

Directional Dark Matter Detection

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The field of direct dark matter detection has recently entered the so-called neutrino fog, meaning that the most sensitive experiments are now detecting significant nuclear event rates caused by coherent scattering of solar neutrinos. Because the nuclear recoil directions for dark matter and neutrinos differ, new types of detectors capable of measuring these directions would have a powerful new handle for discriminating between dark matter and neutrino signals. Recoil directionality may also be key to demonstrating the galactic origin of a dark matter signal, and has several physics applications beyond dark matter.

I will review the field of directional recoil detection. I plan to cover the benefits of recoil directionality for dark matter detection, other physics applications unique to directional recoil detectors, different types of directionality, the performance requirements on directional detectors, recent detector R&D, and thoughts on the future of the field.

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