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Electroweak input schemes and universal corrections in SMEFT

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The choice of an electroweak (EW) input scheme is an important component of perturbative calculations in Standard Model Effective Field Theory (SMEFT). We perform a systematic study of three different EW input schemes in SMEFT, in particular those using the parameter sets $\{M_W, M_Z, G_F\}$, $\{M_W, M_Z, \alpha\}$, or $\{\alpha, M_Z, G_F\}$. We discuss general features and calculate decay rates of Z and W bosons to leptons and Higgs decays to bottom quarks in these three schemes up to next-to-leading order (NLO) in dimension-6 SMEFT. We explore the sensitivity to Wilson coefficients and perturbative convergence in the different schemes, and show that while the latter point is more involved than in the Standard Model, the dominant scheme-dependent NLO corrections are universal and can be taken into account by a simple set of substitutions on the leading-order results. Residual NLO corrections are then of similar size between the different input schemes, and performing calculations in multiple schemes can give a useful handle on theory uncertainties in SMEFT predictions and fits to data.

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