

ProtoDUNE TPC data:
Charge calibration in standard reco

ProtoDUNE sim/reco

David Adams

BNL

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Introduction

New dataprep sequences are available

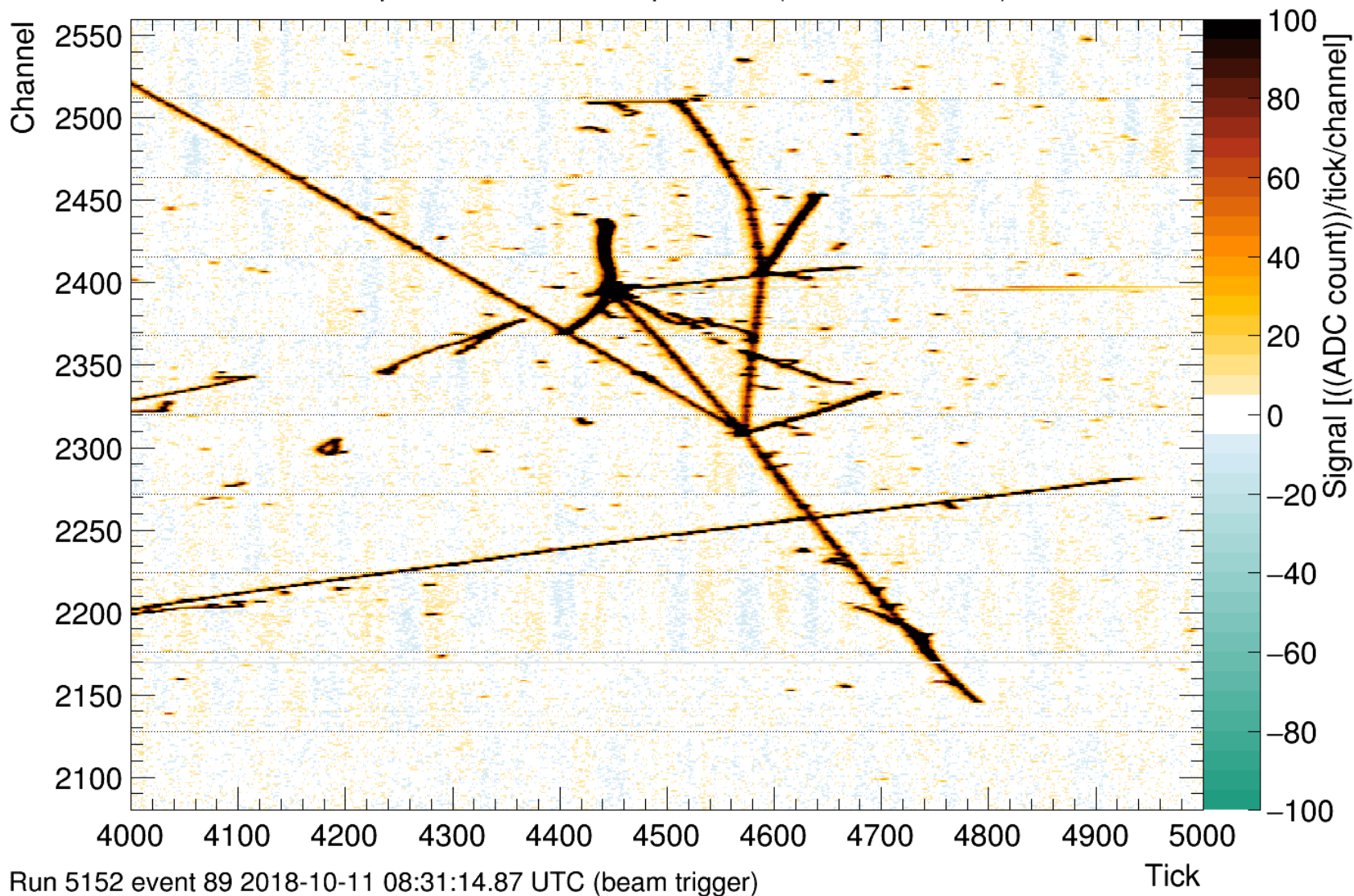
- See `dunetpc/dune/Utilities/services_dune.fcl`
- Available sequences
 - `protodune_dataprep_tools_nocal`
 - No calibration or noise removal
 - `protodune_dataprep_tools_calib`
 - Charge calibration, no noise removal
 - `protodune_dataprep_tools_calib_noiserem`
 - Charge calibration and noise removal
 - `protodune_dataprep_tools_wirecell`
 - Previous plus conversion back to ADC scale and zeroing of bad/noisy channels
 - » Needed for wirecell signal processing
- All sequences do
 - sticky code mitigation
 - timing mitigation
 - undershoot removal

Plots with these and other sequences follow

- All shown at ADC scale to allow comparison with old reco
 - Scale factor is 40 ADC count = 1 ke

