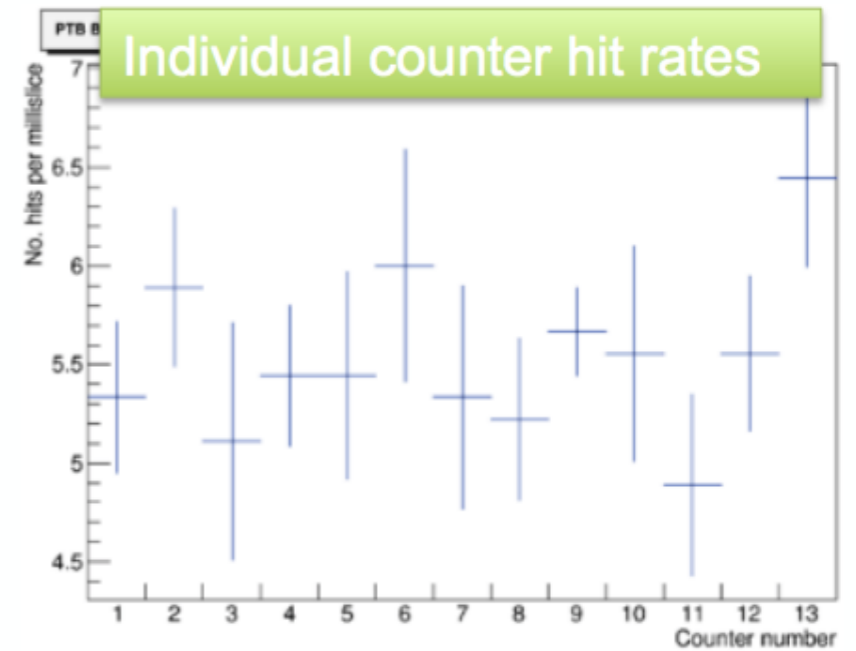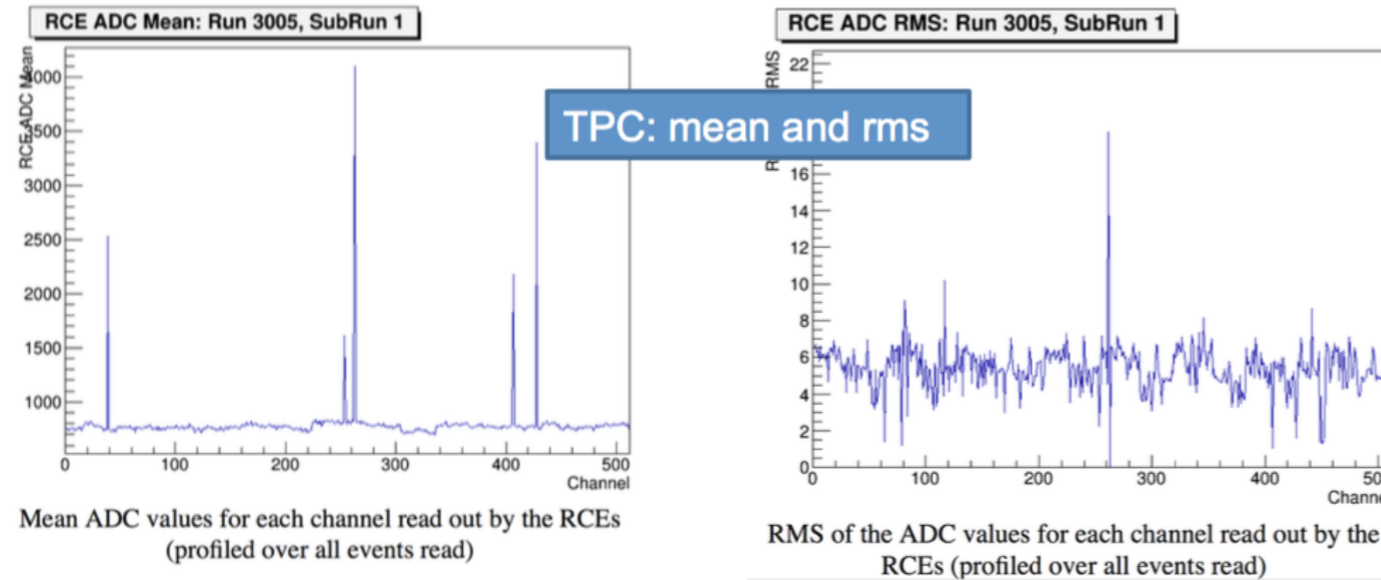# First look at the monitoring metrics for the ProtoDune

Voica Radescu, Dorota Stefan, Robert Sulej, Nektarios Benekos
see also document under preparations from Maxim Potekhin [DocDB1861]

Monitoring @ Dune35t

- Monitoring tools serve the purpose of instrumental operation checks but also assurance of getting physics data

- Three types of monitoring were used:

  - Online monitoring: immediate (<<1min) - displayed on the web
    - updated initially every 30s after start of run (10s takes to save data)
    - during the run every 500s
    - at the end of the run

  - Nearline-monitoring (1-100 min):
    - Provide close to real feedback on simple detector metrics which evolve over fixed time interval

    - running LArSoft analyser module over each subrun

  - Offline-monitoring (>>100 min, daily)

Online Monitoring at Dune35t

- ADC Mean and RMS (PDS, TPC): high rates, out of sync ..

