Noise Status at NP04

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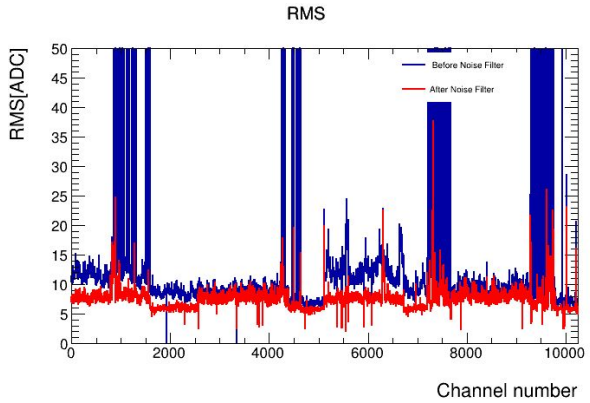
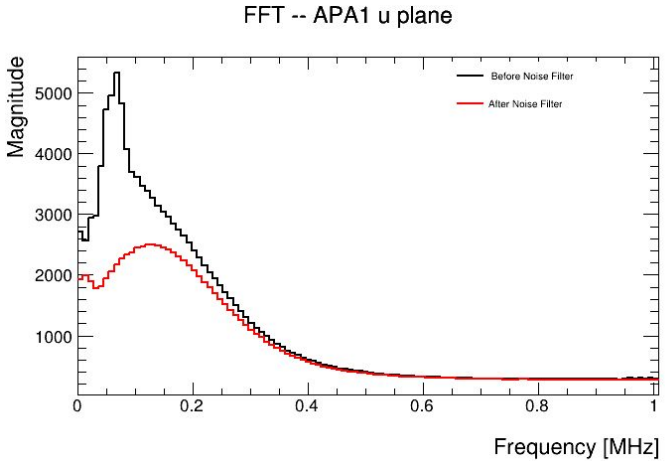
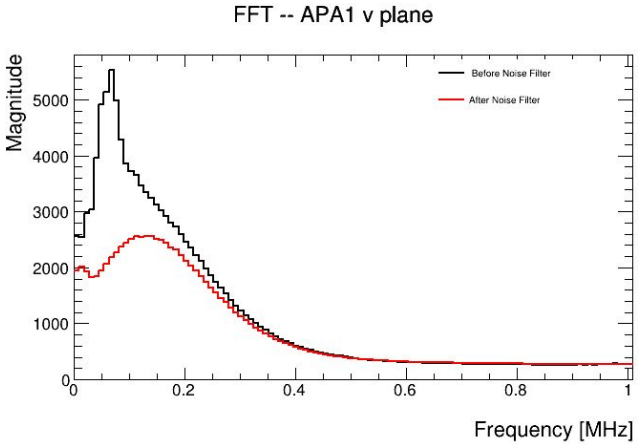
08/08/2024

