

A Quick Study of Unresponsive Channels in ProtoDUNE-SP using Reconstructed Hits

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Fermilab

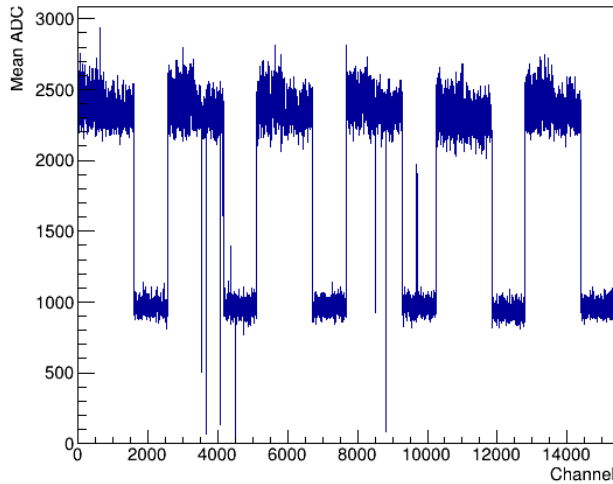
ProtoDUNE Sim/Reco Meeting
April 10, 2019

Mean, RMS, $\langle \text{Hits/event} \rangle$, $\langle \text{Integral} \rangle$

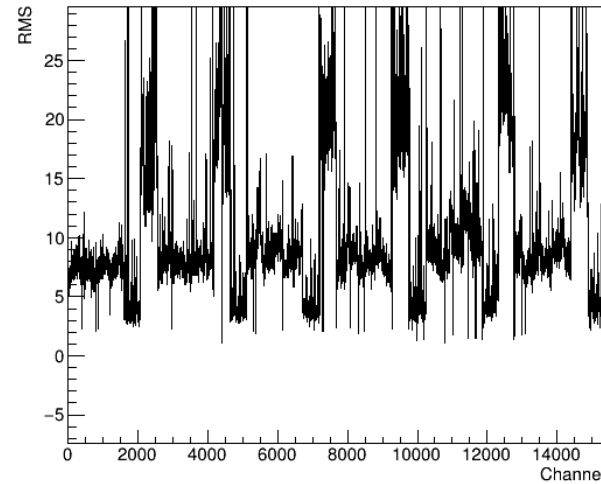
From run
5177

decoded+
reco

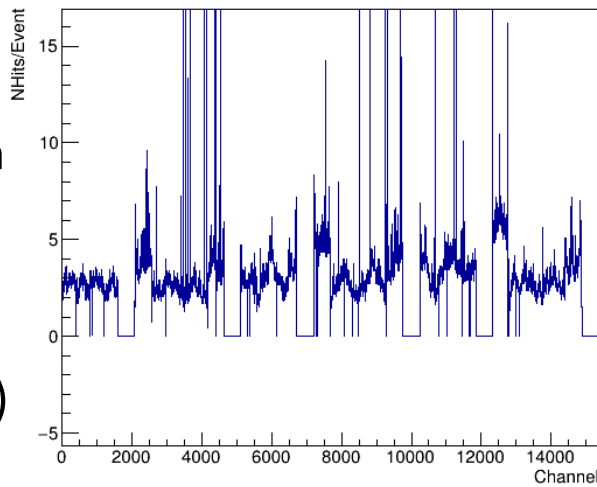
Channel Mean



Channel RMS

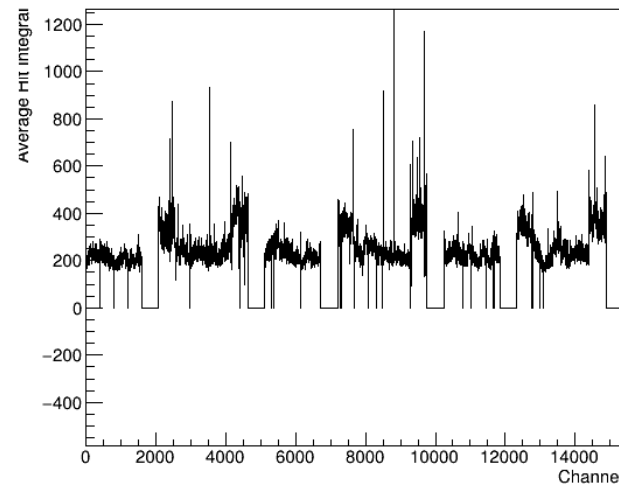


Channel Hit Sums



Order within
an APA:
U, V,
collection
(cryo or TPC)

