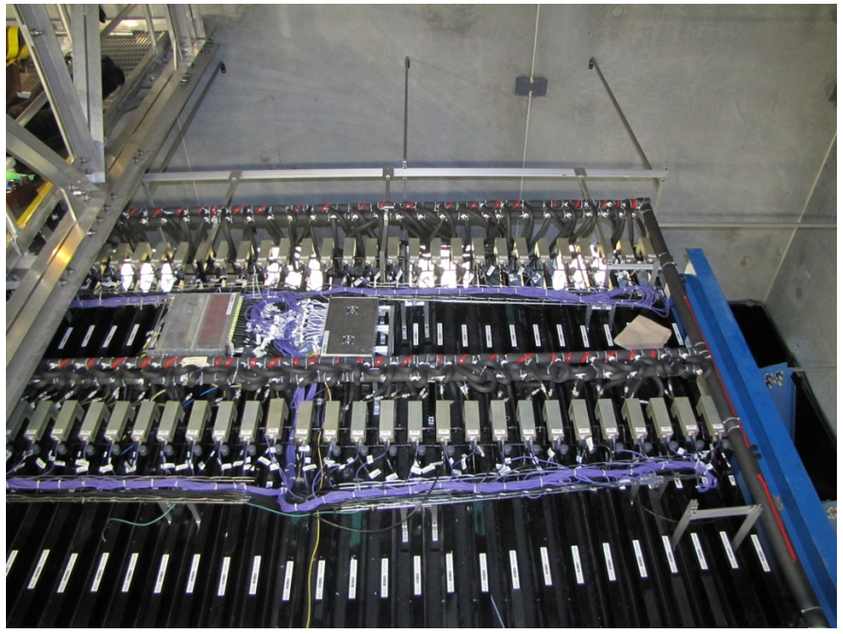
Status of NOvA NDOS



Jonathan Paley
Argonne National Laboratory

Run Coordinator Report
February 21, 2011

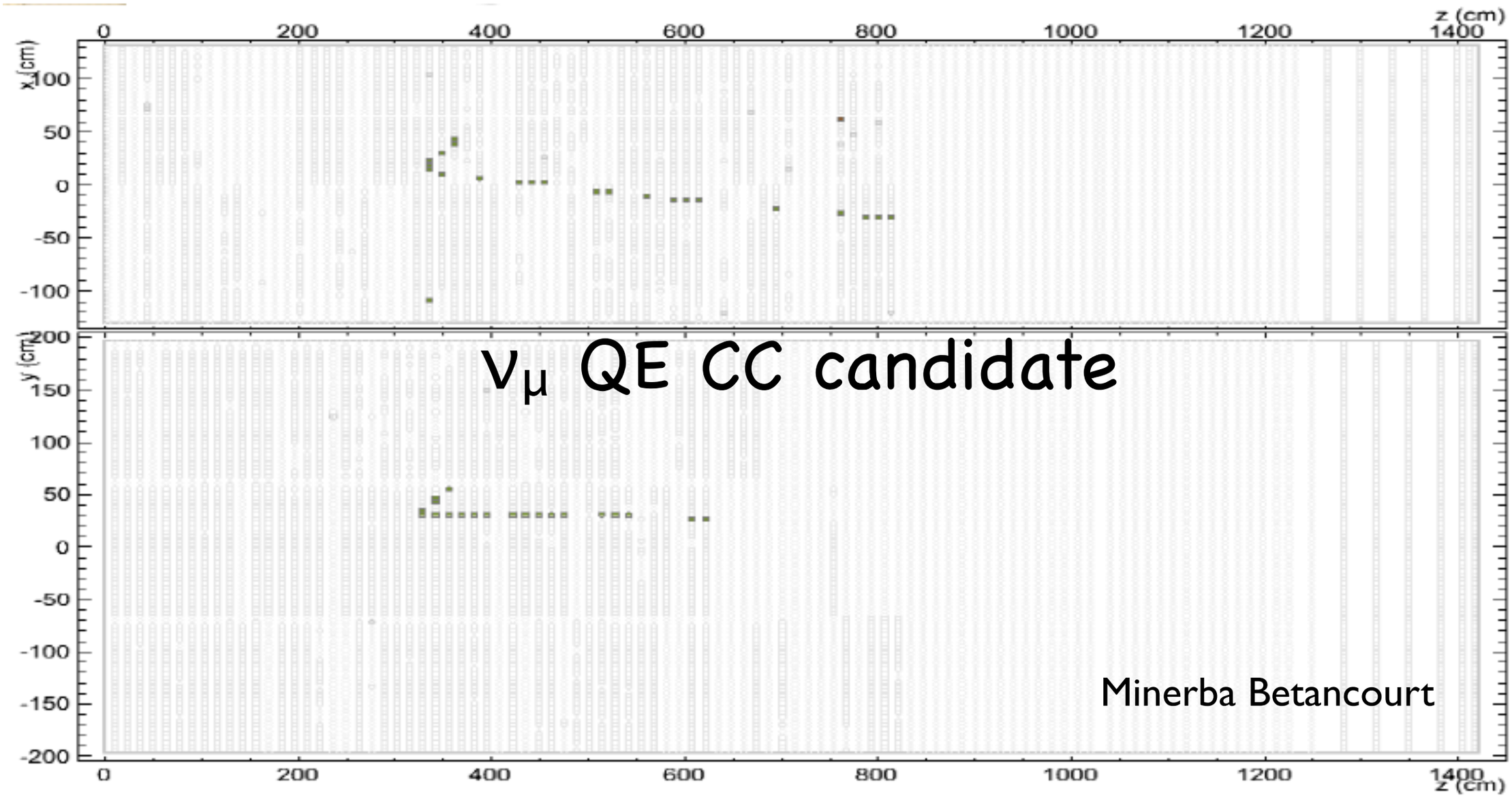
Commissioning Summary

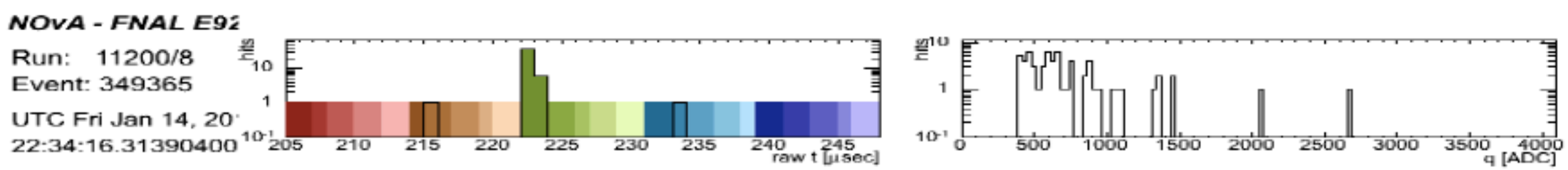
- A great deal of progress has been made since the last AEM report:
  - Dec. 15, 2010: confirmation of observation of NuMI events!
  - DAQ stability has improved enormously (taken from comments by shifters, so it must be true!).
  - DCS environmental data are being collected, monitored and written to the dB.
- Action items for commissioning:
  - Channel recovery: many channels are masked out of DAQ readout due to high noise rates. More on this later.