RCE ADC Mean: Run 3005, SubRun 1

Mean ADC values for each channel read out by the RCEs (profiled over all events read)

RCE ADC RMS: Run 3005, SubRun 1

RMS of the ADC values for each channel read out by the RCEs (profiled over all events read)

TPC: mean and rms

Individual counter hit rates

- Number of subdetectors present in each event in data

- Subdetectors with data per event/run

- Size of data files made by DAQ for last n runs

- Count rates (external scintillation counters)

- Crude event display:

  - based on raw ADC values to provide as much information as possible

  - can see gaps in between APAs

- Wire plane transparency

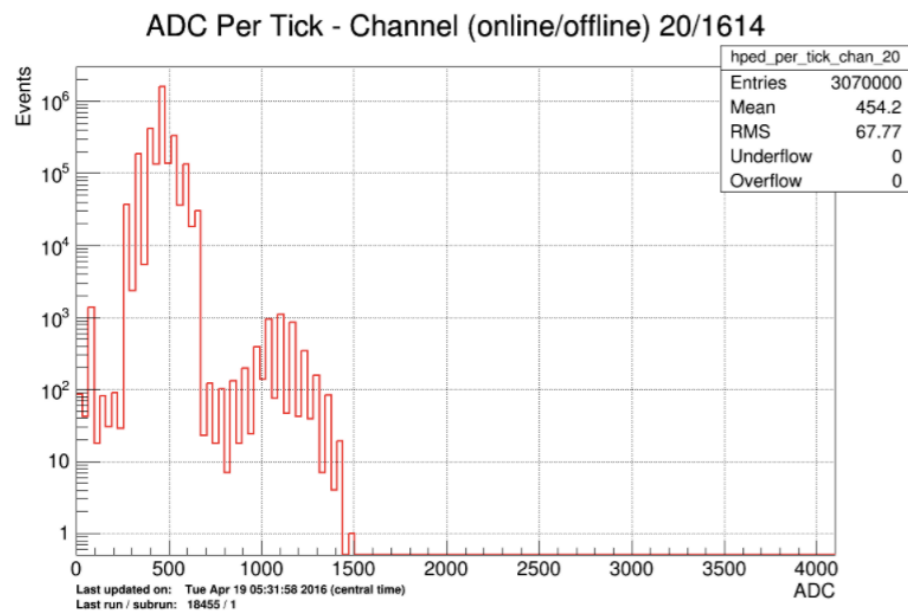Looking down from the top of the TPC
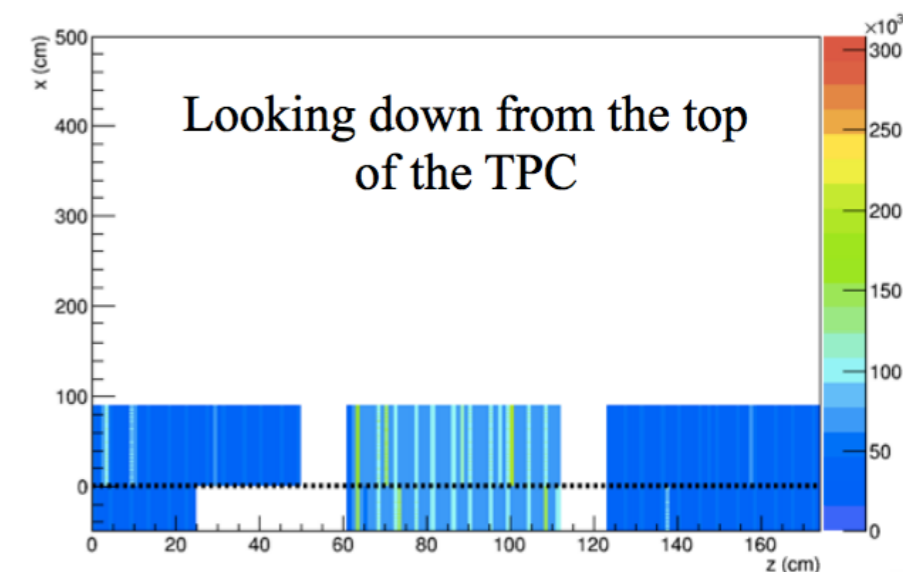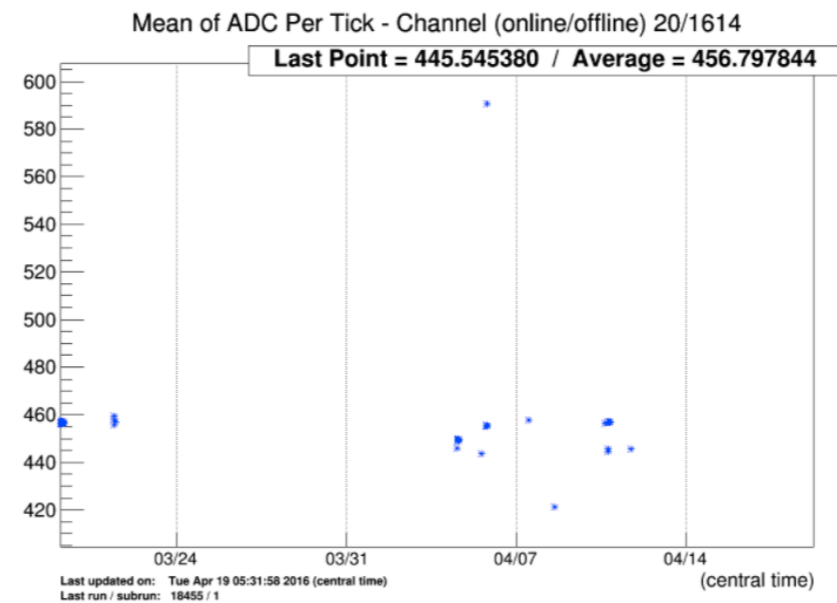
Nearline Monitoring

