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GEM-based Optical TPC for Directional Dark Matter Detection[1]

NGUYEN PHAN, MICHAEL GOLD, JOE LANDERS, ROBERT LAUER, ERIC LEE, DINESH LOOMBA, JOHN MATTHEWS, ERIC MILLER, University of New Mexico — The strongest signature for dark matter detection is a day-night modulation of nuclear recoil directions in the lab frame and is considered by many astrophysicists as a necessary condition for proof of the discovery of dark matter. Detector technologies that have good directional sensitivity also have excellent background discrimination as we will show. Because typical dark matter induced nuclear recoils have low energies and correspondingly short ranges, a detector with both high signal to noise and high resolution is needed. We will discuss R&D efforts at UNM to construct such a detector by utilizing a CCD camera to image recoil tracks in a low pressure time projection chamber.

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