

# On-shell helicity methods for soft-collinear effective field theories

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## Summary

On-shell helicity methods provide powerful tools for determining scattering amplitudes, which have a one-to-one correspondence with leading power helicity operators in the Soft-Collinear Effective Theory (SCET) away from singular regions of phase space. Helicity based operators are also useful for enumerating power suppressed SCET operators, which encode subleading amplitude information about singular limits. In particular, we present a complete set of scalar helicity building blocks that are valid for constructing operators at any order in the SCET power expansion. The analysis is performed in  $D=4$  dimensions and in  $D = 4 - 2\epsilon$  by exploiting the four dimensional formulation of quantum chromodynamics, allowing one-loop computations from unitarity cuts by only four dimensional degrees of freedom.

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