# WEEKLY ANALYSIS UPDATE

03 October 2024

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What's done till date?

- Analysis with the Bismuth Trigger Primitives
  - Data: ProtoDUNE- II Horizontal Drift (PD2HD) Off-beam (Run: 026482)
  - Emulation of TPs using *TPGSandbox* package developed by Alessandro Thea
  - *Motivation:* To study the TPs quantitatively from an independent source i.e. here the radioactive Bismuth source
  - Previously, the Bi-207 source present inside the detector has been studied for Calibration purposes by Alex Oranday (talk), aim is to compare the results
- Approach:
  - Working with the Background TPs → Clustering to remove Cosmics/Signal (off-beam) data
  - Zoom in on Bismuth active region
  - ADC integral plot of Signal (Bismuth) and Background TPs
  - To get only Bismuth TPs: Subtraction the expected background TPs in the Bismuth region from all hits to estimate the distribution of only Bismuth TPs.
- Accessing data of PD2HD run from Fermilab offline storage:
  - This can be done through Rucio/Metacat: Using Rucio from CERN account
  - Also, streaming data is essential for the huge size of the datafiles (Xroot/Kerberos)
  - Using Apptainer in HM01 to run the DUNE-DAQ environment
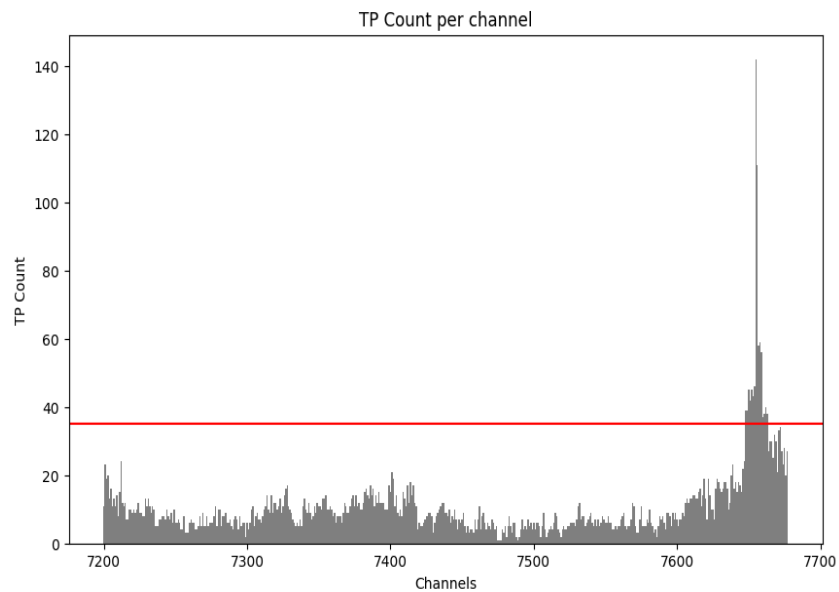
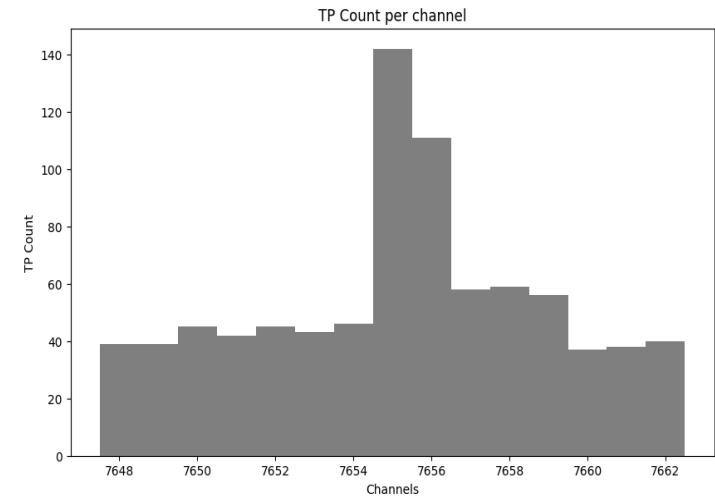# TP Count per channel
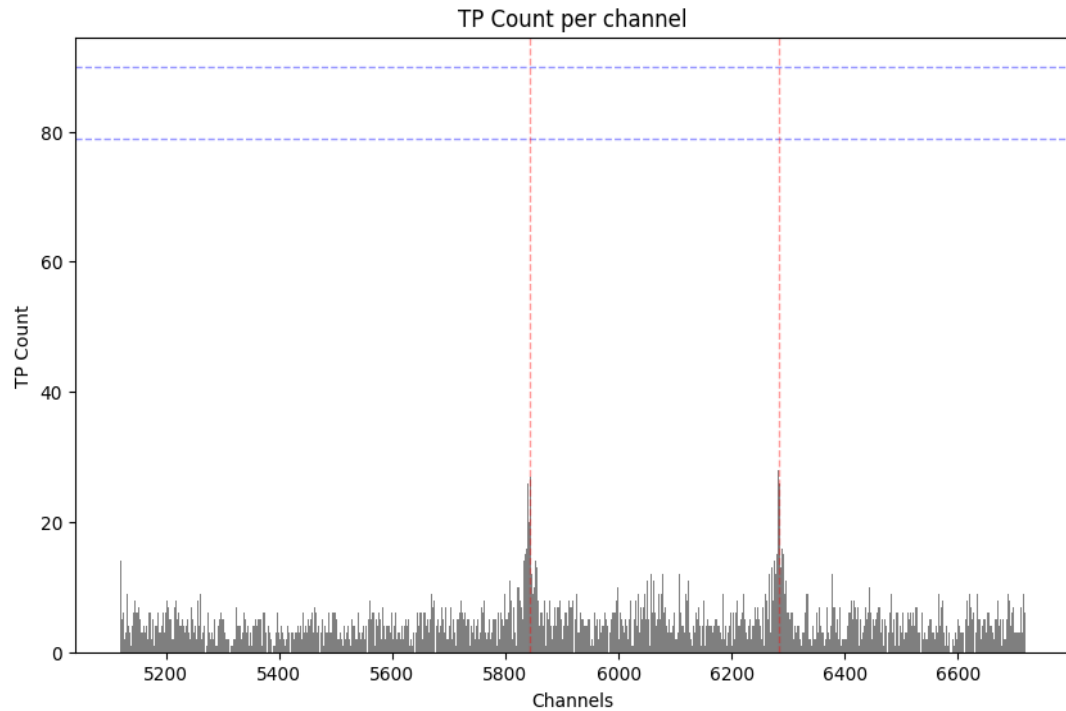
Induction plane
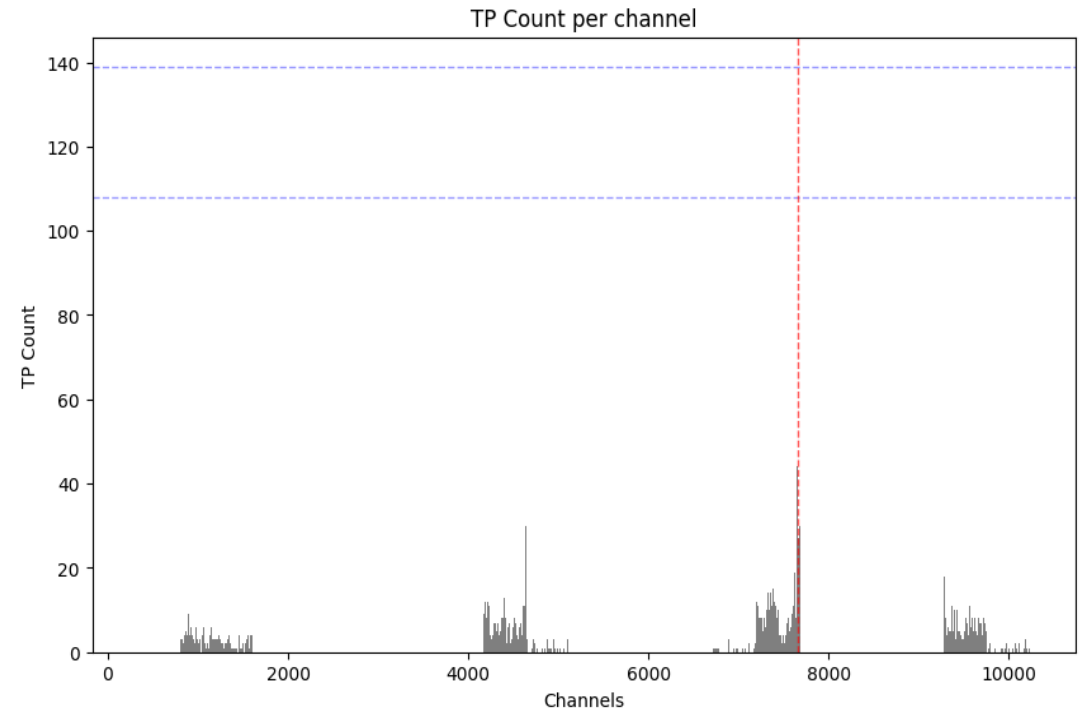
Collection plane
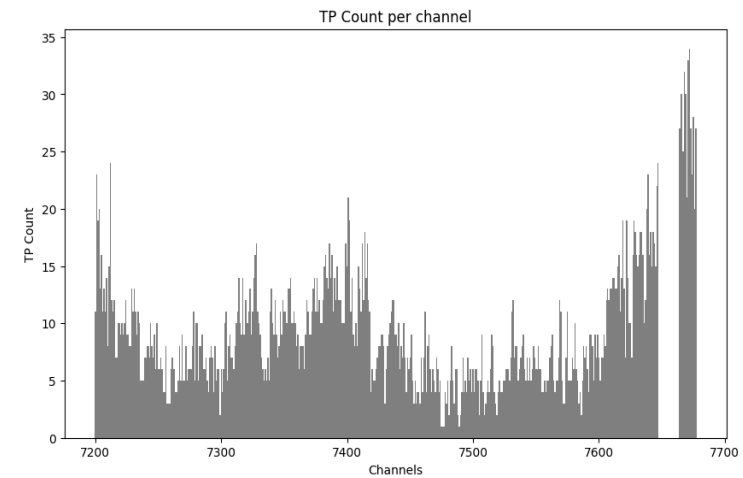
Background TP Count vs Threshold