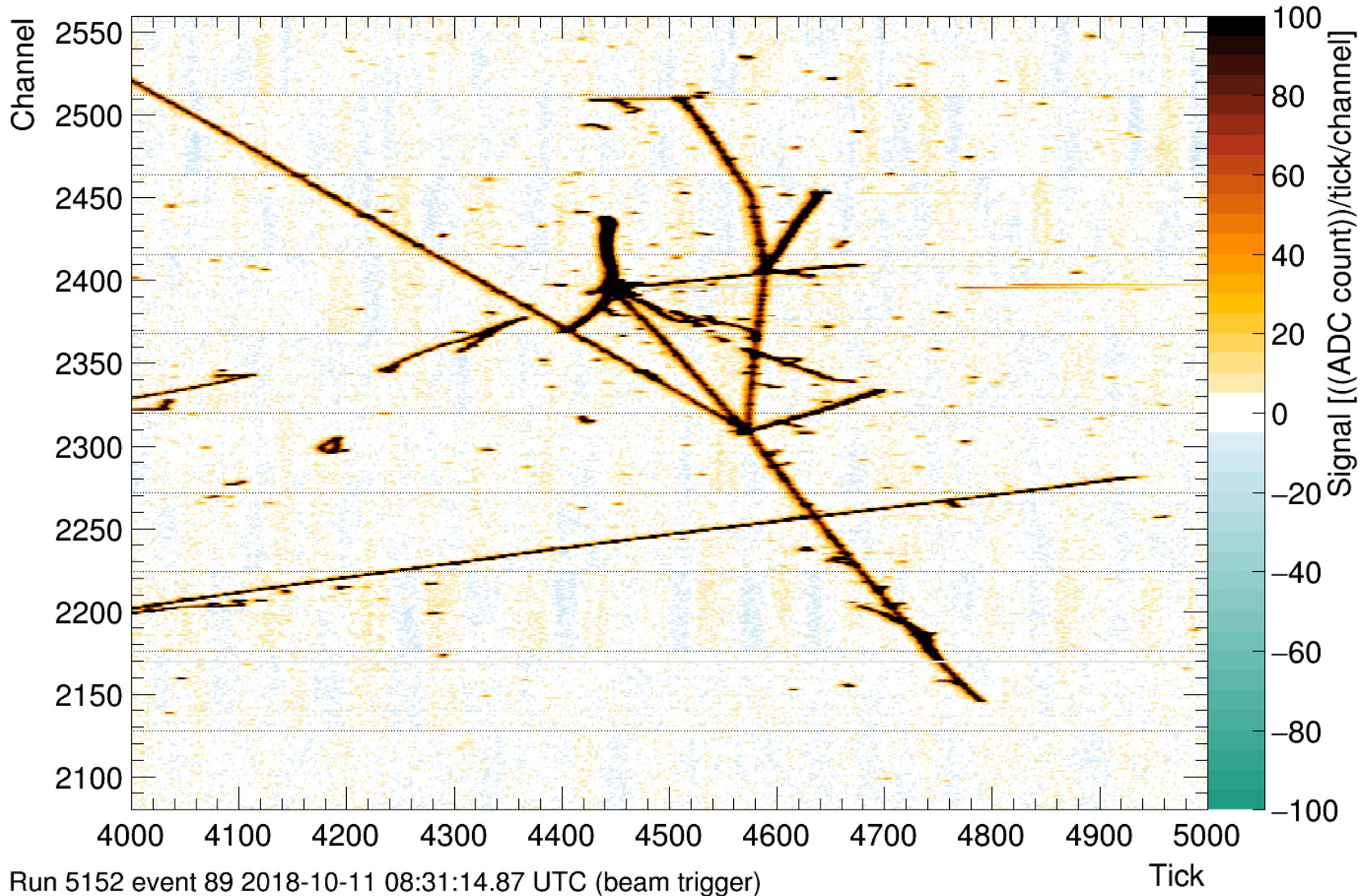
Old reco (v08_14_00)