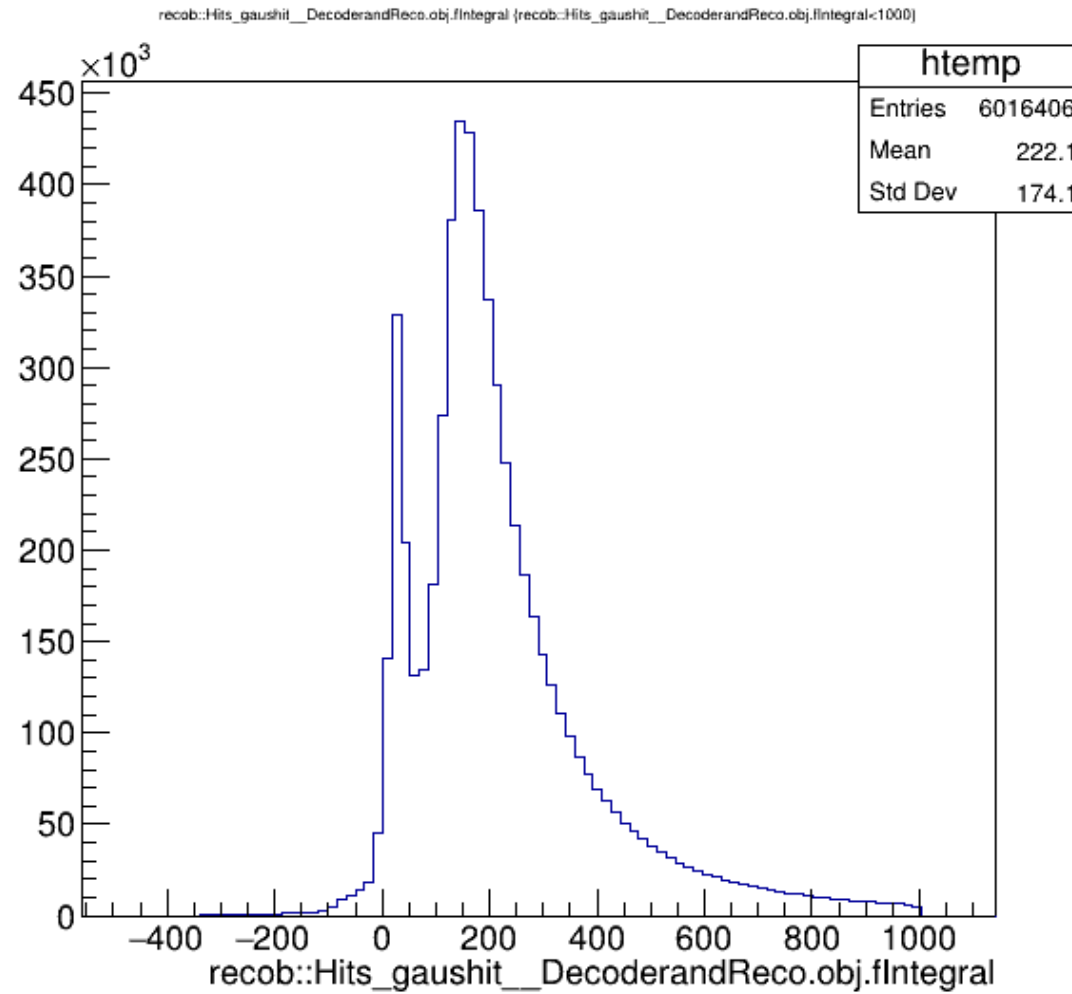
Channel Hit Charge



Offline
channel
numbers

Selecting Bad Channels

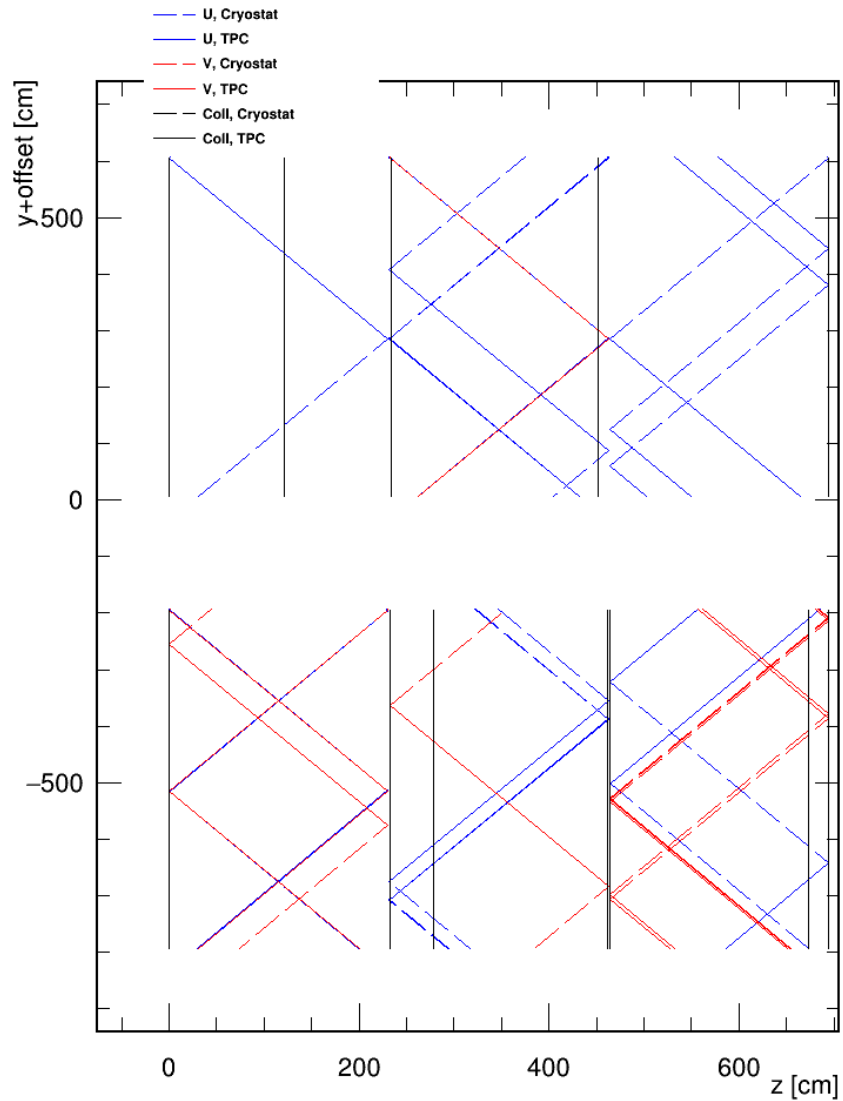
- Look only at hits with ADC integral > 80



Criteria for Unresponsive Channels

- Induction-Plane Channels and TPC-Side Collection-Plane Channels
 - Mean hit charge > 100 ADC count-ticks
 - Avg nhits per event > 0.5
- Cryostat-side Collection-plane channels
 - Not studied at the moment. They are hit rather infrequently

