Energy Reconstruction of Low Energy Events in LArTPC

LeRayah Neely-Brown

GEM Fellow: Purdue University

Supervisors: Joseph Zennamo + Fernanda Psihas
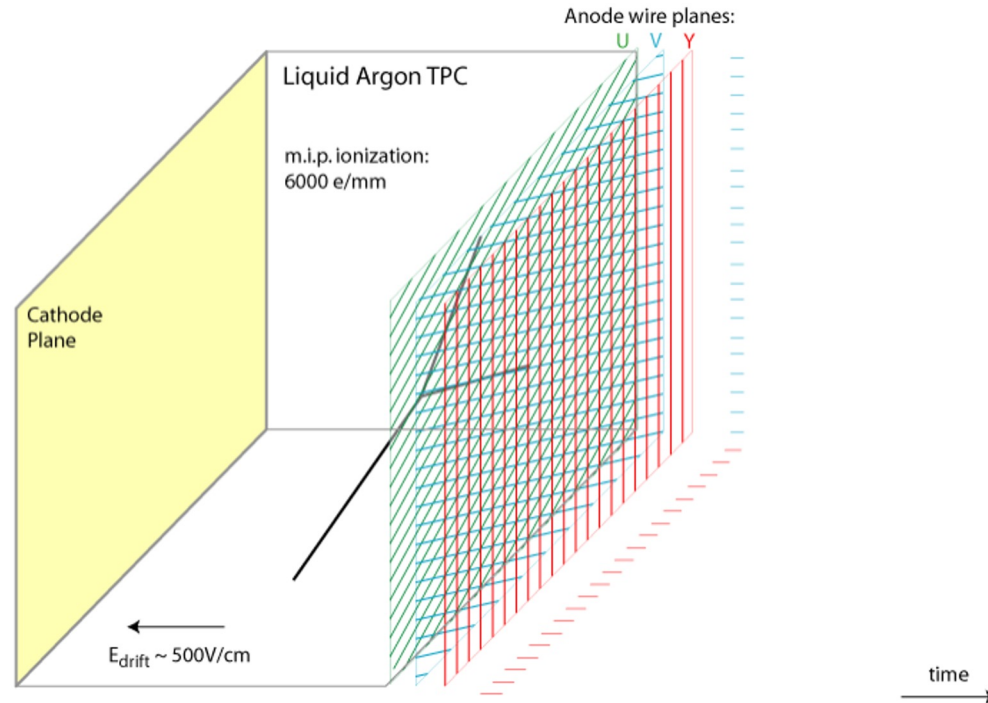
SIST/GEM 5 Minutes 5 Slides

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LArTPC

Liquid **Ar**gon **T**ime **P**rojection **C**hamber

- Detectors where interactions between neutrinos and Argon atoms are observed
  - The energy & trajectory from these interactions are measured via the charge and light emitted


LAr @ BNL Animation: https://lar.bnl.gov/home/img/signal.gif

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LArTPC + Dopants

This summer project's aim is to observe how low energies are detected when photosensitive doping is added to the LArTPC.

- The dopants' purpose are to convert the scintillation light emitted into ionization charge

- We want to discover how doping will improve the energy resolution and measurement at low energies
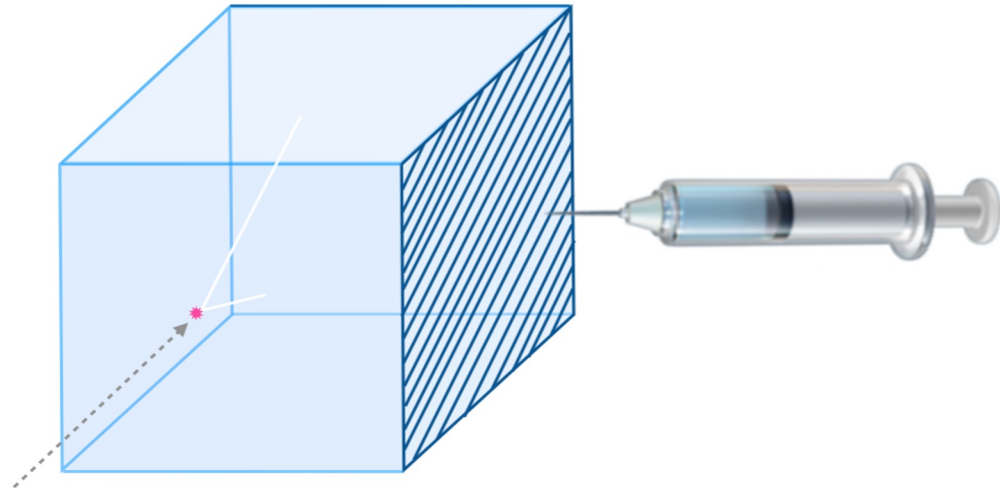
Fernanda Psihas, 2022