- Datafile: run 026482 off beam data for APA 2

- Emulated Collection TPs

- Algorithm: Simple Threshold (=250)

_____ : Threshold to be considered Bi-207 active
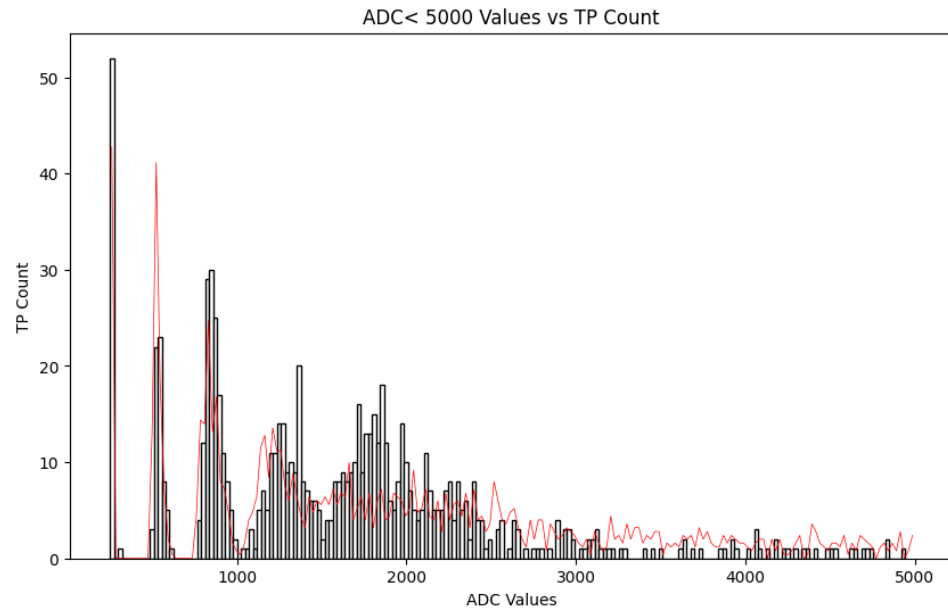

Signal

Background

THANK YOU!

Further Steps for Bismuth Physics

1. Raw data for APA 2 channels for run 026482 TR datafile

2. Analysis with more data: Need Rucio account to access PD2HD TRs: In progress (have been facing technical difficulties)

3. Set of Background TPs:

   1. Clustering to remove cosmics data

   2. Zoom in on Bismuth active region

4. Plotting the number Background TPs vs varying threshold (Hit finding) for different APAs

5. ADC integral plot of Signal and Background TPs

6. To get only Bismuth TPs: Subtraction the expected background TPs in the Bismuth region from all hits to estimate the distribution of only Bismuth TPs.

