

DQM Preparation

Monitoring Algorithms

Algorithm	Input
Raw ADC histograms	Raw data stream
	Trigger record (HDF5)
Raw ADC mean & RMS	Raw data stream
	Trigger record (HDF5)
Raw ADC Fourier transform	Raw data stream
	Trigger record (HDF5)
Raw ADC frequency by channel	Trigger record (HDF5)

Green =
ready

Red = work
in progress

- Raw data monitoring plots work on fixed sampling rates, interfacing to readout.
- Trigger record plots work from HDF5 files: interface and sampling scheme needs defining.

Raw ADC Histograms

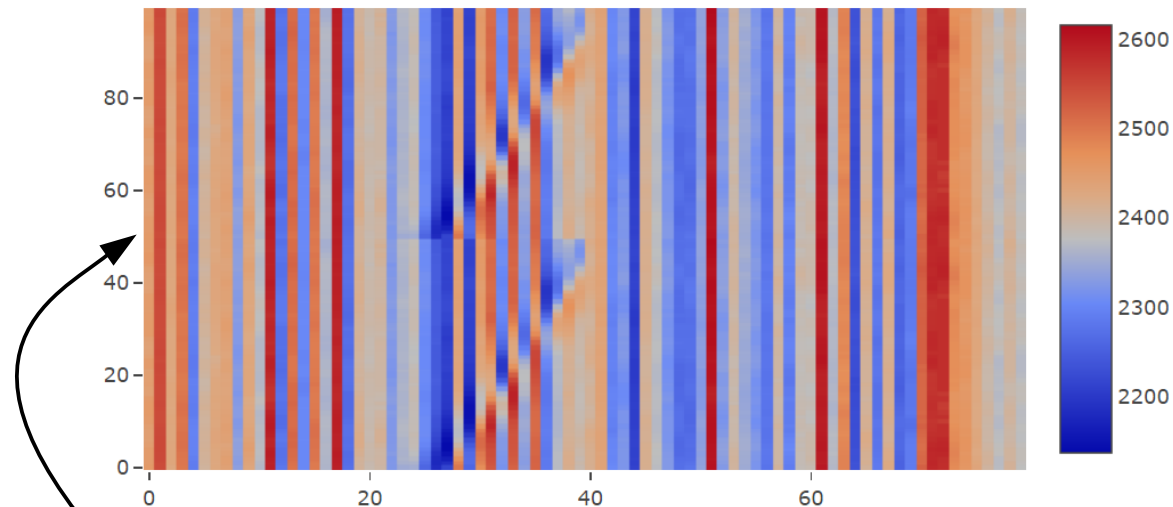
Collects histograms of raw ADC per channel (time window 100 frames) and creates heat map.

X: Channel no.

