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Matching renormalisable couplings between generic theories

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The precise study of the Higgs boson properties – in particular its mass and couplings – is of the utmost importance for the investigation of BSM models with extended Higgs sectors. As New Physics currently seems to be driven to higher scales by experimental searches, the framework of Effective Field Theory becomes necessary to address the large mass hierarchies that appear in calculations. In this context, there is a growing interest for the precise matching of Higgs couplings and its automation. I will present recent work on the matching of renormalisable couplings – in particular scalar quartic and Yukawa couplings – between generic theories at one-loop order. I will first show how to avoid a potential loss of accuracy in the automated calculation of threshold corrections due to large logaritmic terms in both the low- and high-energy parts of the corresponding matching conditions. Then, I will discuss different possible choices of renormalisation schemes that can potentially simplify the matching procedure, focusing in particular on the treatment of mixing between scalars in these schemes. Finally, I show some examples of results, with a comparison of different schemes in a toy model, and expressions for the one-loop matching of the Higgs quartic coupling in Supersymmetric models with Dirac gauginos.

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