

WEEKLY ANALYSIS UPDATE

12 Nov 2024

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Outline of Bismuth TP Analysis

1. Raw data for APA 2 channels for run 026482 TR datafile
2. Analysis with more data:

```
channel_map = detchannelmaps.make_map("PD2HDChannelMap")

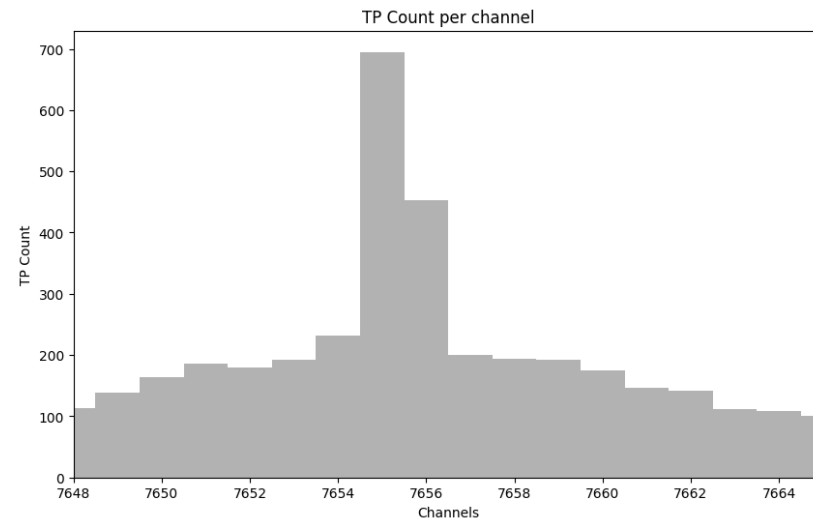
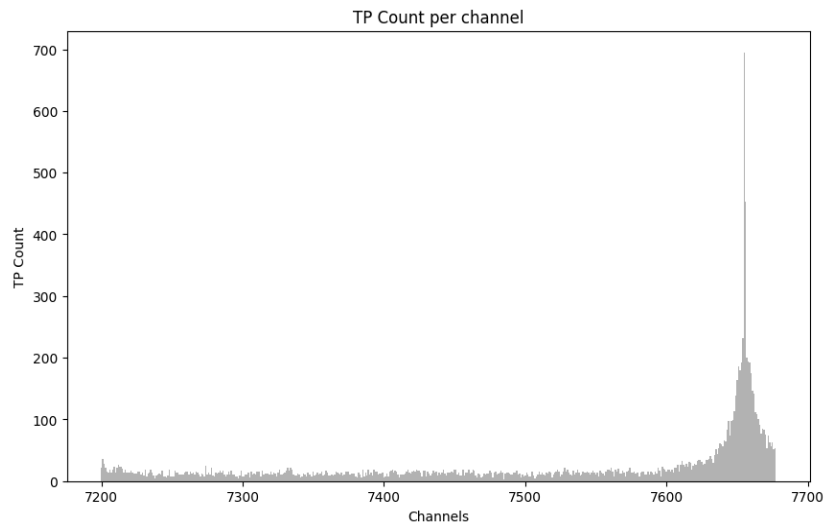
fp1 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0000_dataflow0_datawriter_0_20240528T145108.hdf5.copied"
fp2 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0002_dataflow0_datawriter_0_20240528T150028.hdf5"
fp3 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0003_dataflow0_datawriter_0_20240528T150508.hdf5"
fp4 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0004_dataflow0_datawriter_0_20240528T150948.hdf5"
fp5 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0005_dataflow0_datawriter_0_20240528T151428.hdf5"
fp6 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0008_dataflow0_datawriter_0_20240528T152828.hdf5"
fp7 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0009_dataflow0_datawriter_0_20240528T153308.hdf5"
fp8 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0011_dataflow0_datawriter_0_20240528T154228.hdf5"
fp9 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0012_dataflow0_datawriter_0_20240528T154708.hdf5"
fp10 = "/cephfs/dice/users/gj23442/protodune-data/hd-protodune/np04hd_raw_run026482_0017_dataflow0_datawriter_0_20240528T161028.hdf5"

# List of file paths
file_paths = [fp1, fp2, fp3, fp4, fp5, fp6, fp7, fp8, fp9, fp10]
```