Y: Time

Z: Sum of histogram

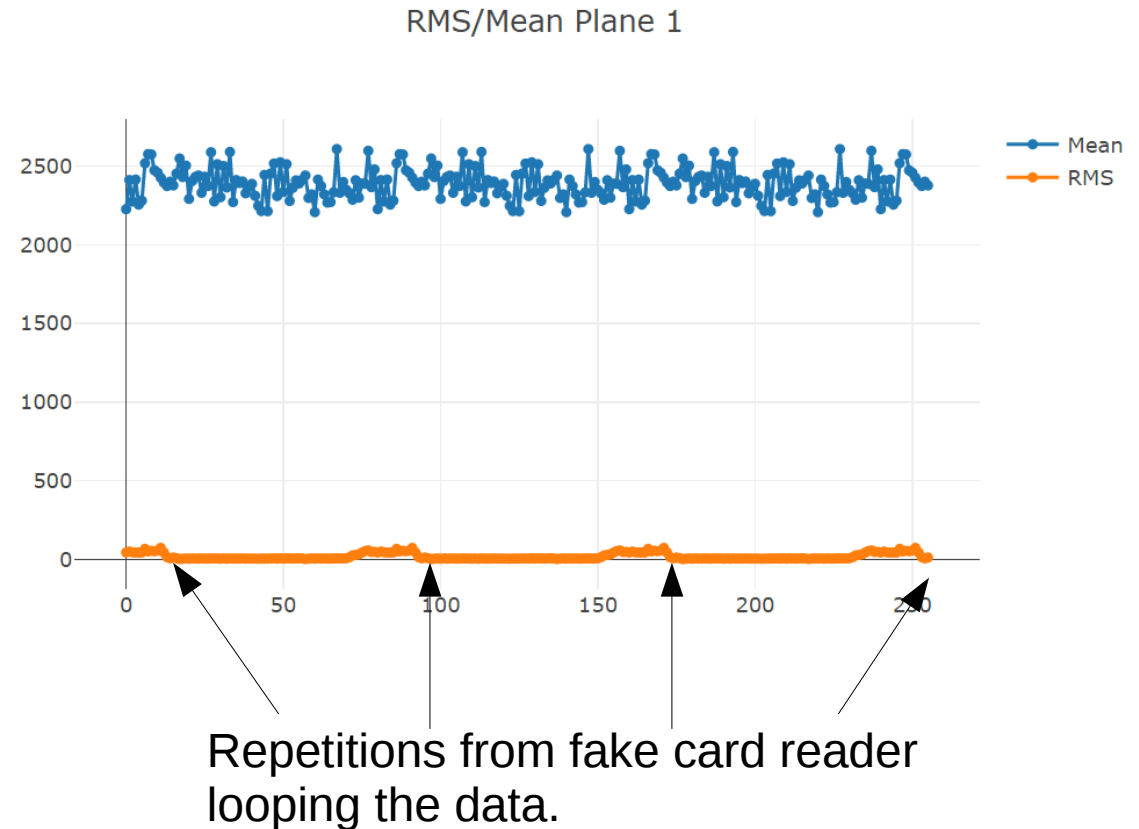
Event display Plane 1



Repetition at Y = 50 comes from current input having same APA # (\Rightarrow same channels) for 2 different links.

Raw ADC Mean & RMS

Tracks mean and RMS
over time of the raw ADC
histograms per channel.



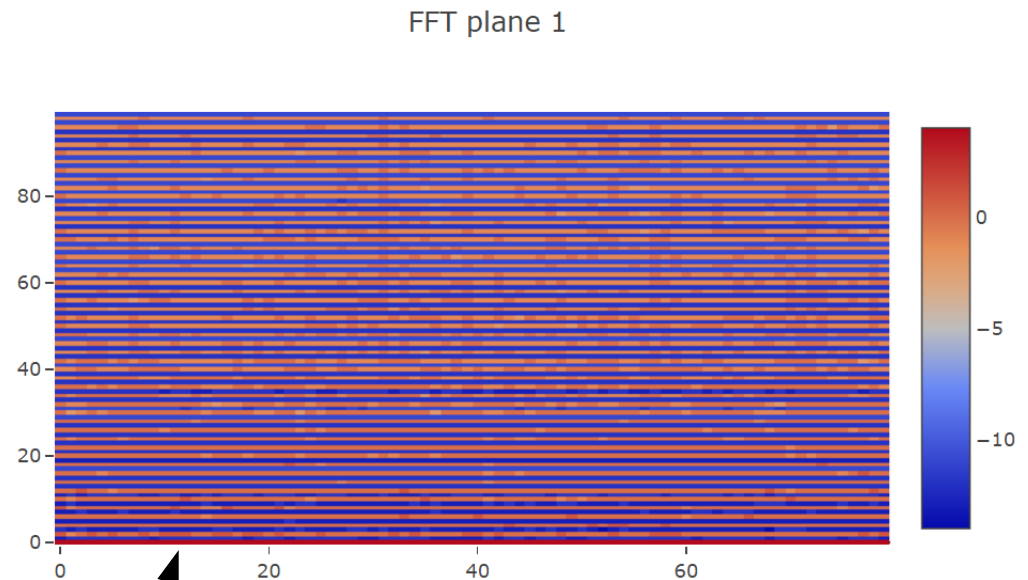
Raw ADC Fourier Transform

Collects time series of raw ADC per channel (time window 100 frames) and creates heat map.

X: Channel no.

Y: Frequency

Z: Value of fast fourier transform of time series (log scale).

