

Characterizing Unresponsive Channels

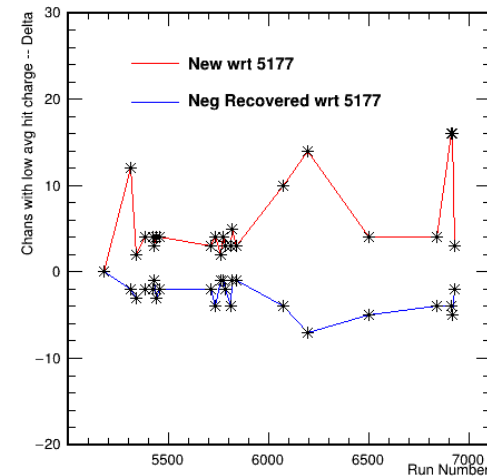
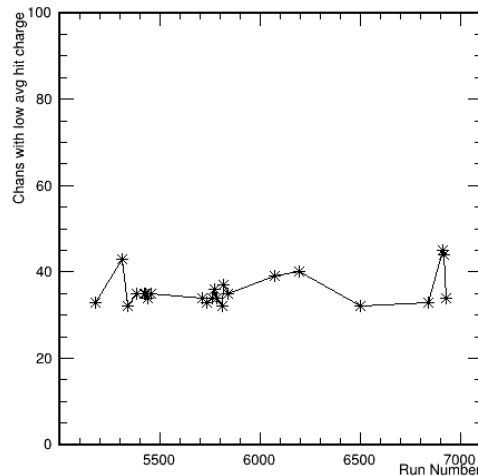
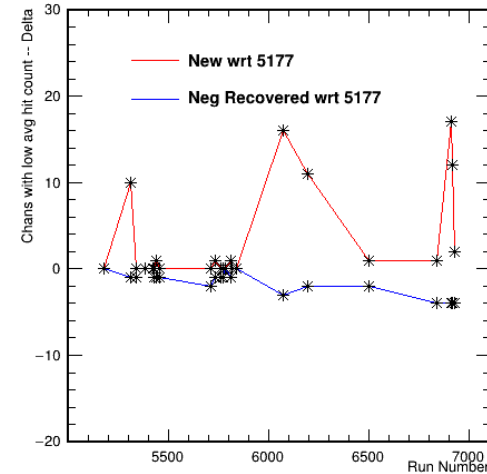
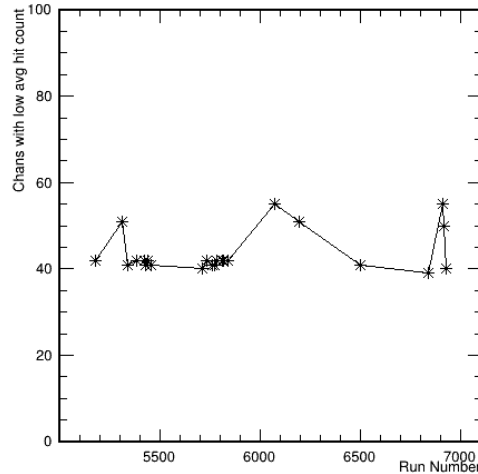
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Fermilab

ProtoDUNE Sim/Reco Meeting
April 17, 2019

From Last Time

History of Unresponsive Channel Counts

Run Date
5177 Oct 11
5311 Oct 15
5338 Oct 16
5380 Oct 17
5423 Oct 18
5426 Oct 19
5439 Oct 21
5456 Oct 23
5709 Oct 31
5735 Nov 1
5759 Nov 2
5771 Nov 3
5784 Nov 5
5809 Nov 7
5817 Nov 9
5835 Nov 11
6071 Dec 7
6191 Dec 12
6497 Jan 21
6838 Feb 19
6909 Feb 27
6913 Feb 27
6927 Feb 28



I read just one file from each run, and demanded all channels be represented in the DAQ using RDTimeStamp data products

