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Perturbative renormalization of ∆S = 2 four-fermion operators with the chirally rotated Schrödinger functional

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The chirally rotated Schrödinger functional (χSF) is a renormalization scheme which renders the mechanism of automatic O(a) improvement compatible with the Schrödinger functional (SF) formulation.
Here we define a family of renormalization schemes based on the χSF for a complete basis of ∆S = 2 parity-odd four-fermion operators.
We compute the scale-dependant renormalization constants of such operators to one-loop in perturbation theory and obtain their NLO anomalous dimensions.
After this is done, we compute the cutoff effects in the corresponding step-scaling functions at one-loop. Due to automatic O(a) improvement, once the χSF action is renormalized and O(a) improved, renormalization constants are affected directly by $O(a^{2})$ effects without the need of operator improvement.

Primary author: Dr VILASECA MAINAR, Pol (Instituto Nazionale de Fisica Nucleare)

Co-authors: Dr DALLA BRIDA, Mattia (DESY - Zeuthen); Dr MAURO, Papinutto ("Sapienza" Università di Roma)

Presenter: Dr VILASECA MAINAR, Pol (Instituto Nazionale de Fisica Nucleare)

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