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A Green's Basis for the Bosonic SMEFT to Dimension 8

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We present a basis of dimension-eight Green's functions involving Standard Model (SM) bosonic fields, consisting of 86 new operators. Instead of using algebraic identities and integration by parts, we prove the independence of these interactions in momentum space, commenting about evanescent operators as well.
In this talk, we show our method to construct a Green's Basis and our application to the dimension-8 bosonic SM effective field theory (SMEFT). Besides renormalising the SM effective field theory (SMEFT), we give some ideas of another possible application: performing matching of ultraviolet models onto the SMEFT to higher order. We have implemented our basis in matchmakereft and used it to integrate out a heavy singlet scalar and a heavy quadruplet scalar up to one loop. We provide the corresponding dimension-eight Wilson coefficients. Likewise, we show how our results can be easily used to simplify cumbersome redundant Lagrangians arising, for example, from integrating out heavy fields using the path-integral approach to matching.

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