Run 5177 Unresponsive Channels

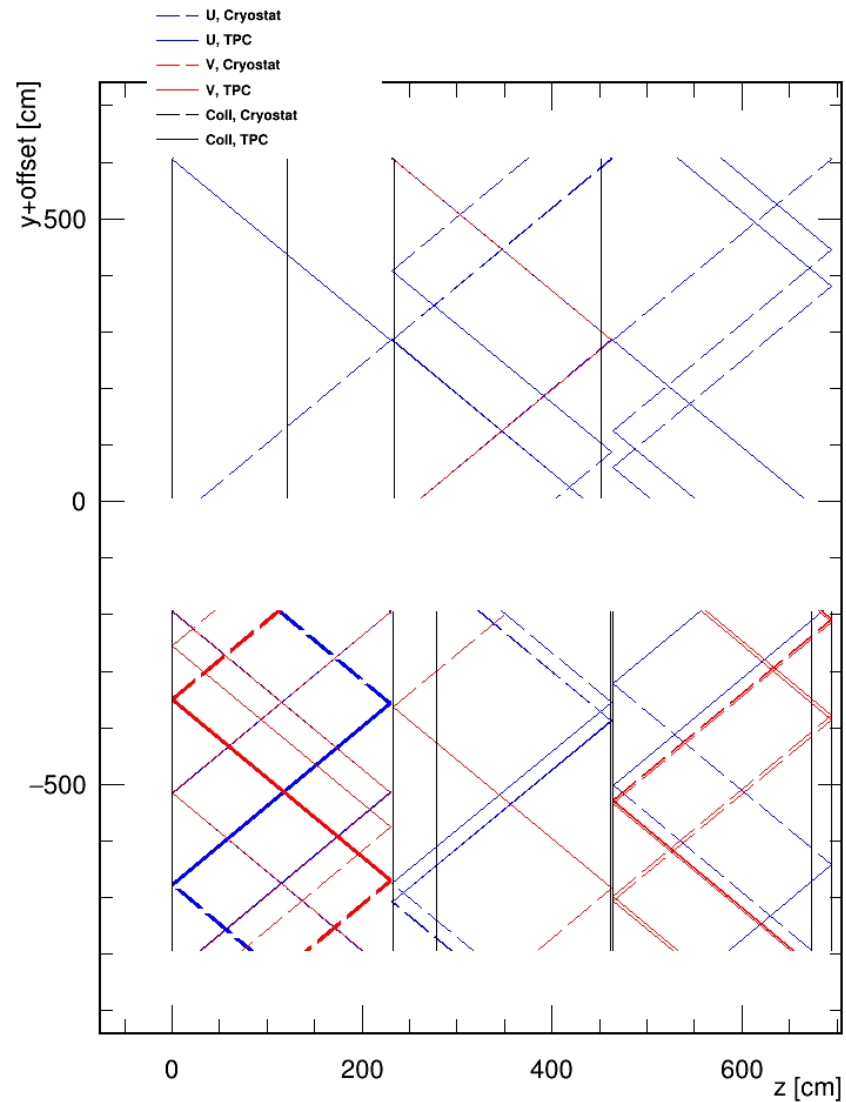


Run 5177 Unresponsive Channels

43 total. List: Offline channel, APA, Plane (0=U, 1=V, 2=Z)

