

# WEEKLY ANALYSIS UPDATE

03 Dec 2024

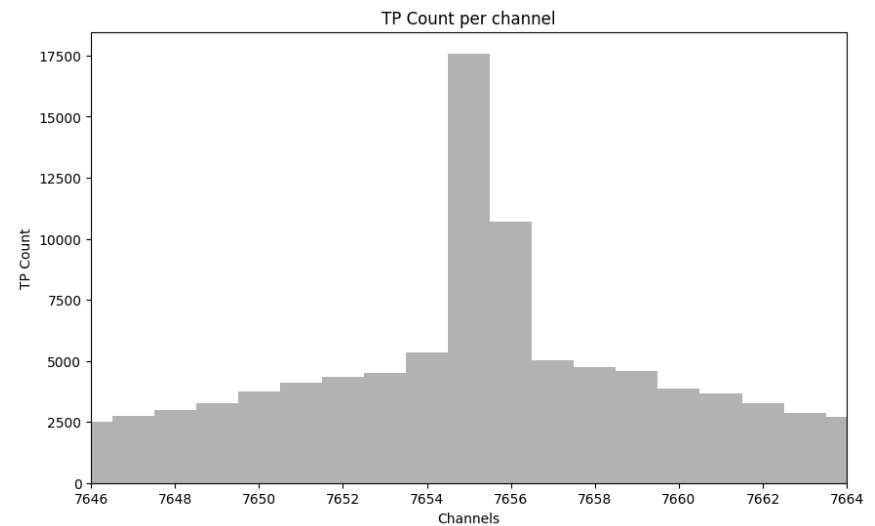
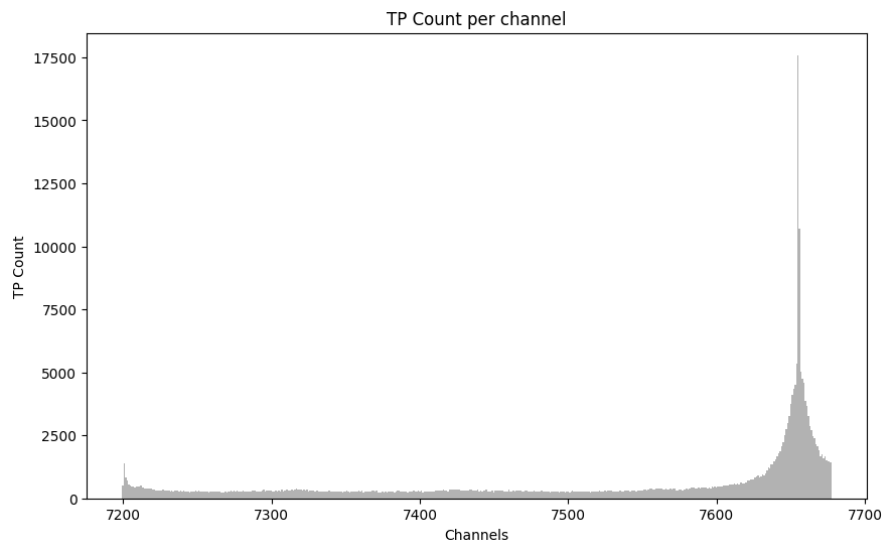
Samikshya Kar