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



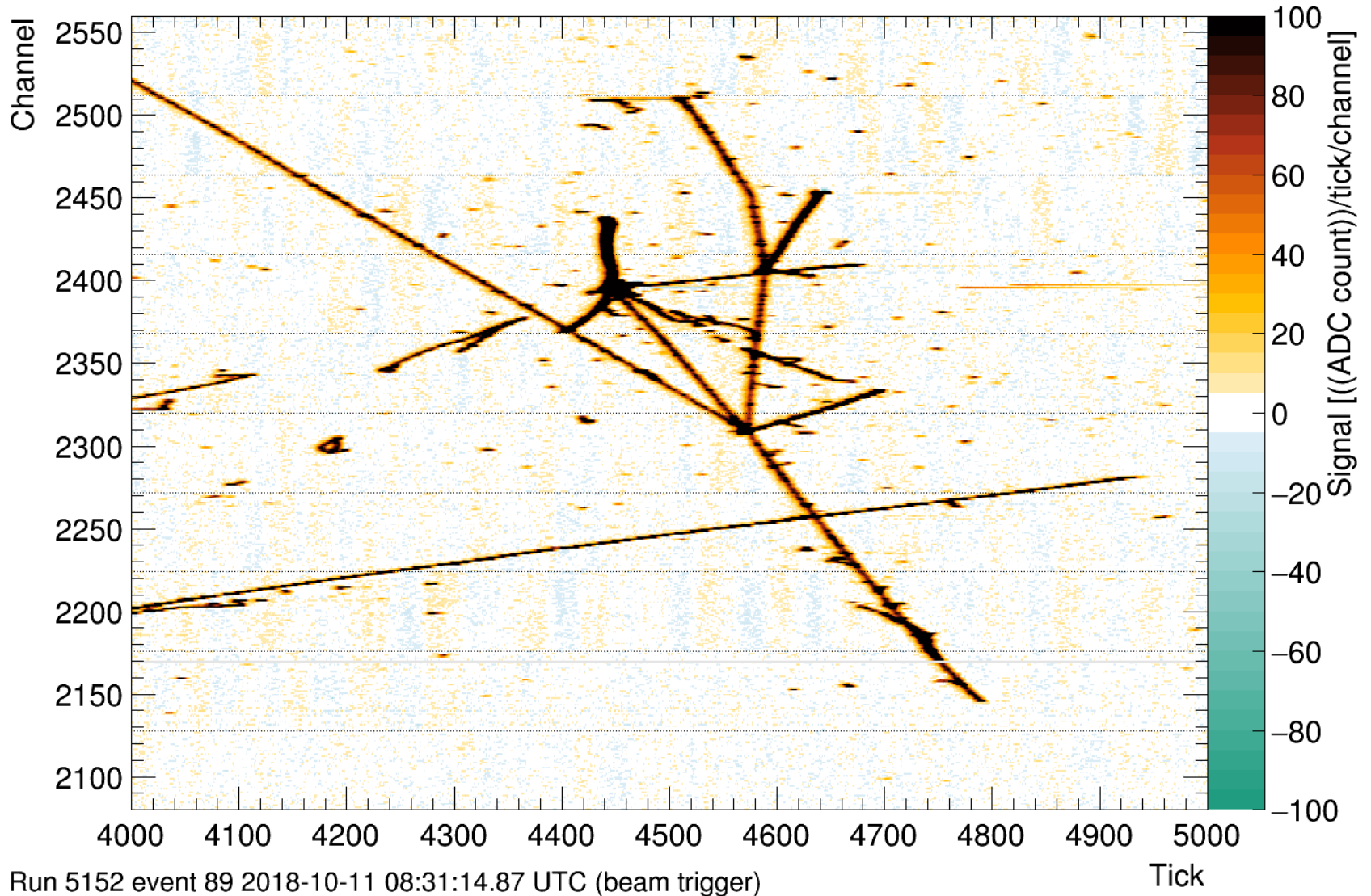
New reco: nocal

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



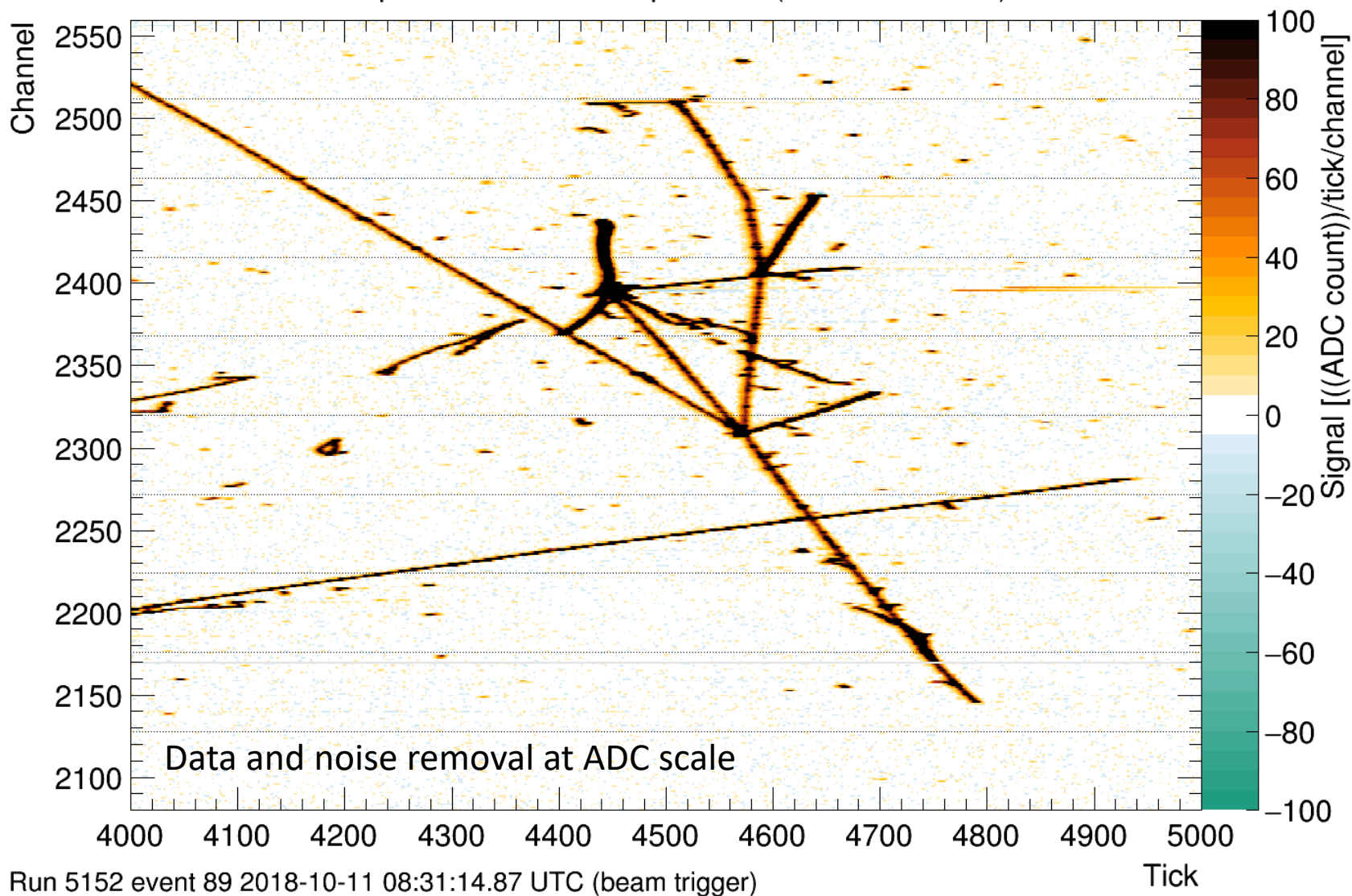
New reco: calib

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



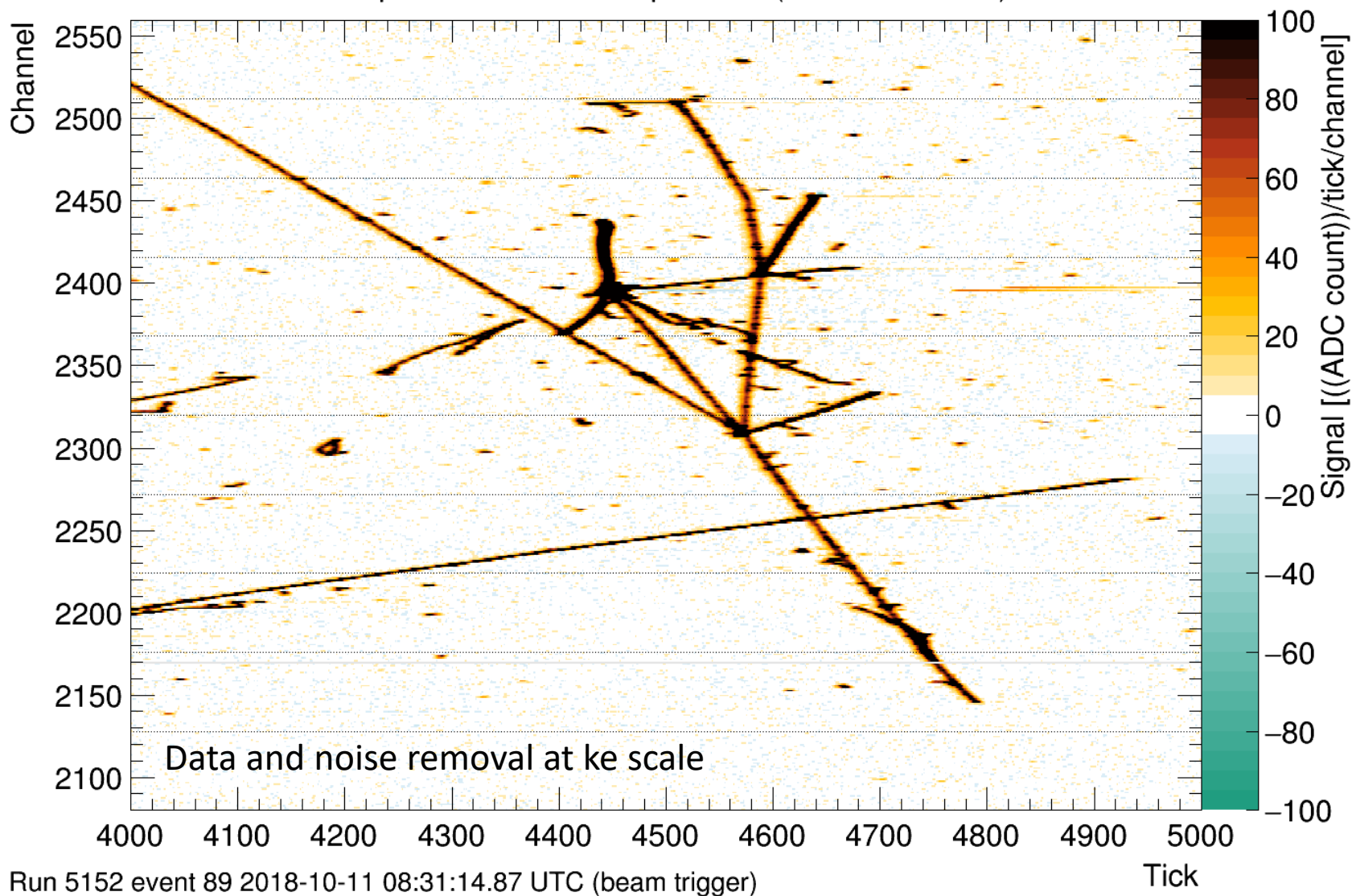
New reco: calib_noiserem after ADC scale

