Recent signal strength and bad channels

ProtoDUNE sim/reco

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Introduction

I was recently asked to look at signal strength distributions

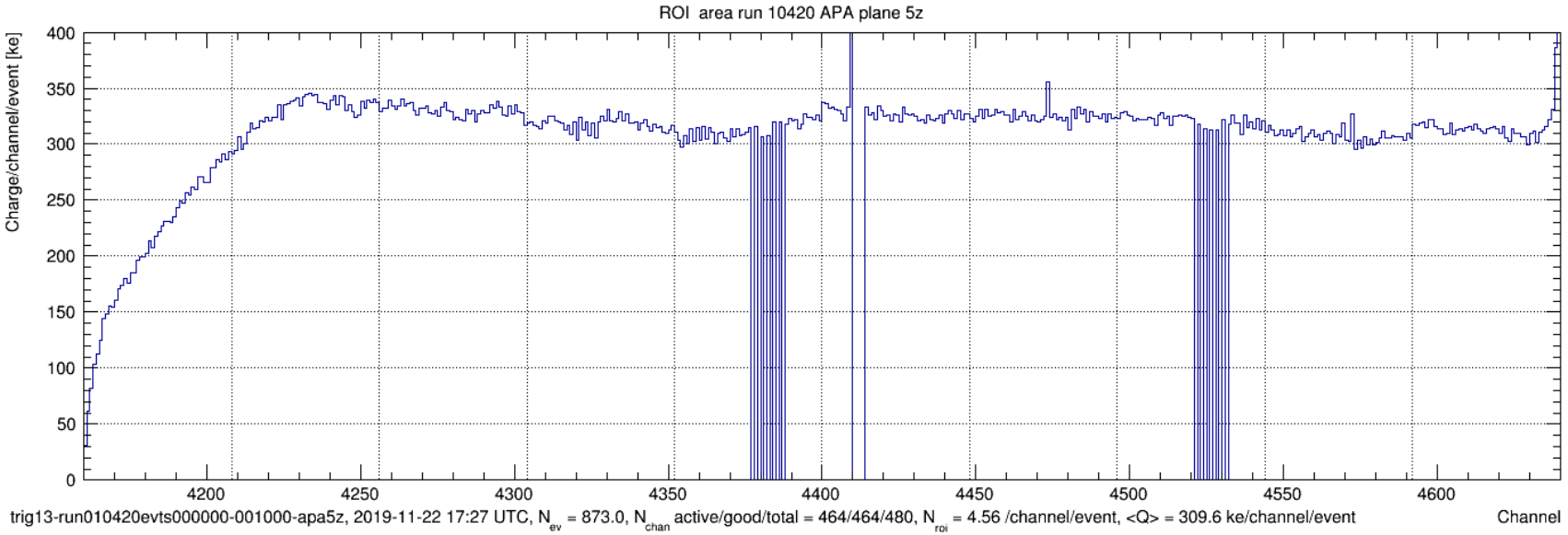
- To check data quality for the in-progress cosmic running
- Signal strength is the mean charge/event for each channel
  - Only charge in low-threshold ROIs is included
  - Pulser calibration
  - Average over ~1000 events to suppress cosmic fluctuations
- Plots follow
  - All planes
  - Back planes with CRT trigger

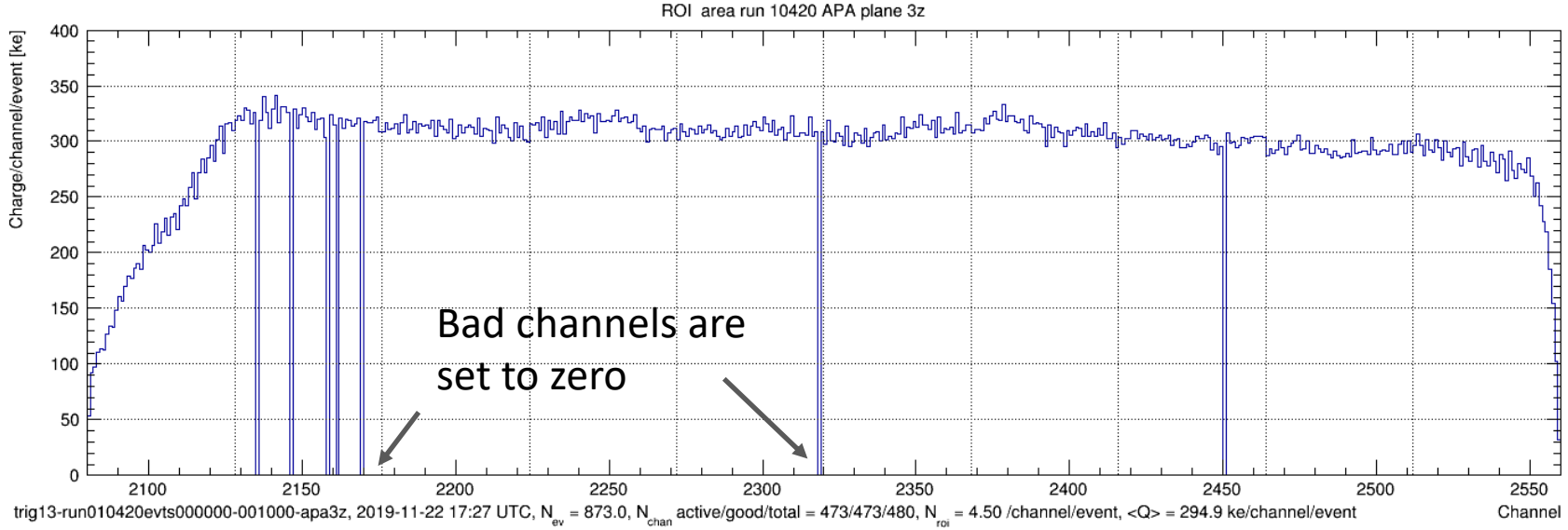
Observations

- Average signal strength was significantly higher than in September
  - Was 270 and is now 300 ke/channel/event
  - Mostly because data is now being collected with CRT trigger
    - Random trigger was added so we can compare directly
- New bad channels appear in APA 1

