

Nuclear recoil detection with color centers in bulk lithium fluoride

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We present results on nuclear recoil detection based on the fluorescence of color centers which are created by recoil cascades in lithium fluoride. We use gamma rays, fast and thermal neutrons, and show that this type of detector is rather insensitive to gamma rays. Furthermore, we establish that the shape of the fluorescent spectrum is different for neutron and gamma irradiation, respectively. 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 using machine learning tools. The number, size, and topology of events agree with expectations. In summary, these results constitute the first step towards 10-1000g scale detectors with single event sensitivity for application to the detection of dark matter particles, reactor neutrinos, and neutrons.

Do you plan to give the talk in person?

Yes

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