- ADC spectra from all ticks on channel 20 during a month

- Mean and RMS of the plot in the left over time (for each subrun)
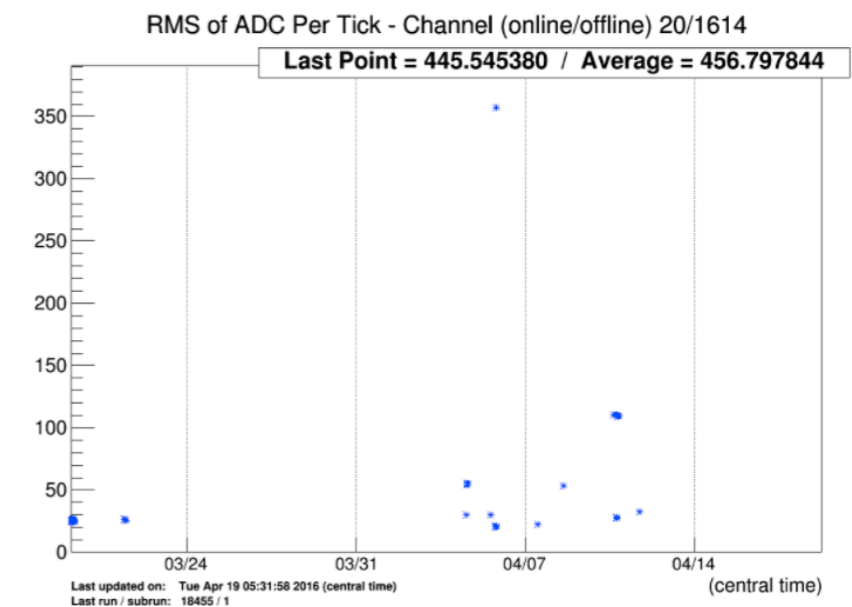
ADC spectrum for channel # 20
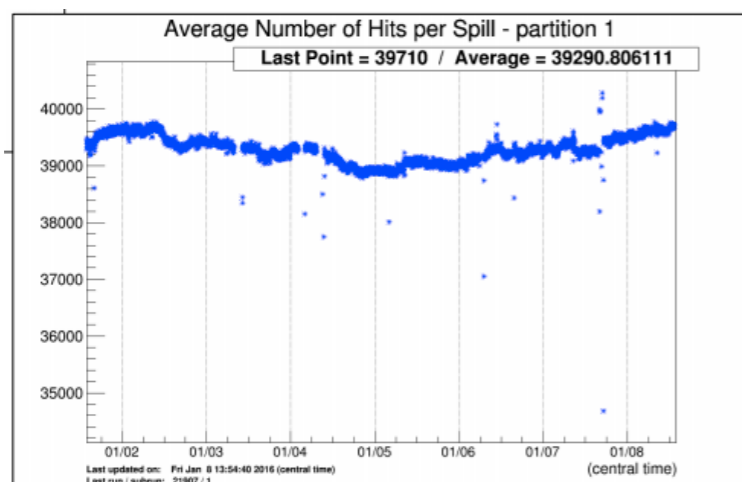
ADC spectrum (APA-3-U-plane).

