Data Quality Monitoring & Tracking

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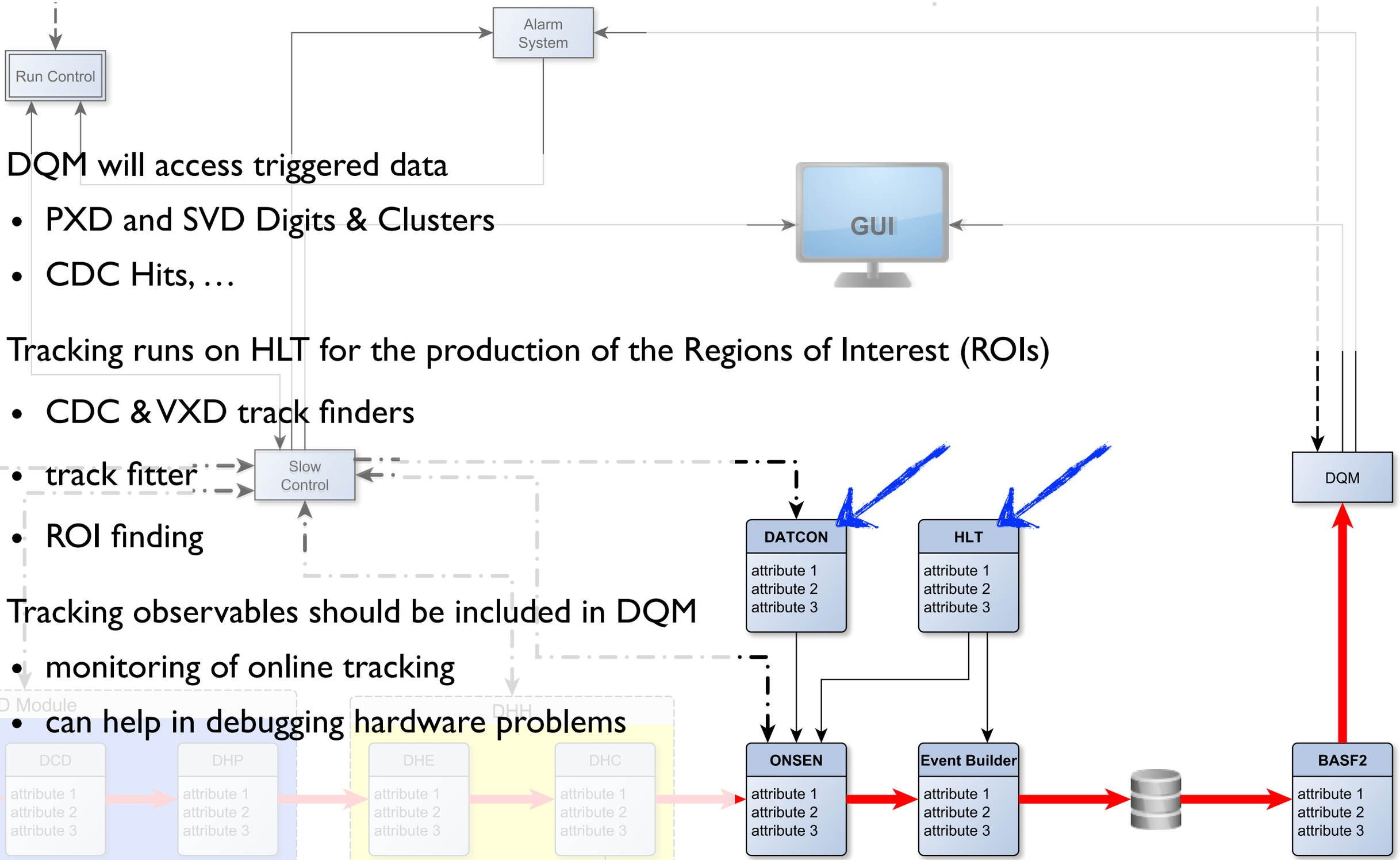
DQM Flow Chart