  - APD cooling: we currently are not cooling APDs on NDOS, although tests indicate that the cooling works as expected. Tools to monitor temperatures are in development.
  - Gain-based channel thresholds (current global threshold is ~1/2 MIP signal). Tools are in place for this.

Many thanks to the NDOS installation and commissioning crews for their outstanding work!

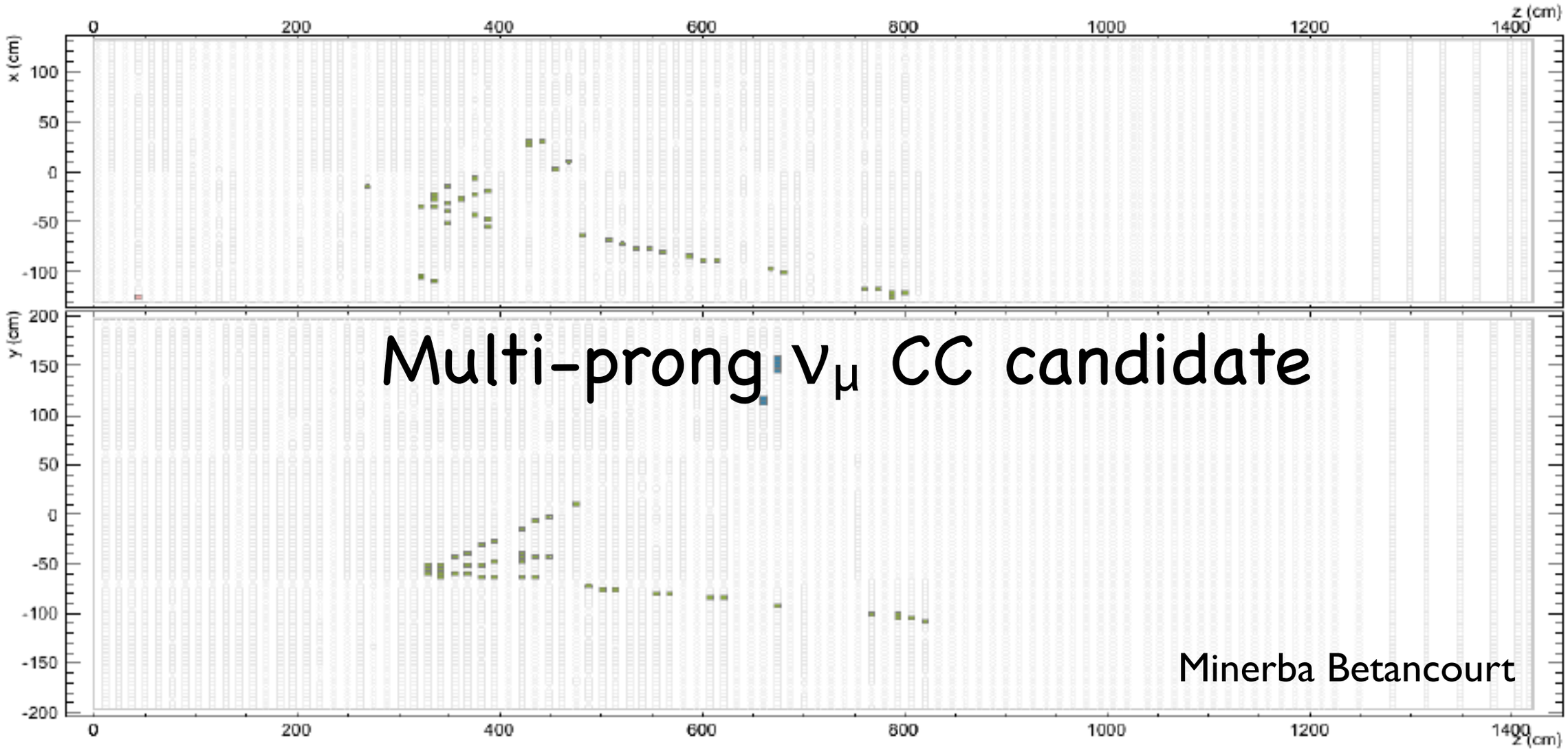
- Minerba Betancourt (UMN-Twin Cities)
- Kurt Biery (FNAL)
- Gavin Davies (Iowa St)
- Chad Johnson (Indiana)
- Sue Kasahara (UMN-Twin Cities)
- Rick Kwarciany (FNAL)
- Mark Messier (Indiana)
- Leon Mualem (CalTech)
- Mat Muether (FNAL)
- Andrew Norman (FNAL)
- Denis Perevalov (FNAL)
- Ron Rechenmacher (FNAL)
- Peter Shanahan (FNAL)
- Rick Tesarek (FNAL)
- and many others from FNAL CD CET, CD ESE, etc.