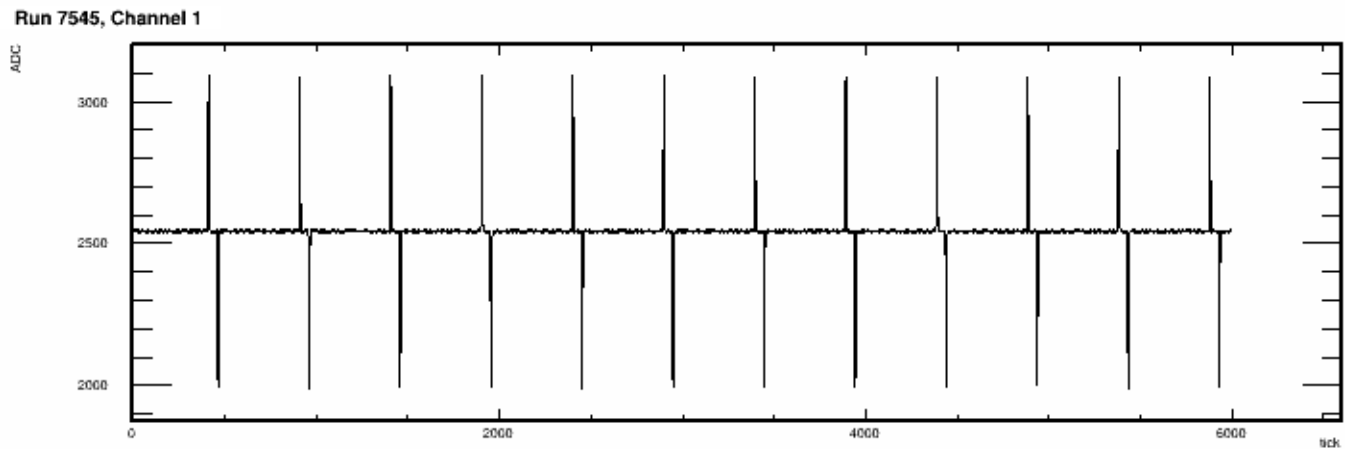
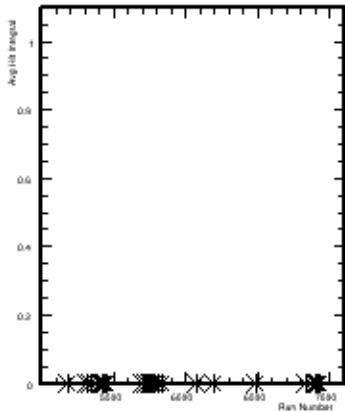
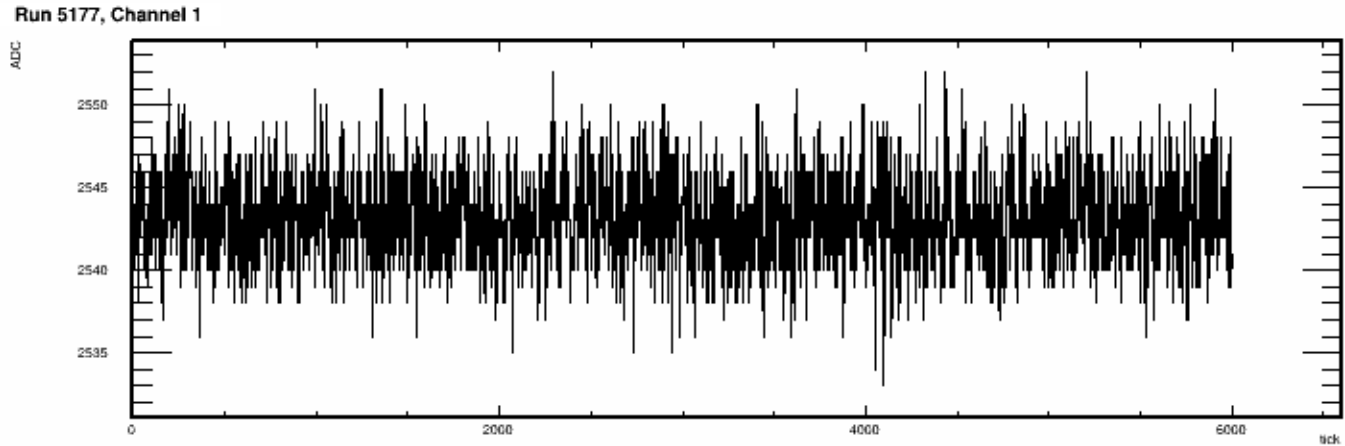
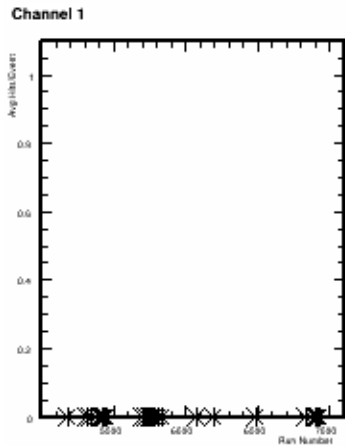
Looking at Individual Channels

- 70 channels were flagged as being bad in one or more runs on that list.
- Criteria: $\text{avg nhits/event} < 0.5$ or $\text{mean hit integral} < 100$ ADC-ticks (hits have to be > 80 ADC-ticks) flags a channel "bad" for a run.
- 40 channels look more or less solidly bad, others come and go.
- Are they dead electronics, APA connection/missing wire, or just slipped below the cut for one run (e.g. APA 3 grid charging up makes for low hit counts and charges).