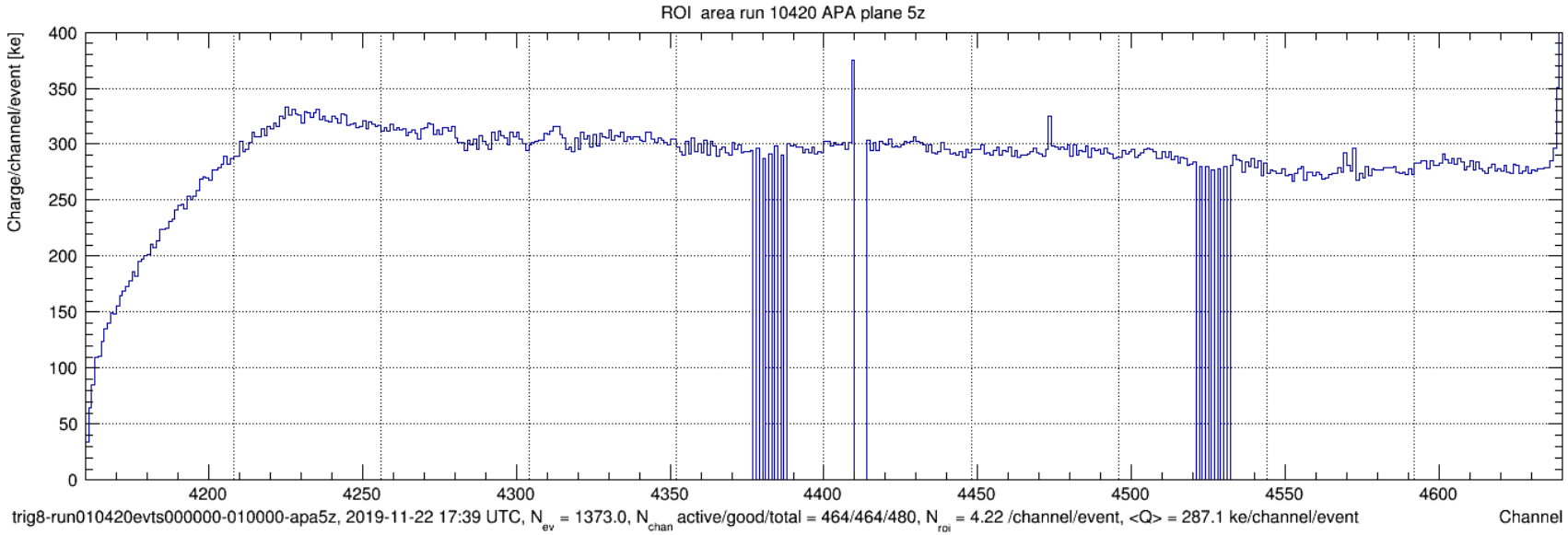
Signal strength plots

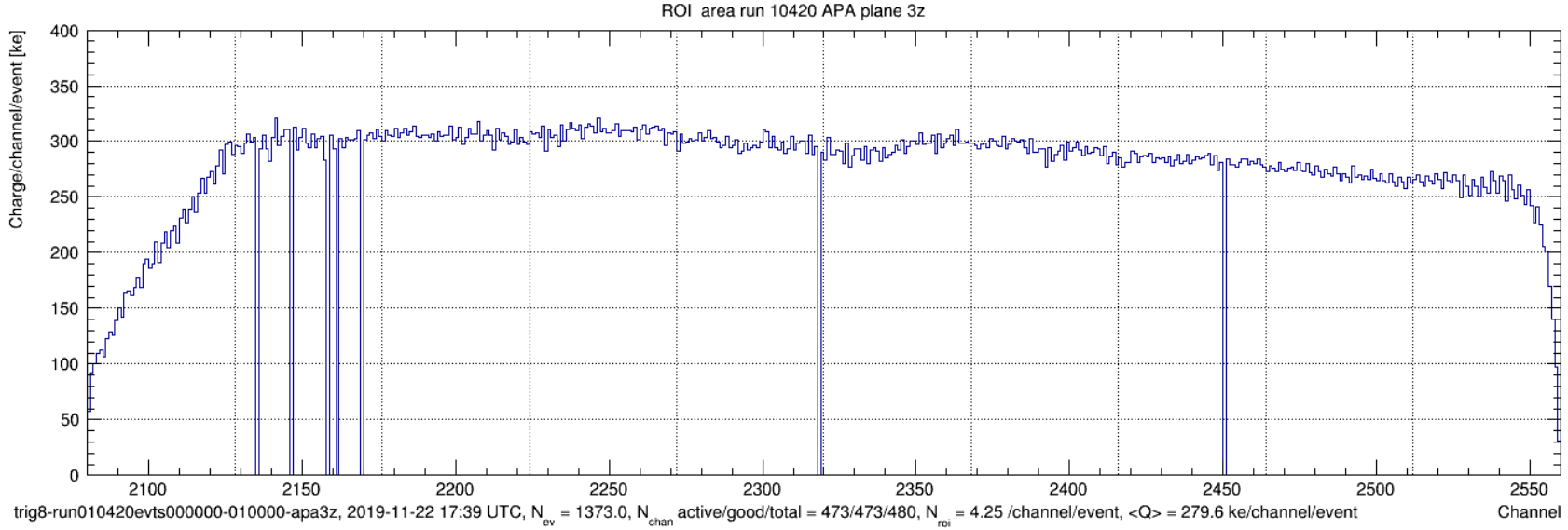
Front APAs with CRT trigger



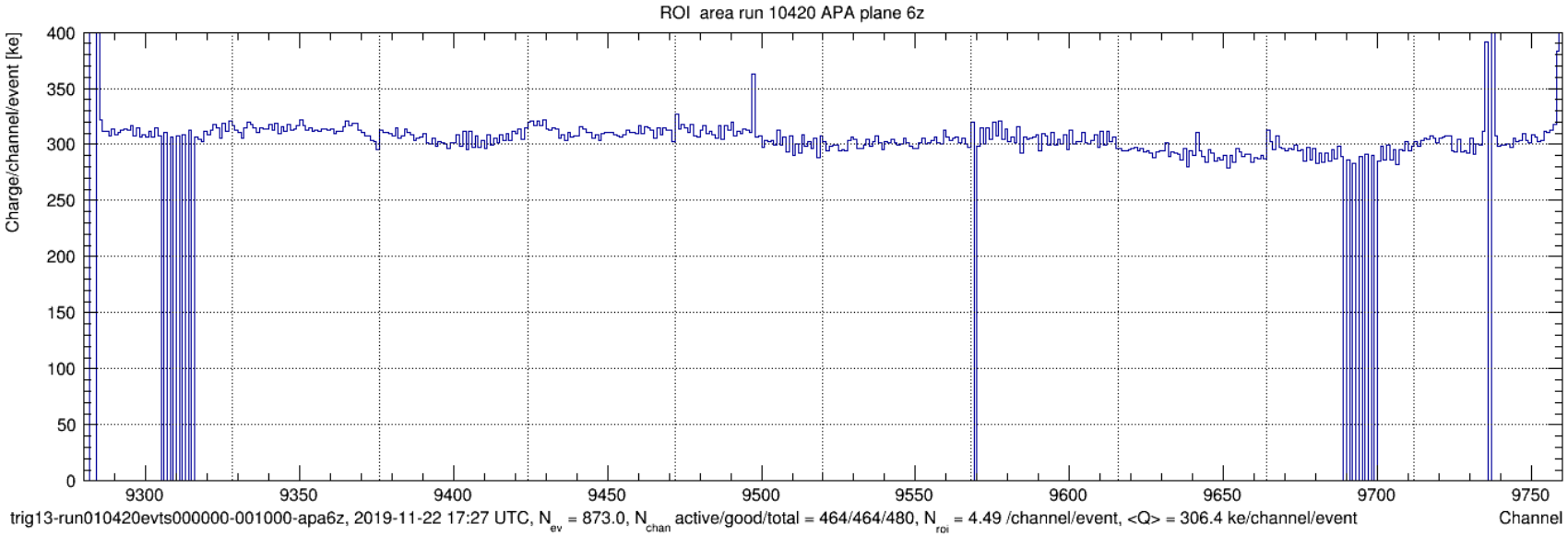


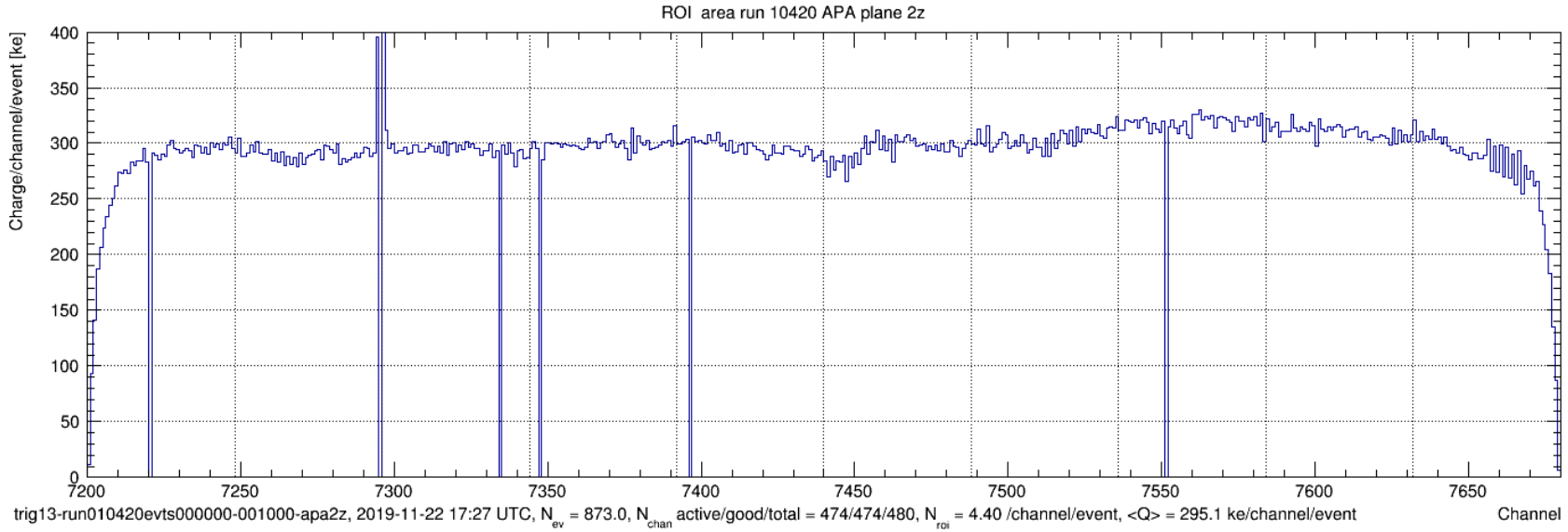
Front APAs with random trigger



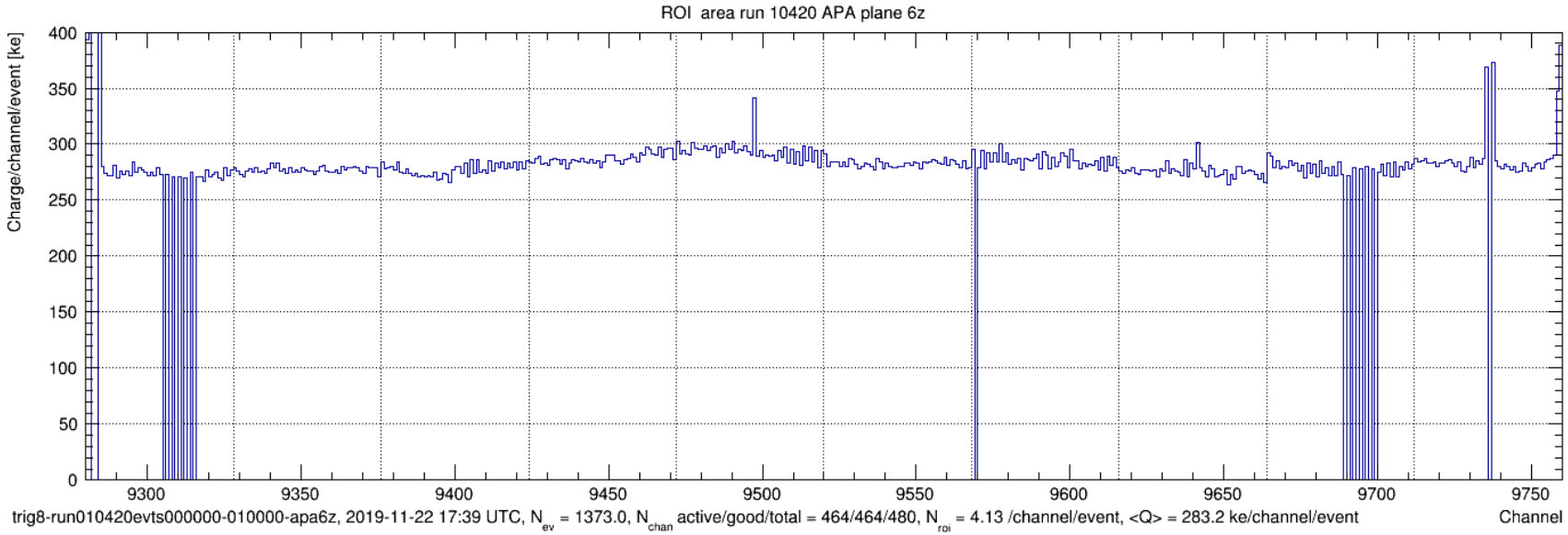


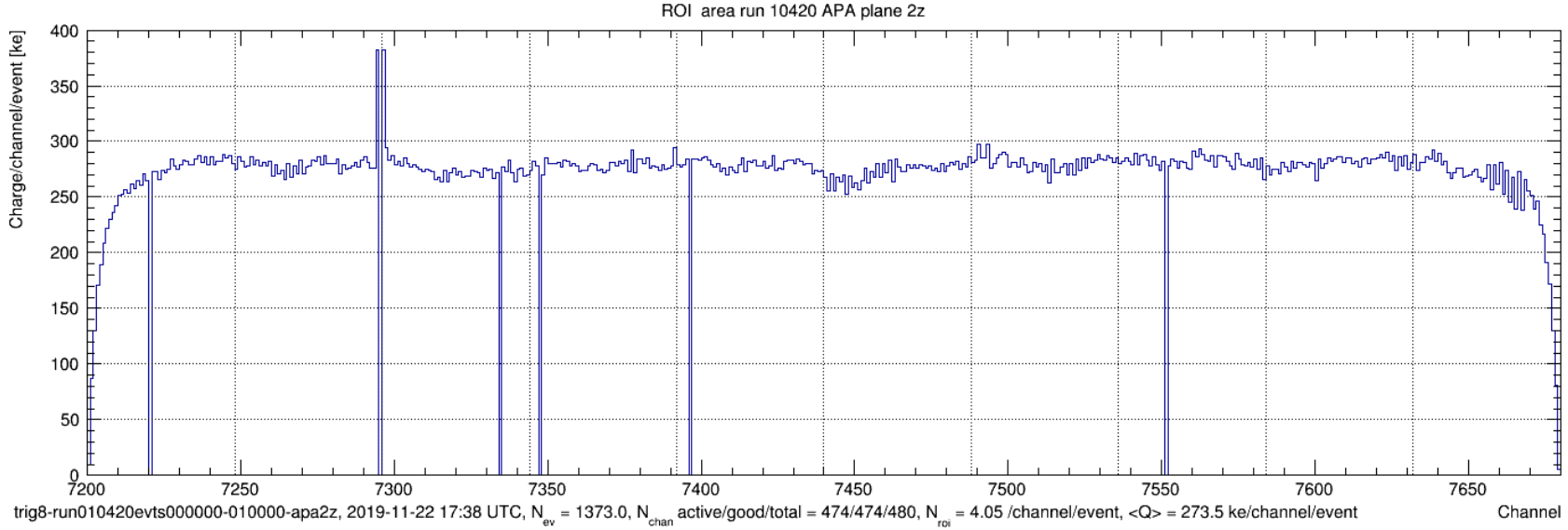