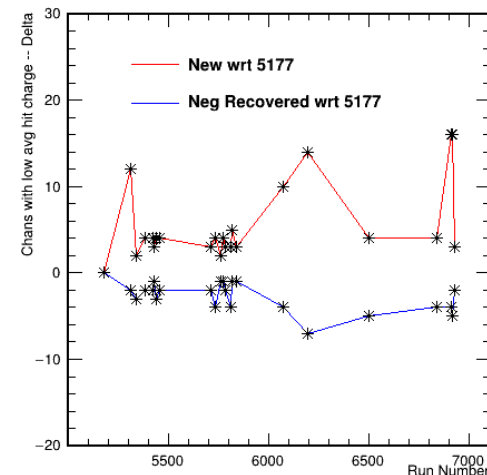
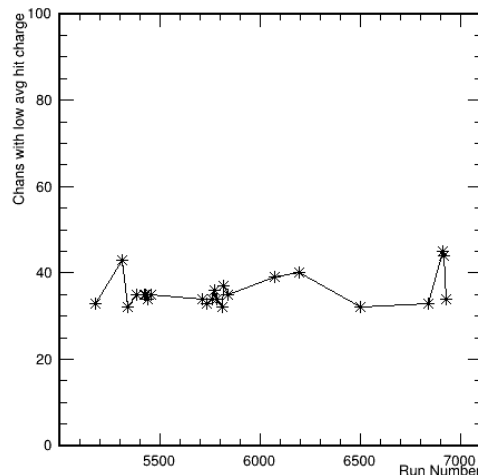
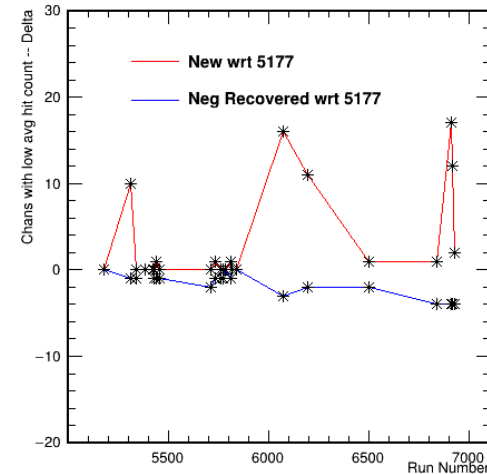
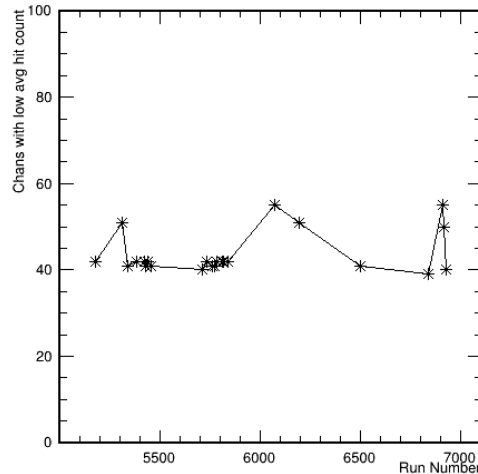
1 3 0	5361 2 0	10800 1 0
2 3 0	5363 2 0	11024 1 0
400 3 0	6132 2 1	11457 1 1
401 3 0	7200 2 2	11459 1 1
800 3 1	7295 2 2	11463 1 1
801 3 1	7679 2 2	11669 1 1
876 3 1	7680 6 0	11679 1 1
1200 3 1	7681 6 0	12320 1 2
2080 3 2	8080 6 0	12756 1 2
2961 5 0	8328 6 0	12799 1 2
4160 5 2	8480 6 1	12801 4 0
4411 5 2	9282 6 2	13001 4 0
4412 5 2	9283 6 2	13081 4 0
5321 2 0	9736 6 2	14879 4 2