7. Conversion of ADC integral to Energy and the 1D energy plot (needs further work)
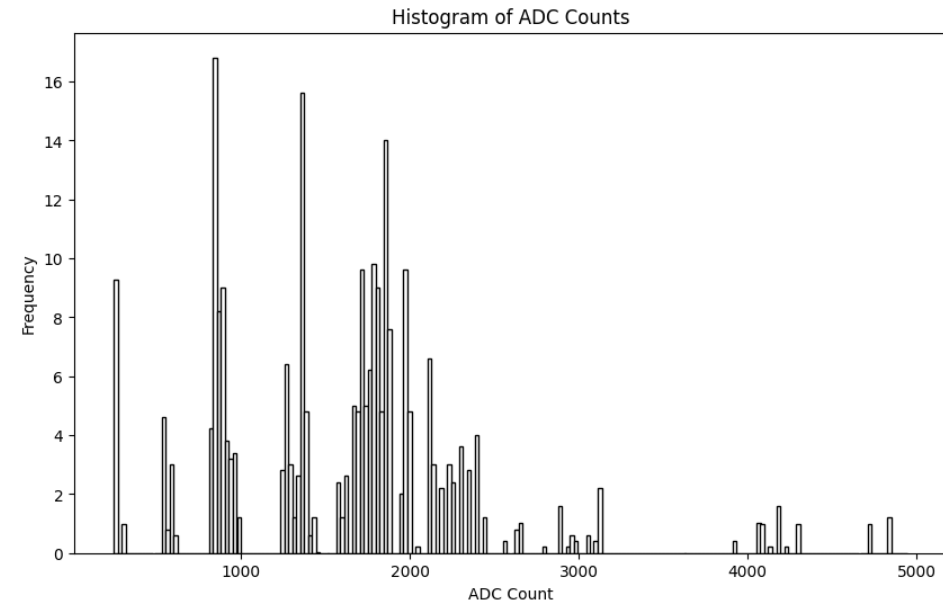
Also: Offline reconstruction: Managed to log in to Fermilab machines

Background Subtraction

- Datafile: run 026482 off beam data

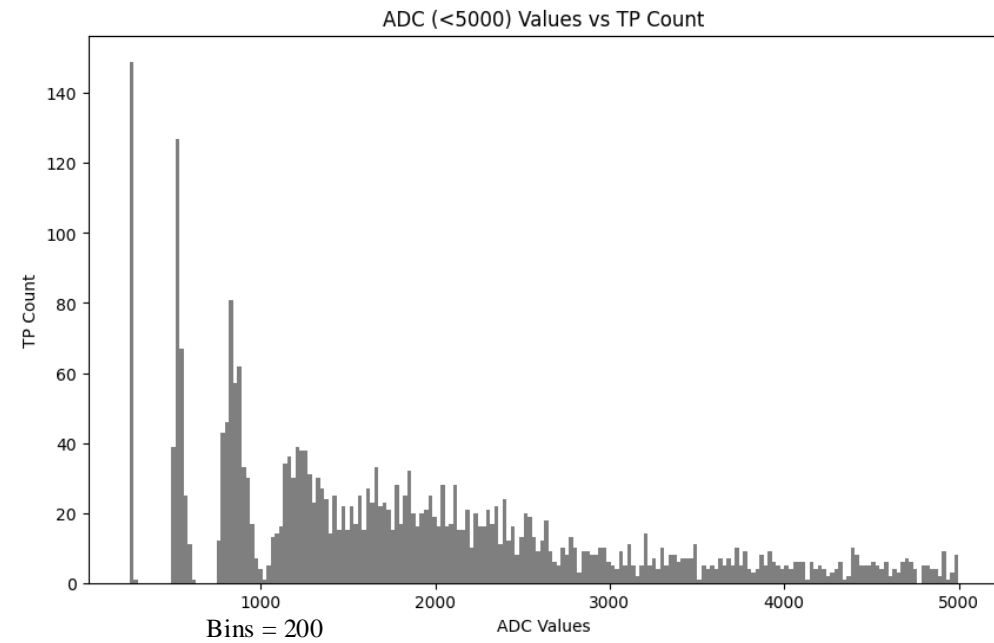- Emulated Collection TPs

- Algorithm: Simple Threshold (=250)

Bismuth region with background
highlighted in red ____

Background subtraction and retention of
only signal TPs

Background TP ADC Histogram

ADC integral of Background
emulated collection TPs from APA 2

Background TP Count vs Threshold

- Datafile: run 026482 off beam data

- Emulated Collection TPs

- Algorithm: Simple Threshold(=250)