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A2: Supercurrent renormalization in $N = 1$ Supersymmetric Yang-Mills Theory

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In this work we study the renormalization of the SUSY Noether current in Supersymmetric $calN = 1$ Yang-Mills (SYM) theory on the lattice. In particular, we study the mixing of the current with all other compatible operators of dimension $7/2$ and $5/2$, leading from the lattice-regularized to the \overline{MS} -renormalized operator basis. We perform our task in two ways:

- (a) We compute, in dimensional regularization, the conversion factors relating the \overline{MS} scheme to an intermediate gauge-invariant coordinate-space scheme. In this second scheme, renormalization can be performed via lattice simulations. This could help to investigate the breaking of SUSY on the lattice and strategies towards simulations of supersymmetric QCD. Here we present some preliminary numerical results.
- (b) We use lattice perturbation theory and compute, to one loop, various two- and three-point functions. We consider mixing with all relevant gauge-noninvariant operators, which contain also ghost fields.

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