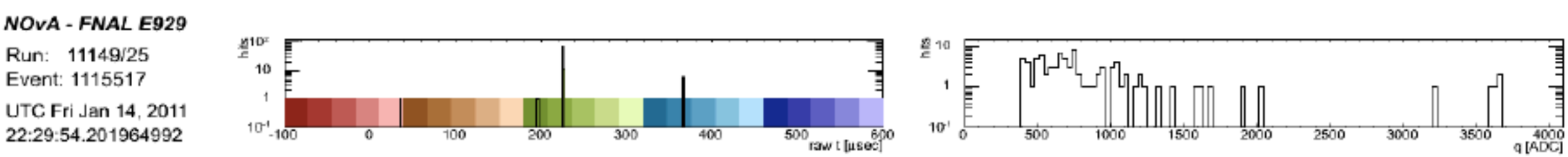
Neutrino Events in the NDOS



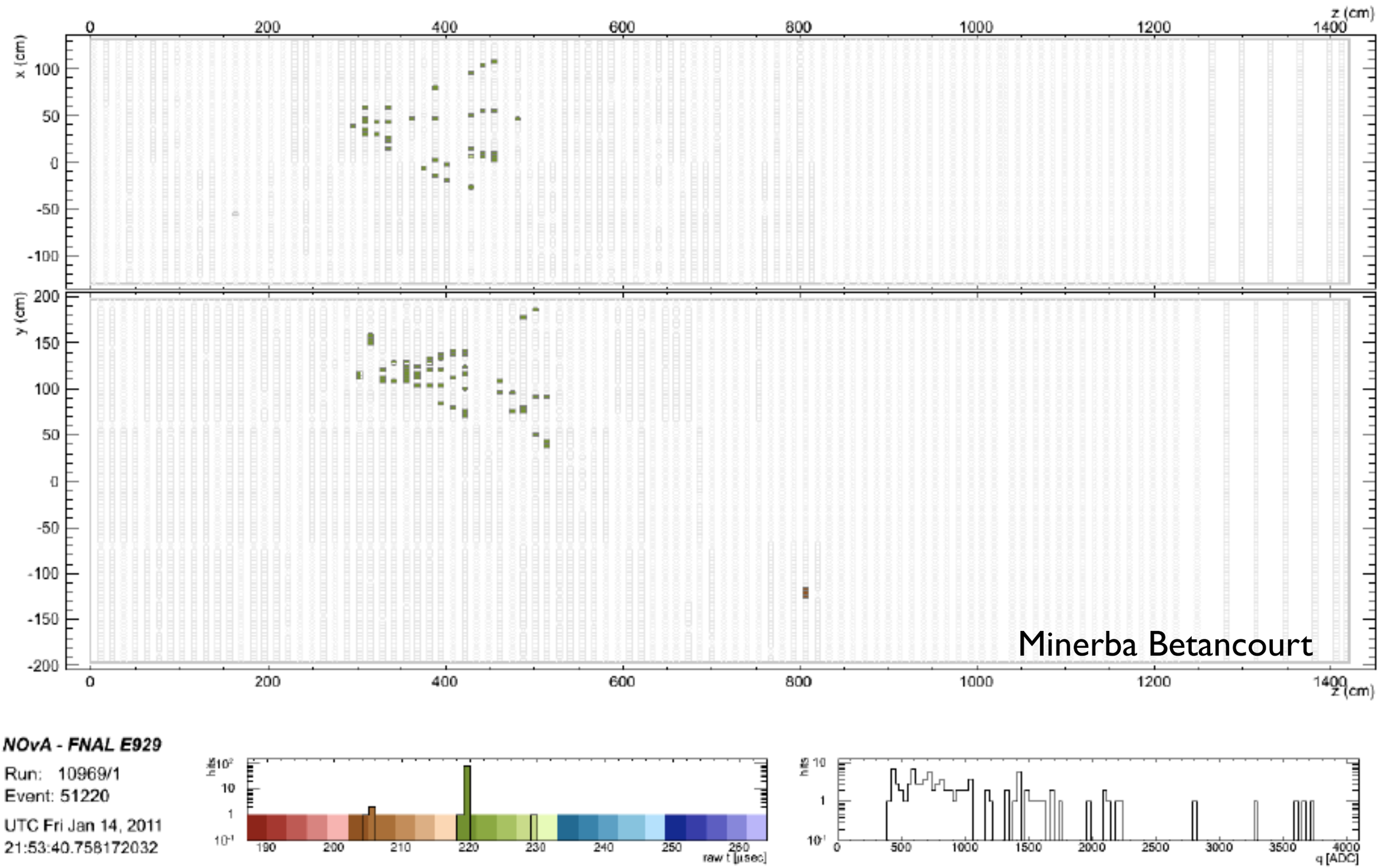


Neutrino Events in the NDOS

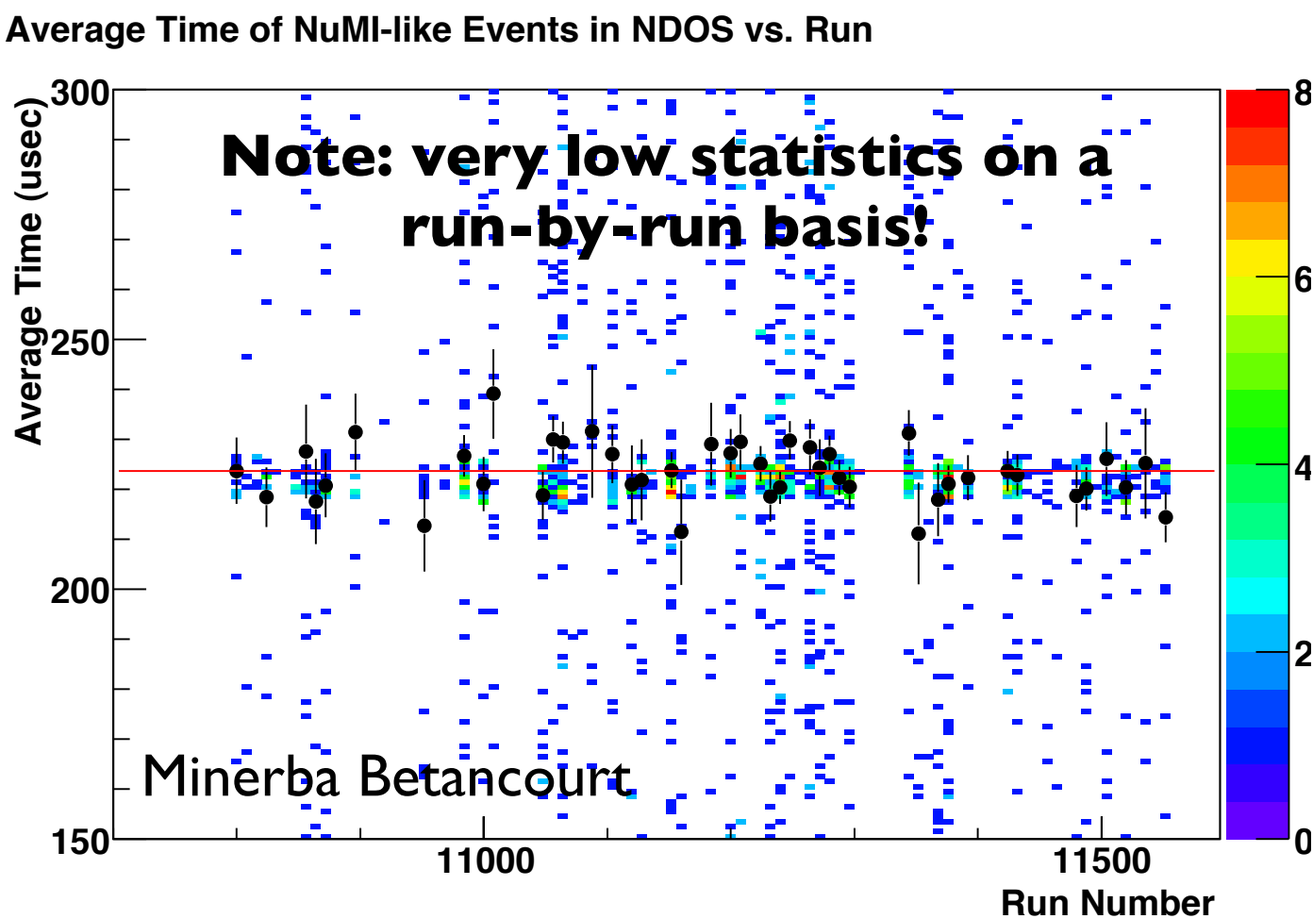


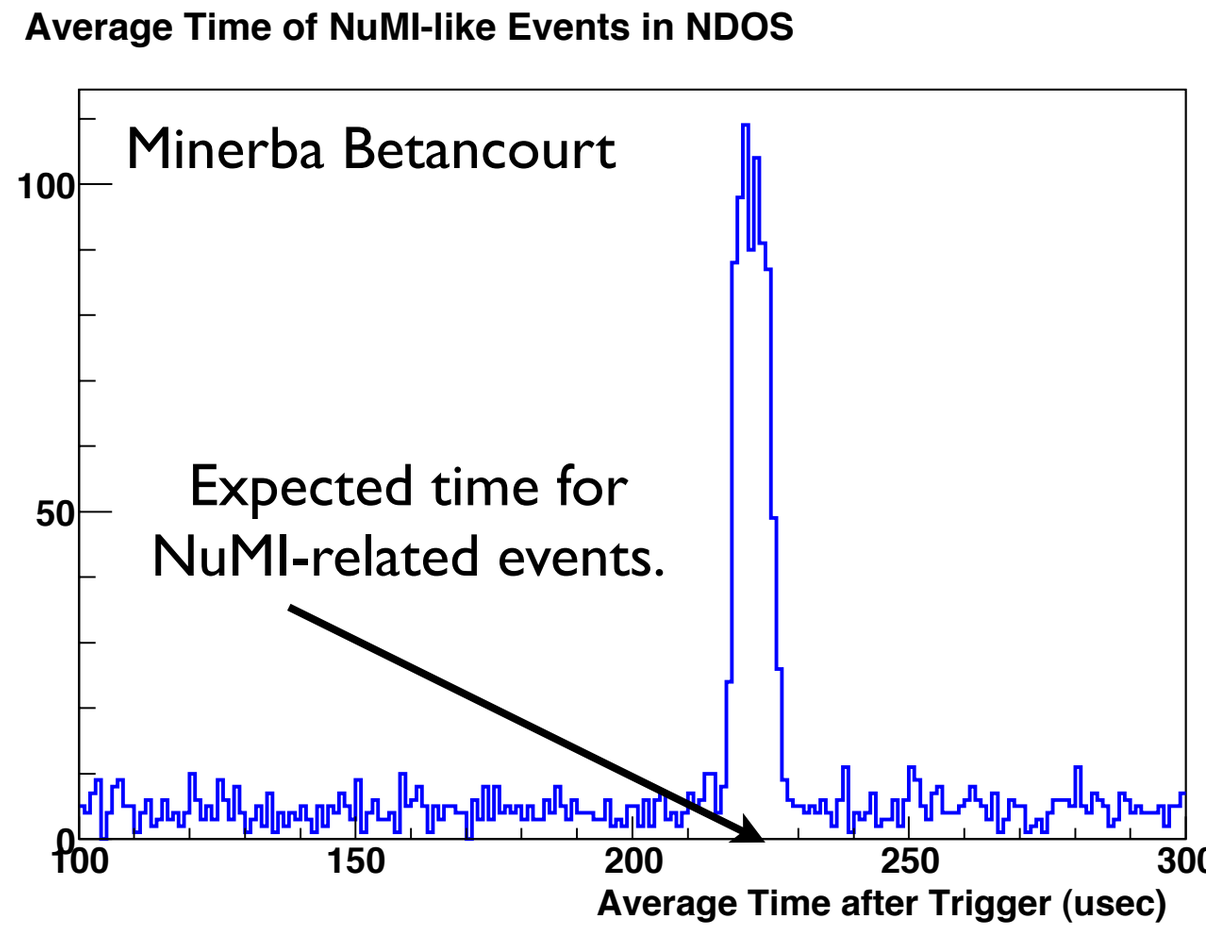