Middle APAs with CRT trigger



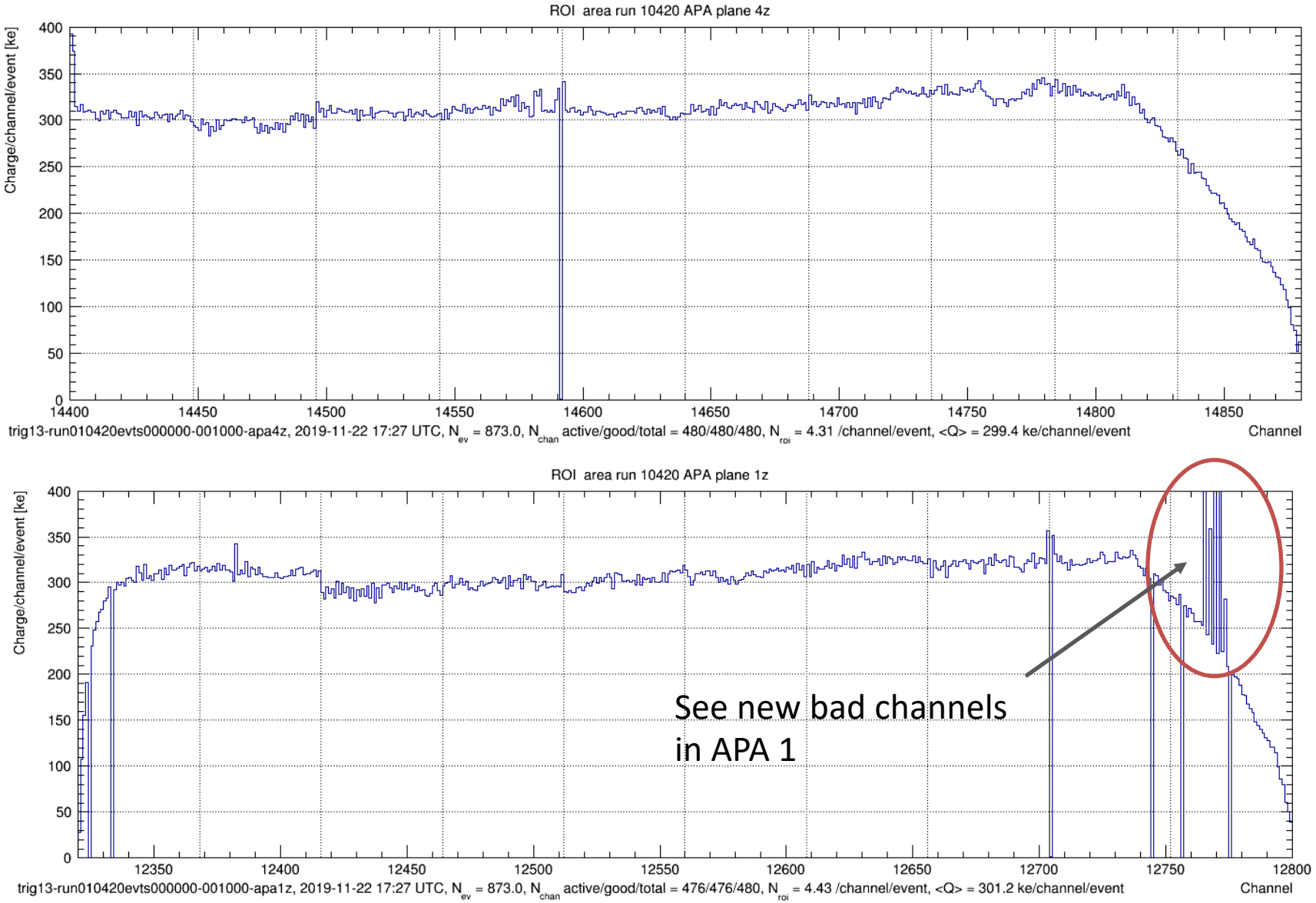


Middle APAs with random trigger

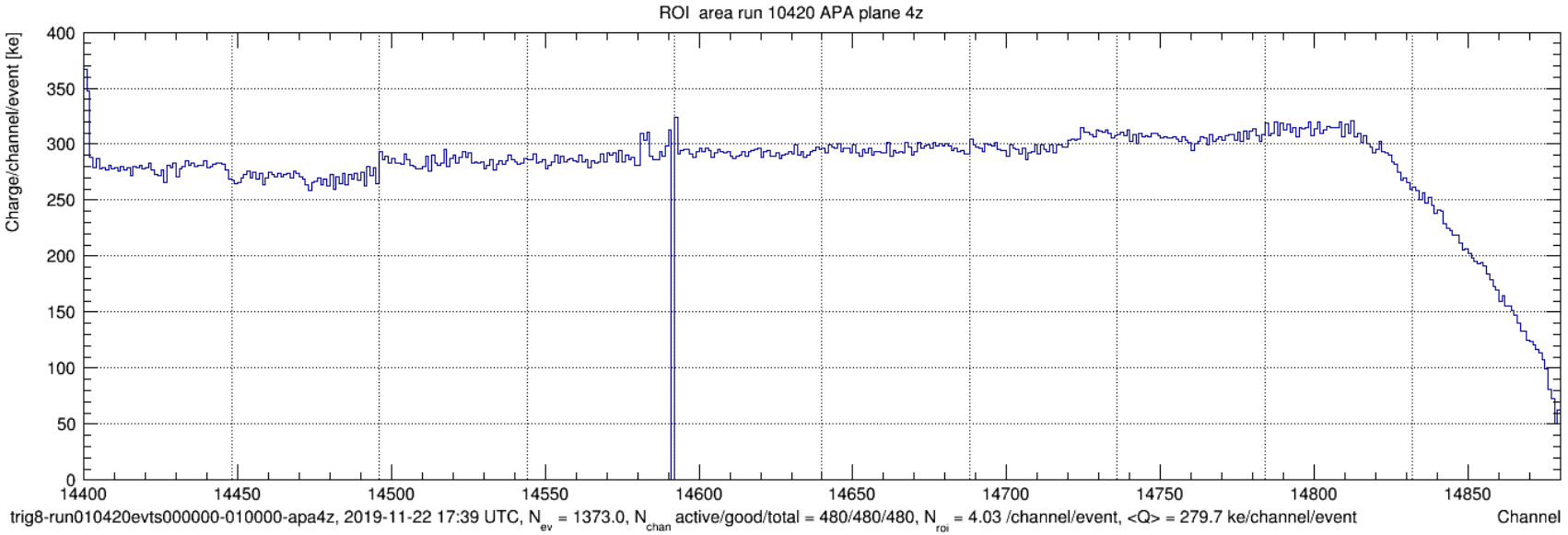


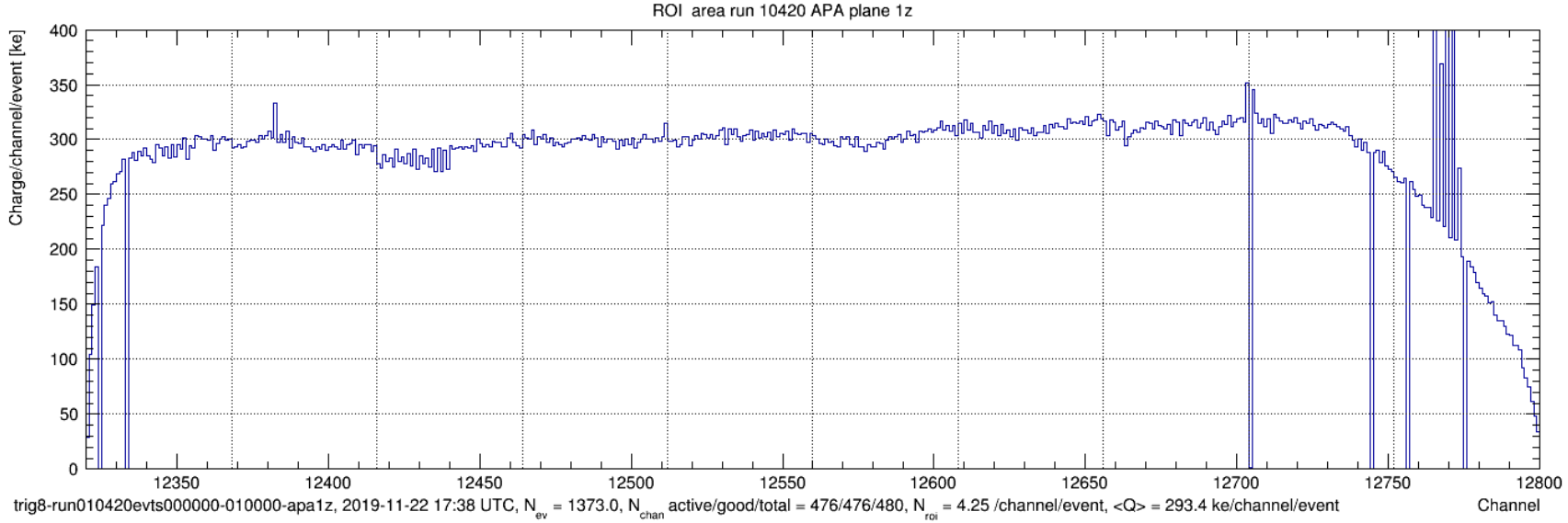


Back APAs with CRT trigger



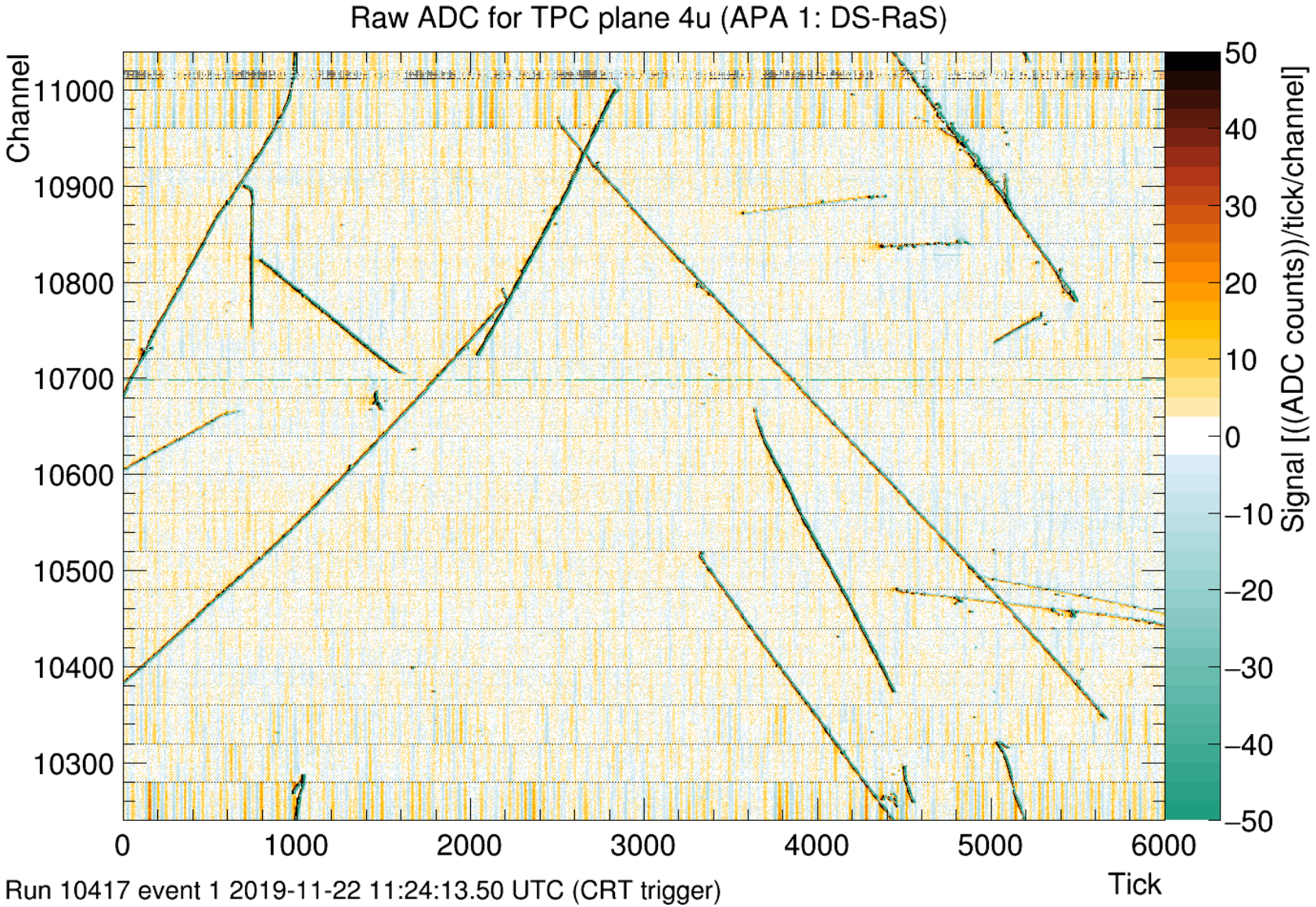
Back APAs with random trigger



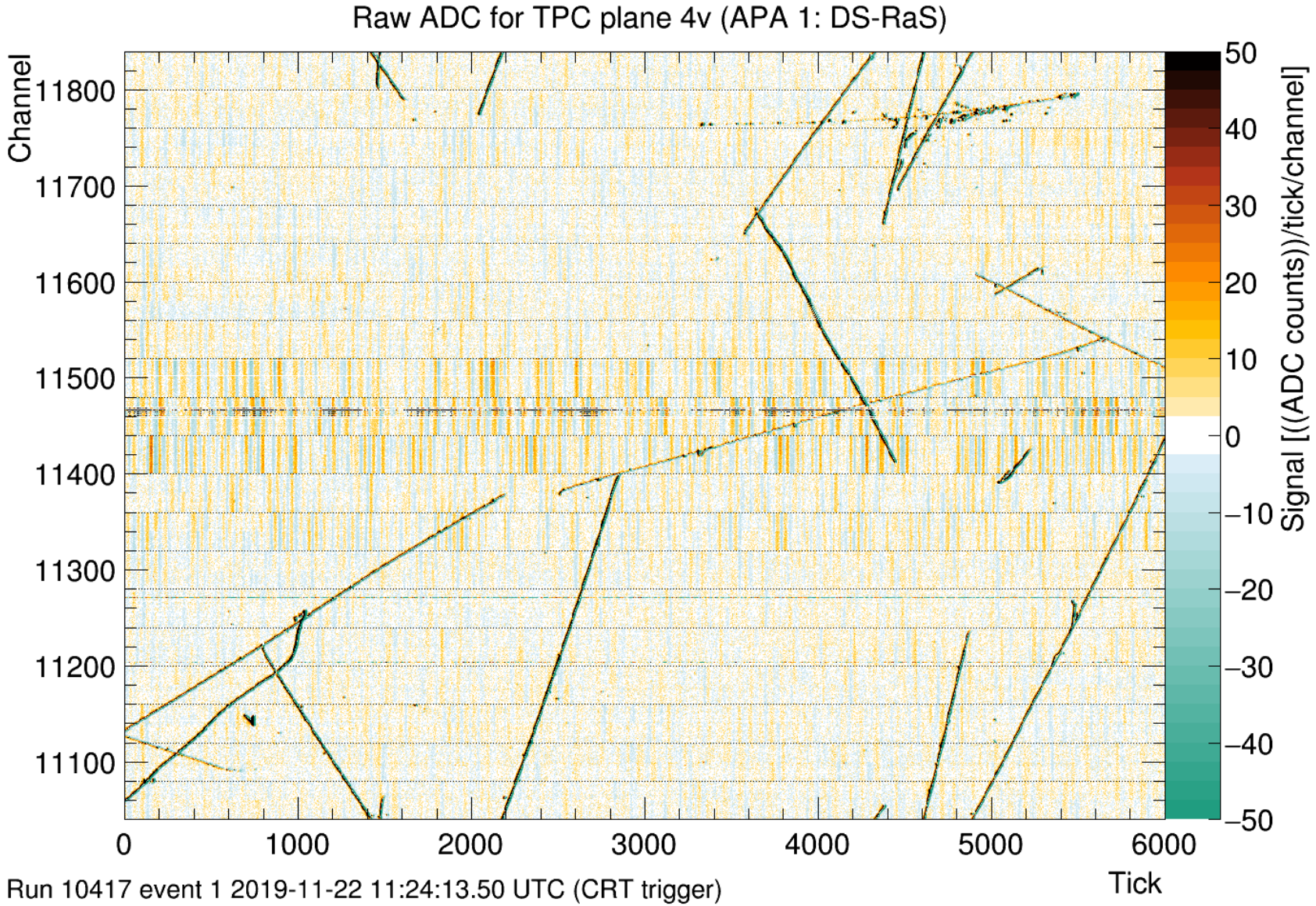


