

Automatic Bad Channel Finder Update

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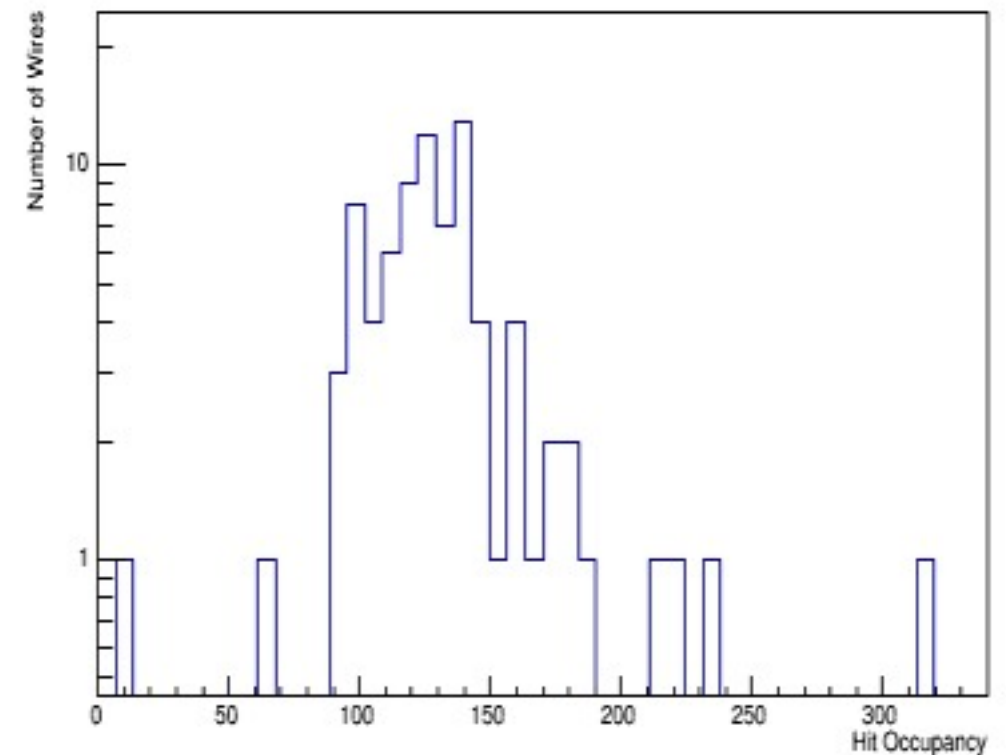
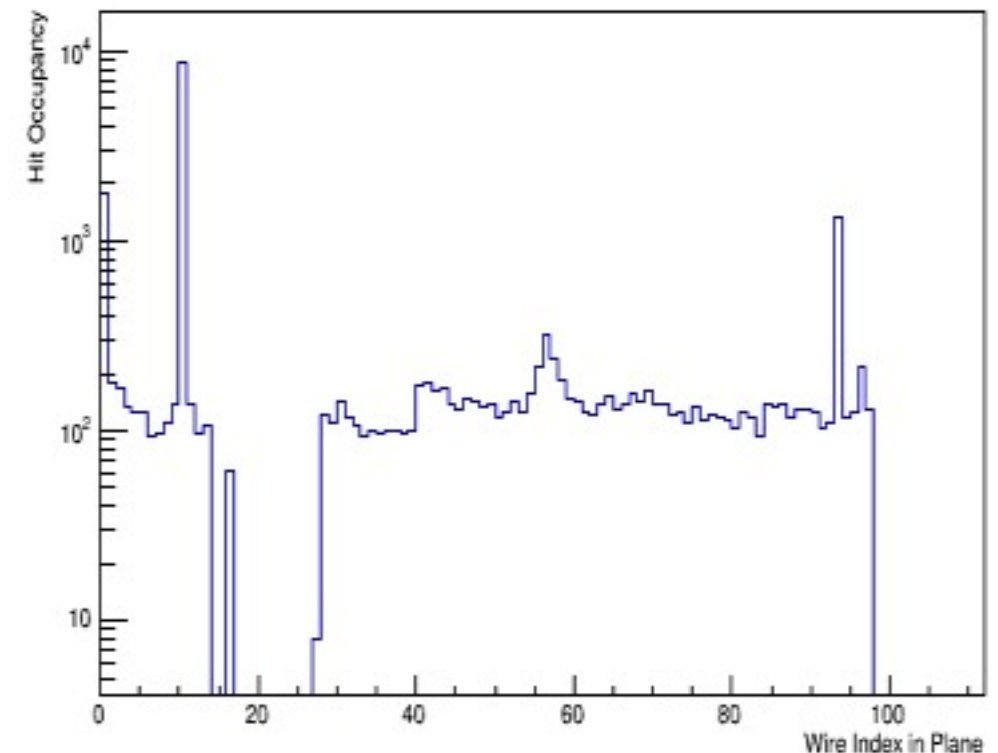
Overview