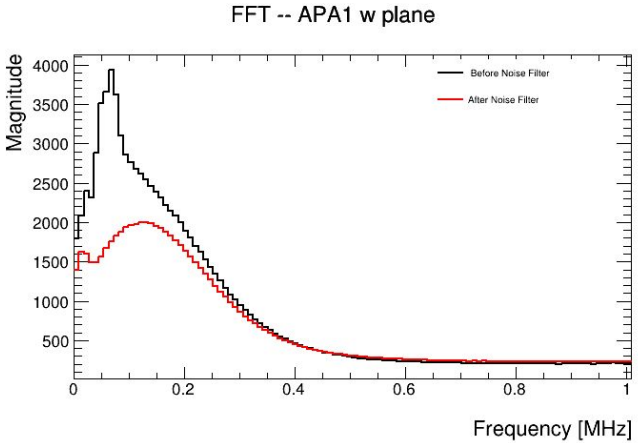
Noise condition in recent runs

Run 28556 Evt 16136

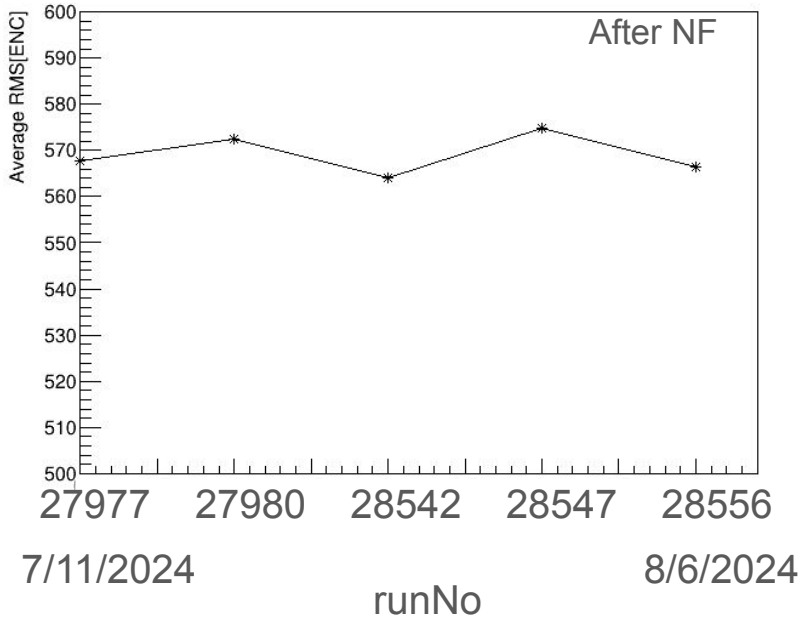


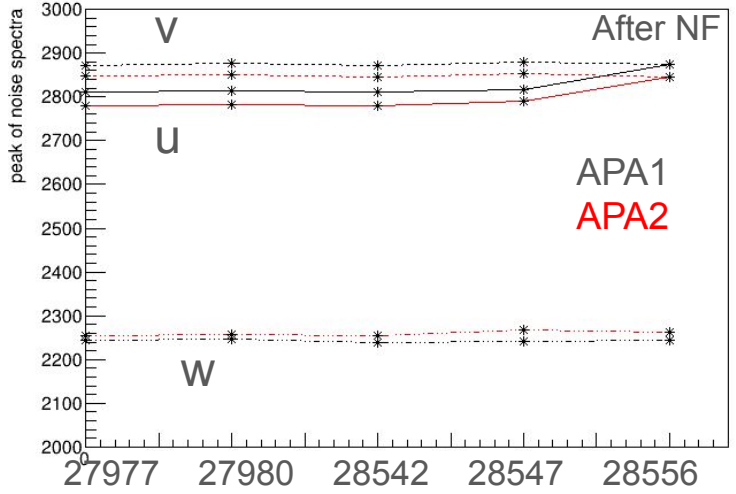


