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## Chiral effective field theory for dark matter direct detection

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We have derived all WIMP-nucleon interactions in chiral EFT to third order in the chiral expansion, including all one- and two-body currents. Because the relevant momentum transfers involved in WIMP scattering off nuclei are of the order of the pion mass, this is a prime regime for chiral EFT.

Combined with large-scale nuclear structure calculations, we have studied spin-dependent WIMP-nucleus scattering for all experimentally relevant isotopes. In addition, we have investigated the signatures of dark matter scattering inelastically off nuclei. If detected, this would point to a spin-dependent nature of dark matter interactions and will enable constraining the WIMP mass in one experiment.

Most recently, we have used chiral EFT to propose analysis strategies for general spin-independent WIMP-nucleus scattering, covering all coherent responses. One of the free parameters in the WIMP-nucleus cross section corresponds to standard spin-independent searches, but in general different combinations of new-physics couplings are probed. We identify the dominant corrections and discuss the general consequences for the interpretation of direct-detection experiments, including minimal extensions of the standard spin-independent analysis.

### Summary

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