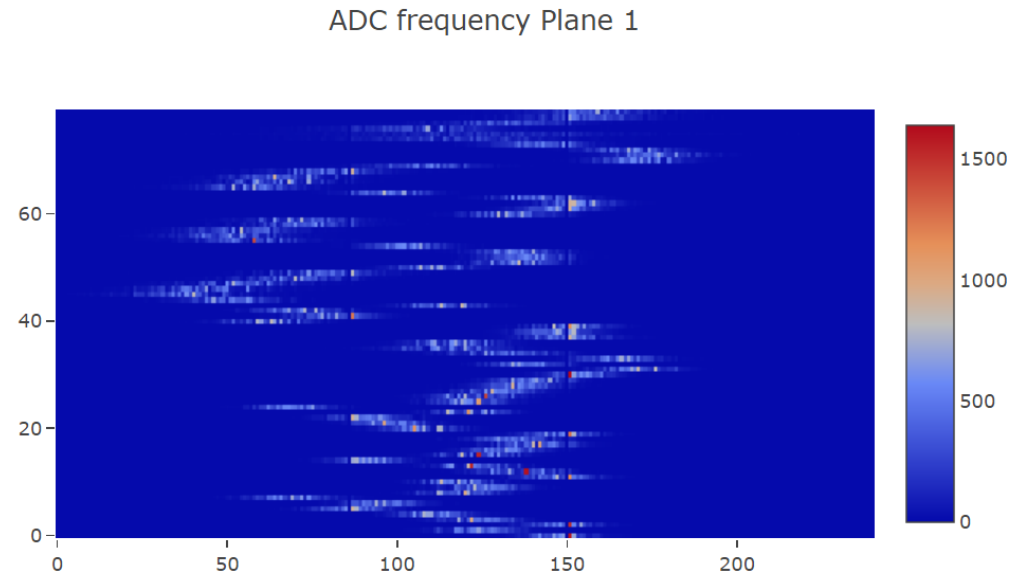


Frequency values of current input concentrated at 0.

Raw ADC Frequency by Channel

Plots the full histogram of raw ADC per channel across all channels.

Y: Channel no.
X: ADC value
Z: Counts



Data Visualisation

Web platform has been developed, but is currently offline while it is brought up-to-date with the production environment.

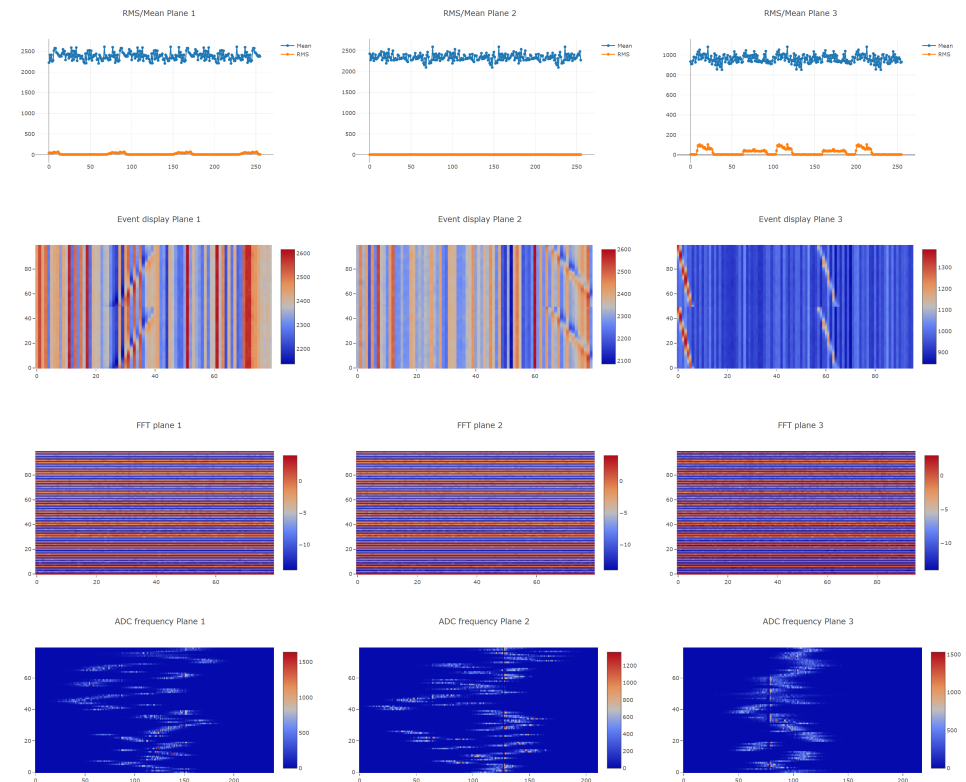
The platform supports both live viewing of the monitoring plots and plots from specific timestamps.

