Isotope Beams, JANGHO KIM, Goethe-Universität Frankfurt am Main, THOMAS LUU, Rheinische Friedrich-Wilhelms-Universität Bonn, Forschungszentrum Jülich, CHRISTOPHER MONAHAN, The College of William Mary, Thomas Jefferson National Accelerator Facility, ANDREA SHINDLER, Michigan State University, Facility for Rare Isotope Beams, SYMLAT COLLABORATION — A major deficiency of the Standard Model is its inability to explain the observed asymmetry between matter and antimatter. Toward a resolution of this problem, Andrei Sakharov proposed three conditions for a theory to produce a matter-dominated universe, in particular a violation of the combined charge-parity (CP) symmetry. The measurement of a neutron electric dipole moment may provide a path to study beyond-the-Standard-Model sources of CP violation. The only available nonperturbative approach is lattice QCD (LQCD). Unfortunately the mixing of the underlying operators is natively parametrized by the lattice spacing alone, and the continuum limit is muddled by power divergences. We use the gradient flow to circumvent this problem. The flow fixes QCD as the initial condition for a set of diffusive PDEs in a parameter called the flow time such that the high-momentum modes of the fields are suppressed. Further, this provides an alternative parametrization of the mixing, and the continuum limit may be performed smoothly. We herein discuss the case of the quark chromoelectric dipole moment (qCEDM). We present novel perturbative calculations of its leading-order mixing and compare to flowed LQCD computations.

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