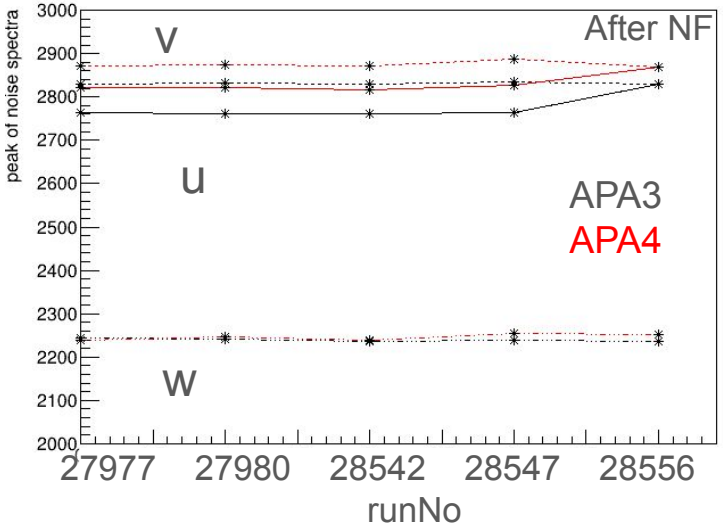




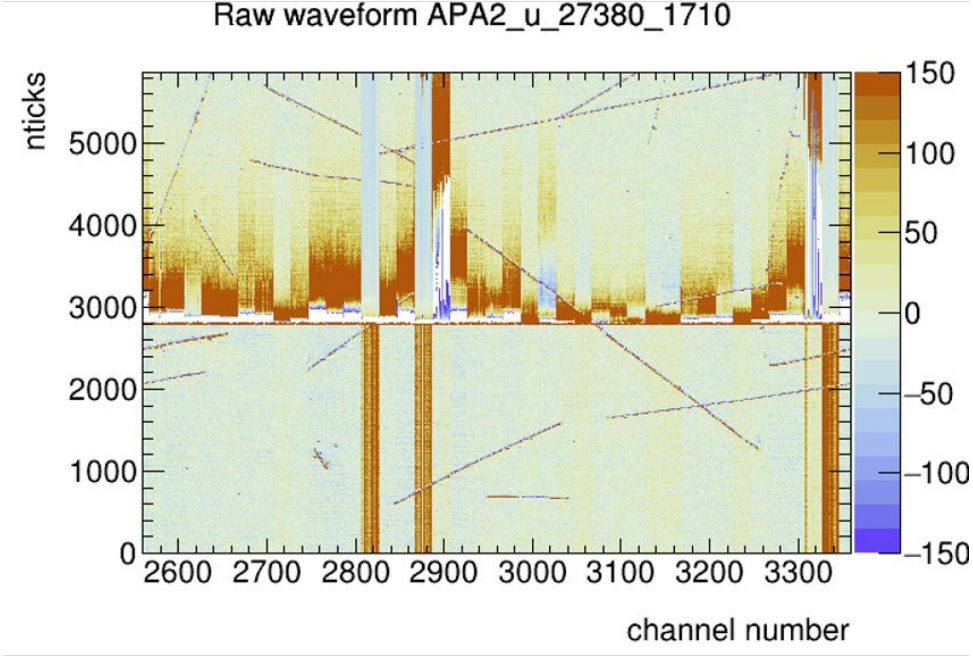
Noise condition in recent runs



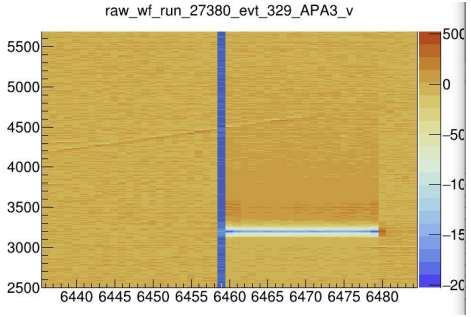




Noise filter for “1Hz noise”