APA 1 event displays

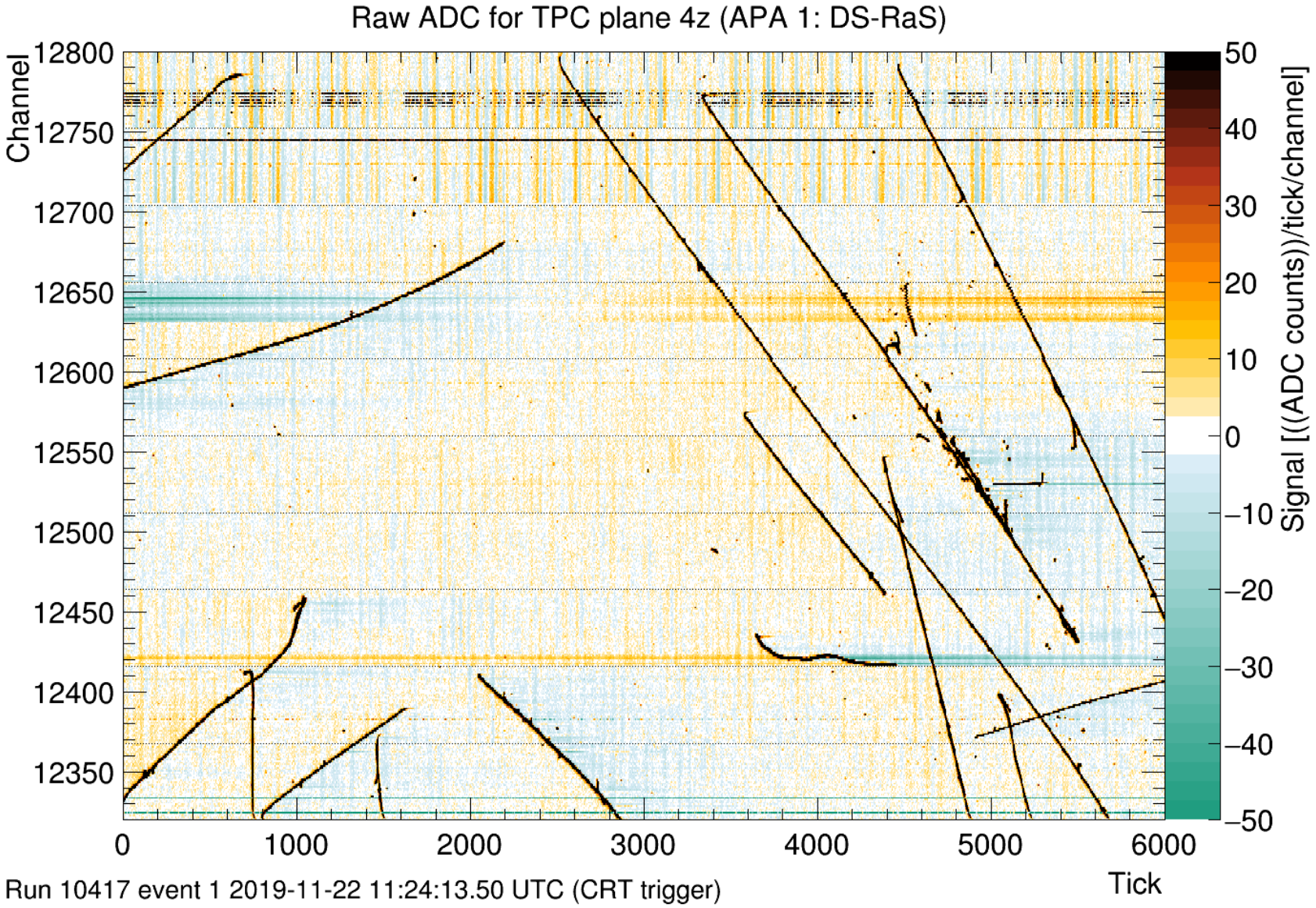
APA 1u


Raw ADC for TPC plane 4u (APA 1: DS-RaS)
Channel
11000
10900
10800
10700
10600
10500
10400
10300
0
1000
2000
3000
4000
5000
6000
Tick
50
40
30
20
10
0
−10
−20
−30
−40
−50
Signal [((ADC counts))/tick/channel]
Run 10417 event 1 2019-11-22 11:24:13.50 UTC (CRT trigger)

