

New signals in dark matter detectors

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Abstract content

We investigate several new event types that can be searched for in dark matter direct detection experiments. In the first part of the talk, we discuss the scattering of solar neutrinos on electrons and atomic nuclei. The rates of these processes are small in the Standard Model, but can be enhanced by several orders of magnitude in models with new light gauge bosons ("dark photons") and with sterile neutrinos. We discuss the expected event spectra and temporal modulation effects in such models, as well as constraints from a variety of astrophysical, cosmological, and laboratory experiments. In the second part of the talk, we consider models where dark matter scattering leads to multiple hit events in a detector: The first scattering process excites the dark matter particle into a state that has much stronger interactions with Standard Model particles. Multiple hit events are rejected in generic dark matter searches, but we will argue that a search for new physics in these events can be quite interesting.

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