## Updates of the week

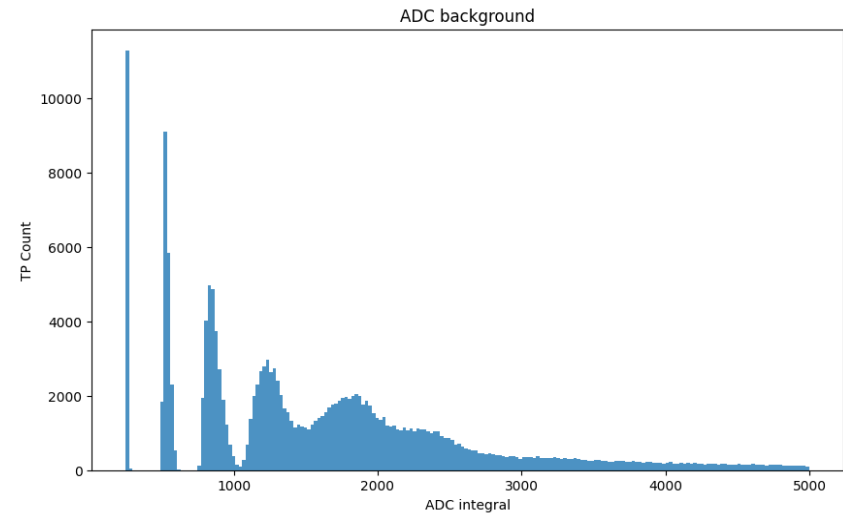
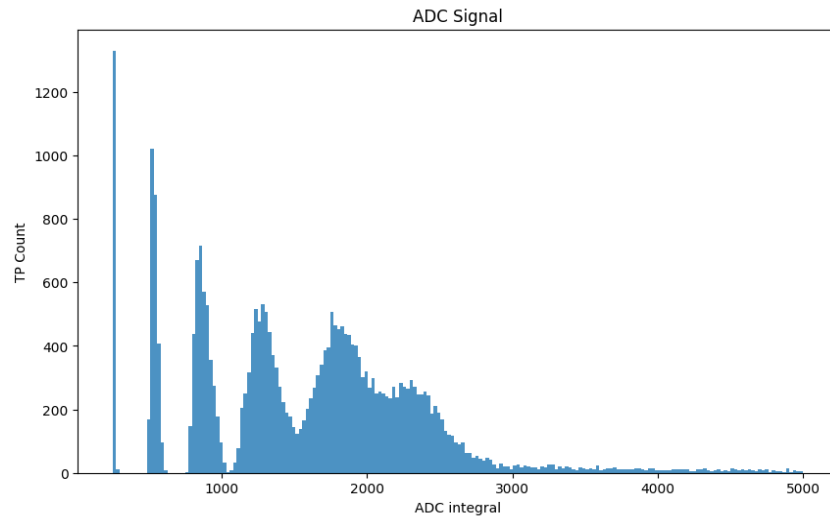
1. TP stream files for APA 2 channels for run 026482
2. Statistics from TPstream files are significantly high
3. Initial issue with *justintime* in reading TP stream files, fixed now
4. Set of Background TPs:
  1. Clustering to remove data from cosmics
  2. Zoom in on Bismuth active region
5. Plotting ADC value histogram for signal (Bismuth) and background region
6. 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: Run the script on One TPstream datafile
- Data read using *justintime* package only from APA 2 collection channels
- Collection TPs that are recorded before being passed to Trigger
- Selection:
  - Signal selection: TPs from channel 7655 and 7656 (from visual inspection)
  - Background selection: Channels with TP count  $> 2500$  are removed from rest to get Background

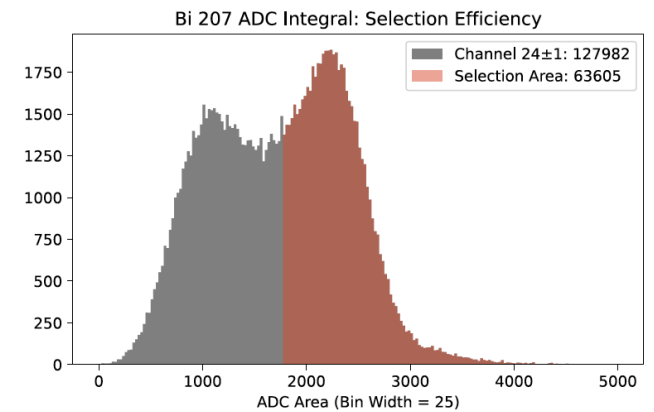


# TP ADC Histogram



Bins = 200 to match Alex's plot

- ADC integral distribution of TPs from Signal (left) and Background (right)
- TP numbers after selection:
  - For signal: 28272
  - For background: 189872

