NF/SP update in PDVD

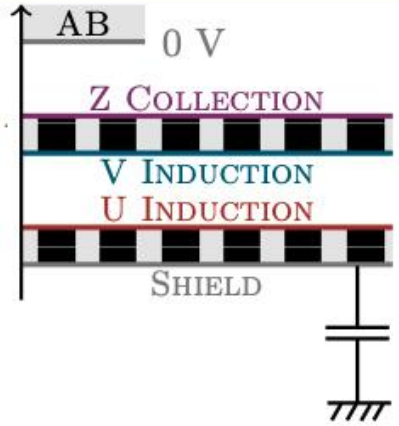
Xuyang Ning

Brookhaven National Laboratory

CNR group for pdvd

- Group channel for pdvd:
  - separate top and bottom, group offline channels according to femb, crate, stream, plane;
  - All channels will be divided in groups of different numbers.
    - 4;16;30;32;48
  - **If number of channel <4, don't apply CNR**

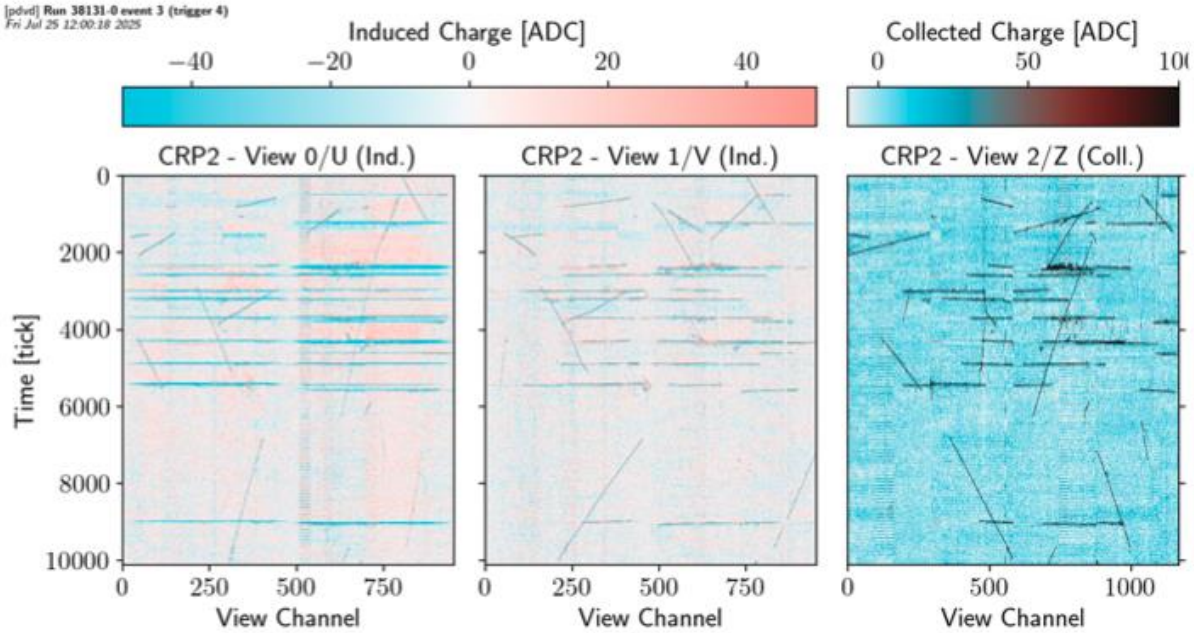
The Shield Plane Coupling



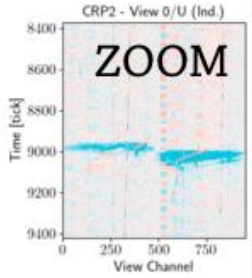
That capacitor is different for Top and Bottom CRPs:
C_{TDE} = 100 nF and C_{BDE} = 800 nF
Meanwhile the shield plane is also capacitively coupled to the strips of the View 0 (2 nF/strips, ~1μF total)

—> For TDE, the capacitor is not big enough.
—> The shield current is flushed to the View 0 strips.
Small strips see less shield current (coupled capacitance is lower)

This is visible for large deposition (shower, muon halo) and affects the signal processing



Muon halo (mostly summer runs)



