# Neutrino Data

## **MINERvA Masterclass**

## **Now mature; Will continue in IMC 2023**





$$p_{neutrino} + p_{neutron} = p_{proton} + p_{muon}$$

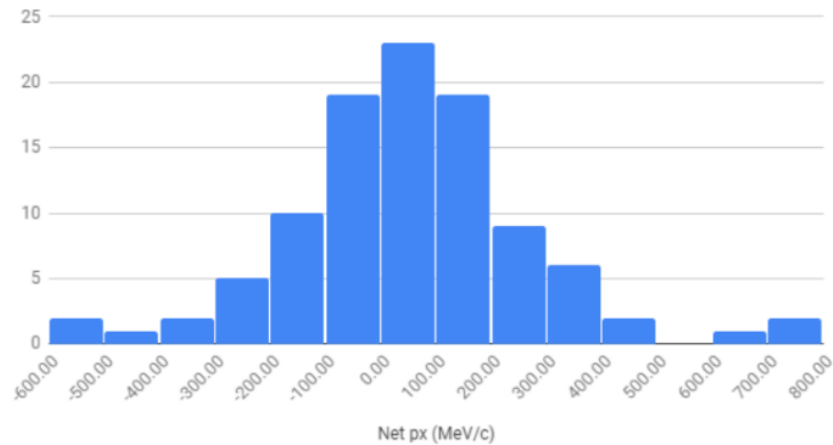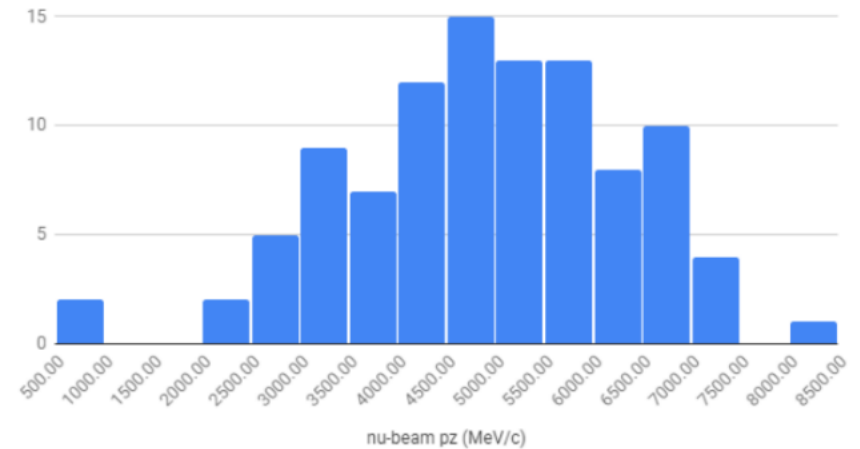

Pasero, Wood, Ad Board Meeting, Jan. 2023
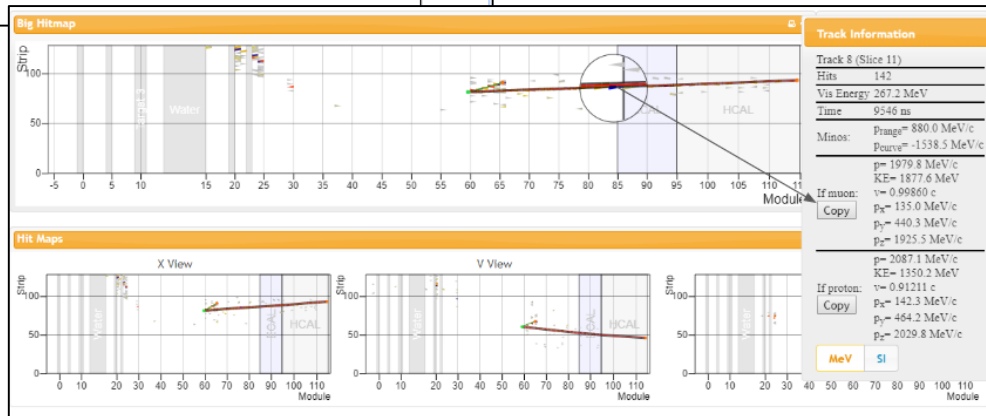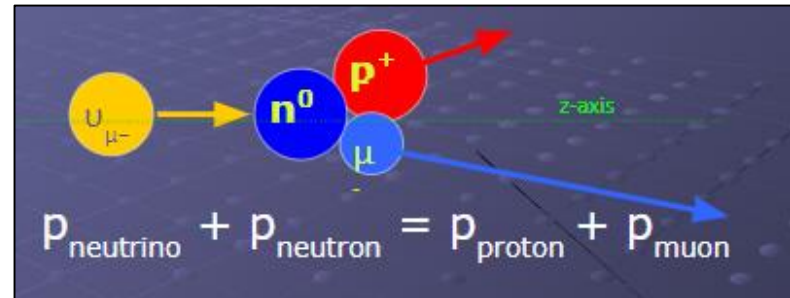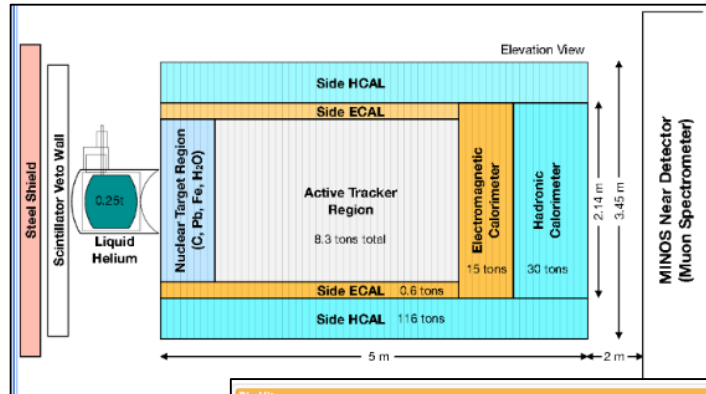
# MINERvA Masterclasses