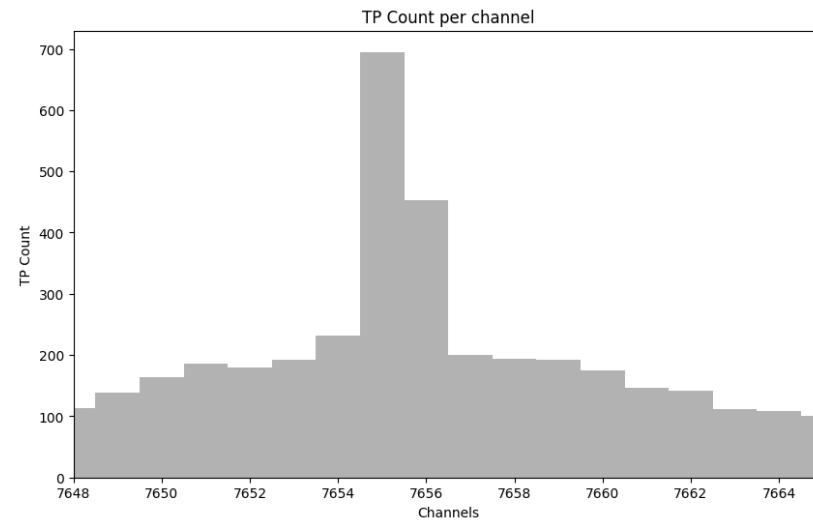
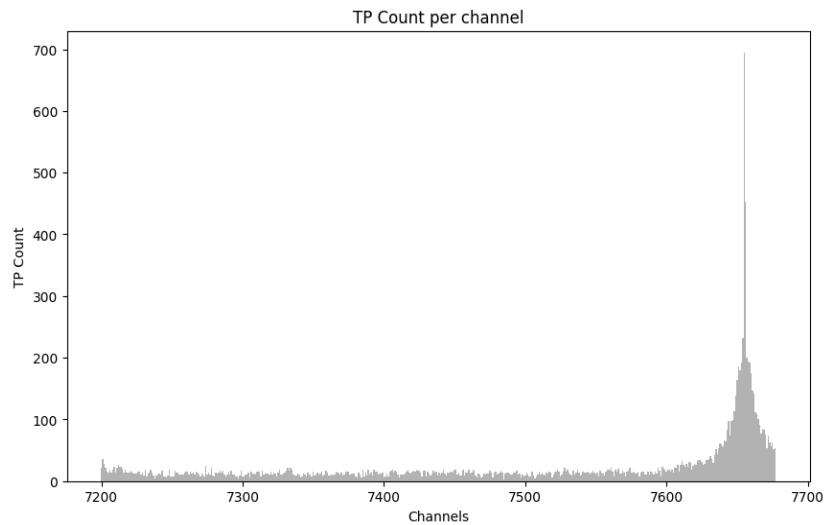