Checking a Channel

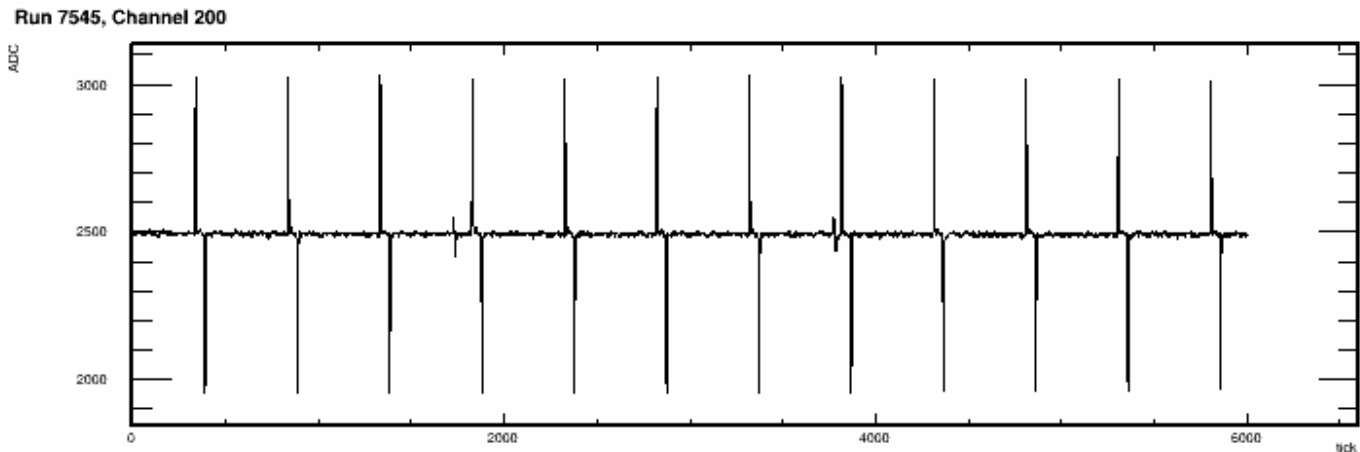
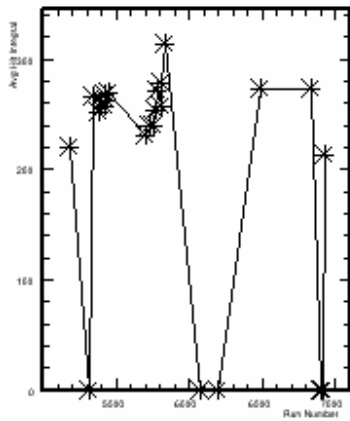
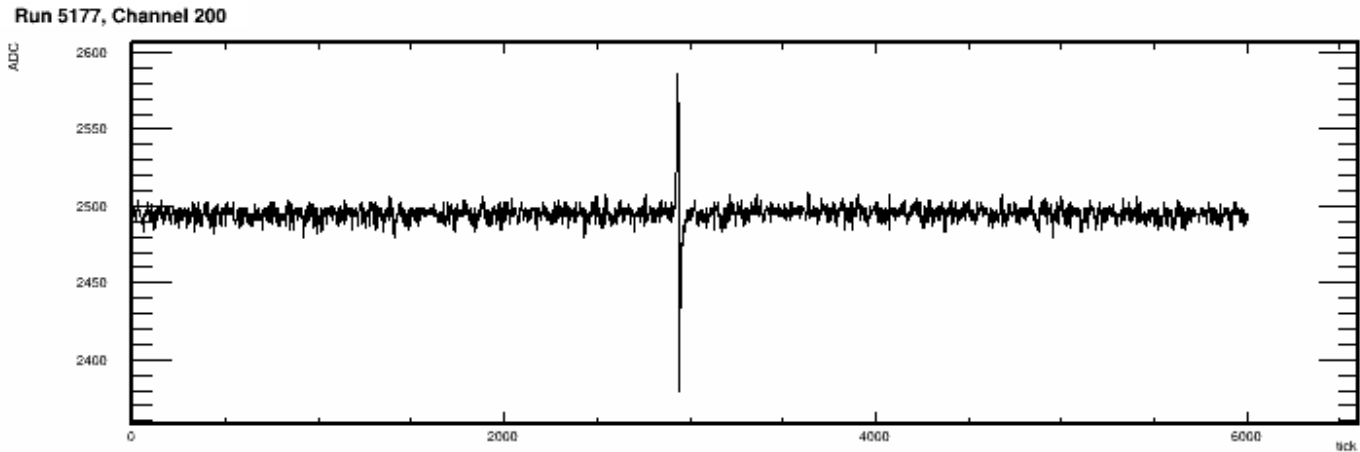
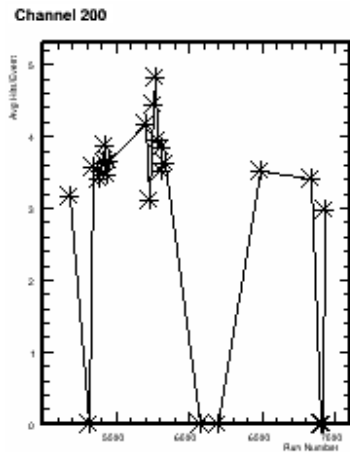
- Look at the waveform in an event in Run 5177 (Oct 10, 2018) and Pulser Run 7545 (April 10, 2019)
- Show history plots of average nhits/event and avg hit Integrals alongside
- Judge whether hits are present or absent, or died partway through the run.
- Pulser response – most of electronics functionality + DAQ is working.
- Can see if a channel just is intermittently on the list
- I'll show just one example of each category of channel behavior that looks different.

