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## New insights into two-loop running in effective field theories

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### Abstract

We present a novel approach to compute two-loop beta functions in effective field theories obtained via dimensional reduction from five to four dimensions. We isolate UV divergences in the 4D theory from the IR divergences arising in the matching procedure (remarkably 1 and 2 loop UV divergences in 5D vanish). This method provides a straightforward way to disentangle 4D from 5D contributions, allowing the computation of 4D two-loop beta functions without introducing infrared regulators or employing more intricate techniques such as  $R^*$ -methods. Our approach thus offers a clean, efficient, and conceptually transparent alternative for higher-order renormalization in dimensionally reduced effective field theories.

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