- DQM will access triggered data
  - PXD and SVD Digits & Clusters
  - CDC Hits, …
- Tracking runs on HLT for the production of the Regions of Interest (ROIs)
  - CDC & VXD track finders
  - track fitter
  - ROI finding
- Tracking observables should be included in DQM
  - monitoring of online tracking
  - can help in debugging hardware problems



work-in-progress flow chart

existing DQM & future DQM

➡ DQM Modules developed for the 2014 test beam

- VXD Track Finder (8 histo)
- Track Fitter (histo: 10 + 8 x VXD layer + 2 graph)
- Intercepts (histo: 1 + 21 x PXD layer)
- ROIs (histo:3 + 7 x PXD layer)

➡ The DQM modules where developed with the idea that *only the experts would have looked at them*

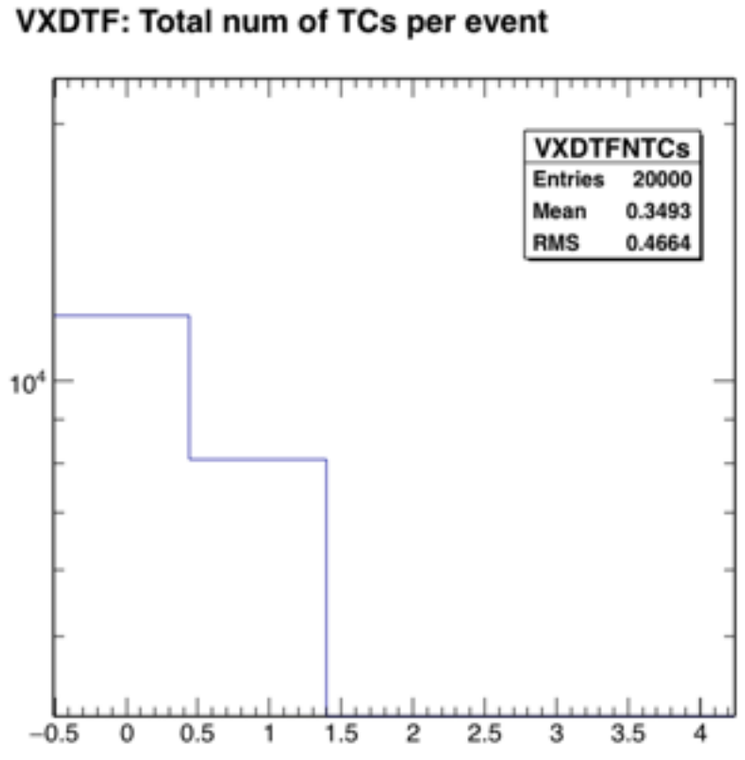
- many histograms, apparently all with the same importance
- many histograms inserted a posteriori to debug problems