Neutrino Events in the NDOS



Neutrino Events in the NDOS



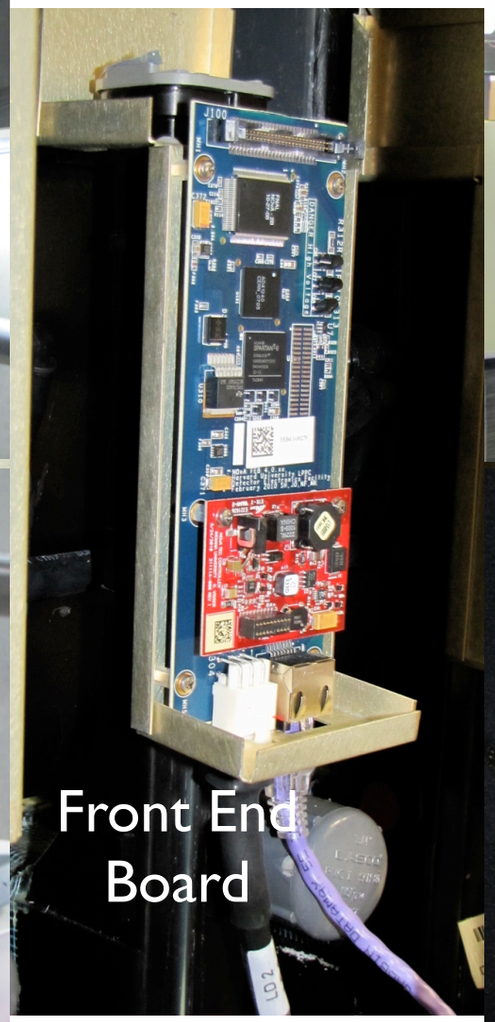


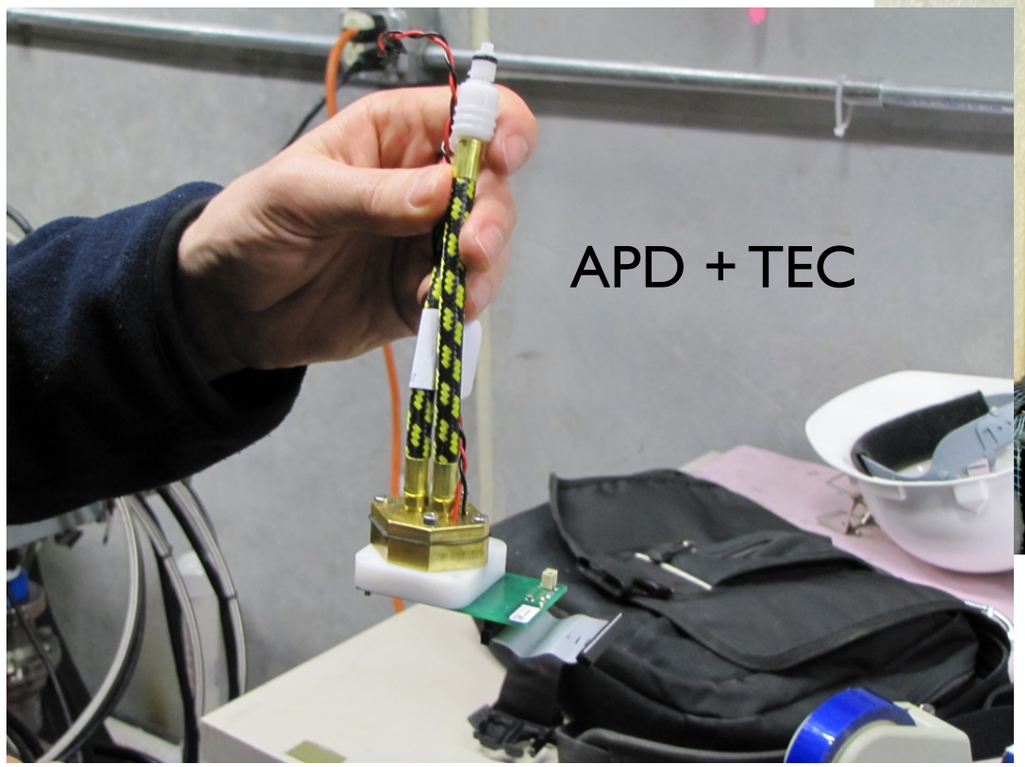
- Neutrino events are clearly observed in the NDOS
- Peak in time distribution found where NuMI events are expected.
- After much searching, Booster neutrinos not yet observed; these are being actively pursued by a dedicated group of both DAQ and offline analysis experts.