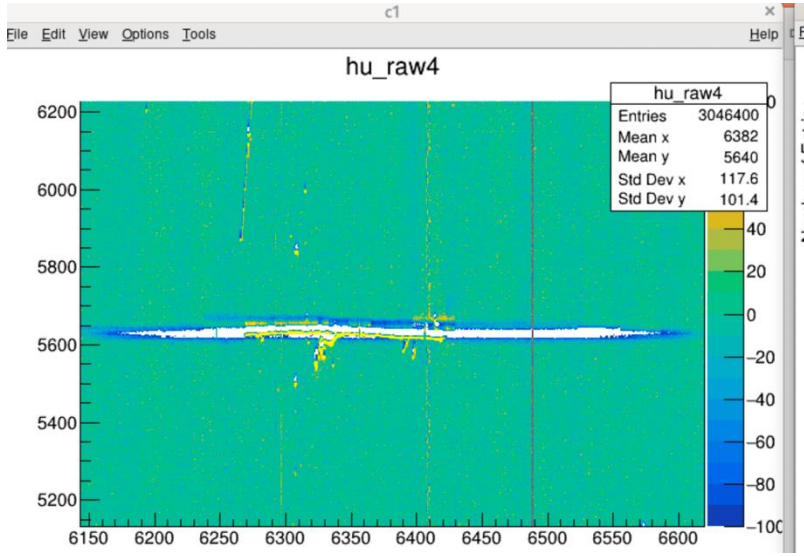
We believe muon halo enters the TPC around Top CRPs level.

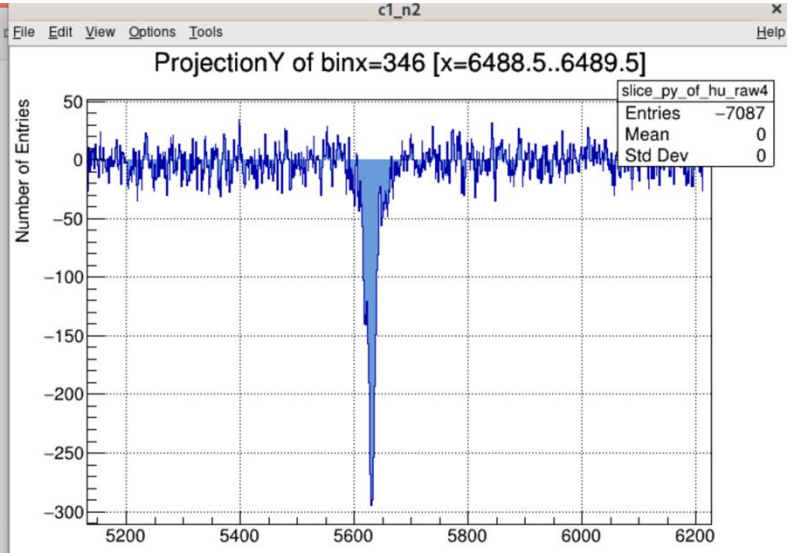
We see a large negative current on all strip in a given CRU over the muon halo tracks. The duration of the shield current is as large as the track angle.

