Contribution ID: **78** Type: **Oral**

Advancing Particle Research: Multimodal Pixel Detectors with Integrated Tracking and Photodetection

Thursday, 9 November 2023 13:30 (20 minutes)

In the realm of particle physics, the quest for ever more precise and efficient detection methods is an ongoing pursuit. A cutting-edge technology, Liquid Argon Time Projection Chamber (LArTPC), is poised to revolutionize the field by introducing a paradigm-shifting pixelated approach to enhance neutrino detection experiments.

Traditionally, LArTPCs have relied on wire-based projective readout technologies, which, while effective, pose construction challenges and require continuous readout systems. Furthermore, the complexity of reconstructing complex neutrino interaction topologies using wire-based readouts has pushed the boundaries of current methodologies.

In response to these challenges, the exploration of true 3D pixel-based schemes has gained significant momentum. However, this transition to pixelated charge readout presents a unique obstacle - the detection of scintillation light. Unlike wire planes, pixel planes are opaque to light, necessitating novel solutions.

A groundbreaking proposal involves coating the dielectric surface of pixels with a specialized photoconductor designed to respond to vacuum ultraviolet (VUV) light incident on its surface, effectively transforming the pixel into an integrated tracking/photodetector. In this presentation, I unveil the results of early research and development efforts toward realizing this integrated tracking/photodetector for pixel based LArTPCs.

By seamlessly combining charge and direct VUV light detection capabilities in a true multimodal pixel, this technology promises to be a game-changer, offering unparalleled precision and versatility in the study of elusive neutrinos. Join me on this journey as I unveil the future of neutrino detection, with a proposed small-scale demonstrator LArTPC serving as a strategic stride toward a paradigm-shifting pixelated technology poised at the forefront of scientific innovation.

Early Career

Yes

Primary author: ROOKS, Michael (University of Texas at Arlington)

Presenter: ROOKS, Michael (University of Texas at Arlington)

Session Classification: RDC1+2+7

Track Classification: RDC Parallel Sessions: Cross-Cutting: RDCs 1, 2, and 7