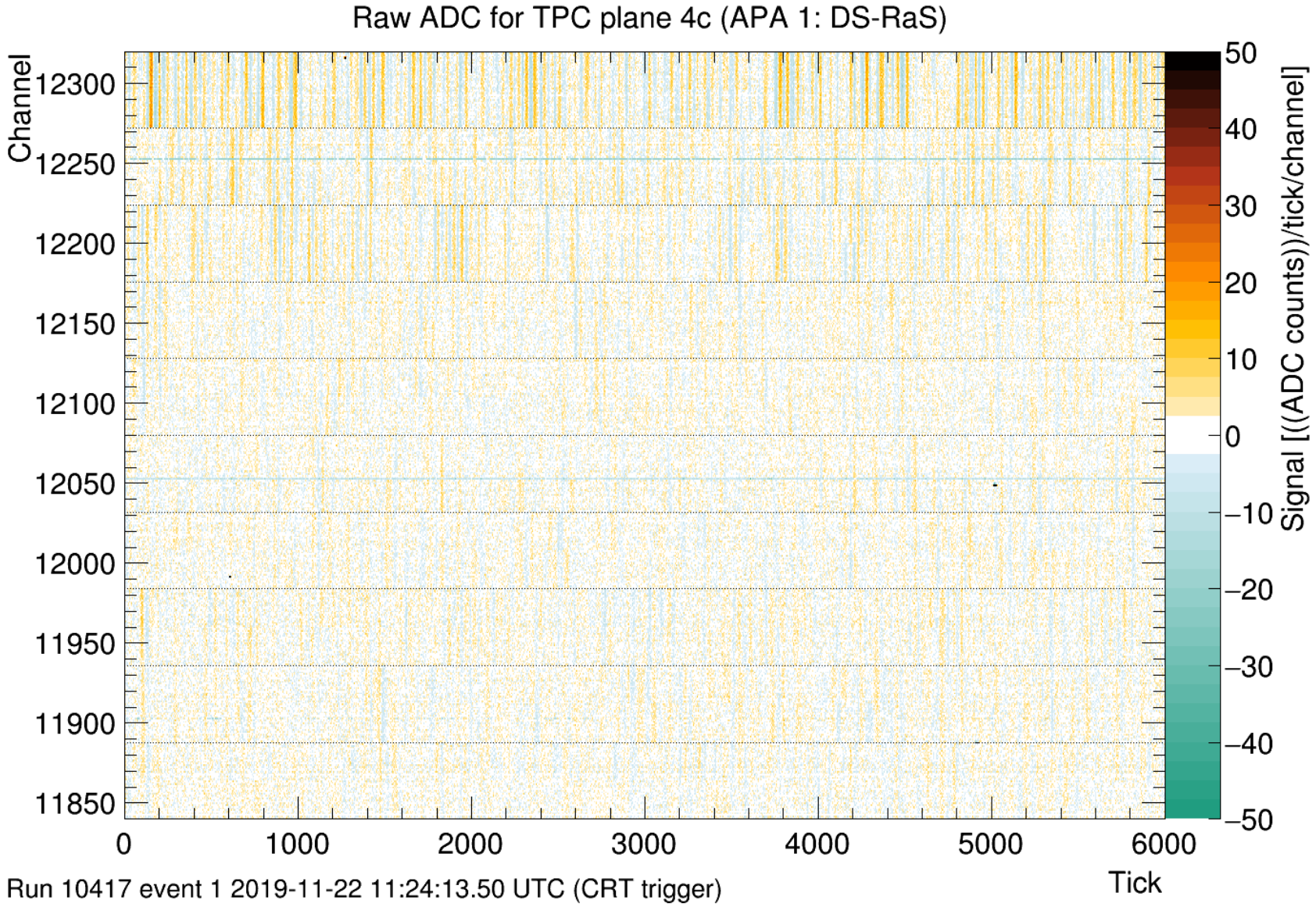
APA 1v


Raw ADC for TPC plane 4v (APA 1: DS-RaS)
Channel
11800
11700
11600
11500
11400
11300
11200
11100
0
1000
2000
3000
4000
5000
6000
Tick
50
40
30
20
10
0
−10
−20
−30
−40
−50
Signal [((ADC counts))/tick/channel]
Run 10417 event 1 2019-11-22 11:24:13.50 UTC (CRT trigger)