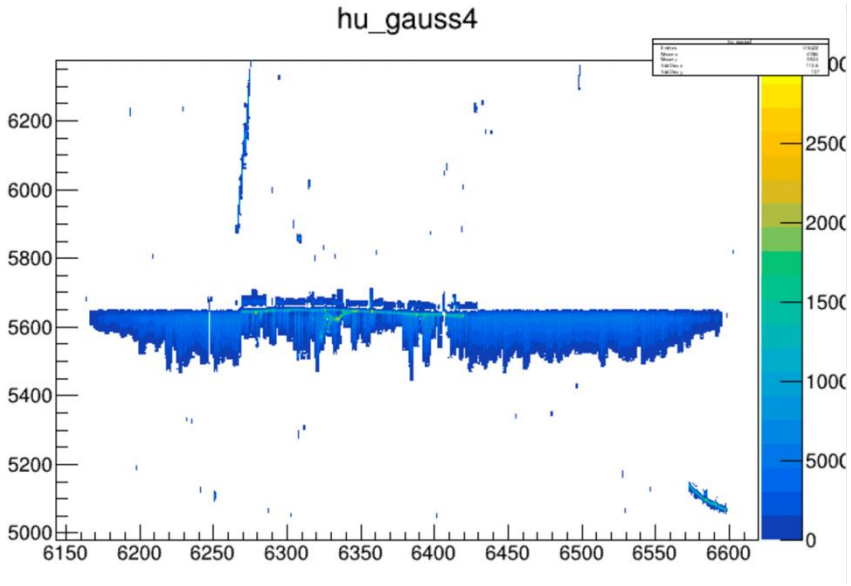
7

From Laura's DRA meeting talk

Shield Coupling for TDE u plane





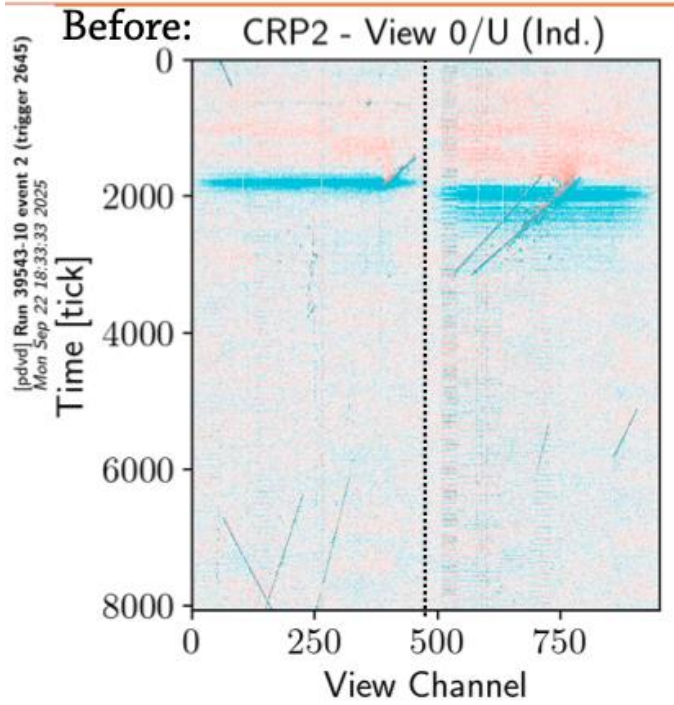


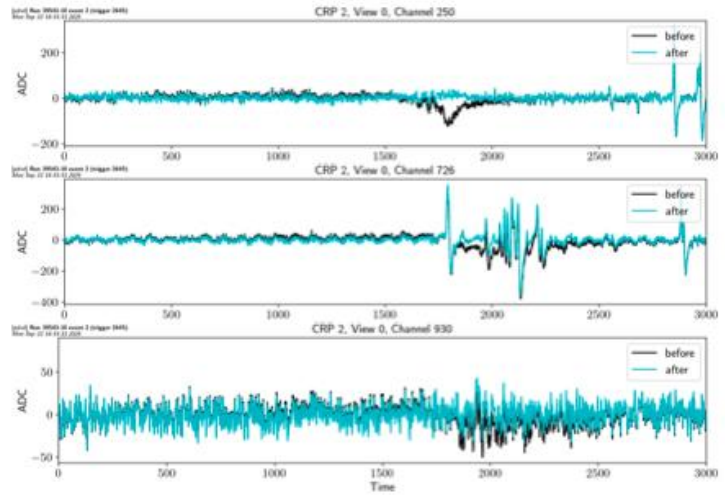
decon result

Shield Coupling removal (TDE view 0 only)

[LARDON's Shield Coupling removal]

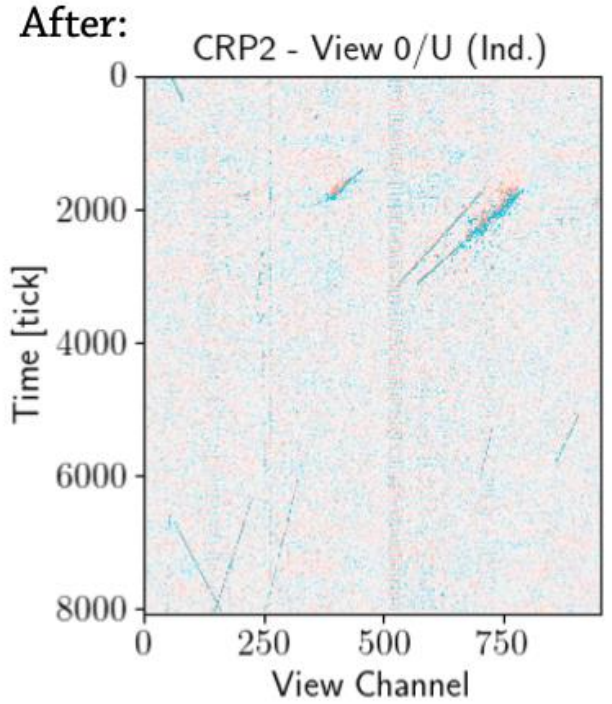
Plan to add it into our noise filter.