Mean of the ADC spectra for channel # 20 (APA-3-U-plane).

RMS of the ADC spectra for channel # 20 (APA-3-U-plane).

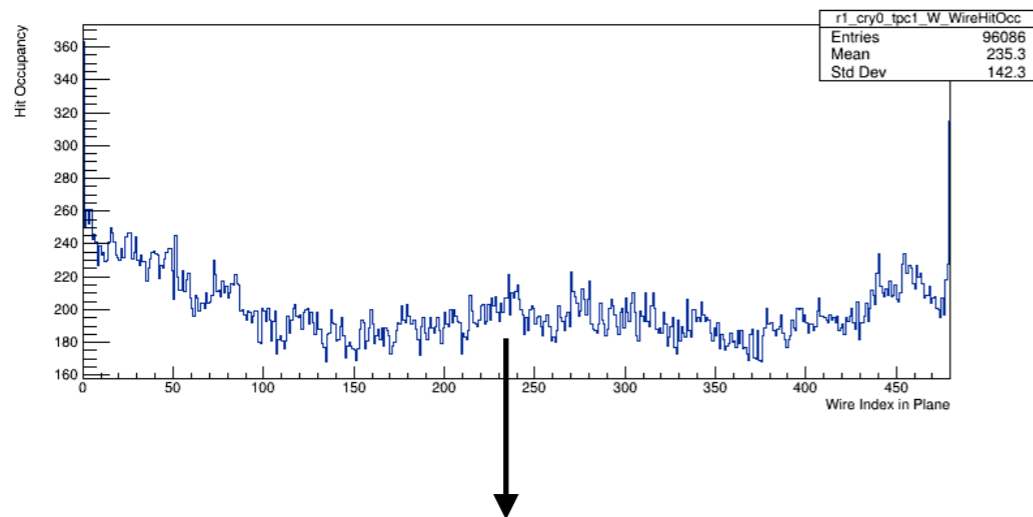- Average number of Hits per Spill:
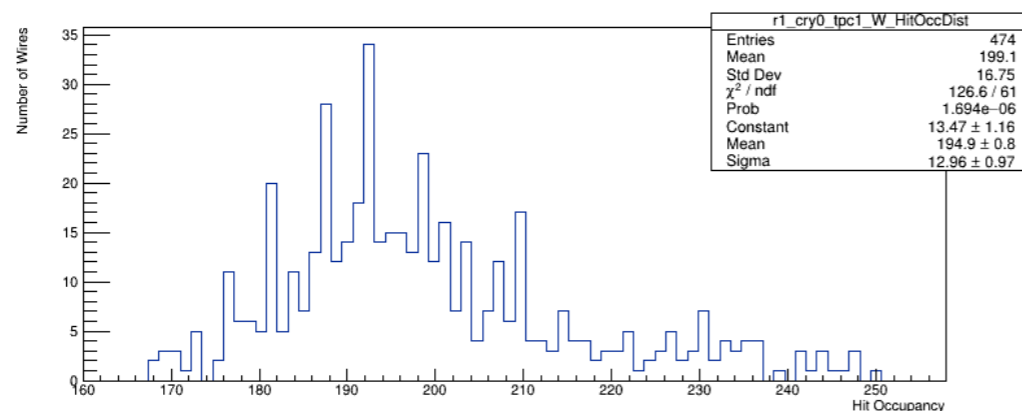

4

Available tools on LArSoft

- Automatic Good Channel Finder (Ryan Linehan and Mark Conevry):
  - it provides a good/bad channel lists for each run
  - it can be used as an assessment of the channel status as function of time (run number)
  - output:
    - root file with hit occupancy plots
    - text files with list of good/bad channels

- NearlineMonitoring (Michael Baird and Jonathan Davies):
  - it makes plots of mean/RMS ADC for a selection of channels

First Look at Good Channel Finder

- It creates plots with Number of wires vs Hit Occupancy and the Hit occupancy distributions:

One can define a criteria by looking at the number of standard deviations away from the mean of a simple gauss fit for the Hit Occupancy distribution (fcl parameter)

Nsigma	Good	Bad
1	3410	2350
3	4197	1563
5	4265	1497

after cut on very noisy wires

The module also returns a list of good/bad runs —> turn into a map to display over runs?

Time of 1 event processing: 12s

Wish list for the online monitoring [<<1min]

- Add the RMS/Mean for ADC counts for the good channels — this is no time consumption
- Try check the clustering algorithm to see how much time it would take
- Separate in different regions:
  - beam region vs non-beam region
- Check outputs of monitoring plots using different simulated files: noise thresholds, beam halo, cosmics, muons, etc ..

- [The work flow is being settled now - discussions with Giovanna&Karol/D&R/Maxim&Brett]