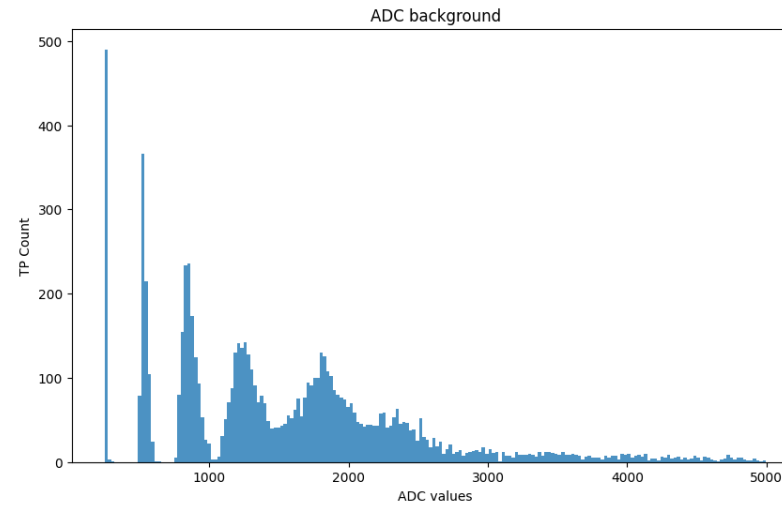
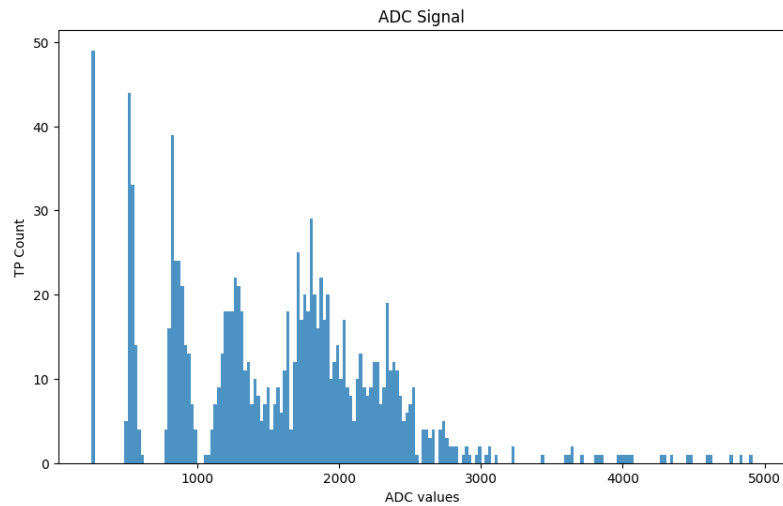
3. Set of Background TPs:
 1. Clustering to remove data from cosmics
 2. Zoom in on Bismuth active region
4. Plotting ADC value histogram for signal (Bismuth) and background region
5. To get only Bismuth TPs: Subtraction of the expected background TPs in the signal region to estimate only Bismuth TPs

TP Count per Channel

- Datafile: 10 sub-runs of run number 26482 off beam data
- Data read using *justintime* package only from APA 2 collection channels
- Emulated Collection TPs using *TPGSandbox* with Simple Threshold (=250) algorithm
- Selection:
 - Signal TPs from channel 7655 and 7656 (from visual inspection)
 - Channels with TP count > 100 are removed from rest to get Background