Histogram of Net px (MeV/c)



Histogram of Net pz (MeV/c)

# QuarkNet

# NOvA Masterclass

## New NOvA masterclass focuses on a result about the neutrino as a particle.

**Piloting with teachers:**

- **University of MN Center**
- **Neutrino Fellows**
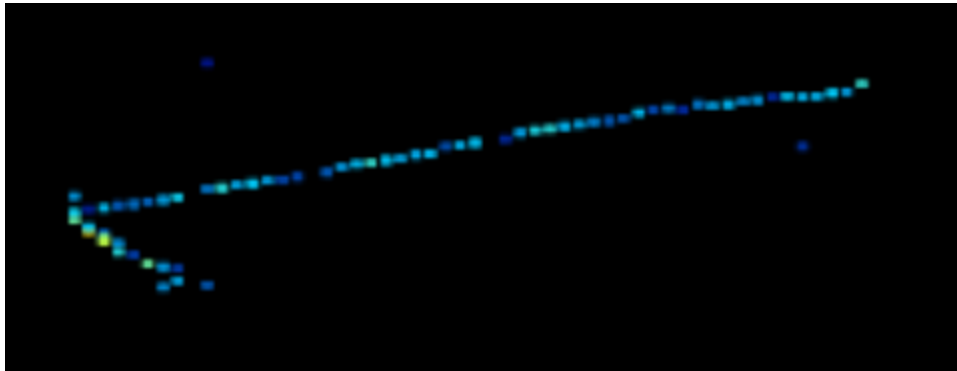- **Summer 2022 workshops (4)**
- **AAPT Winter 2023 meeting**

**Piloting with students:**

- **April 23, 2022 @ U. of MN**
- **Phase 2 pilot in IMC 2023**

an. 2023

**QuarkNet**

# NOvA Masterclass

Python + colab

CO ▲ NOvANearAnalysisV2_YourName.ipynb ☆

File Edit View Insert Runtime Tools Help  Last edited on Aug 3, 2022

S

+ Code  + Text

Instead, let's see if data analysis tools within this Python document can help us analyze the events more efficiently.

## Importing Data

Now, let's officially turn our analysis to the Near Detector. A set of event data from the Near Detector is available to you. As a starting point, we'll want to import it into this Notebook Document to work with.

In our notebook, we'll create a "Pandas Data Frame," which is a 2D structure that's able to hold data, and has easy access to many data manipulation and organization tools within the Python environment.

There are many ways to import data. Here we'll use an importing feature that pulls the data in from a "CSV" file that's hosted on a web page (GitHub)

If you need help with this step, a Screen Shot Tutorial can be found here.

```
# Importing data into a Dataframe from a web based source
# For this activity, Near NOvA Event Data can be found at this website:  https://github.com/ThePAEngineer/NOvAData
# The file you'll want to focus on is called:  NOvA-ND-Events.csv
# Once there, click on the file of interest, then copy the link from the "Raw" button, pasting it in the indicated space below

dataImported = pd.read_csv('web link here')
```

# Workshops

**QuarkNet**

## Neutrino Data Workshops in 2022

Held at **10** centers. (up from **7** in 2021)

Led by staff and/or fellows.

Based on data from MINERvA and/or NOvA.



Pasero, Wood, Ad Board Meeting, Jan. 2023