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Finite volume renormalization schemes and the fermionic gradient flow

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Non-perturbative renormalization of composite operators can be achieved by combining the step-scaling method with an intermediate finite volume renormalization scheme. Matching to low energy physics requires that the finite volume scheme can be accurately evaluated at the bare couplings used in simulations of hadronic physics.
In this regime, the gradient flow for the gauge field has been essential for recent progress with the strong coupling, and one may hope for similar benefits when extending the flow to fermion fields.
Here we define finite volume renormalization schemes for fermionic bilinear operators. We use Schrodinger functionial (SF) and chirally rotated SF boundary conditions and consider different fermionic flow definitions, with and without spin structure. We present some results at leading order of perturbation theory and identify parameter choices with small discretization effects.

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