Channel 1



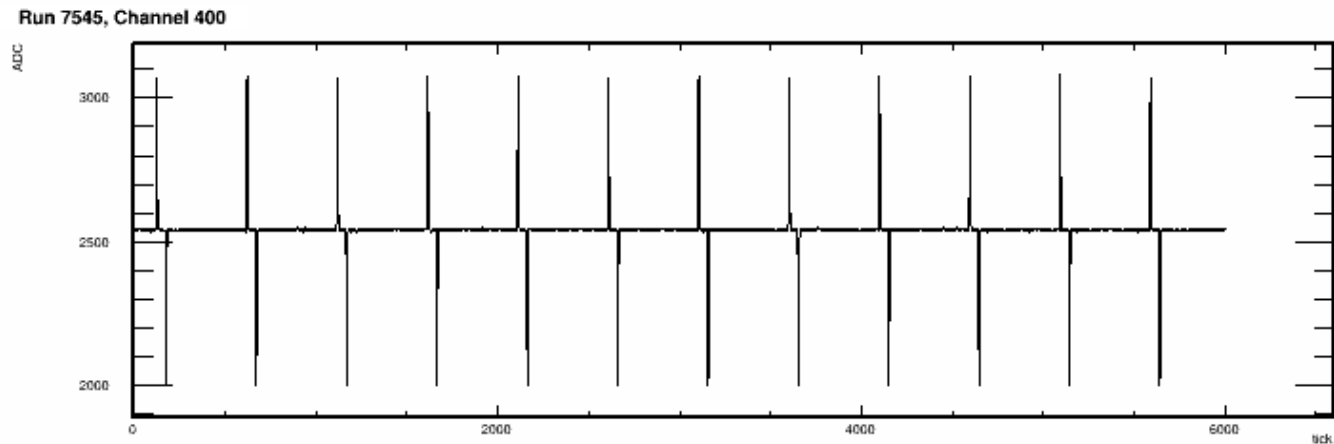
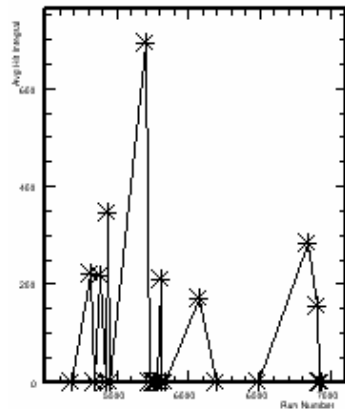
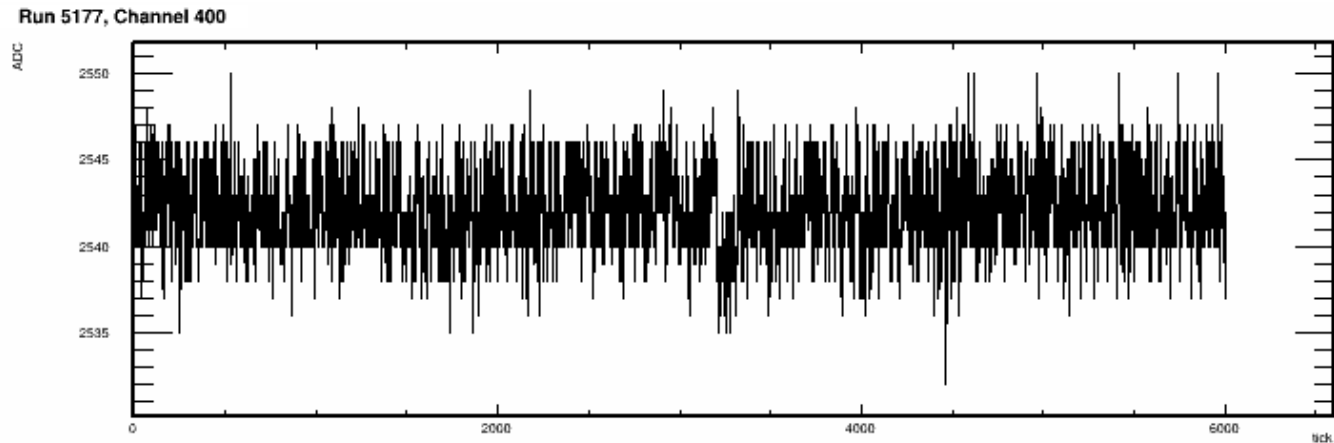
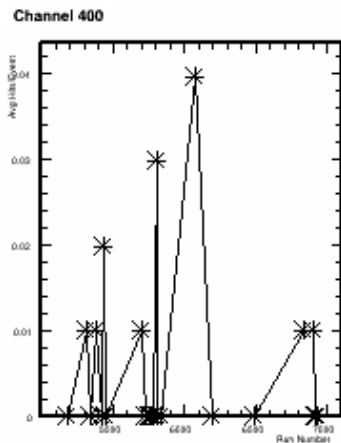
Never sees any hits. Responded to pulser April 10. Suspect wire missing or disconnected.