- 1.) Quick recap on our method for finding bad channels
- 2.) Time evolution of collection plane bad channels
- 3.) Tweaks to method for induction planes
- 4.) Preliminary induction plane bad channel results
- 5.) Future work

Bad Channel Finding Method: Recap

Large-statistics approach to bad channel finding:

- 1.) Take run of >100-ish events, each with 1-3 CR muons.
- 2.) Run the reco chain up to hitfinding.
- 3.) For each TPC's collection plane, plot the total number of hits on each channel→
 - should be roughly flat for our triggered CR muon events
- 4.) Plot the channel occupancies and fit to a gaussian→
- 5.) Cut channels based on hit occupancy:
 - Dead: hit occupancy = 0
 - Noisy: hit occupancy is >5 sigma above the mean
 - Quiet: hit occupancy >0, but <0.1*mean
- 6.) Otherwise, channel is good



Collection Plane Bad Channel Time Evolution

Big questions:

- Will a single set of bad channels suffice for all runs?
- If not, how many runs will a single set of bad channels reasonably represent?
- Do we have to create a database for bad channel numbers?

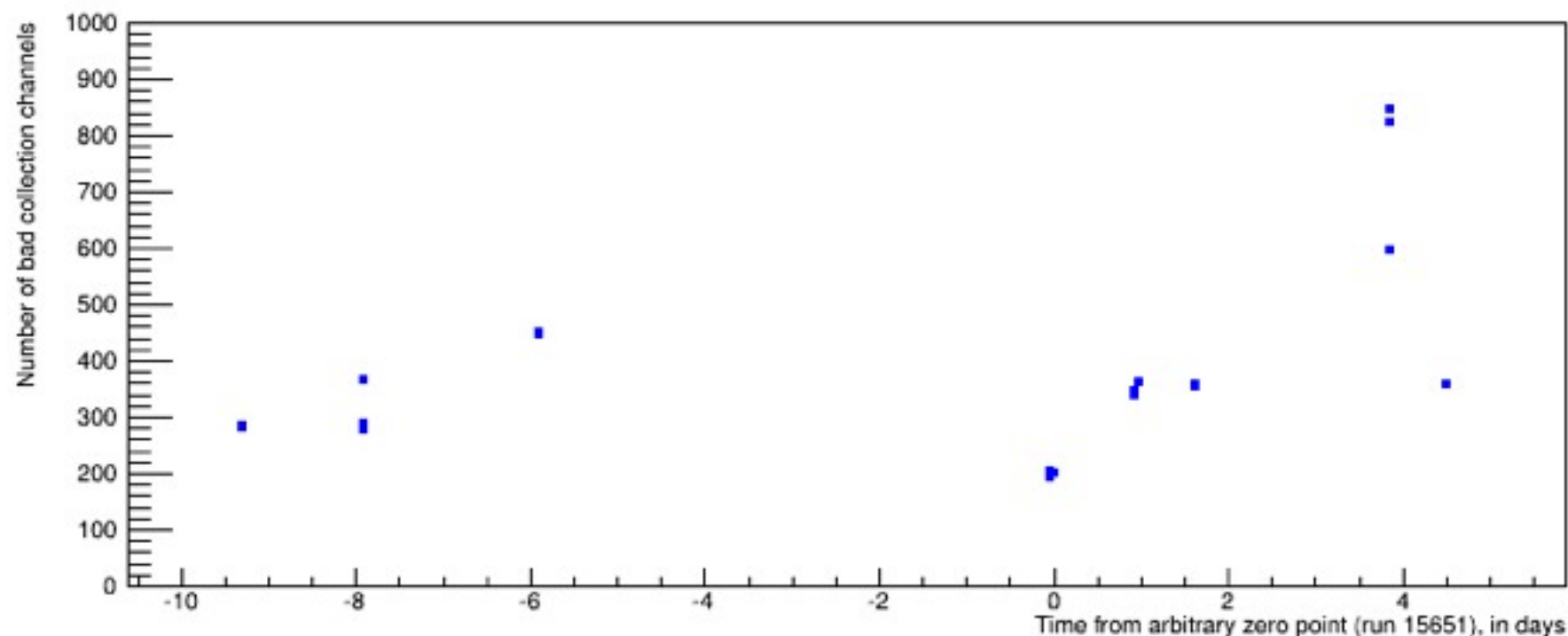
Looked at several sets of adjacent runs to characterize bad channel time evolution.