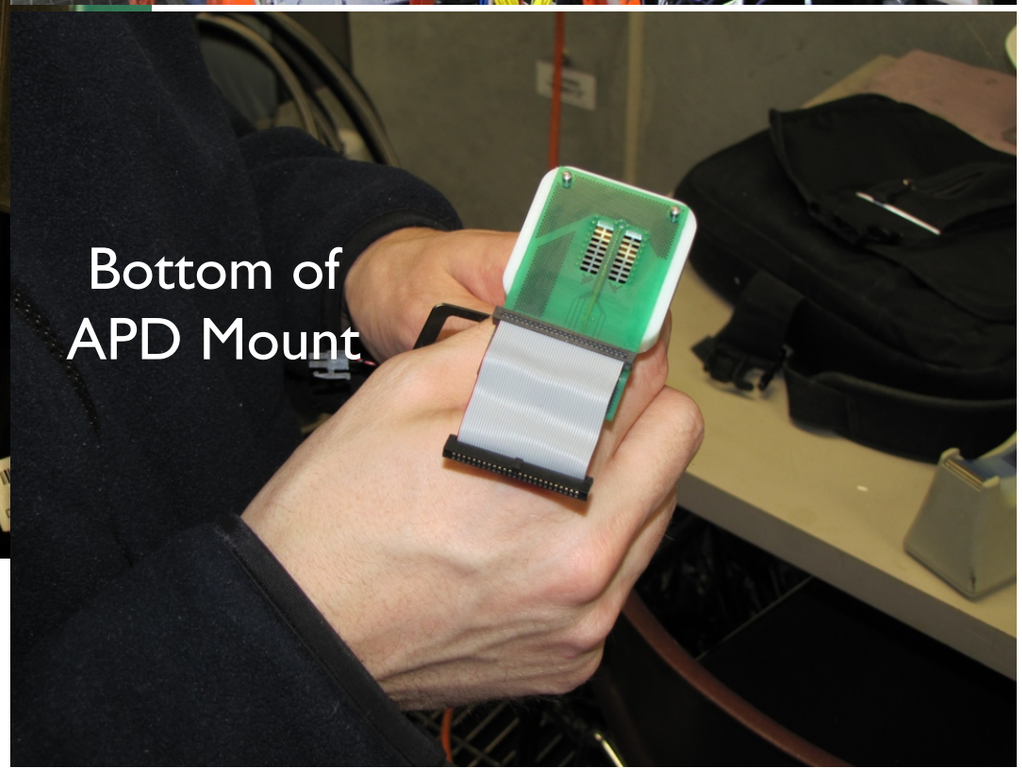
Channel Recovery

- Many FEBs have been removed from the DAQ readout because they were found to produce too much noise.
- We cannot claim we know the cause of all of the problematic FEBs, but:
  - Some APDs and fibers were found to have oil on them, some APDs were found to be very dirty, some APDs were found to have imprints of fibers on them.
  - ~60 oily/dirty APDs have been removed from the detector and replaced. The WLS fibers were cleaned, and most oily APDs were replaced by new APDs (nearly all of which are reading out fine since).
  - A handful of APDs were also cleaned and reinstalled, but these have shown degradation in noise levels over time since reinstallation.
- Pedestal scans are used to identify bad channels; we see large changes in the bad channel map from one scan to another. This is being investigated.