Channel 200



Looks like it intermittently doesn't see hits. Responds to pulser on April 10

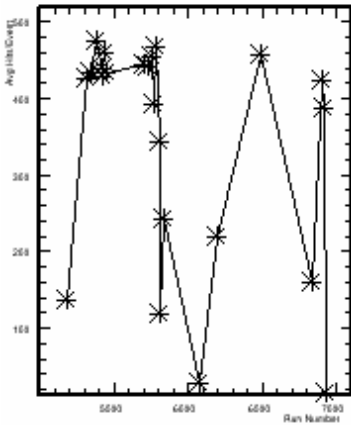
Channel 400



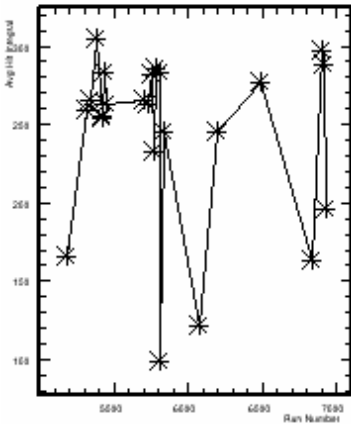
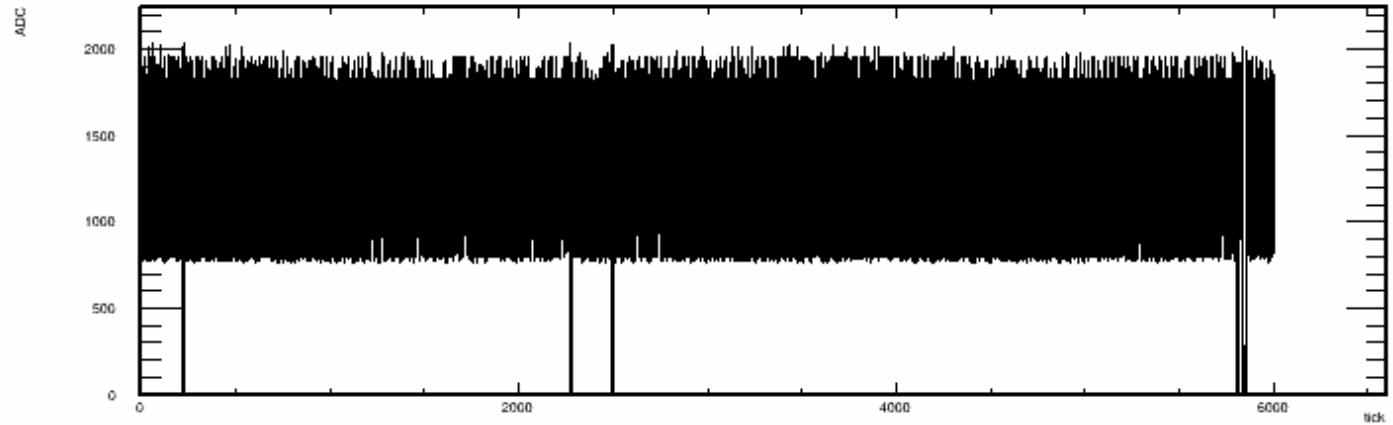
A lot like channel 1 – almost no hits/event but evidence of noise – large integrals when there are hits. Suspect wire missing or disconnected.

Channel 4831

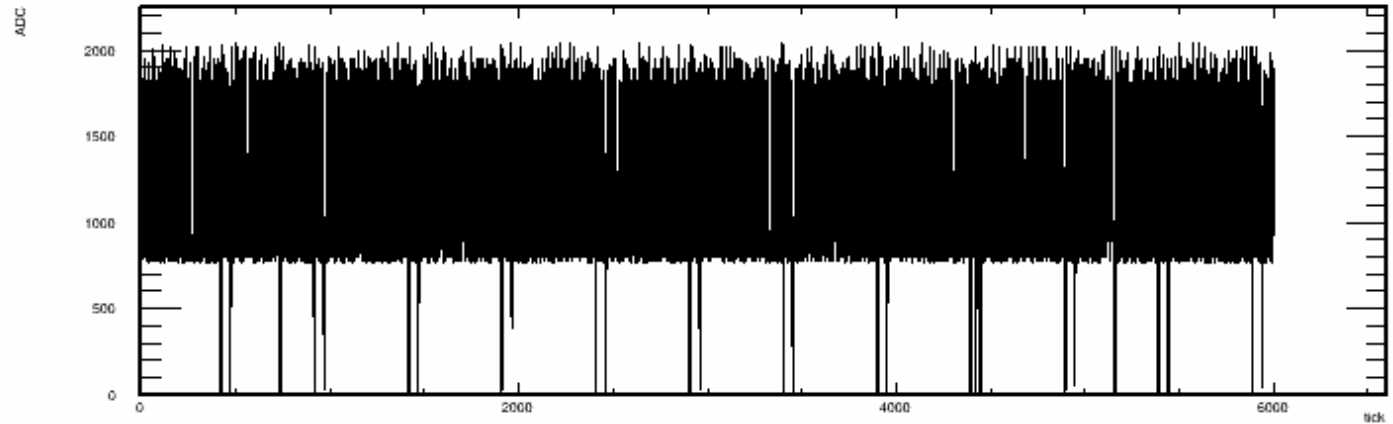
Channel 4381



Run 5177, Channel 4381



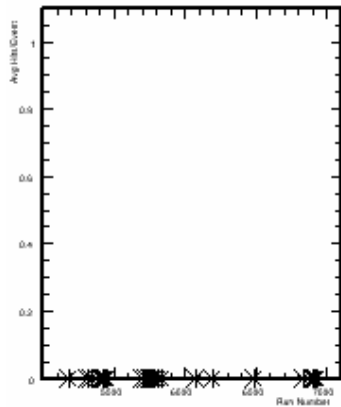
Run 7545, Channel 4381



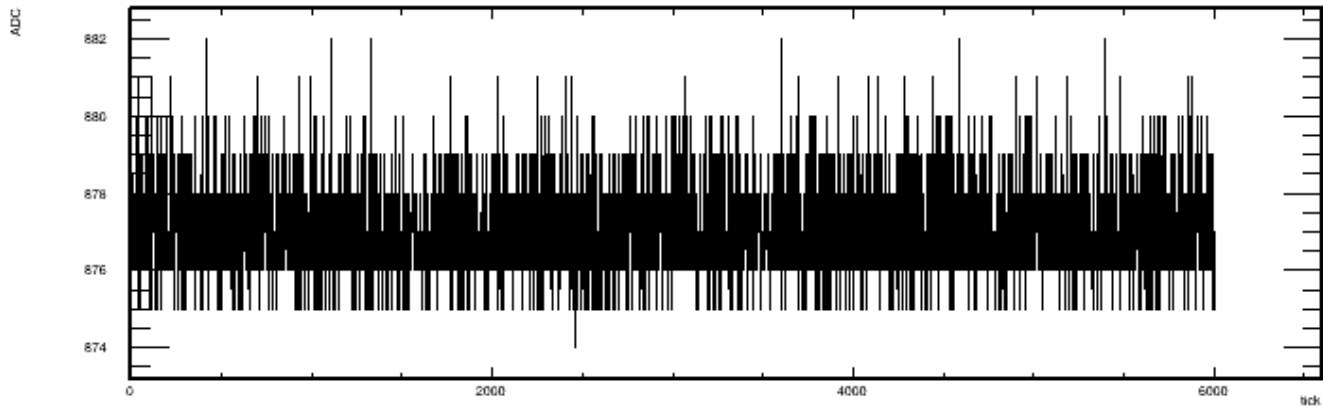
Noisy.