[Link](#) to Alex's presentation

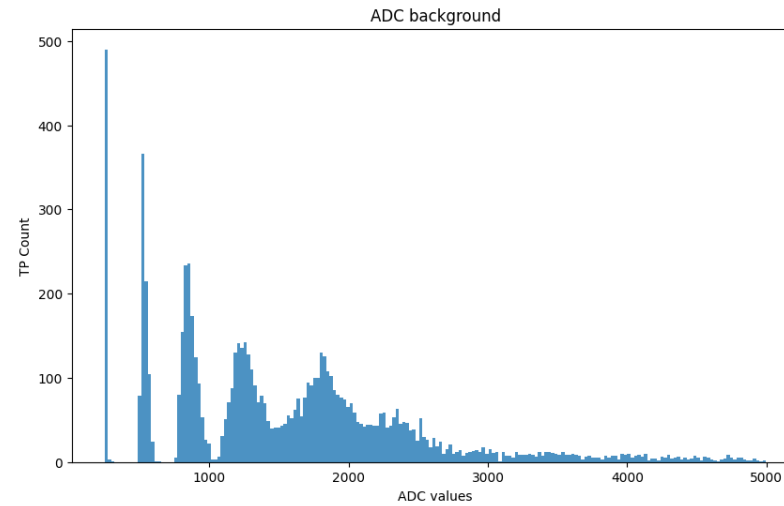
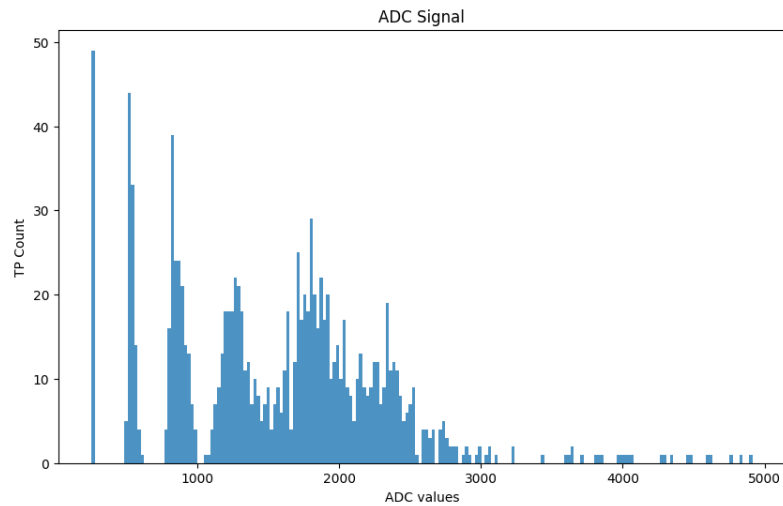
**THANK YOU!**