LARDON's procedure to remove the shield current from View 0:

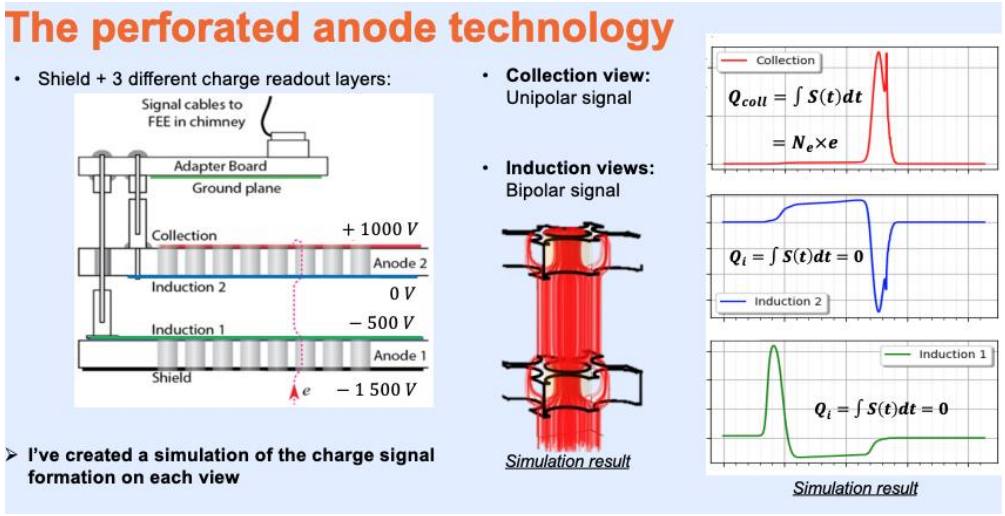
1. All ADCs are weighted by their corresponding strip length
2. The median weighted-ADC value computed over all channels in the same CRU is subtracted
3. ADCs are de-weighted



13

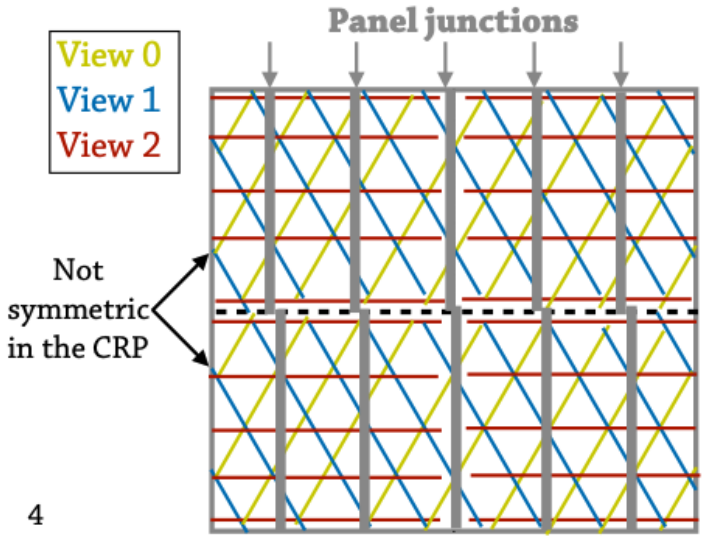
Signal processing

- Field response:
- For the 7% u plane collection in simulation, we haven't seen it in data
- Top shield have lower voltage (-1.4kV) but others are nominal.