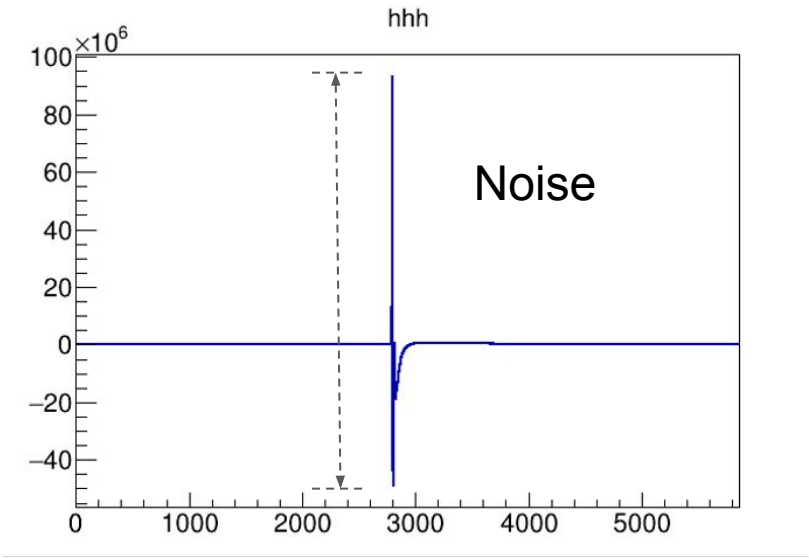


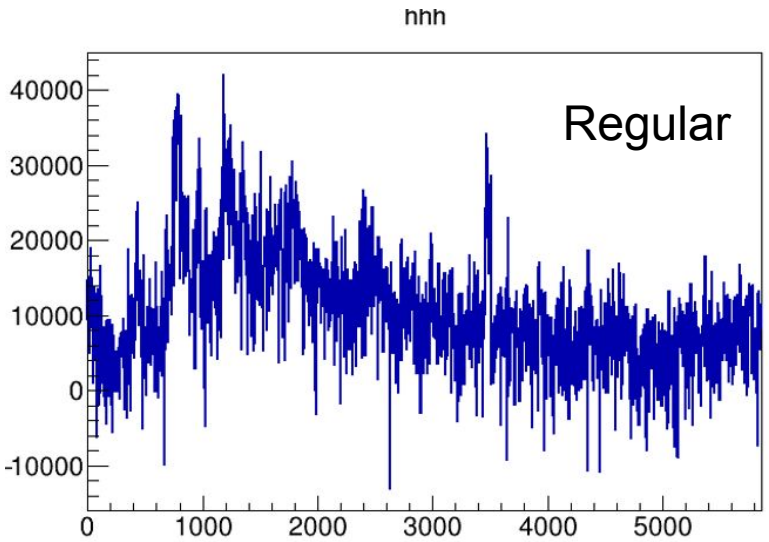
- Found 2 out of 1716; Happened at around 0.1%
- Affect the removal of FEMB “noise”



- We want to filter them out before they enter the wirecell process

Noise filter for “1Hz noise”

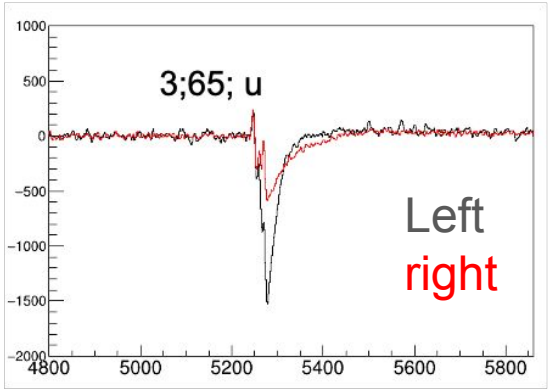




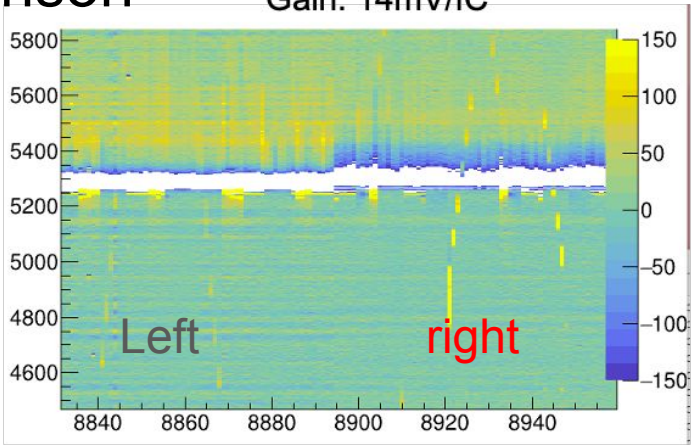
- Integrate all channel numbers along each tick
- Evaluate Max-Min.
- For regular event: Max-Min< 1e6;
- For noise event: Max-Min> 1e8;
- Cut: Max-Min > 1e7;