# 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

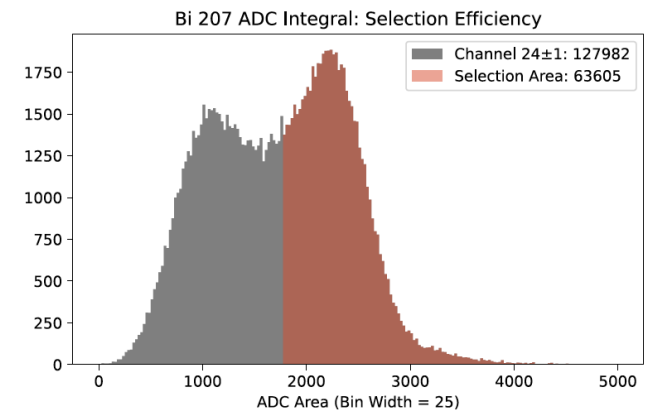


# TP ADC Histogram



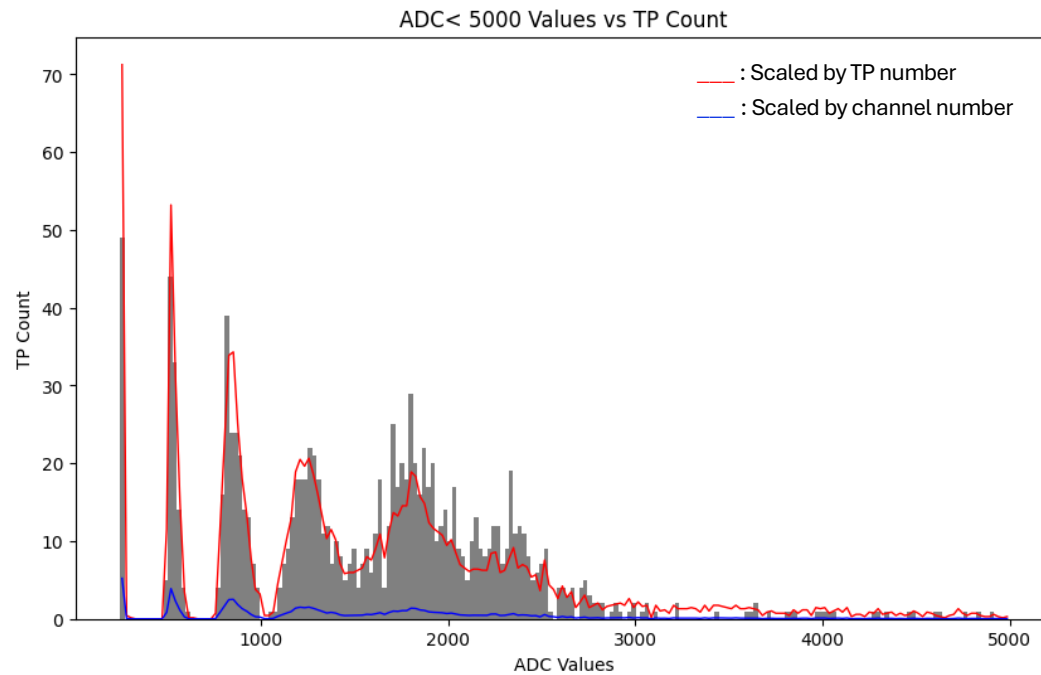
Bins = 200 to match Alex's plot

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

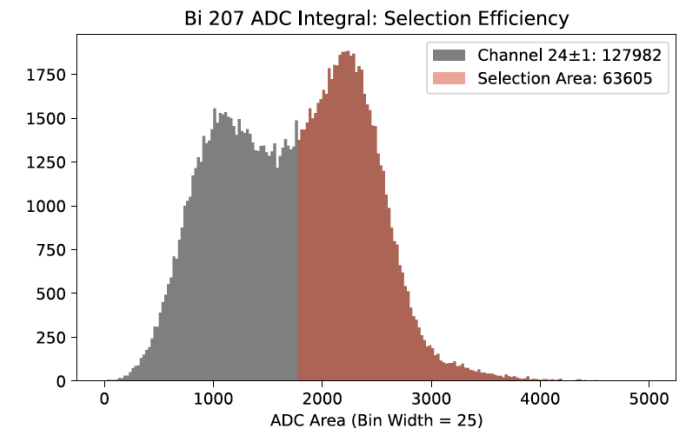


[Link](#) to Alex's presentation

# Bismuth ADC Histogram



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



[Link](#) to Alex's presentation



# 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

## Steps for accessing ProtoDUNE data in DICE: Rucio

Use metacat to find the files and rucio to locate where they are stored and also download

Requirements: FNAL Username and Password (both Services and Kerberos)

Get list of datafiles from here: [https://metacat.fnal.gov:9443/dune\\_meta\\_prod/app/gui/datasets](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 <FNAL_username>@FNAL.GOV`
- `kx509`
- `export ROLE=Analysis`
- `voms-proxy-init -rfc -noregen -voms=dune:/dune/Role=$ROLE -valid 120:00`
- `export RUCIO_ACCOUNT=<fnal_username>`
- `rucio whoami`
- `rucio list-file-replicas <detector-source>:<file-name>*`
- `rucio download <detector-source>:<file-name>`

\* Example: `hd-protodune:np04hd_raw_run026482_0002_dataflow0_datawriter_0_20240528T150028.hdf5`

## 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](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 metacat`
- `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 METACAT_AUTH_SERVER_URL=https://metacat.fnal.gov:8143/auth/dune`
- `export METACAT_SERVER_URL=https://metacat.fnal.gov:9443/dune_meta_prod/app`
- `metacat auth login -m password <fnal_username>`
- `metacat query "files from dune:all where core.file_type=detector \ and core.run_type=hd-protodune and core.data_tier=raw \ and core.data_stream=cosmics and core.runs[any]=27296 limit 2"`

\* Further metacat operating instructions: [Here](#)