- **Field response organizing work suggested by Brett will do in parallel:**
- Garfield now can run in a container provided by Brett.
  - https://www.phy.bnl.gov/~bviren/garfield/
- Collect all the existing field response gar files, organize them and add README for everyone easy to use.
  - I start a repo with my PDHD APA1 field-response gar files.
  - https://github.com/Ningclover/wirecell-field-sim
  - will collect all gar files under Yichen's dir.
- Collect configurations for VD strip FRs using pochoir.
- Setup automatic file conversion from output .dat to .json.bz2 (wire-cell-python)
- Managing releases of these repo(s) and versions of .json.bz2

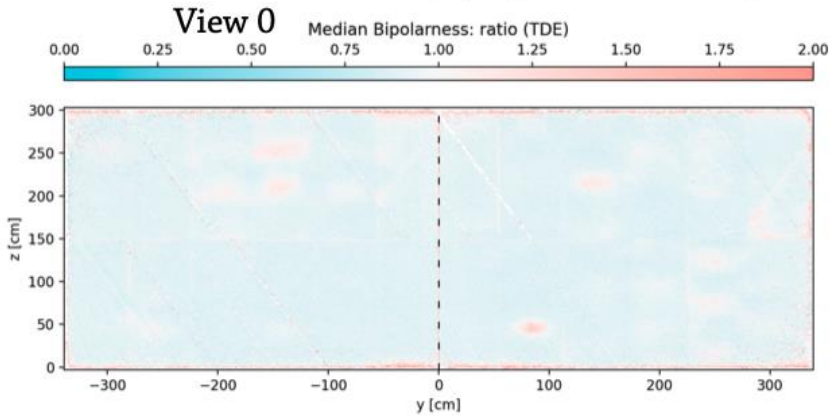
Signal processing



From Laura's DRA meeting talk

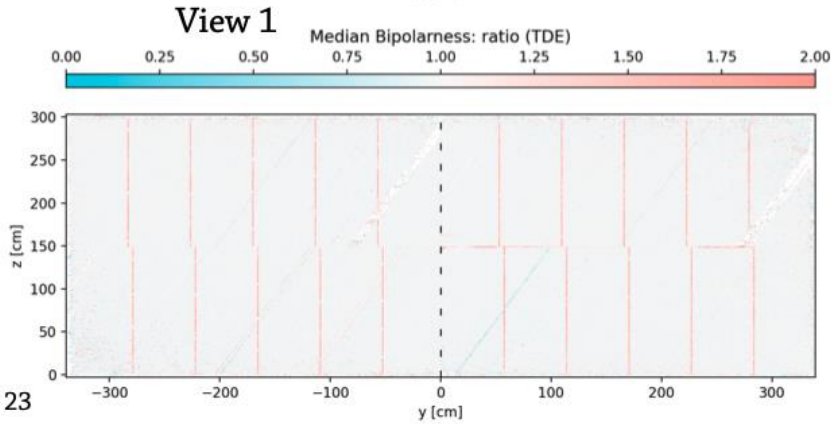
Hits Bipolarness / CRP planarity (TDE)

Looking at the bipolarity of induction hits can inform us about the CRP geometry.
In principle, the positive and negative bumps carry the same integrated charge : $Q_{pos}/|Q_{neg}| = 1$.
If the ratio is > 1, it could imply a problem where part of the electron is collected on that view



- We see hotspots (ratio > 1) indicating areas where the gap between the PCBs is not 1 cm: local excess of collected hits

- Interestingly, the mean ratio value is <1 (to be investigated)

