Abstract Submitted
for the 4CS20 Meeting of
The American Physical Society

Quantification of the Two-Dimensional Range-Component Signature for the DRIFT-IIe Detector FREDERICK SCHUCKMAN, Colorado State University, DRIFT COLLABORATION — Evidence suggests that a halo of dark matter surrounds and is distributed throughout our galaxy. The Weakly Interacting Massive Particle (WIMP) has been a popular dark matter candidate. As we move through this halo it should appear as a wind of WIMPs incident upon us. A properly-placed detector could have this wind blow through its top face at one time in the day, and through a side face 12 sidereal hours later. DRIFT-IIe is a low-pressure gas negative-ion time projection chamber designed for direct and directional detection. Partial directional information of a WIMP recoil could be extracted by measuring the range of the track of ionization that it produces in two dimensions. To study this signature, the detector was exposed to a source of neutrons in a series of runs. In one run the source was placed above the detector and in a second run the source was placed to the side of the detector. Neutron recoils mimic those expected from WIMPs, and the source placement mimics a specific WIMP wind direction. For the two runs, the range information was compared with a Monte Carlo resampling test. It was found on average 302 ± 4 neutron recoils, sampled with WIMP-like energy spectra, are required along each of these axes to discern the two populations with a significance of 3σ.

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Date submitted: 29 Sep 2020 Electronic form version 1.4