Channel 4411

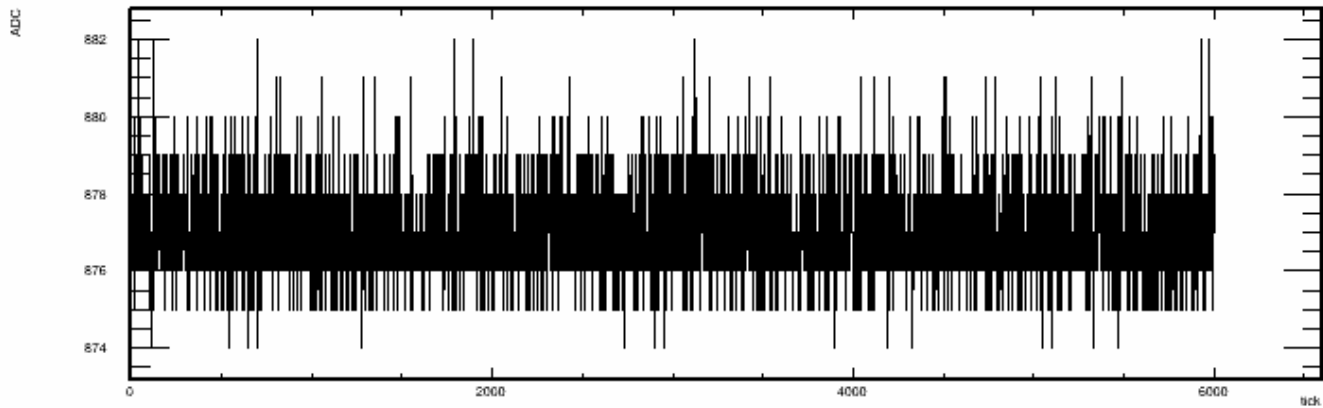
Channel 4411



Run 5177, Channel 4411



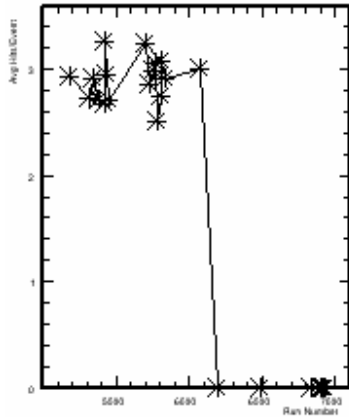
Run 7545, Channel 4411



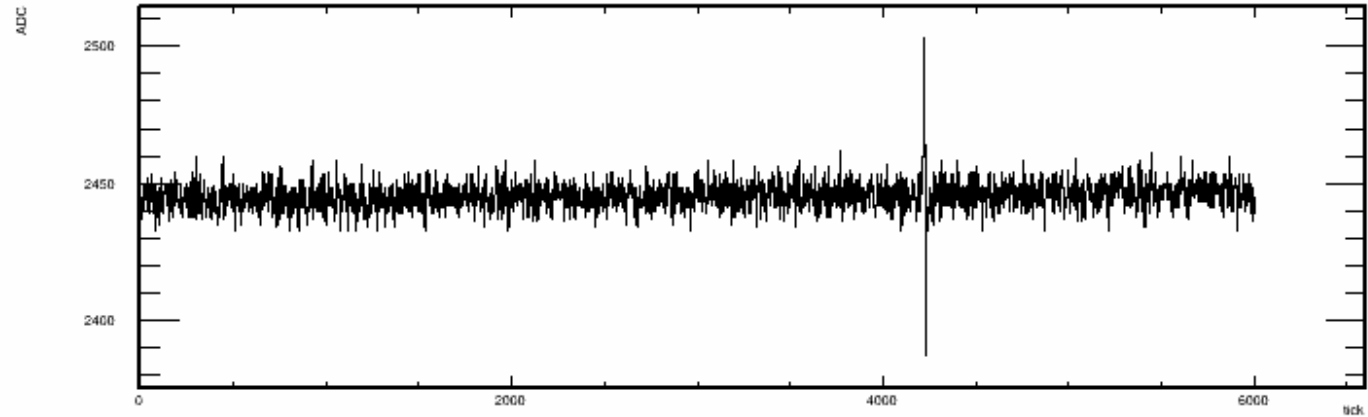
Electronics looks dead. No hits and no pulser response