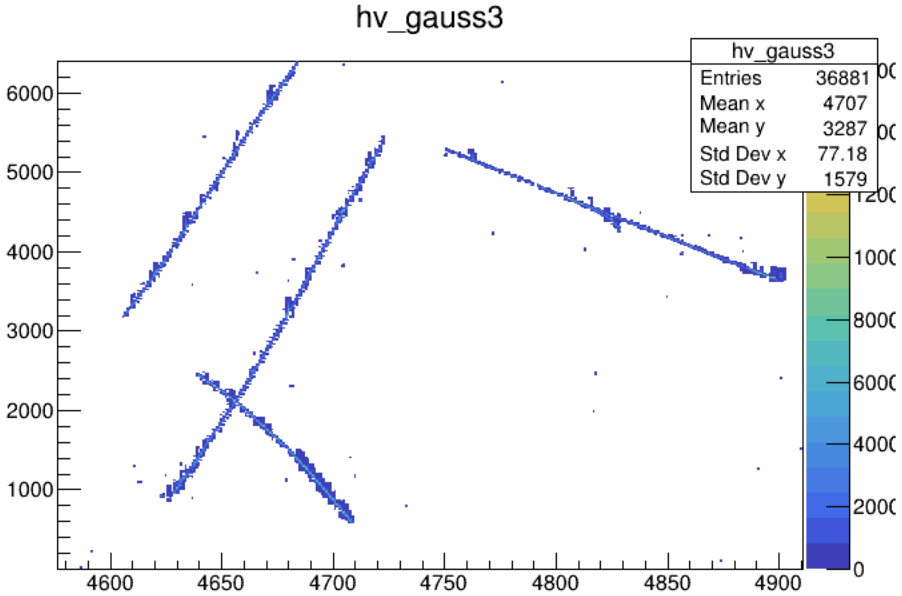


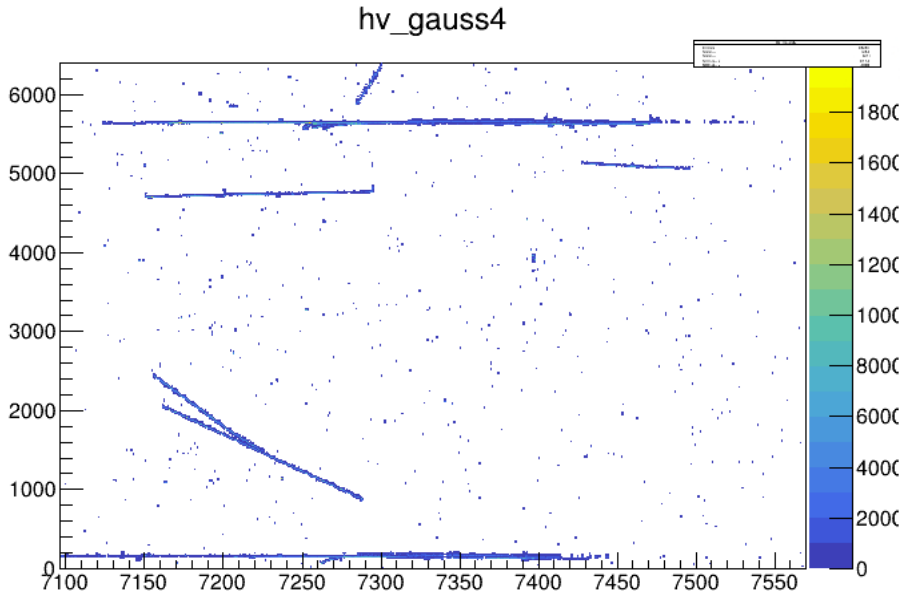
- We see hotspots (ratio > 1) at the panel junctions: electrons are collected on the view 1 because they can't cross the PCB to the collection plane