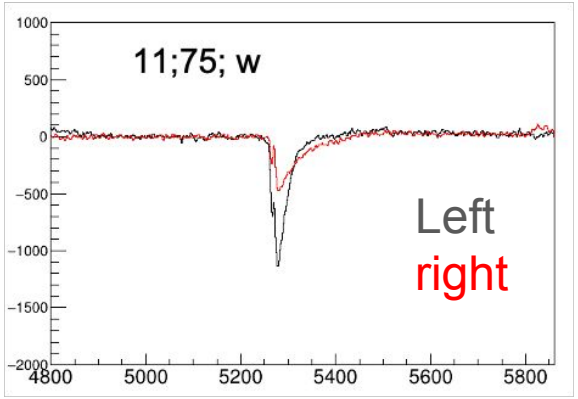
FEMB “noise”:1D waveform comparison

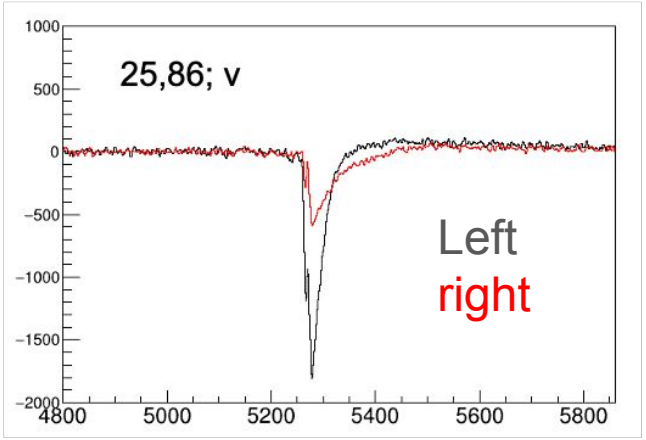
run_27380/Evt2672_APA3_group9



Gain: 14mV/fC



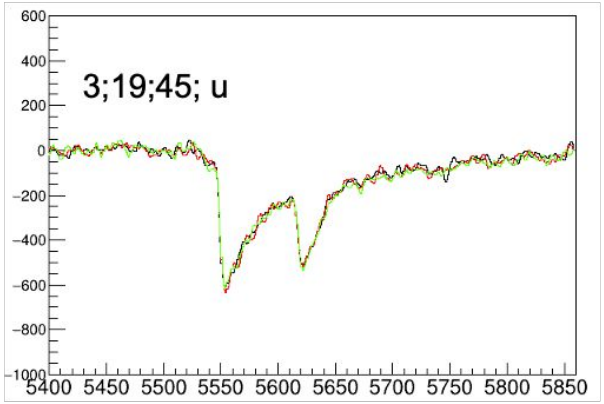


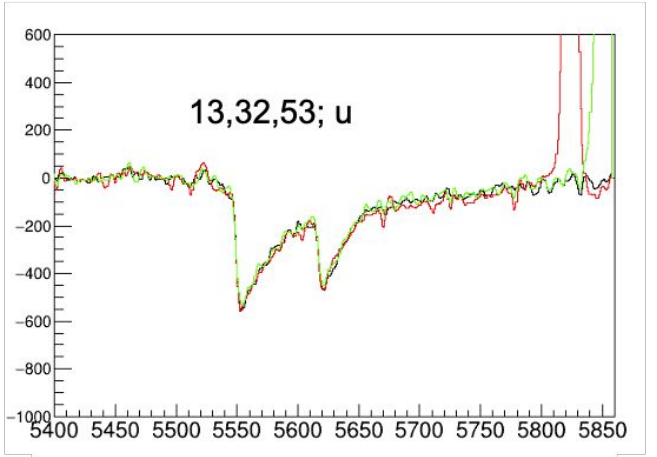


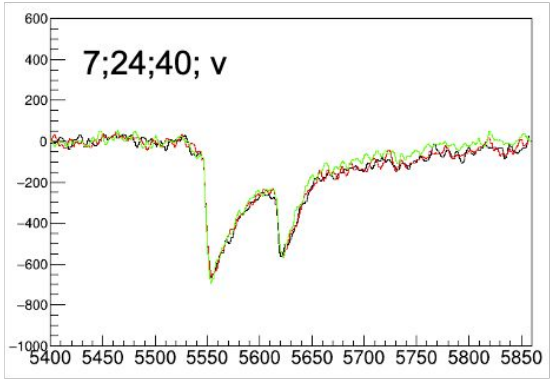
FEMB “noise”:1D waveform comparison

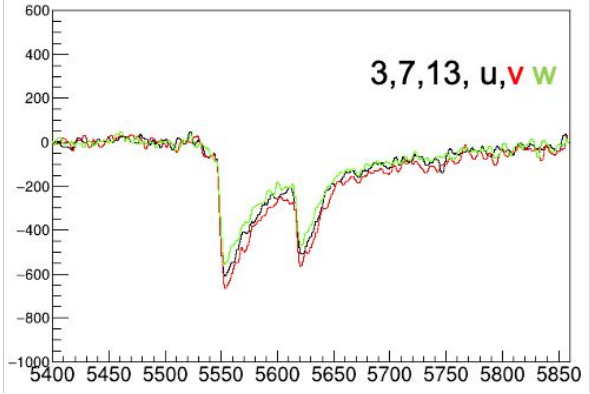
- Difficult to find a general model to describe the “noise”
- So, let’s blind the region.