Access requirements:

- Have a CERN account
- Be on the right side of the CERN firewall.

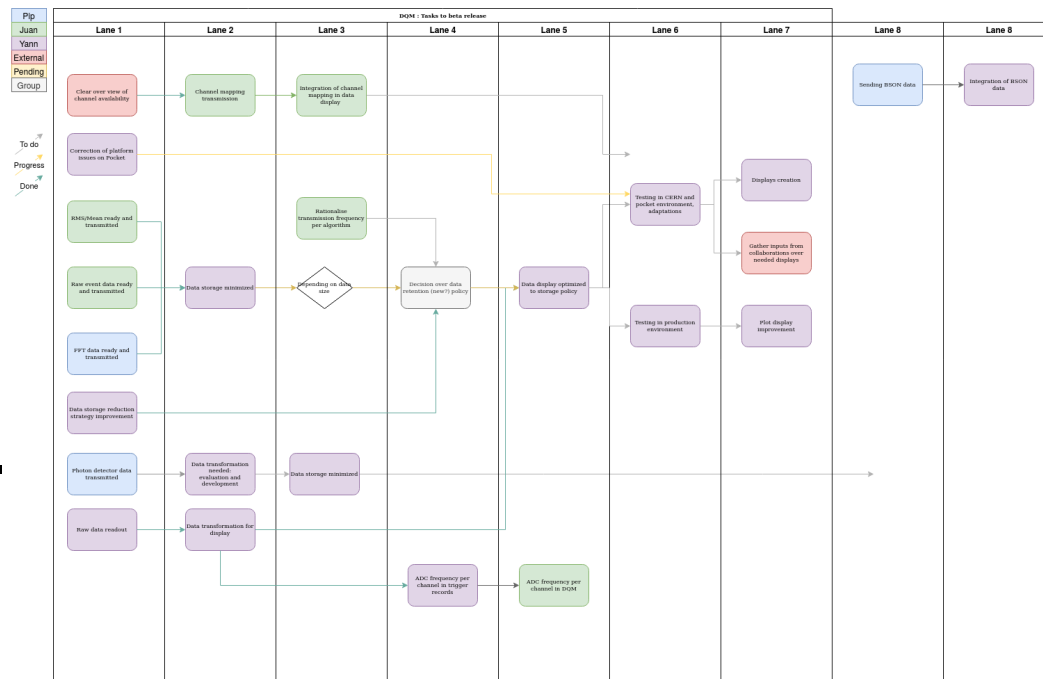
Dashboards

- The amount of data we currently have to visualise (4 plots x 3 planes) can fit on a page.
- Admins for the web platform can define and save pages with arbitrary configurations of monitoring plots from different sources.
- To define expansion of scope, we need test data with the appropriate range of data sources and user feedback.