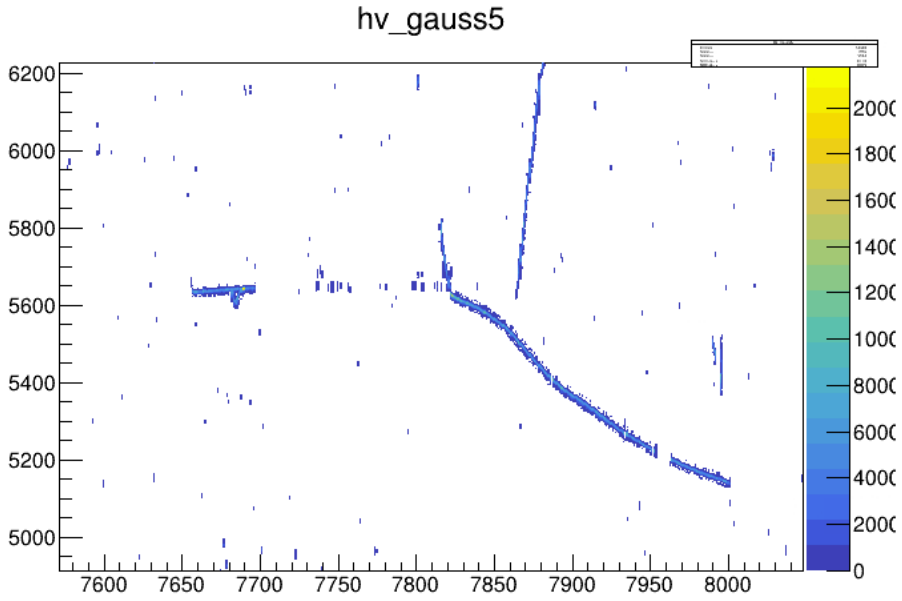
23

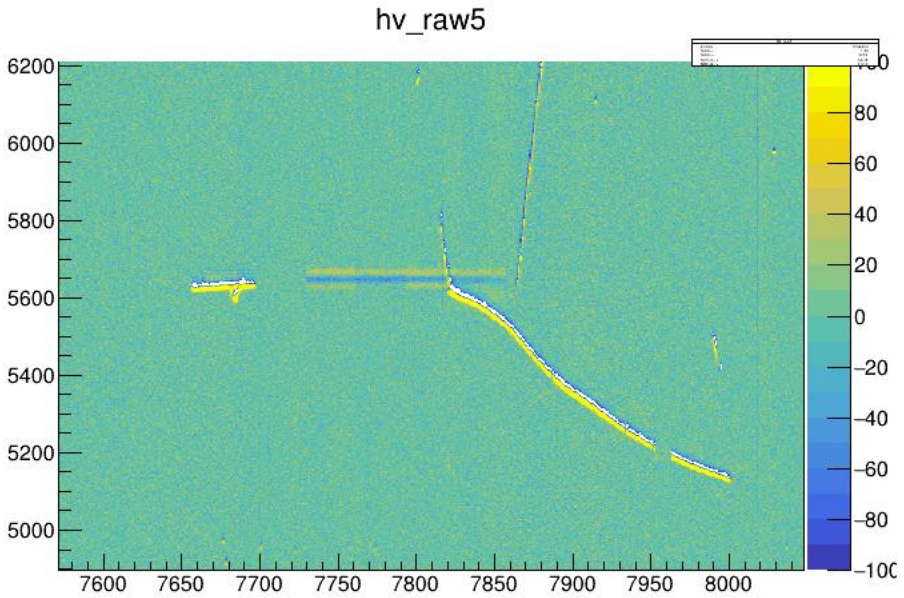
Decon result in v plane

Difficult to find the feature from the raw waveform or decon result





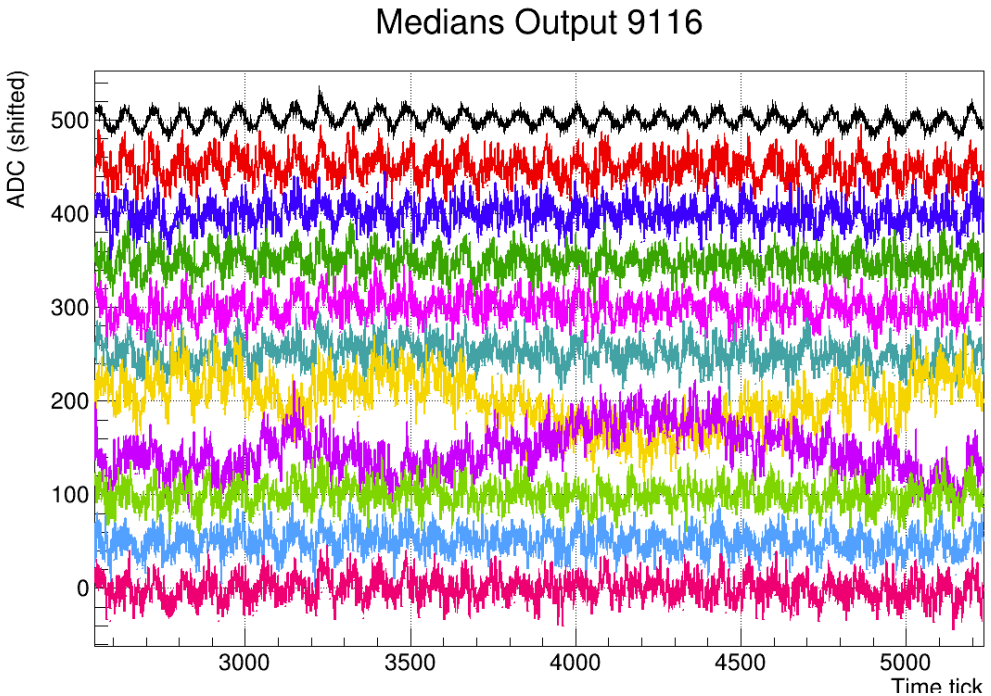


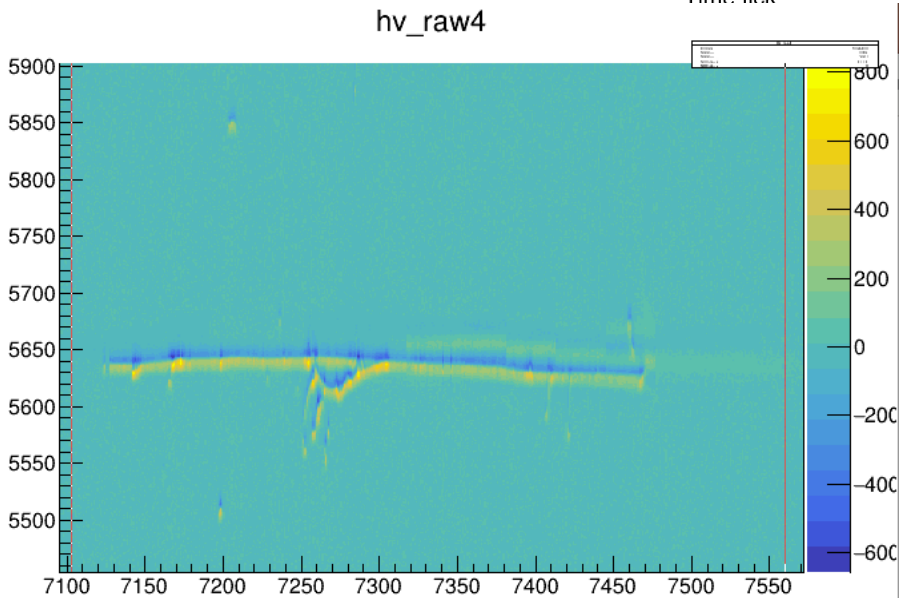