run_28084/Evt73_APA1_group10 Gain: 7.8mV/fC

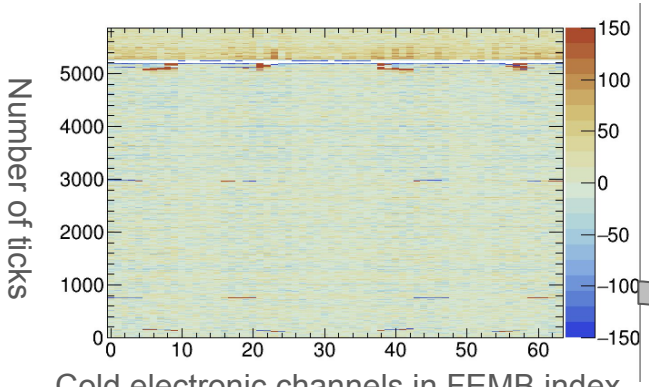


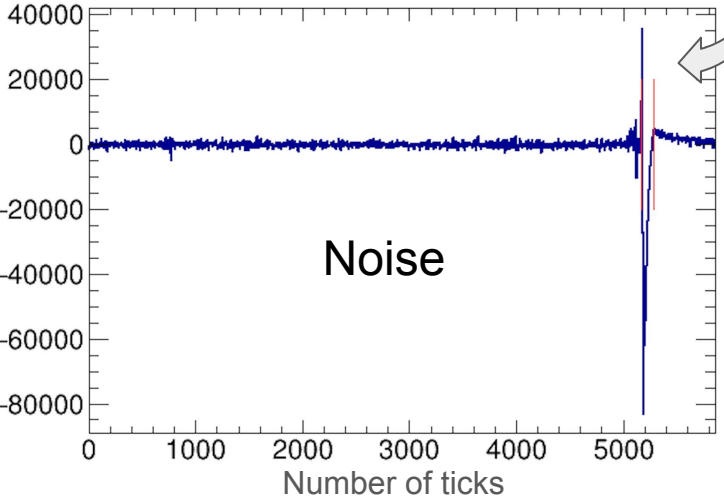




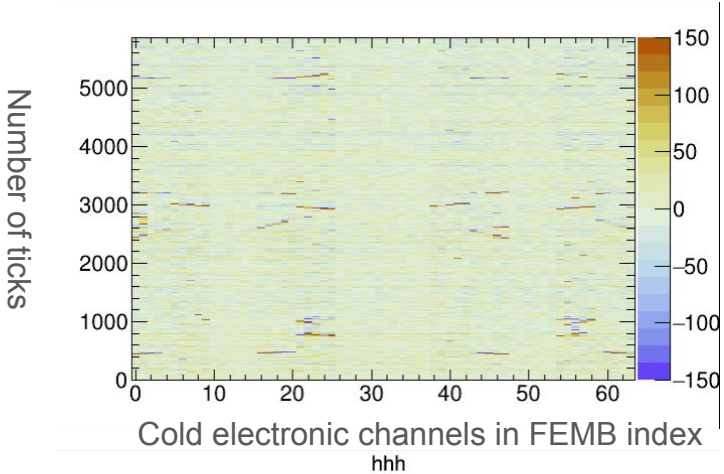


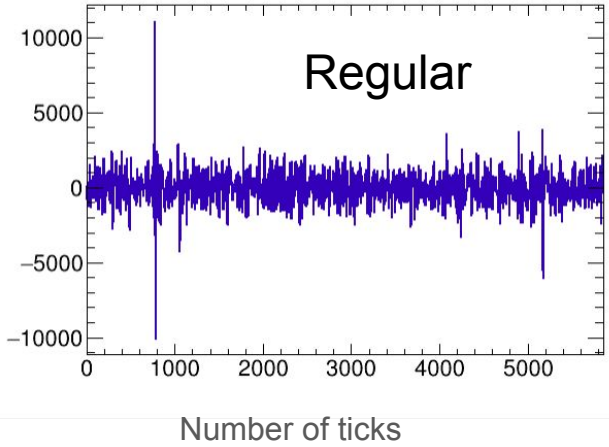
Locate FEMB “noise”:





- Loop over each half of FEMBs
- Integrate along each ticks





Locate FEMB “noise”:

Plan: tag the negative peak
- Use CNR to mitigate the tail

○Find all “- signal ROIs” in this integral histogram:

■ (if ADC-baseline < -3.5 r.m.s)

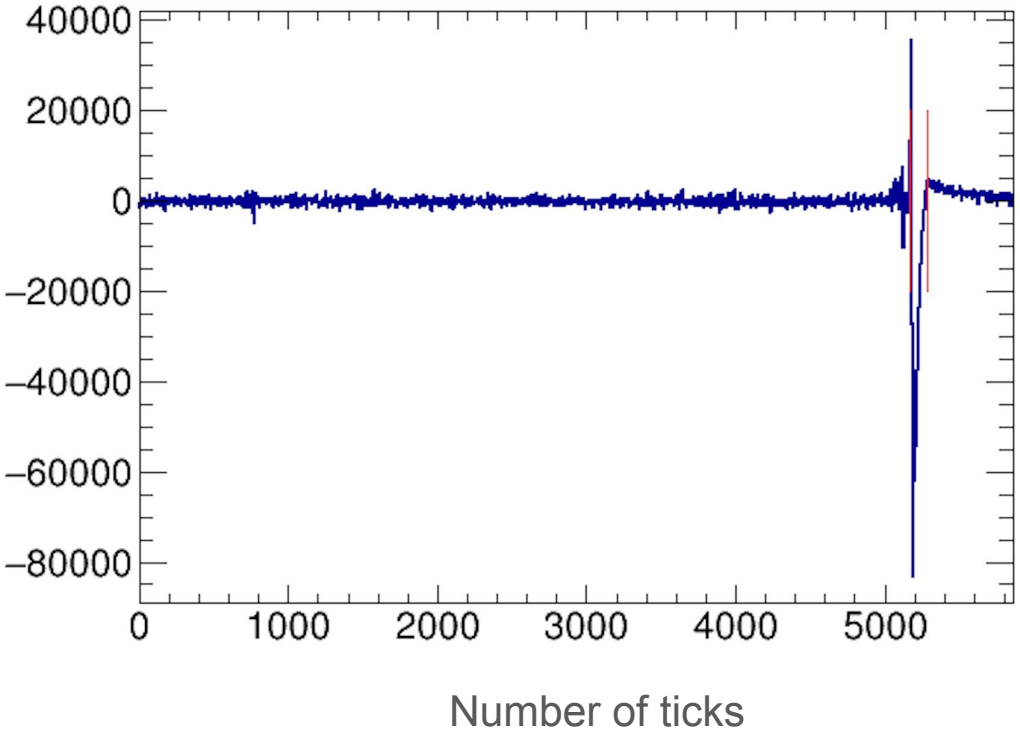
=> vector<int> roi

If there is a width of the “signal” larger than 50, then it is an FEMB noise. (regular event won’t more than 20)

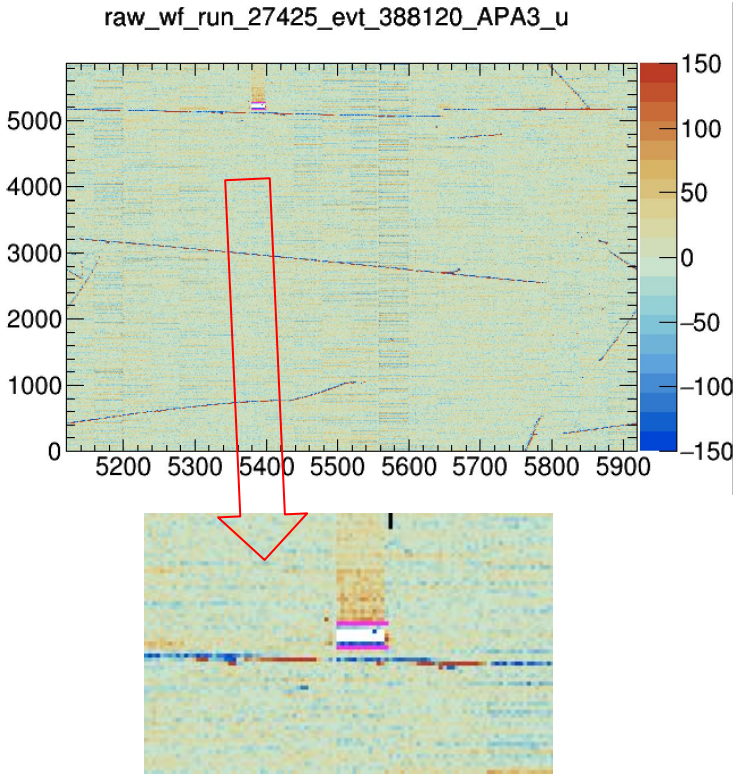
- Blind region is defined as:

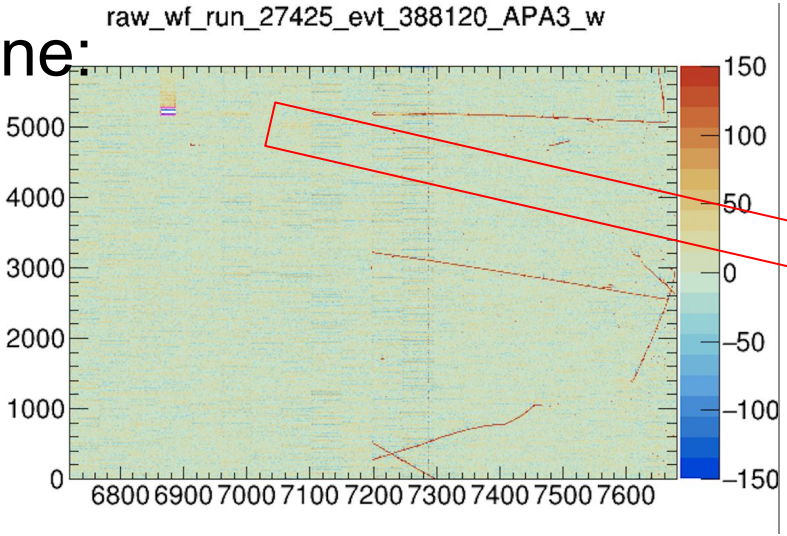
  start_ticks = roi[0]-20;

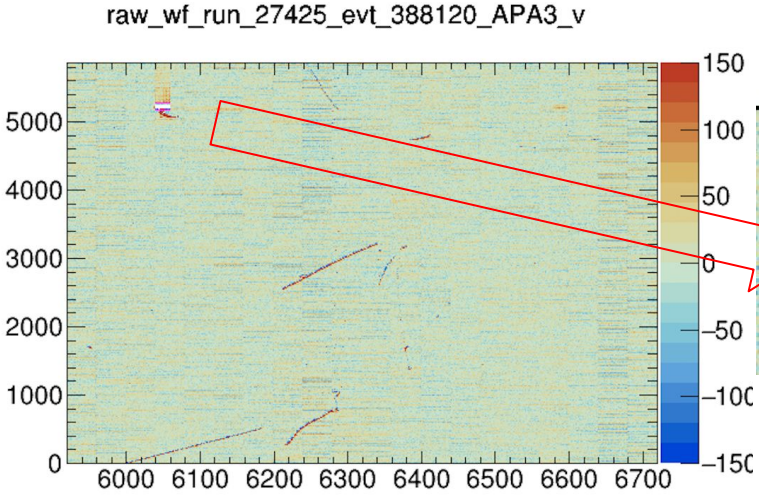
  end_ticks = roi.back()+20;
- Channel number can be found according to the map



Locate FEMB “noise” in plane:







Summary and plan

- Tagged so-called 1Hz noise and will develop a larsoft filter to remove the impacted events: O(0.1) % of total events

- Studied FEMB “noise” and tagged the bad region:
  - For the bad region with negative pulse: blind it
  - For the remaining positive tail:
    - Using similar removal method as coherent noise, but in FEMB views, 64 channels in a group. Need further studies.
  - Study the impact in signal processing.