Adjacent runs used because:

- Wanted to see how bad local fluctuations in the bad channel lists were
- Wanted to find an average to use in long-time comparisons

First example: total number of bad channels (all TPCs)

Note: total # of collection wires: 896



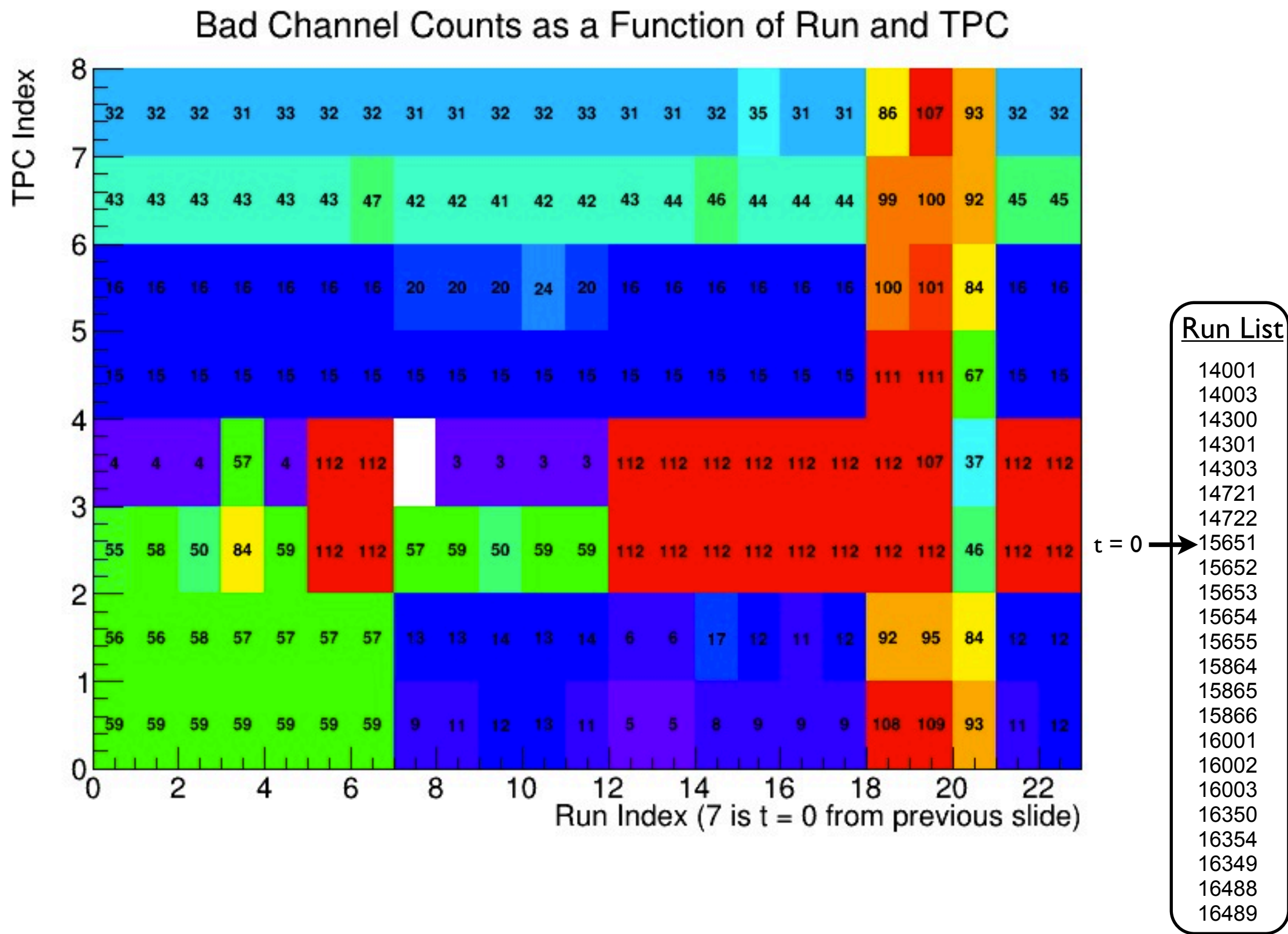
Run List

14001
14003
14300
14301
14303
14721
14722
15651
15652
15653
15654
15655
15864
15865
15866
16001
16002
16003
16350
16354
16349
16488
16489

t = 0



Total bad channel number is a little opaque, so let's stratify by TPC:



Induction Planes: Methodology

Slight tweaks made to method for induction planes because odd/even TPCs share same channels:

- Now we arbitrarily ignore all LArSoft wires on even-numbered TPCs
 - Consider all wires on the odd TPCs' induction planes up to the point where channel number starts repeating.
- + 144 unique channels per APA plane

Other than that, method is the same.

Induction Planes: Preliminary Results

Ran on a couple of runs to check time evolution (runs spaced 1 day apart)

U-Plane Bad Channels

	Run 15651	Run 15865
TPC 0/1	14 / 144	13 / 144
TPC 2/3	28 / 144	144 / 144
TPC 4/5	14 / 144	14 / 144
TPC 6/7	35 / 144	35 / 144
Total	91 / 576	206 / 576

V-Plane Bad Channels

	Run 15651	Run 15865
TPC 0/1	22 / 144	17 / 576
TPC 2/3	37 / 144	144 / 576
TPC 4/5	13 / 144	13 / 576
TPC 6/7	47 / 144	43 / 576
Total	119 / 576	217 / 576

Consistency in time looks similar to the trend for the collection (W) plane, but further runs are necessary to confirm.

- For most TPCs, expecting rough consistency in bad channels might be reasonable.

Suggestions for Future Work

Collection planes show some consistency in the number of bad wires identified.

- Small variations exist from run to run, but if we're willing to pay a small price in accuracy, we could use this to reduce the work necessary for a bad channel database.
- If we're able to identify a good run list, we can hone/direct our automated bad wire finding.

Induction planes are a work in progress.

- So far, we have rough consistency in the induction planes, but we need to run on more data.
- Finding a generally good run list would also benefit this task.