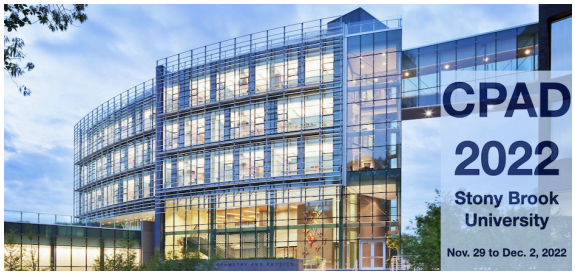

Contribution ID: **103** Type: **Contribution Talk**

3D reconstruction of low-energy electron recoils in gas Time Projection Chambers with MPGD charge readouts

Wednesday, 30 November 2022 12:15 (20 minutes)

Directional 3D reconstruction of low-energy electron recoils is widely applicable, for example to neutrino detection, characterization of the Migdal effect, and X-ray polarimetry. Electron recoils have low charge densities and non-trivial topologies, requiring highly segmented and sensitive MPGD charge readouts. The two leading order effects on the angular resolution of electron recoils in gas are the multiple scattering of the recoiling electron and the effective point resolution with which the secondary electrons can be detected. The PDG review on the Passage of Particles through matter provides an angular resolution formula for multiple scattering through small angles; however, we find that this formula does not accurately describe electron recoils in gas. With some modification, we obtain a similar formula that is better suited for this application. In addition, we incorporate treatment for the effective point resolution of the detector. The result is a framework that not only predicts the angular resolution of electron recoils in gas TPCs but determines how much of the recoil track should be fit to optimize the angular resolution. We demonstrate good agreement with simulations and first results with experimental data from the BEAST TPCs — miniature TPCs with highly-segmented pixel ASIC charge readout.

Primary author: GHREAR, Majd

Presenter: GHREAR, Majd

Session Classification: WG5: MPGDs

Track Classification: WG5: MPGDs