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Higher order renormalisation in scalar effective field theory

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There exist relations between operators in effective field theory (EFT) Lagrangians due to the freedom to perform field redefinitions and integration by parts. Recent progress in the characterisation of operators that are independent under such redundancies led to a particular basis that we call the "conformal basis". Since the conformal basis is mathematically singled out, it is interesting to study its properties by calculating basis-dependent objects such as the anomalous dimensions. These are essential quantities in EFT, because they relate Wilson coefficients between energy scales through the renormalisation group equations, which generally involves an intricate mixing structure. In a first application of the R^*-operator in EFT, we renormalise the single complex scalar field EFT up to 4 loops at mass dimension 6 and 2 loops at mass dimension 10. The R^*-operation is well suited to deal with Feynman graphs of high multiplicity and high degree of divergence by allowing for a procedure called infrared rearrangement. We will report on the observed structure in the anomalous dimension matrices at one-loop level and beyond.

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