What the Group is Working On

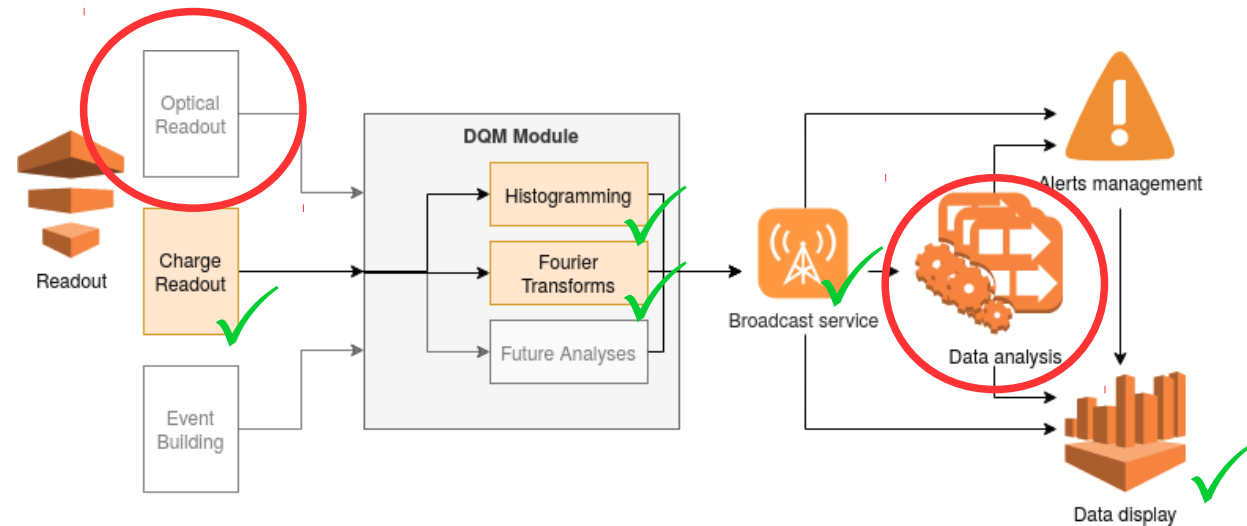
- ADC Frequency-by-channel plots in raw data.
- Reintroduction into production environment.
- Polishing of display UI.



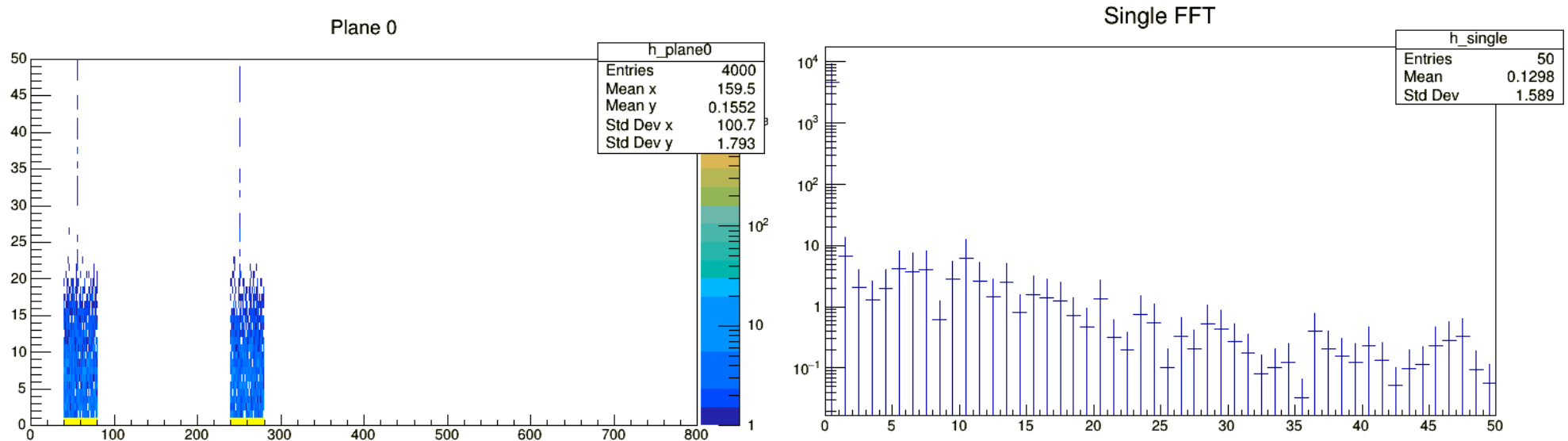
Working group action plan

Beyond the Cold Box

- Technical changes to transmission format (BSON).
- **Integration of optical data.**
- **Development of data analysis module.**



Backup: Fourier Transforms



Fourier transform algorithm has been validated on ProtoDUNE input that produces typical ProtoDUNE noise spectra.