Channel 9260

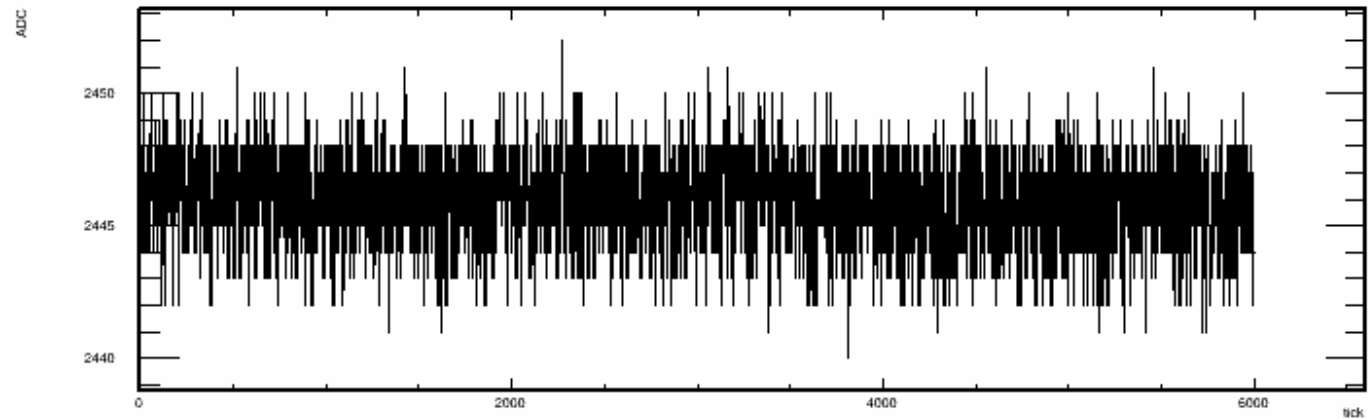
Channel 9260



Run 5177, Channel 9260



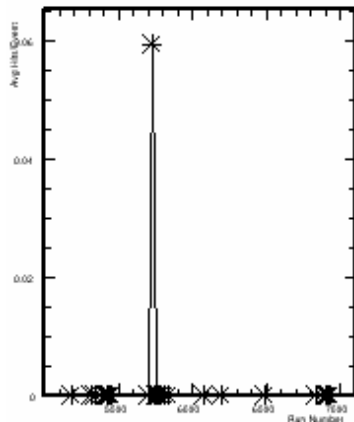
Run 7545, Channel 9260



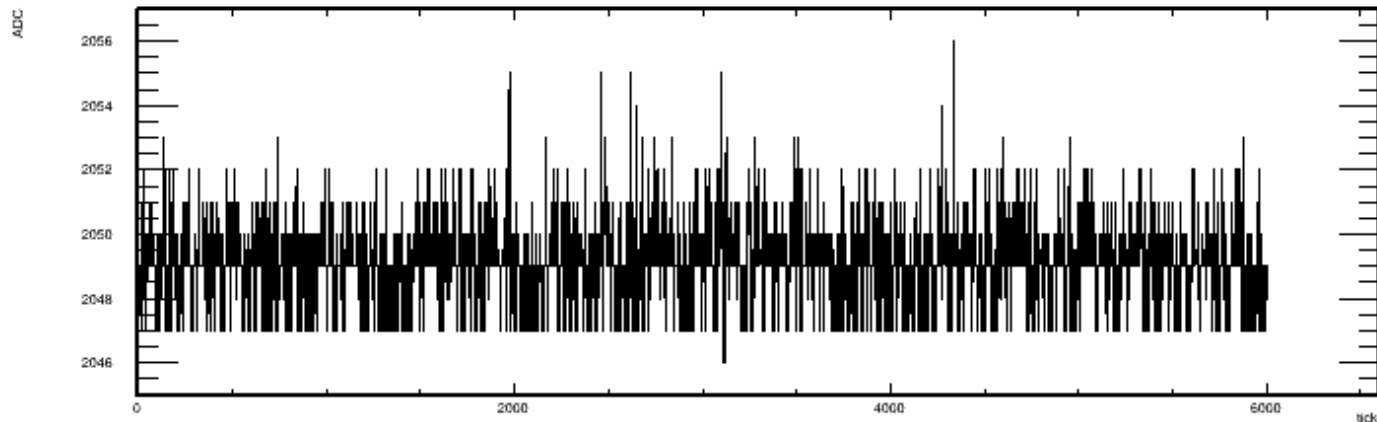
Looks like the electronics died some time after run 6000

