

Two-loop renormalization of vector, axial-vector and tensor fermion bilinears on the lattice

We compute the two-loop renormalization functions, in the $\overline{\text{RI}}'$ scheme, of local bilinear quark operators ($\bar{\psi} \Gamma \psi$), where Γ corresponds to the Vector, Axial-Vector and Tensor Dirac operators, in the lattice formulation of QCD. We consider both the flavor nonsinglet and singlet operators.

We use the clover action for fermions and the Wilson action for gluons. Our results are given as a polynomial in c_{sw} , in terms of both the renormalized and bare coupling constant, in the renormalized Feynman gauge.

Our results are also presented in the $\overline{\text{MS}}$ scheme, for easier comparison with calculations in the continuum, generalized to fermions in an arbitrary representation. Finally, we discuss some special features of superficially divergent lattice integrals at two loops.

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