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



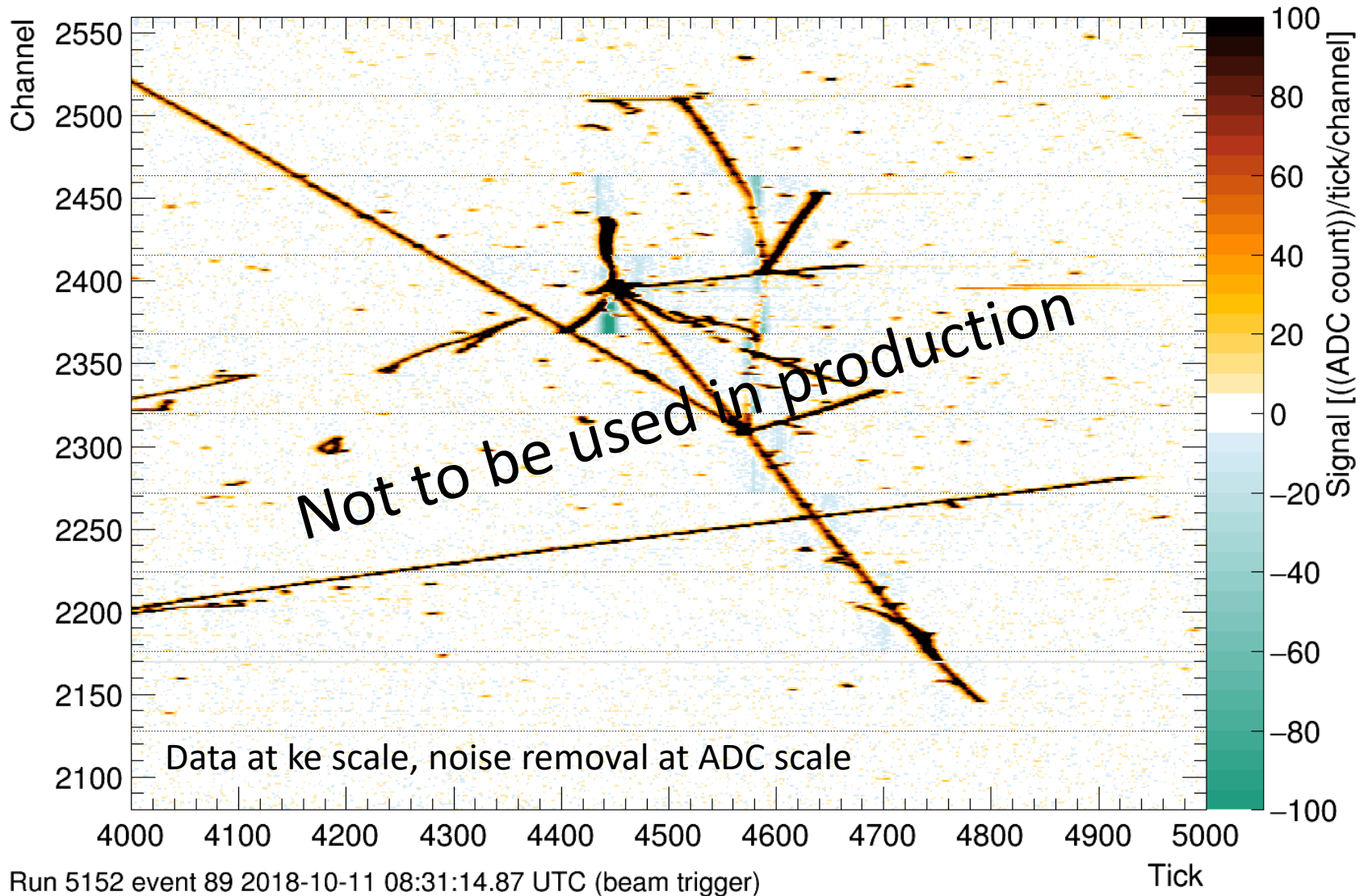
New reco: calib_noiserem at ke scale

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



New reco: calib_noiserem at wrong scale

Prepared ADC for TPC plane 0z (APA 3: US-RaS)



Coming soon...

Tail removal

- Tom wrote a nice tool to remove tails: UndershootCorr
- I have added a new tool that goes beyond this: ExpTailRemoval
 - No longer need to supply four fcl params use to fit the two event-varying parameters: residual pedestal and initial tail level
 - Those four were obtained by hand tuning for each choice of decay time
 - Simpler (and faster?) fit to determine those parameters