Run 5311 Unresponsive Channels



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

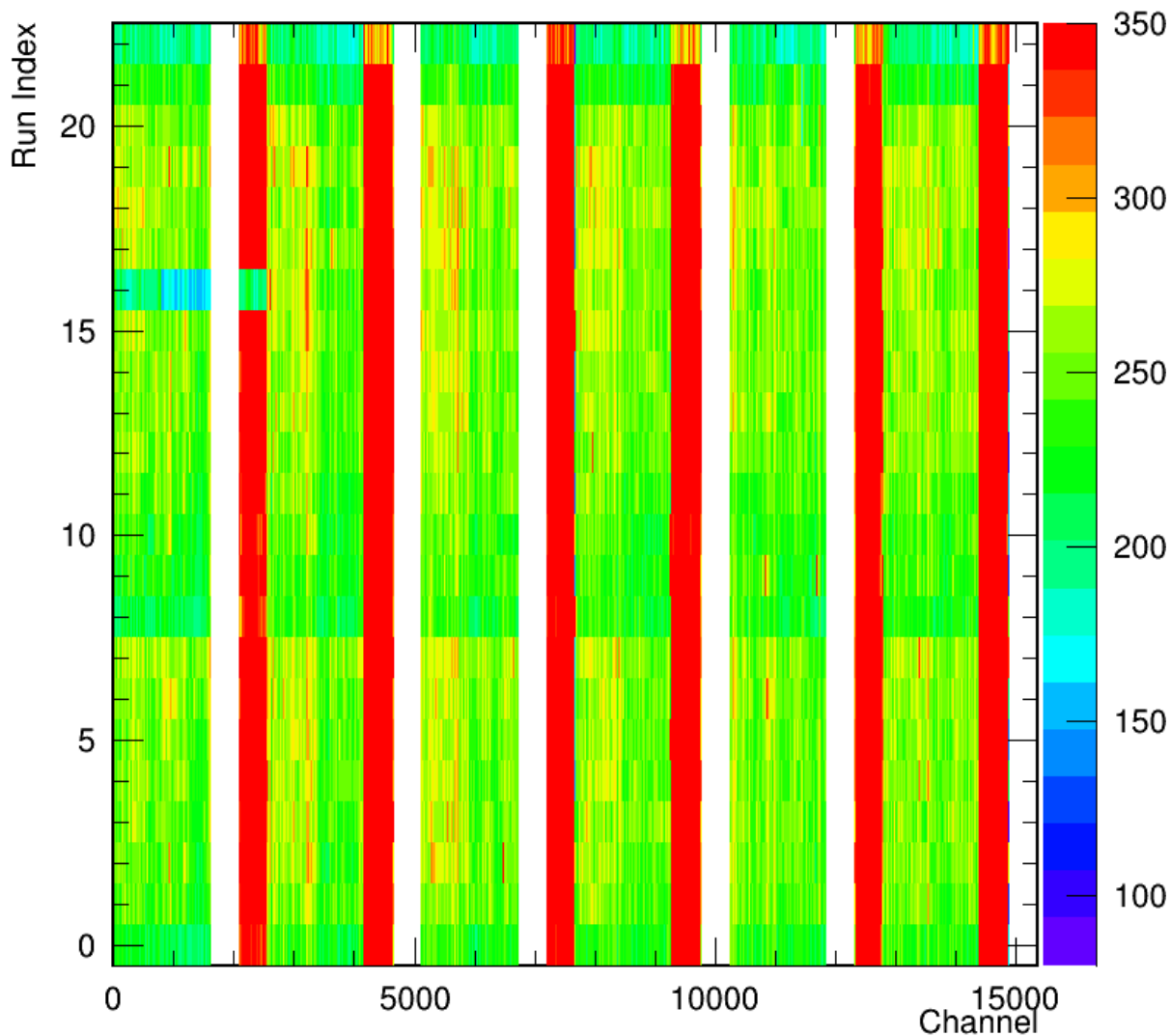


I read just one file from each run, and demanded all channels be represented in the DAQ
using RDTimestamp data products

Average Hit Integral by Channel By Run

Index	Run	Date
0	5177	Oct 11
1	5311	Oct 15
2	5338	Oct 16
3	5380	Oct 17
4	5423	Oct 18
5	5426	Oct 19
6	5439	Oct 21
7	5456	Oct 23
8	5709	Oct 31
9	5735	Nov 1
10	5759	Nov 2
11	5771	Nov 3
12	5784	Nov 5
13	5809	Nov 7
14	5817	Nov 9
15	5835	Nov 11
16	6071	Dec 7
17	6191	Dec 12
18	6497	Jan 21
19	6838	Feb 19
20	6909	Feb 27
21	6913	Feb 27
22	6927	Feb 28

Average Hit Charge



To Do

- Look at pulser runs to distinguish (some) bad electronics from bad connections.
- Run 7504 taken with the pulser on (we requested a DAC value of 3) on April 4 and analyzed the same day by David Adams
- Several new low-RMS (and no pulser response) channels seen in APA 6
- The analysis so far is encouraging that the dead channels are rather stable, though the new ones in 7504 are disturbing.
- The fact that the new dead channels in run 7504 do not respond to the pulser points to an electronics issue and not the APA.