APA 1z

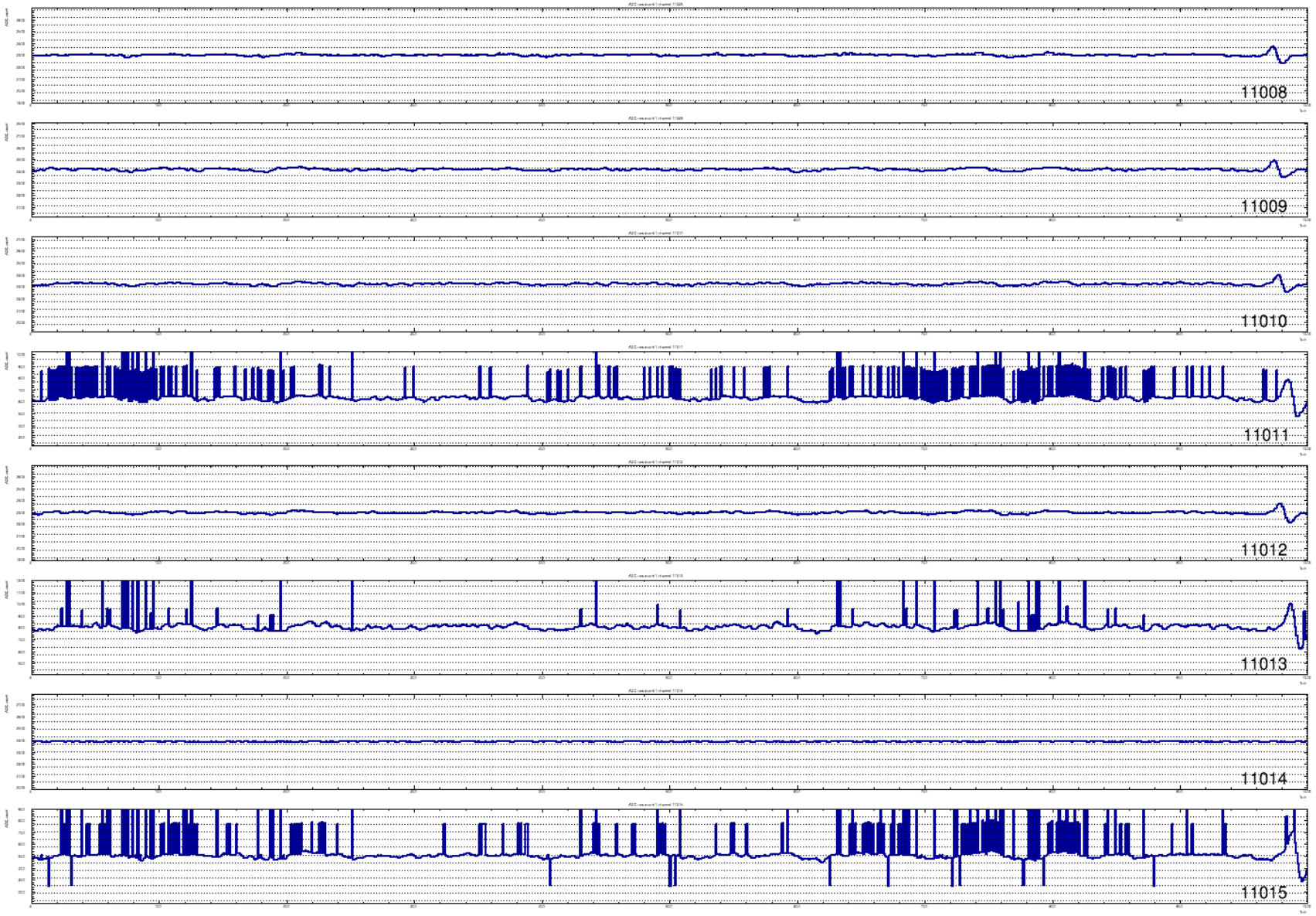

Raw ADC for TPC plane 4z (APA 1: DS-RaS)
Channel
12800
12750
12700
12650
12600
12550
12500
12450
12400
12350
0
1000
2000
3000
4000
5000
6000
Tick
50
40
30
20
10
0
−10
−20
−30
−40
−50
Signal [((ADC counts))/tick/channel]
Run 10417 event 1 2019-11-22 11:24:13.50 UTC (CRT trigger)

APA 1c (cryostat side collection)

