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Absorption of Fermionic Dark Matter in Direct Detection Experiments

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Current dark matter direct detection searches can be split into two broad classes: elastic scattering and absorption, with the latter reserved purely for bosonic dark matter. In this work, we study a new class of signal: absorption of fermionic dark matter. We present the lowest-dimension operators which make this possible, their implications, and their simple UV completions. Most importantly, such dark matter is inherently unstable as there is no symmetry which protects it against decays into standard model fermions. Nevertheless, we show that fermionic dark matter absorption can be searched for in current and future direct detection and neutrino experiments, while ensuring consistency with its observed abundance and required lifetime.

Summary

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