Channel 10800

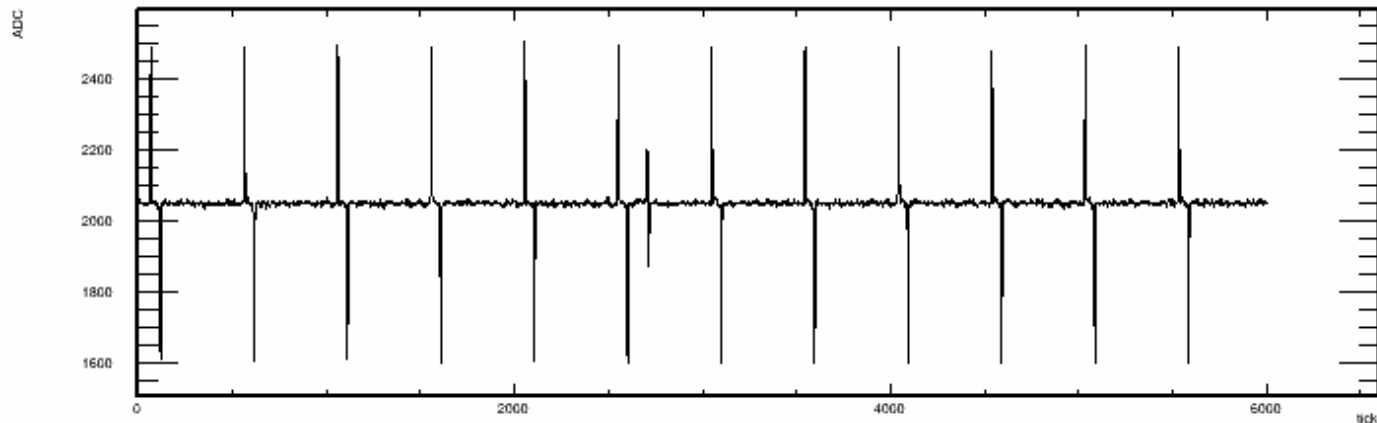
Channel 10800



Run 5177, Channel 10800

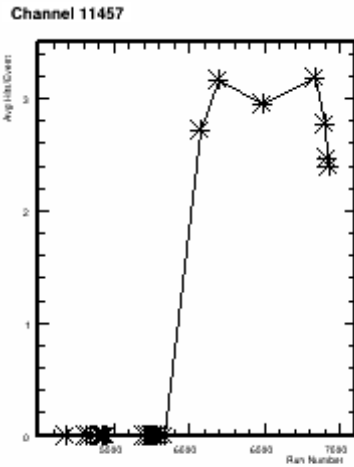


Run 7545, Channel 10800

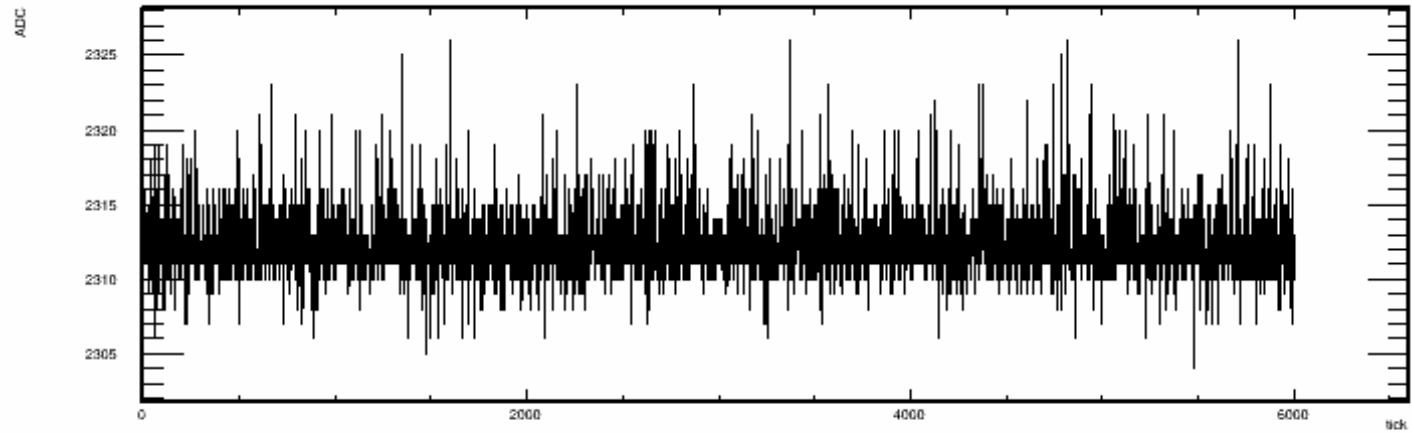


Very confusing – hardly ever sees hits but there's one in the pulser waveform. Going to call this one disconnected.

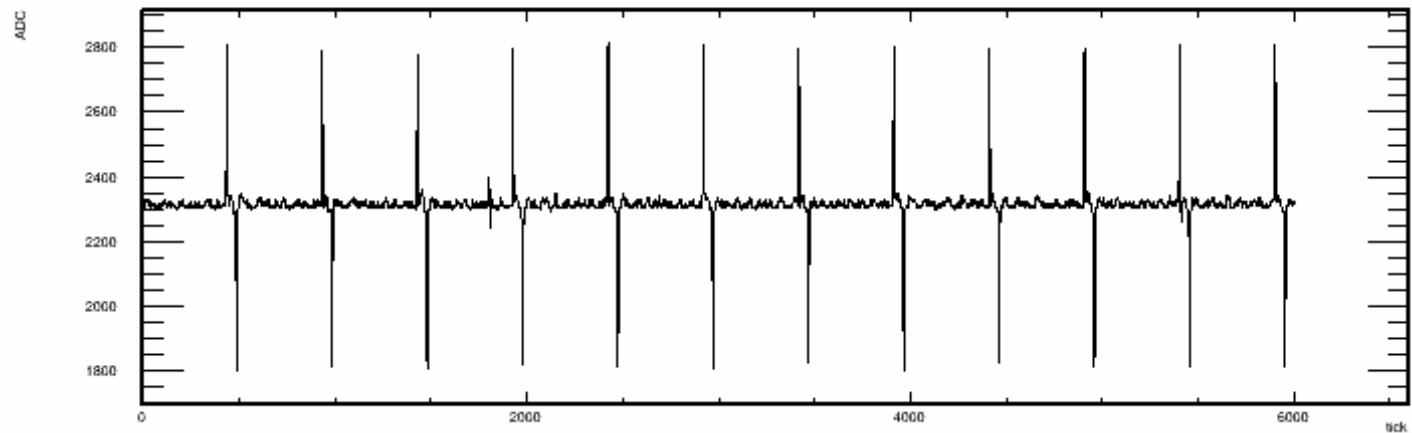
Channel 11457



Run 5177, Channel 11457



Run 7545, Channel 11457



Was unresponsive, but starts responding partway through the run

Summary Statistics

- No hits but sees pulser in run 7545. Missing or disconnected wire candidates
31 channels
- No hits and no pulses: Dead or noisy electronics.
6 channels
- Hits and pulses, just intermittent drops in averages:
30 channels
- Channel electronics stopped working partway through run:
1 channel
- Channel electronics started working partway through run:
2 channels
- N.b. Cryostat-side collection-plane channels not studied.