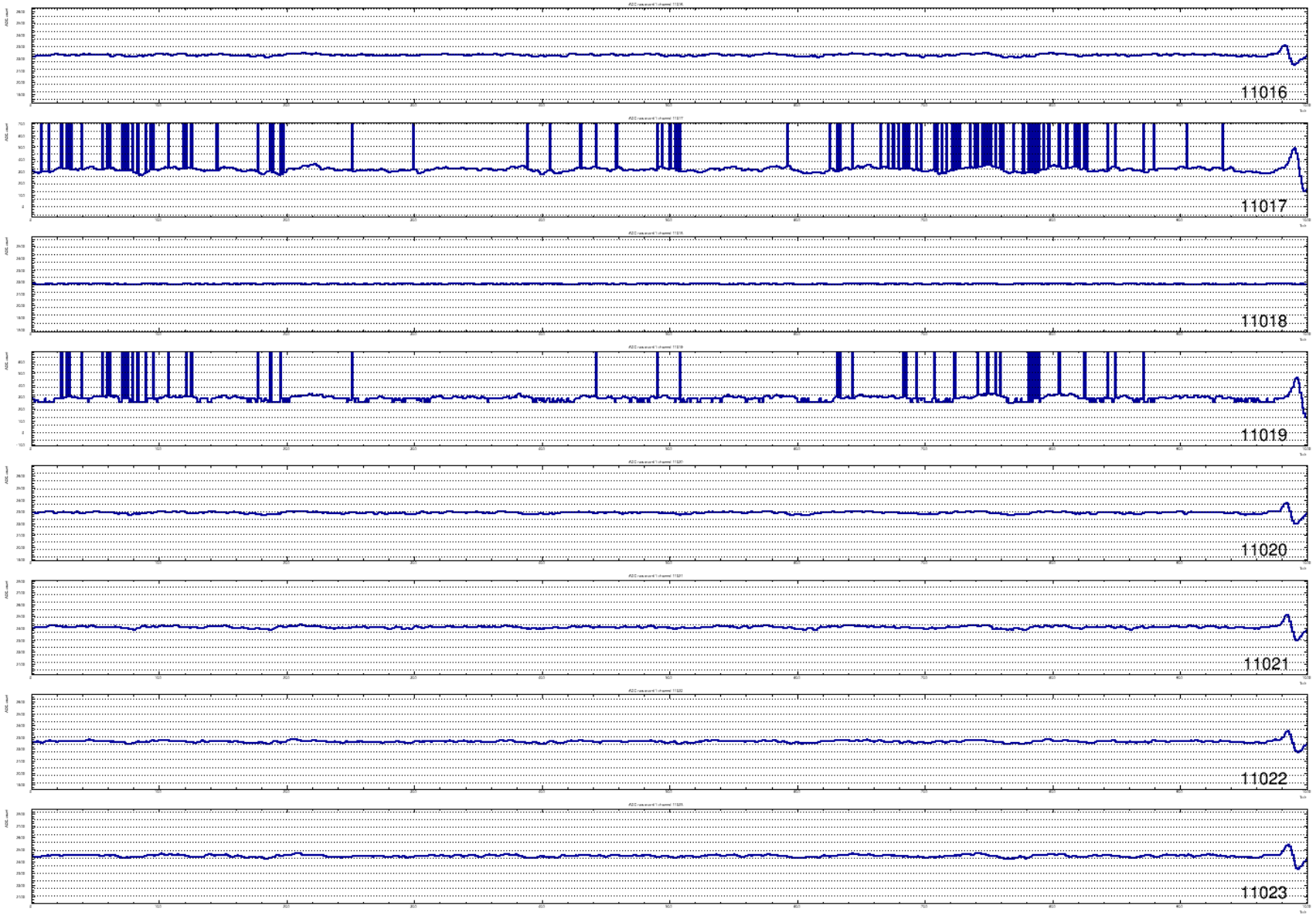


Bad channel waveforms

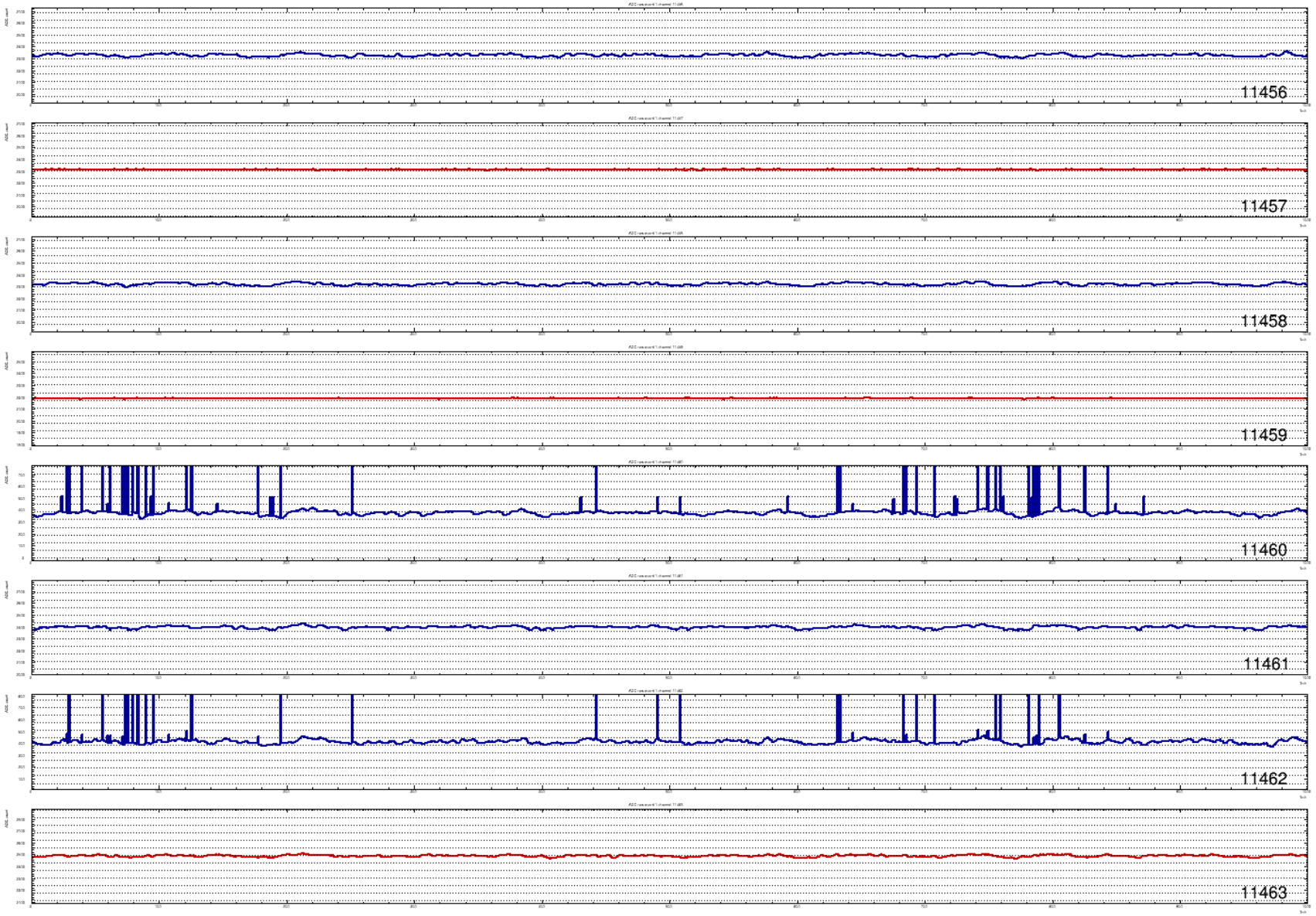
APA 1u



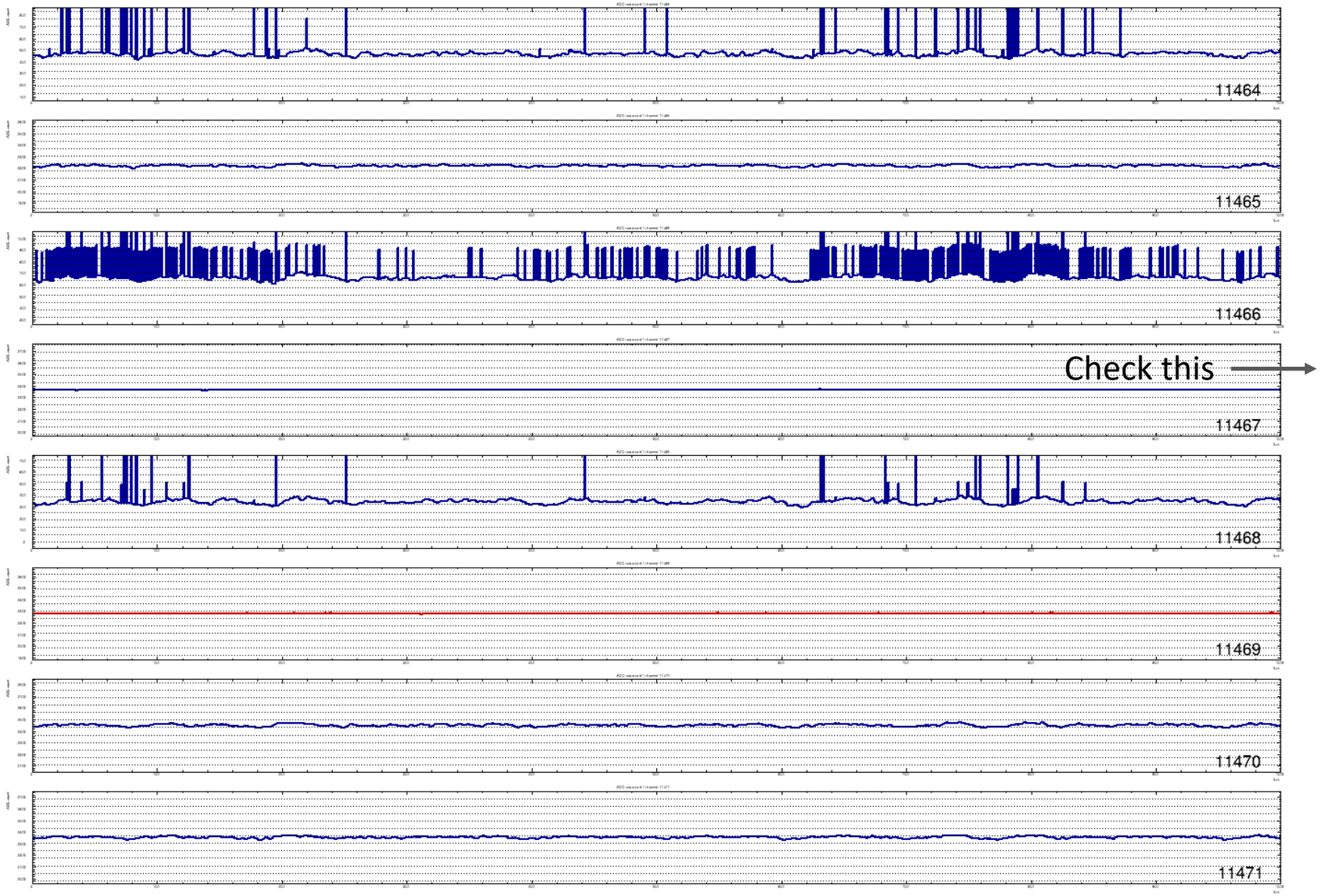
APA 1u



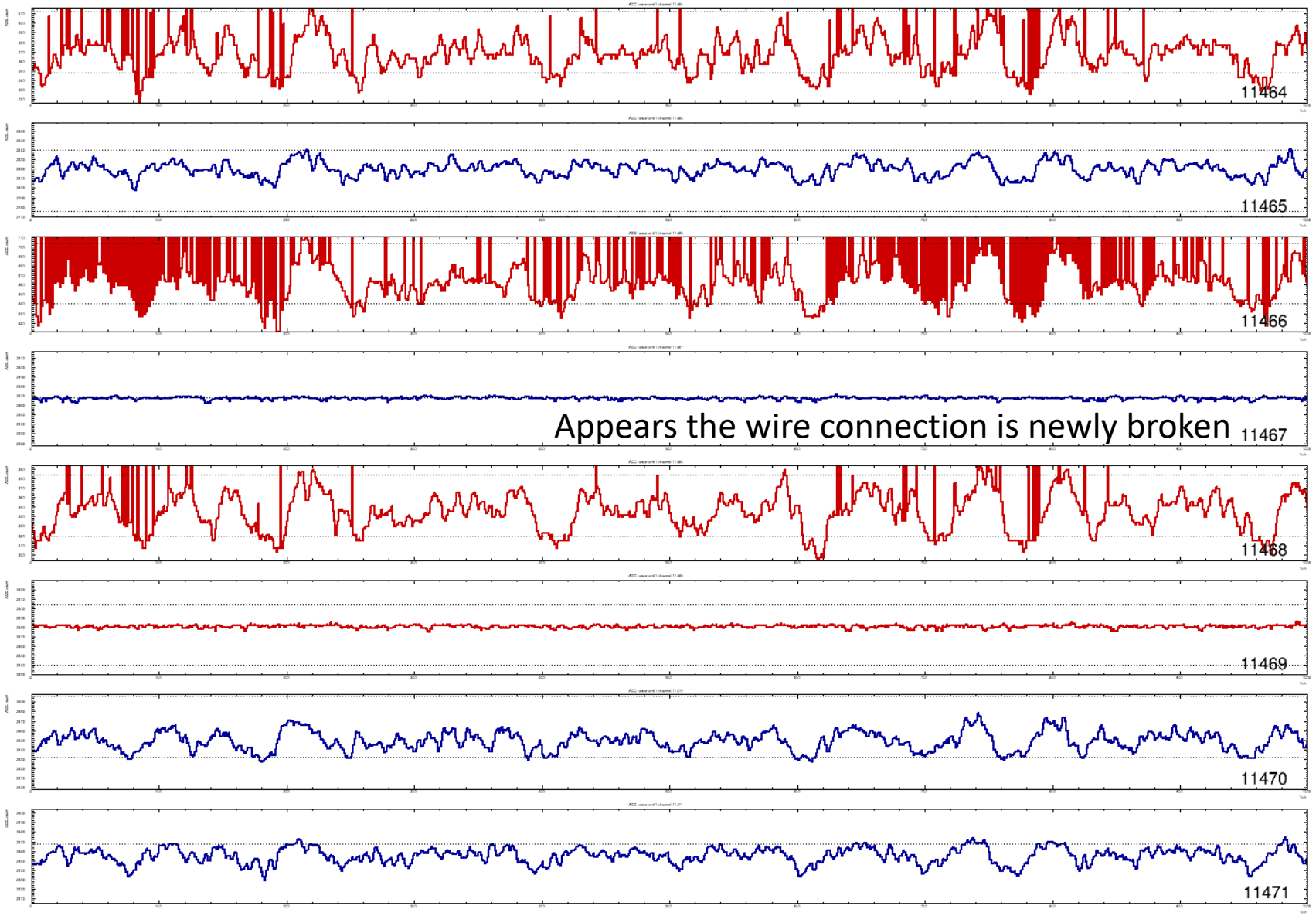
APA 1v



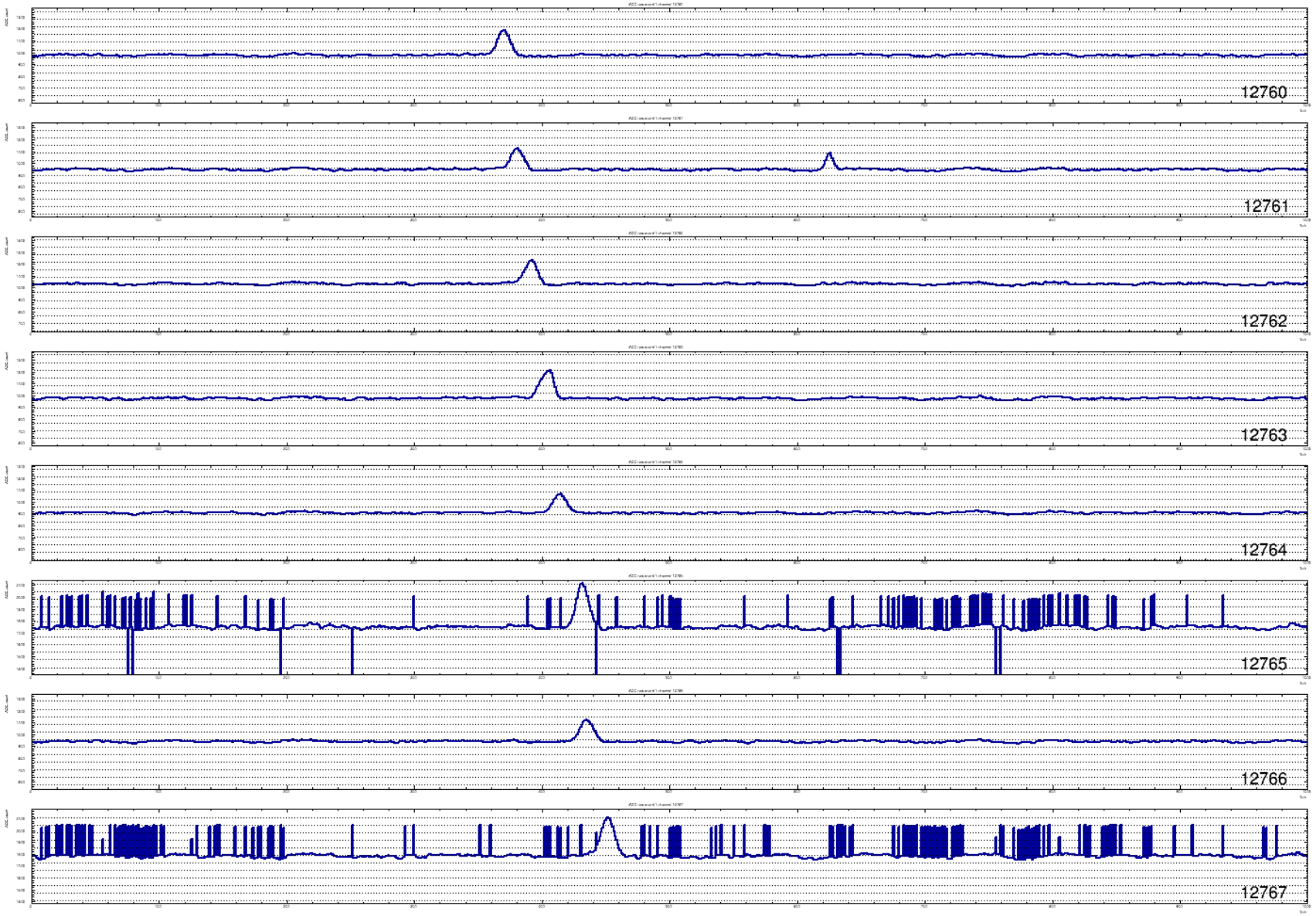
APA 1v



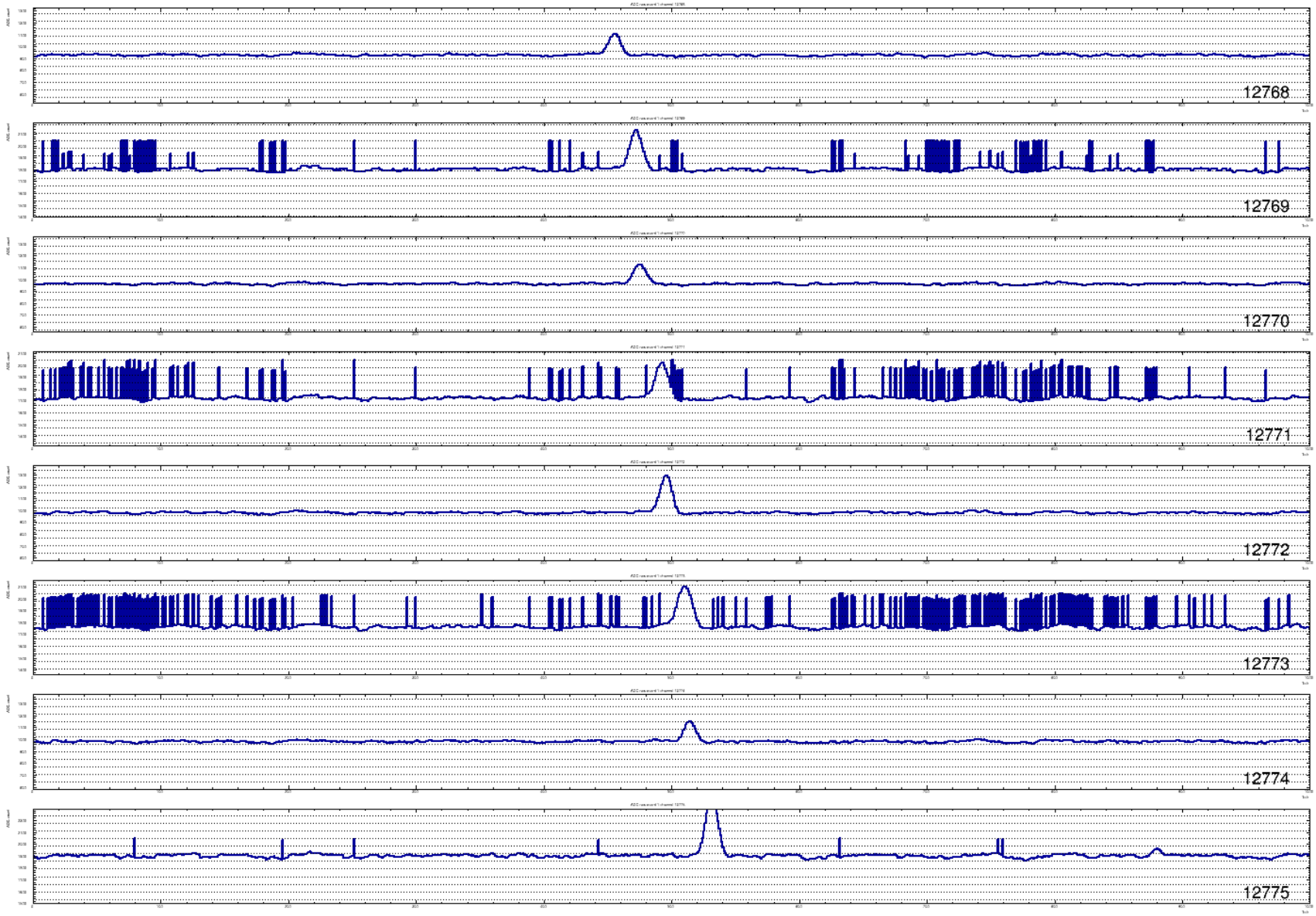
APA 1v (zoom of preceding w/ new bad channels)



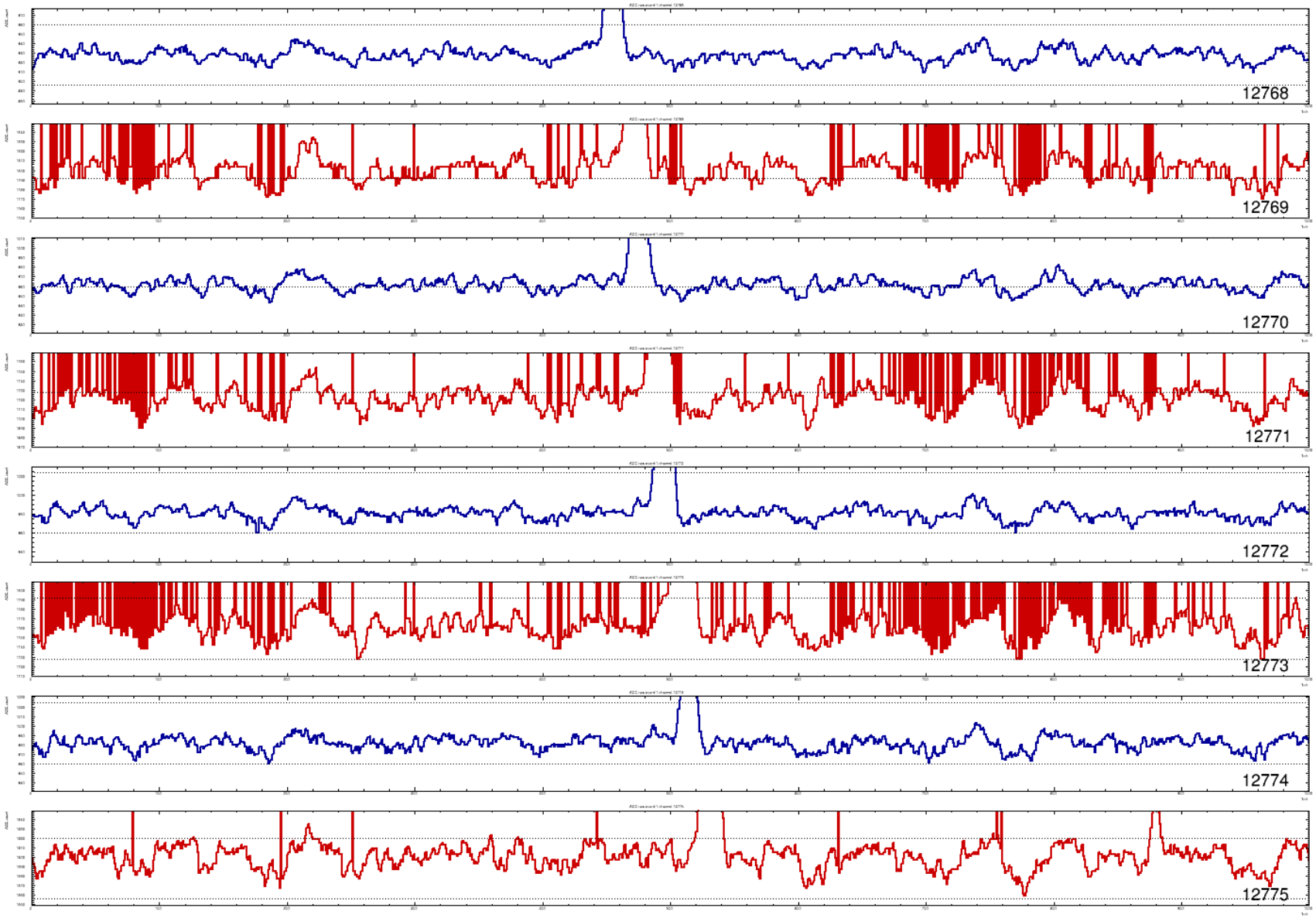
APA 1z



APA 1z



APA1z (zoom of preceding w/ new bad channels)



Bad channel list

Bad channel update

Plots show we have some new bad channels

- All 16 channels for (presumably) one ASIC in FEMB 110
  - Waveforms suggest this is dropped/hot bits rather than sticky codes
- One additional channel (11467) appears to be disconnected
  - Noise level is much less than good channels
  - This was not the case in the 2018 data survey
  - Same problem for 11469 was observed in that survey

The bad channel list has been updated

- I.e. changes are in prolog
  - pdsp_channel_status in channelstatus_pdsp.fcl
- Old fcl (without these changes) is copied to
  - pdsp_channel_status_2018 in channelstatus_pdsp_2108.fcl

Are there more new bad channels?

Extras

More plots

- Event displays:
  - https://internal.dunescience.org/people/dladams/protodune/data/dqmw/
- Signal strength plots:
  - https://internal.dunescience.org/people/dladams/protodune/data/roisigstren/

Processing directories

- Event displays: ~dladams/dev/dudev03/mp04-prod/nov19/dqmw
- Waveforms: ~dladams/dev/dudev03/mp04-prod/nov19/dqmw
- Signal strength: ~dladams/dev/dudev03/mp04-prod/nov19/roi