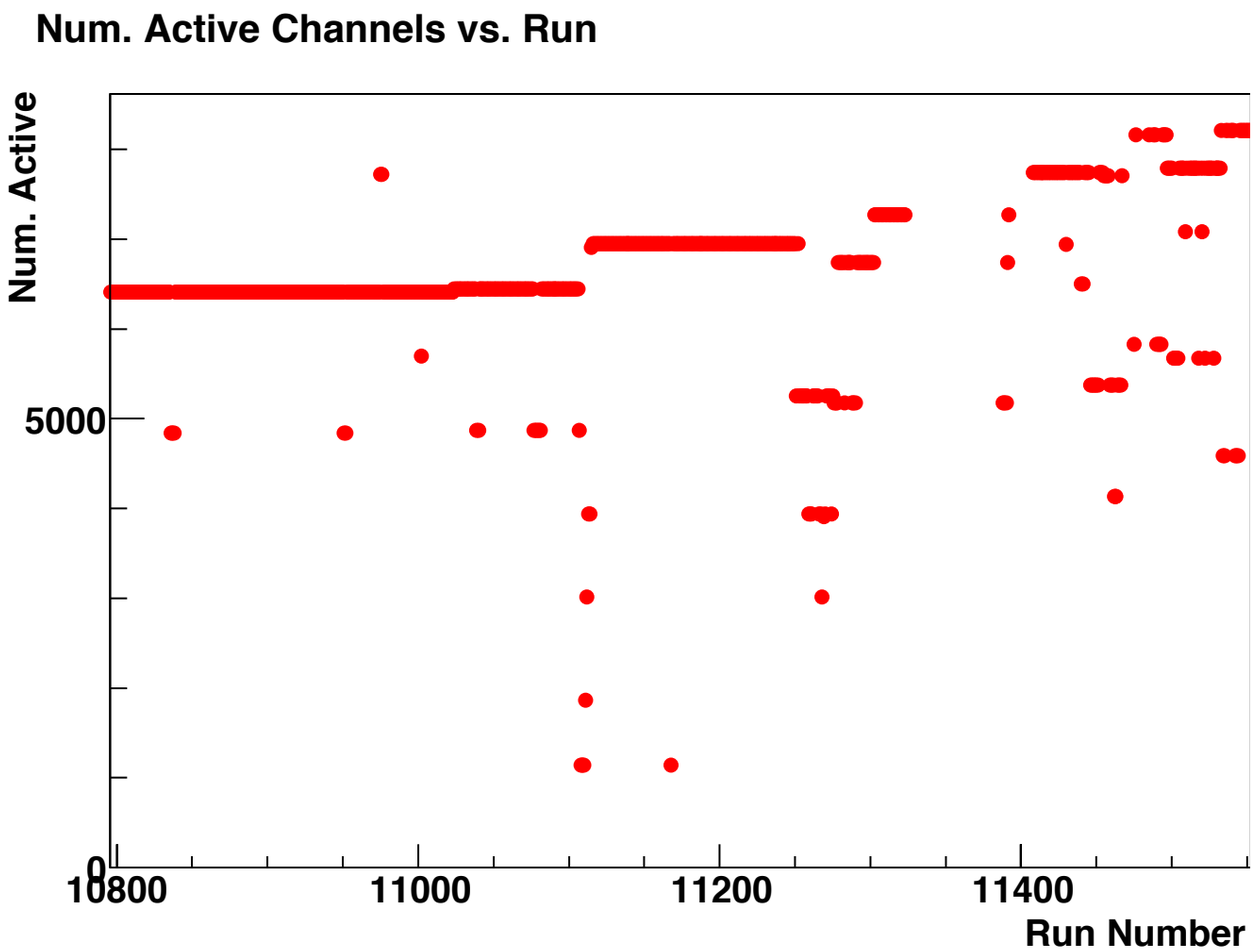
NDOS Channel Recovery

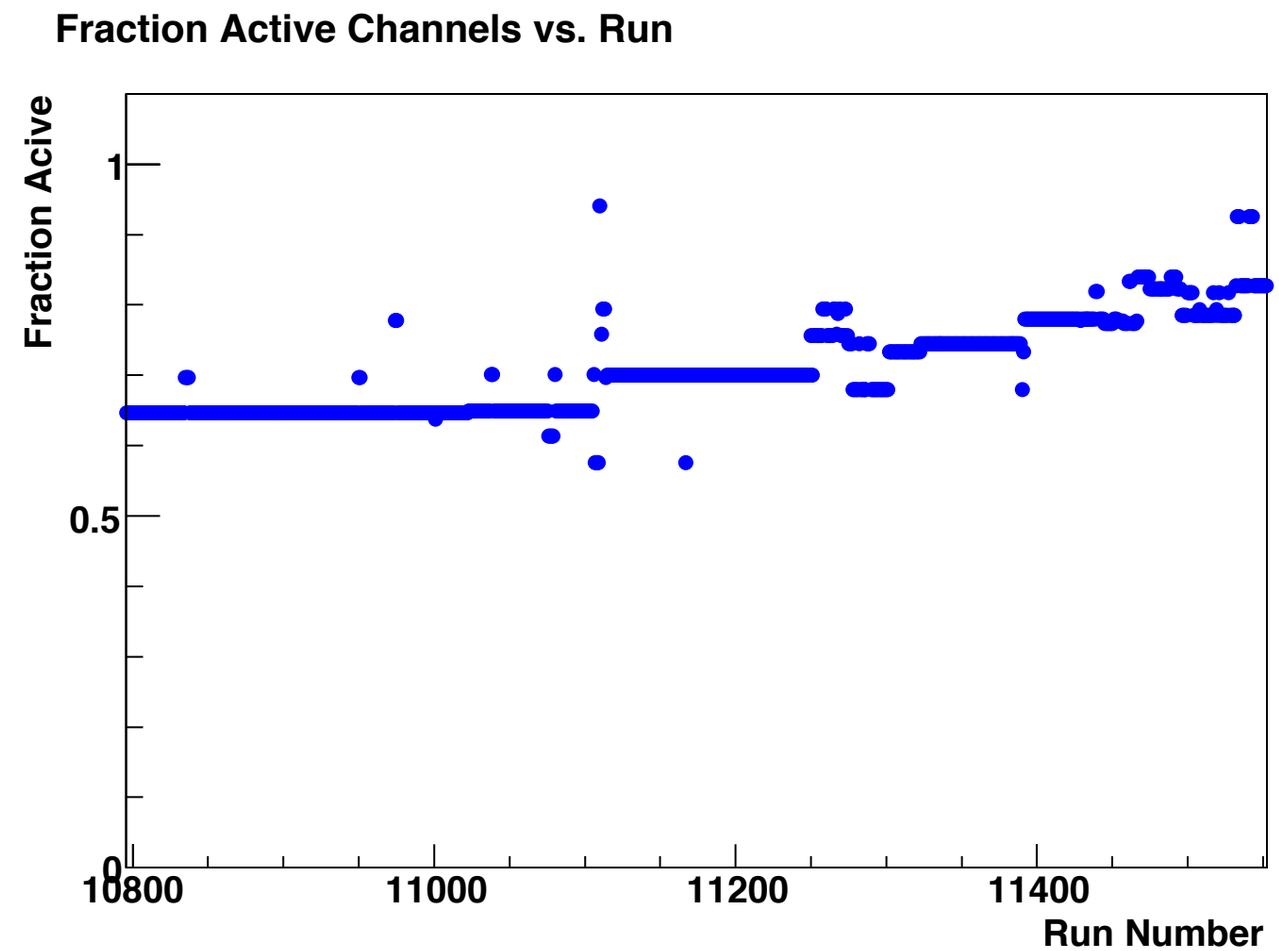






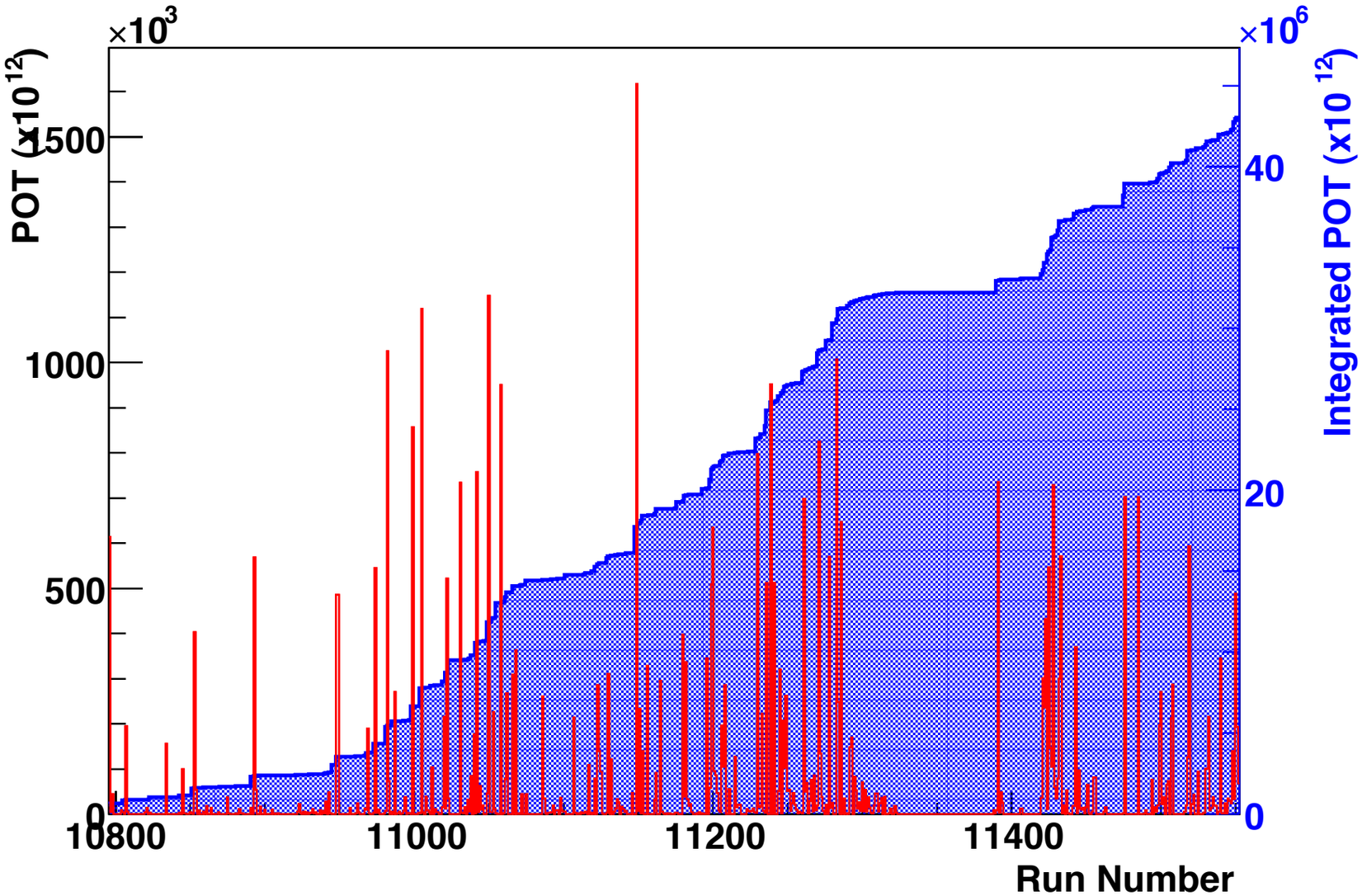
NDOS Channel Recovery





- Overall channel count is increasing over time; sudden drops are usually due to entire sections of the detector being left out of the readout for special tests or during channel recovery tasks.
- Fraction of active channels vs. run is increasing over time; note that this plot does not include efforts over this past weekend, so fraction is expected to go higher today or tomorrow.

NDOS Live Time



- "Uptime" is a bit hard to define during commissioning; when not collecting data in a "run", we are collecting other, very useful data.

- Show above: NuMI POTs

- I didn't have convenient access to the Booster spill information at this time, expect to have it at the next AEM presentation.

Summary

- Commissioning is progressing well, with huge improvements in the DAQ software (and firmware).
- There are some critical issues that need to be resolved (channel recovery, APD cooling), but good progress is being made on these fronts.
- This week's installation and commissioning goals:
  - installation of the Muon Catcher
  - reinstallation of ~20 more APDs (640 channels)
  - many improvements in DAQ software
  - enabling of high voltage regulation on the FEBs
  - implementation of channel-by-channel thresholds (at much lower values than the current thresholds).