Plans

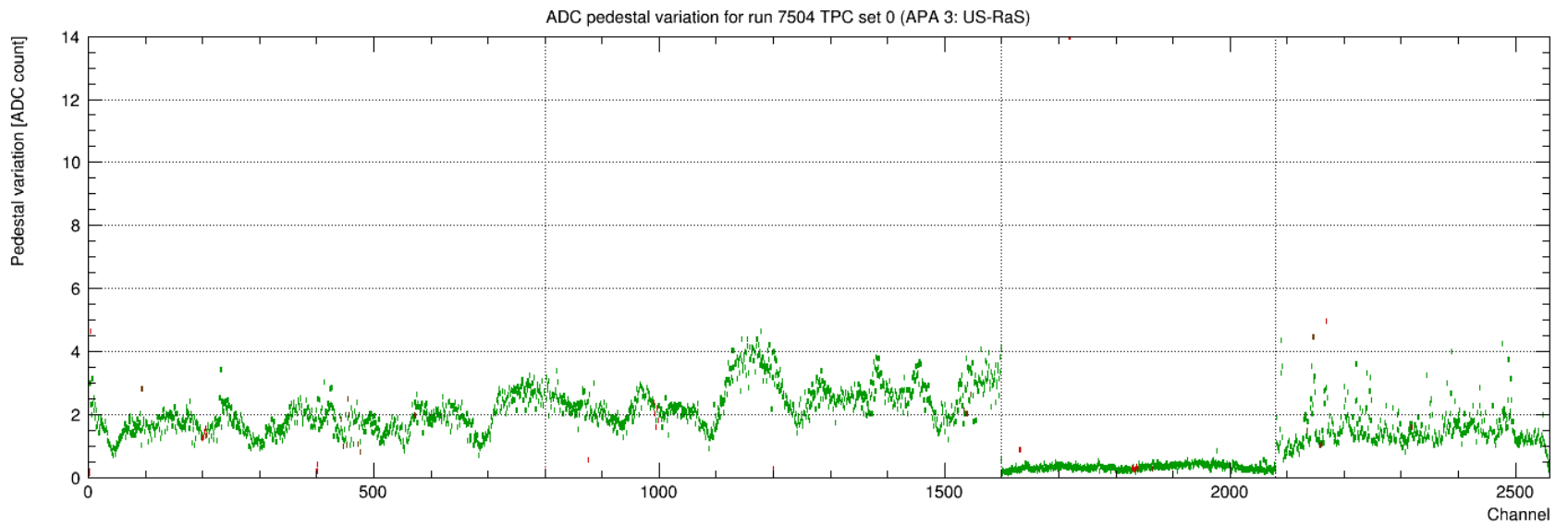
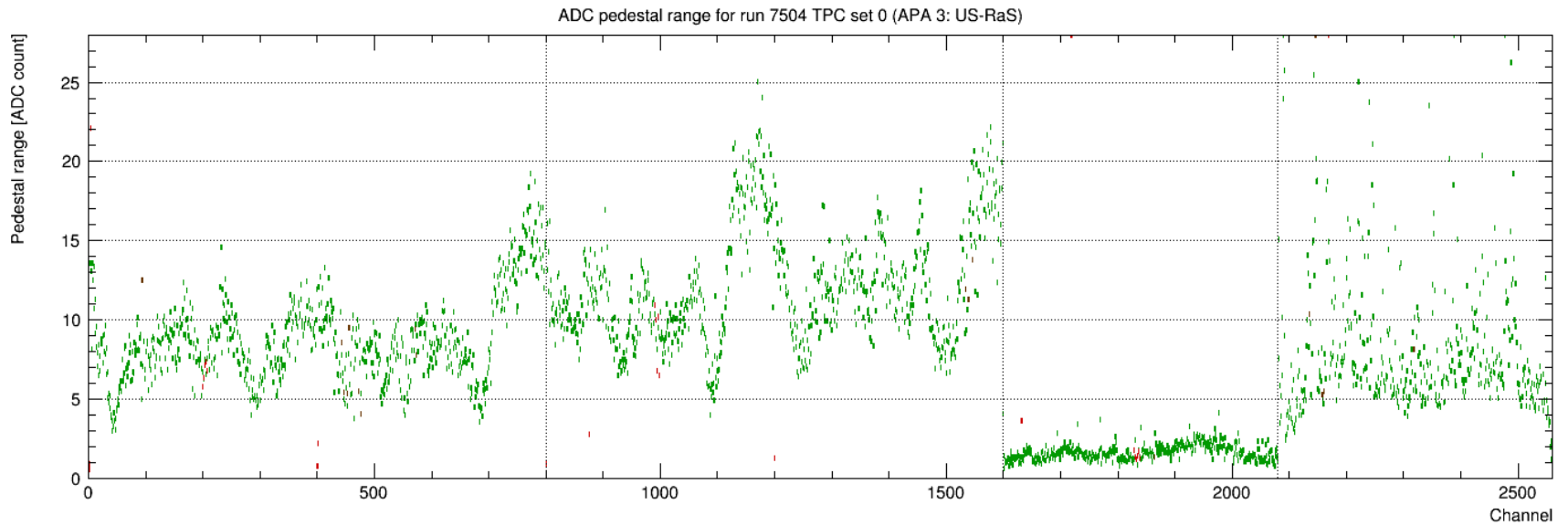
- Demonstrate new tool works as well or better than old
- Tune decay time
- Tune decay amplitude with preference to choose value so that tail area cancels that of signal (not quite true for our current default)
- Study pedestal variation when residual pedestal is included
 - Hope to see a big decrease
- Integrate tail removal into initial pedestal evaluation

