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# Nuclear recoil detection with color centers in bulk lithium fluoride

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We present initial results on nuclear recoil detection based on the fluorescence of color centers created by nuclear recoils in lithium fluoride. We use gamma rays, fast and thermal neutrons, and study the difference in responses they induce, showing that this type of detector is rather insensitive to gamma rays. We use light-sheet fluorescence microscopy to image nuclear recoil tracks from fast and thermal neutron interactions deep inside a cubic-centimeter sized crystal and demonstrate automated feature extraction in three dimensions using machine learning tools. The number, size, and topology of the events agree with expectations based on simulation with TRIM. These results constitute the first step towards 10-1000g scale detectors with single-event sensitivity for applications such as the detection of dark matter particles, reactor neutrinos, and neutrons.

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