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Summer Research Goals & Objectives

Main Objective: Take low energy simulations from the LArTPC and view how well the energy of the particles can be reconstructed <u>with **and** without photosensitive doping</u>
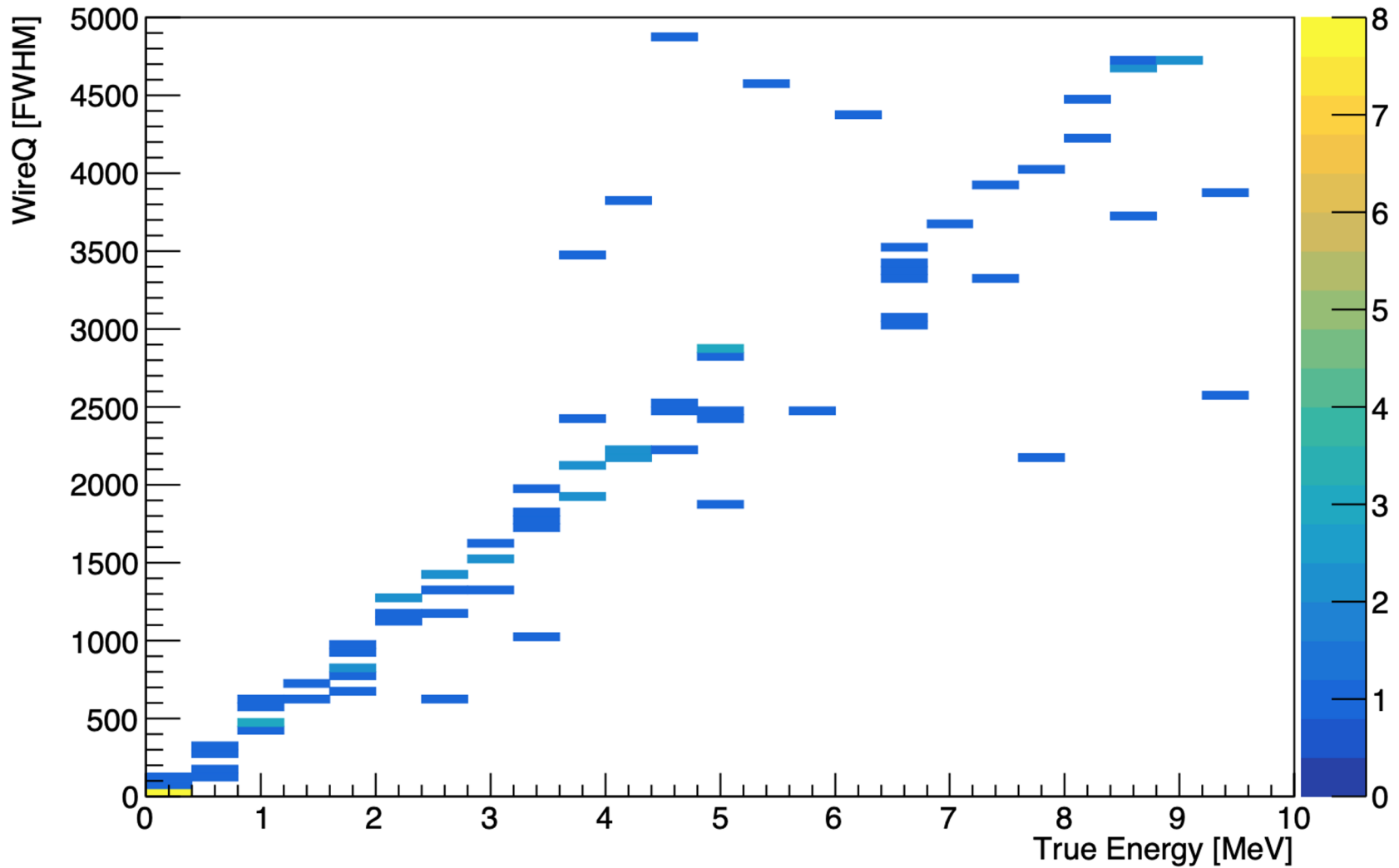
Goals To Meet Objective:

- Analyze simulated electrons at 2.5 MeV & make energy distribution plots to understand energy reconstruction & resolution

  - Steps for this process include using stored data products from the interactions in the LArTPC to create ROOT Ttrees to make plots depicting the interactions **and** true deposited energy

  - Ultimately, these plots will help determine the **ideal reconstructed energy** and help **improve resolution at low energies**

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Current Progress + Near Future Steps

- Recently created energy distribution plots using LArSoft files without doping

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True Energy vs Sum of Wire Charge

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- For the upcoming weeks, creating more energy distribution plots for low energy reconstruction with the 5000+ LArSoft simulation files with doping is the main goal

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