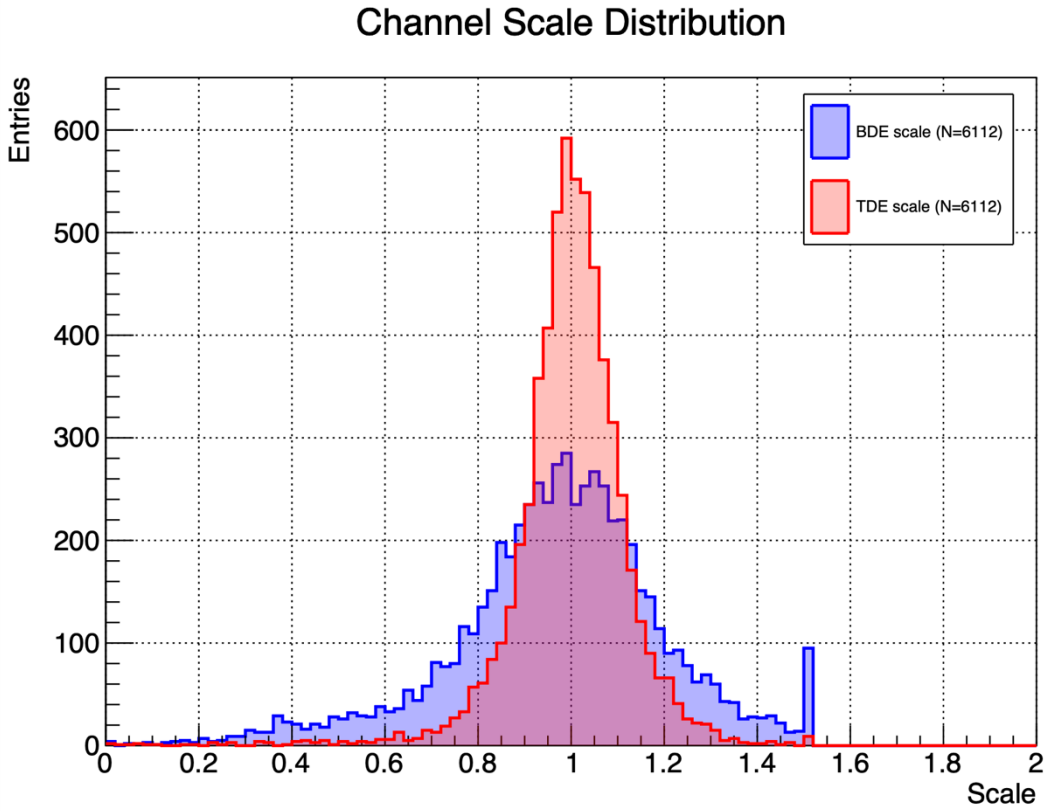
To do list:

1. Shield plane coupling removal
2. Field response check and collect information and organize
3. Time shift problem after deconvolution mentioned by Yoann.
4. Panel junction on v plane? any idea on how to identify it?

backup







Other grouping method