

Matching On Shell-Calculator

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The calculation of the Wilson coefficients of an effective field theory (EFT) for specific new physics models is usually performed by matching off-shell one-light-particle irreducible Green functions, which requires an off-shell basis of effective operators. We introduce “mosca”, a Mathematica package designed to perform the much less standardized matching on-shell. This matching procedure allows to work directly on the physical basis, but requires a delicate cancellation between non-local contributions in both theories that we sidestep by evaluating the amplitudes with randomly generated physical momenta.

In its first approach, “mosca” is focused on the simplification of the reduction of Green’s bases to physical bases in EFTs, as well as transformations between arbitrary bases. This package allows users to systematically convert any Lagrangian expressed in a Green’s basis into a chosen physical basis by specifying the models for both representations. Thus, “mosca” provides a robust and efficient framework for basis transformations, streamlining calculations in effective field theory research. This initial version lays the foundation for future enhancements, including implementing renormalization of effective Lagrangians directly in terms of a physical basis and computing finite matching, including evanescent contributions.

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