Current pedestal variation

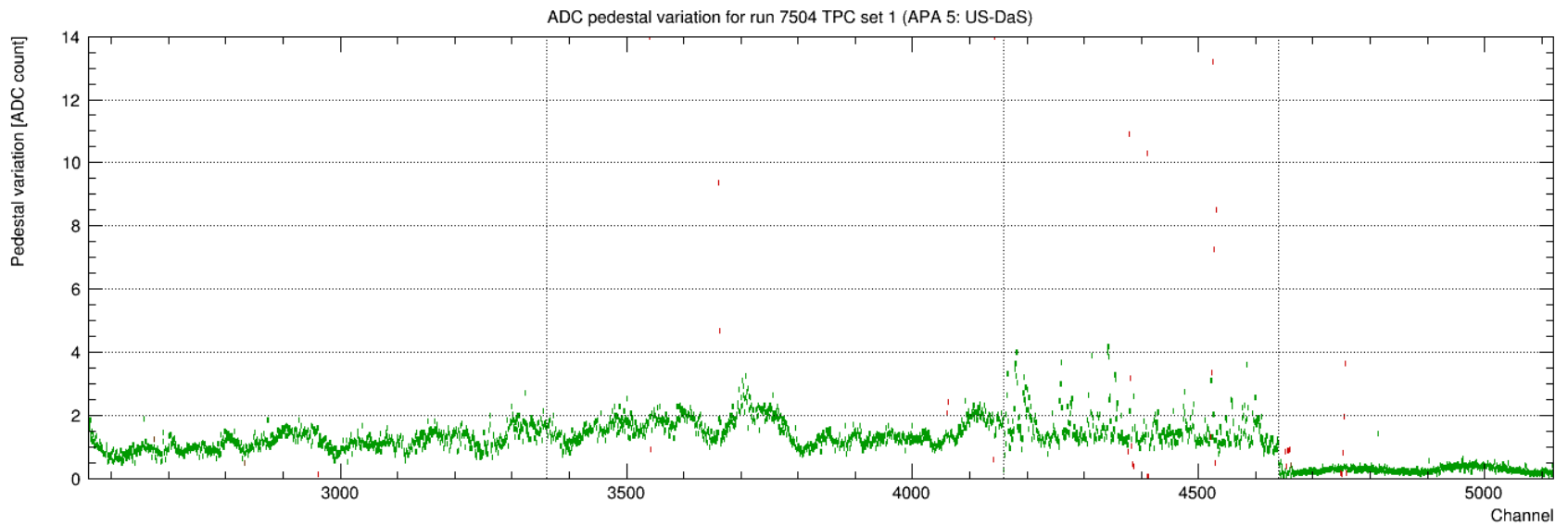
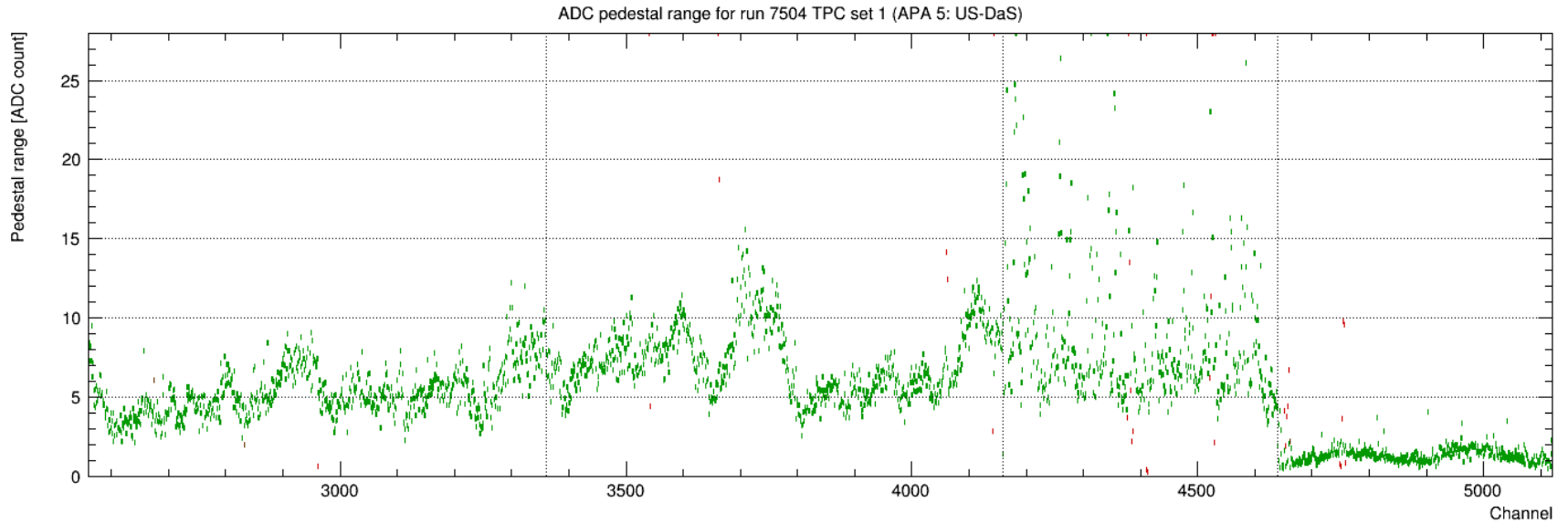
Following plots show pedestal variation

- First 50 events in run 7504
- Top is full range of variation: max - min
- Bottom is the RMS of the variation
- Pedestal is the initial value, i.e. before undershoot correction

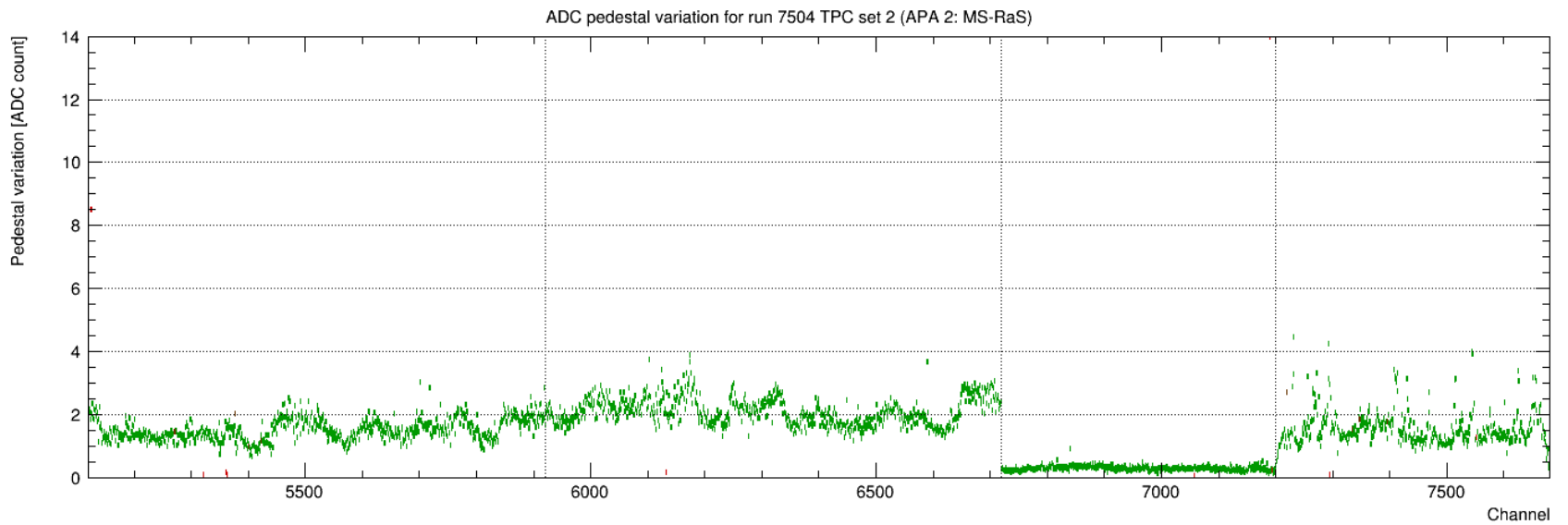
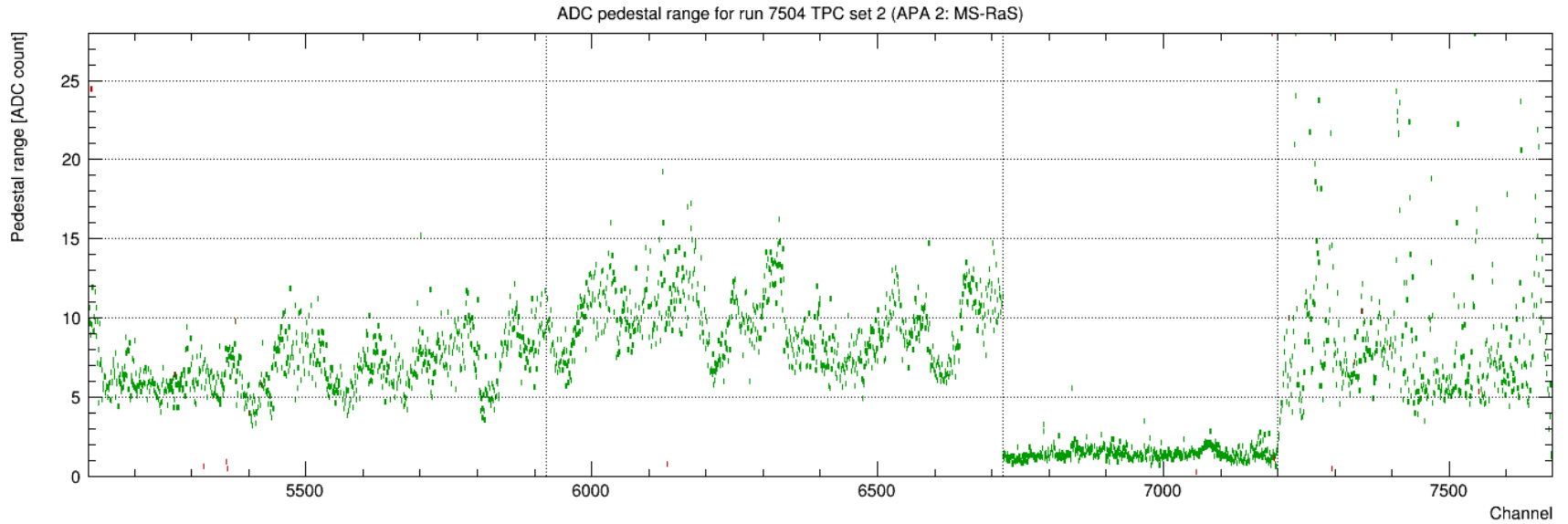
APA 3



