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Automating Basis Reduction for Effective Lagrangians in FeynRules

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Accounting for redundancies among higher-dimensional operators is necessary in any Effective Field Theory, and has historically been a source of confusion in its applications to the Standard Model. Even while the procedure is now well-understood, reducing an arbitrary set of operators onto an agreed basis is still a time-consuming step arising in matching a given UV completion to an EFT, and at each order in perturbation theory where this plays a key role in renormalizing the theory.

Emulating the procedure used to derive the 'Warsaw' basis of the dimension-six SMEFT, work to automate this reduction will be discussed using FeynRules, with the aim of providing a tool which will be useful in SMEFT calculations and lend itself to future generalization, e.g. to the construction of operator bases for theories beyond the SM, and eliminating redundancies in operators of still higher mass dimension.

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