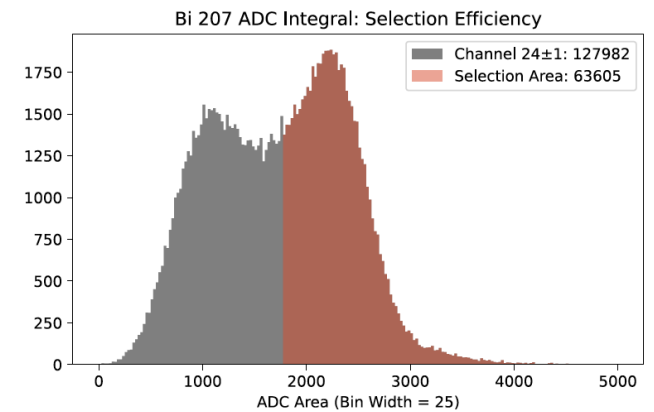


TP ADC Histogram



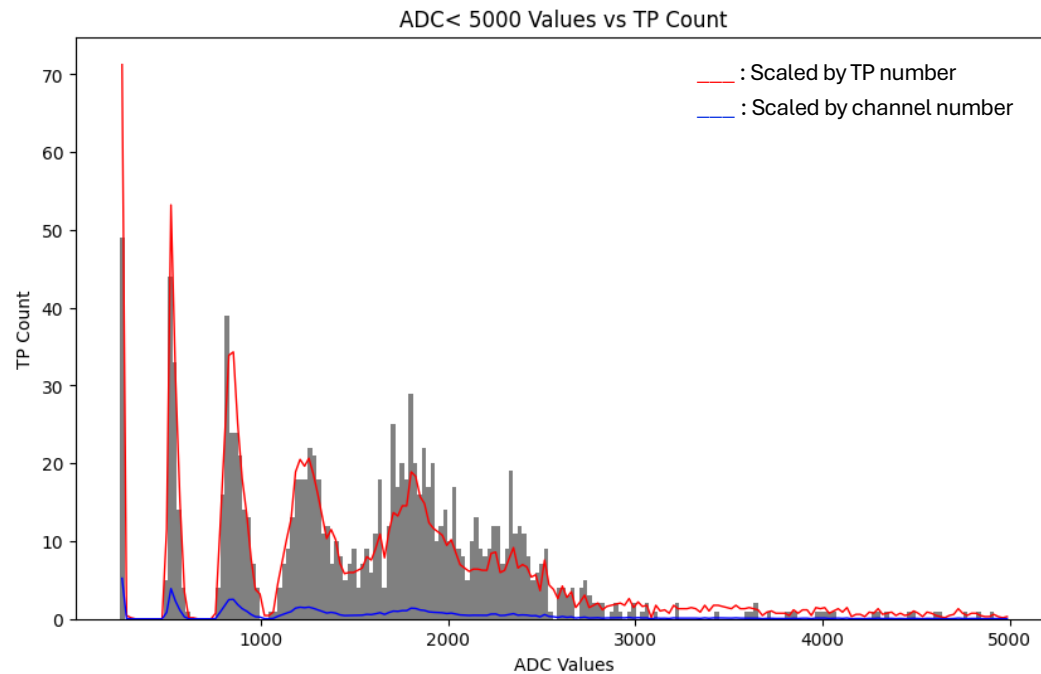
Bins = 200 to match Alex's plot

- ADC integral distribution of TPs from Signal (left) and Background (right)
- TP numbers after selection:
 - For signal: 1148
 - For background: 7895

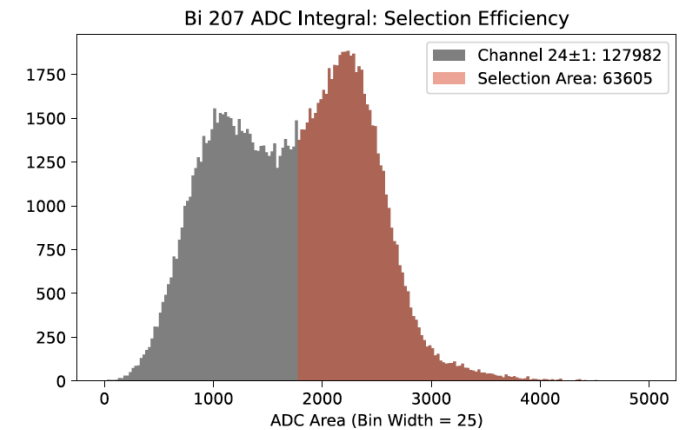


[Link](#) to Alex's presentation

Bismuth ADC Histogram



- ADC integral distribution of Bismuth region TPs
- Extrapolated background distribution using two different parameters



[Link](#) to Alex's presentation

THANK YOU!

Steps for accessing ProtoDUNE data in DICE

In Alma9 (done in sc01):

Requirements: Fermilab username and Kerberos password

Get list of datafiles from here: https://metacat.fnal.gov:9443/dune_meta_prod/app/gui/datasets

List of commands:

- `. /cvmfs/larsoft.opensciencegrid.org/spack-packages/setup-env.sh`
- `spack load r-m-dd-config experiment=dune`
- `spack load kx509`
- `kinit <username>@FNAL.GOV`
- `kx509`
- `export ROLE=Analysis`
- `voms-proxy-init -rfc -noregen -voms=dune:/dune/Role=$ROLE -valid 120:00`
- `export RUCIO_ACCOUNT=<username>`
- `rucio whoami`
- `rucio list-file-replicas hd-protodune:np04hd_raw_run026482_0008_dataflow0_datawriter_0_20240528T152828.hdf5`
- `rucio download hd-protodune:np04hd_raw_run026482_0008_dataflow0_datawriter_0_20240528T152828.hdf5`