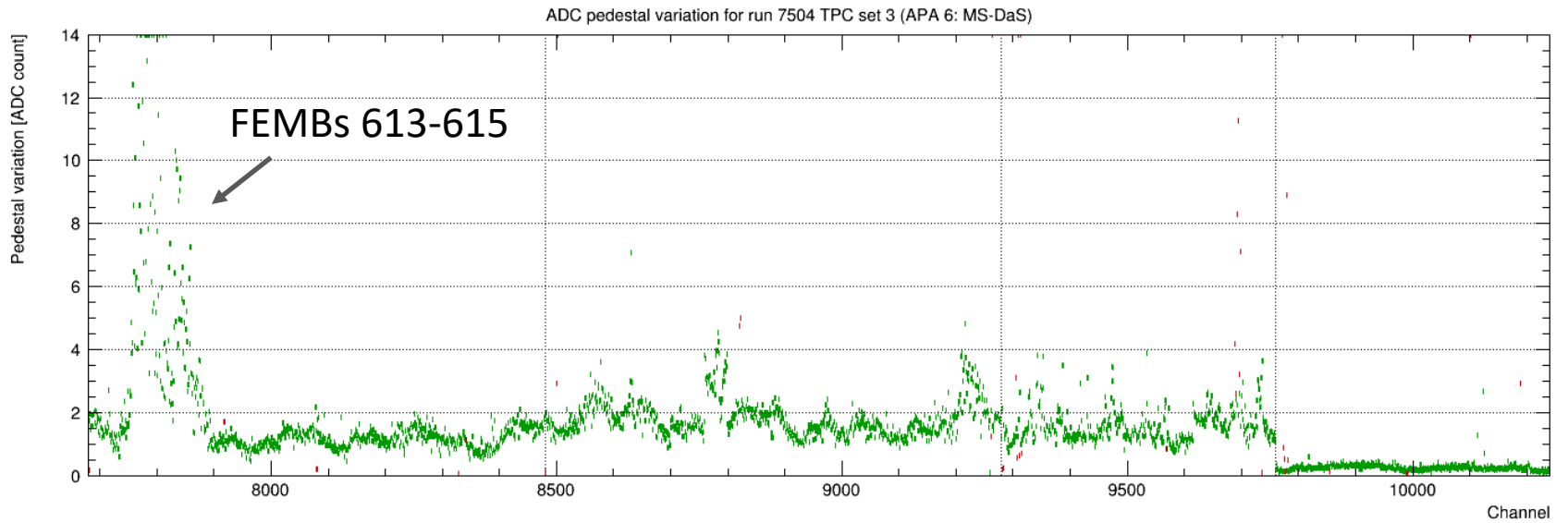
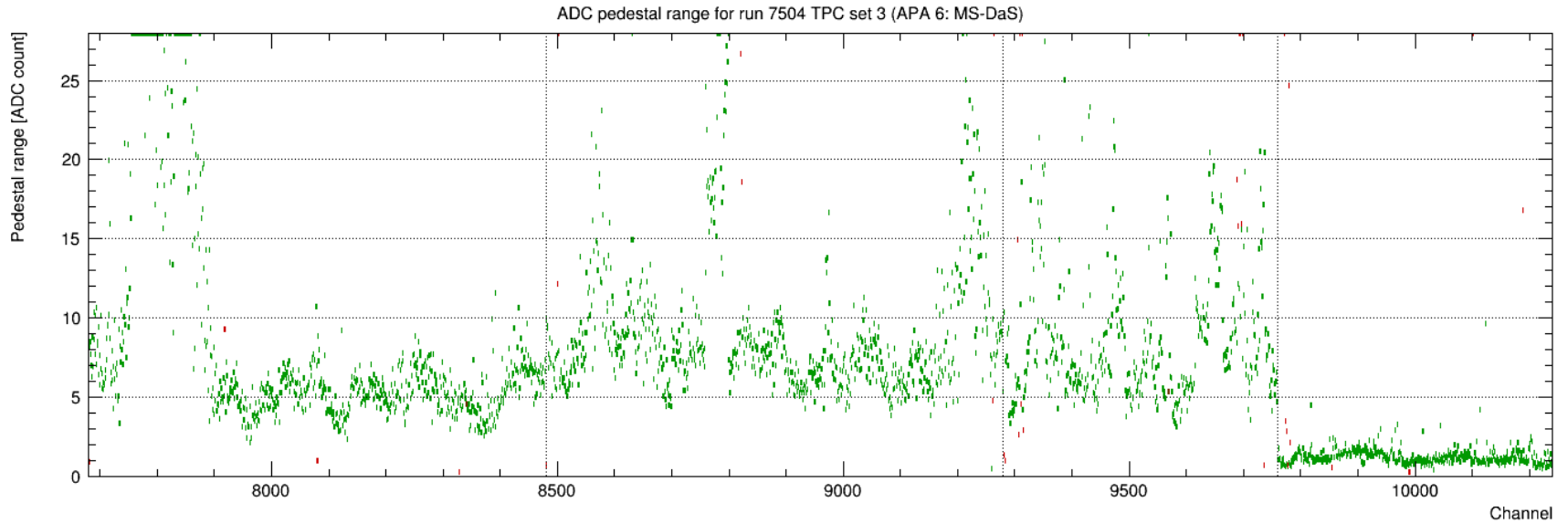
APA 5



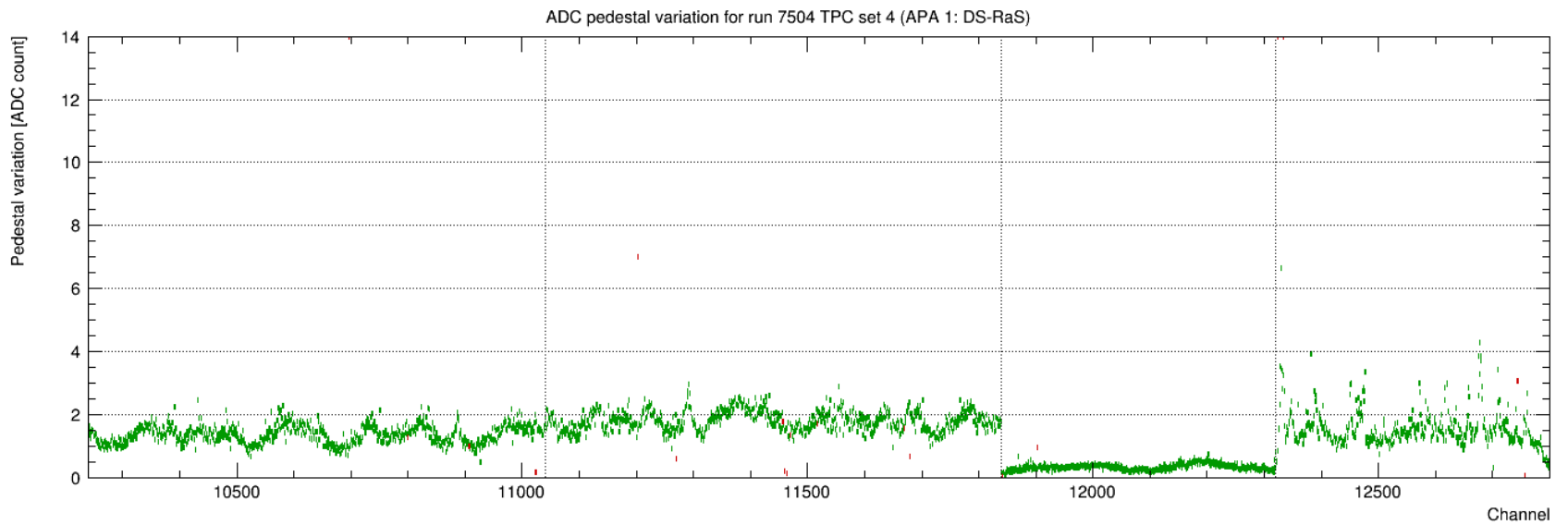
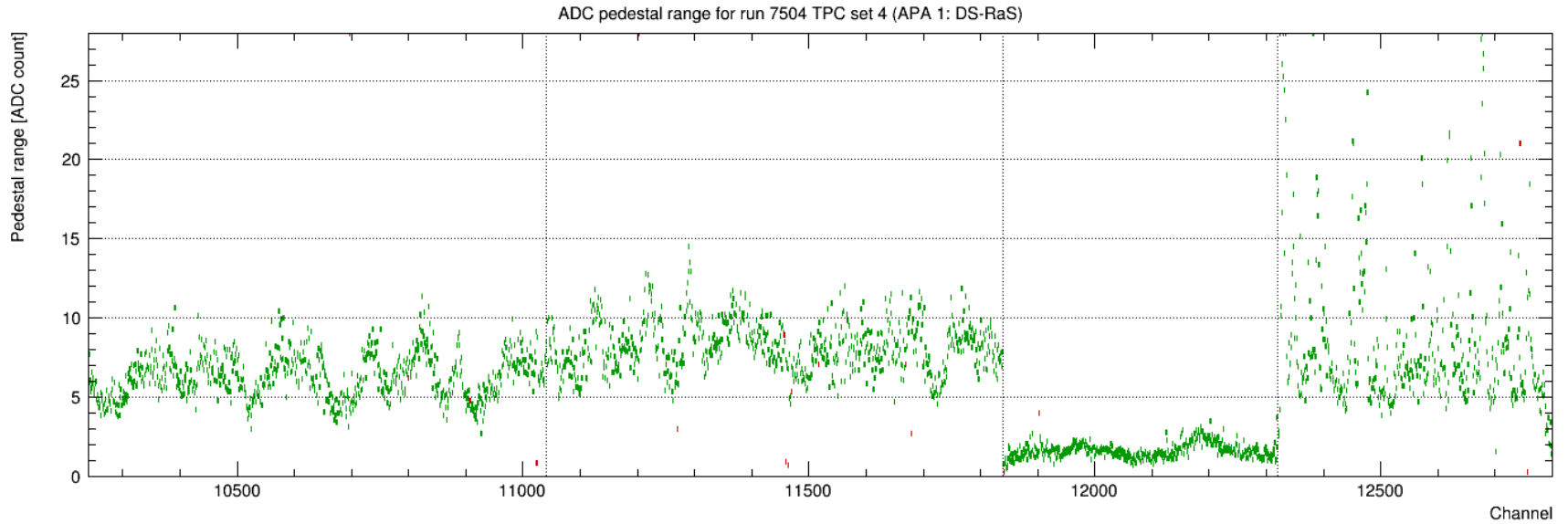
APA 2



APA 6



APA 1



APA 4