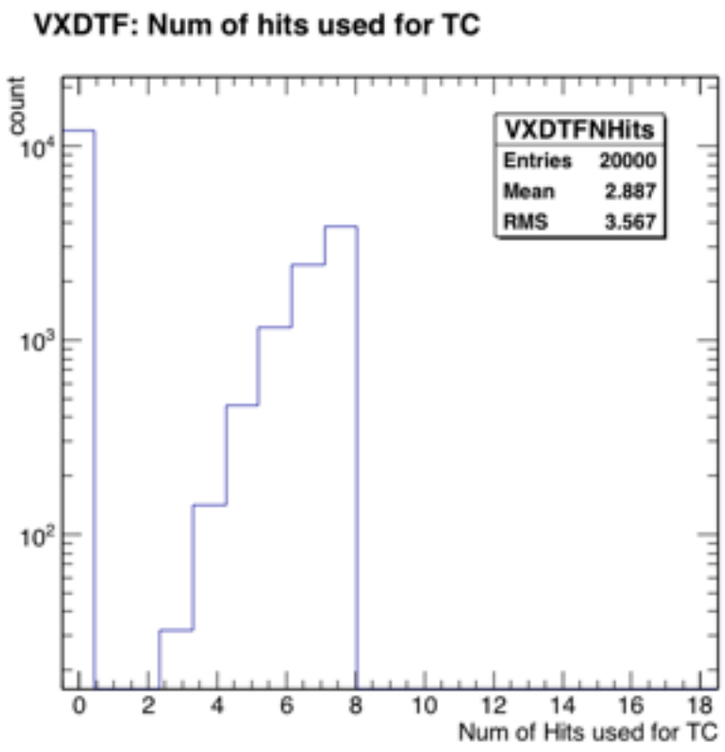
➡ We want a user friendly DQM that

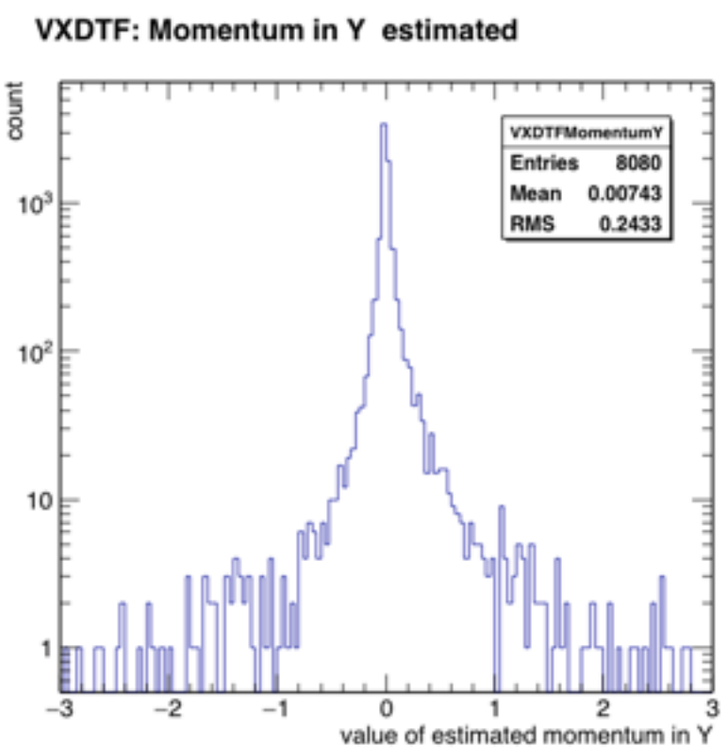
- shows the relevant plots for the person who is looking at them: shifter vs expert
- as much as automatically as possible detects the status of the system
- direct the expert/shifter to the plots that should be checked
- requires to contact the expert as less as possible

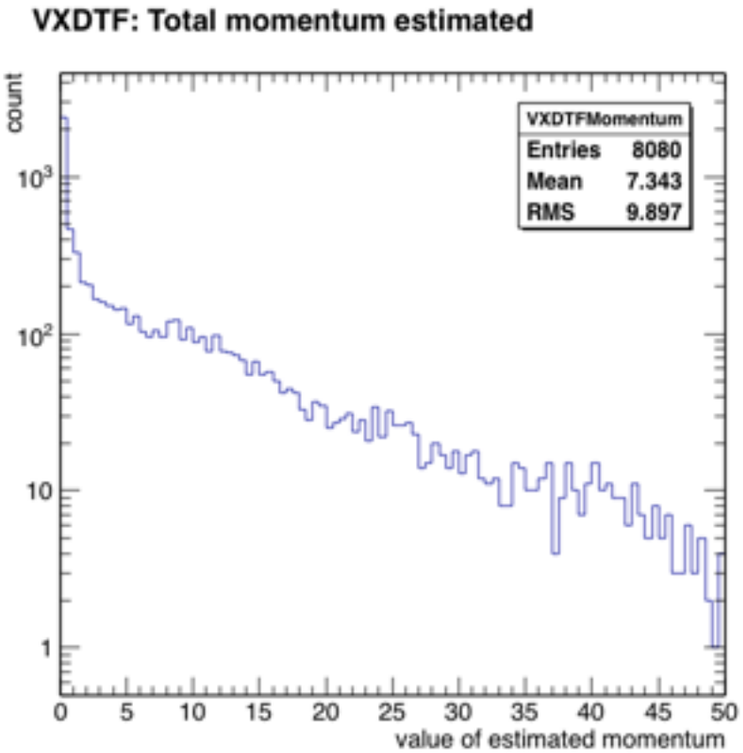
VXD TF DQM @ DESY 2014

- DQM Modules developed for the 2014 test beam
  - **VXD Track Finder** (8 histo)
  - Track Fitter
  - Intercepts
  - ROIs



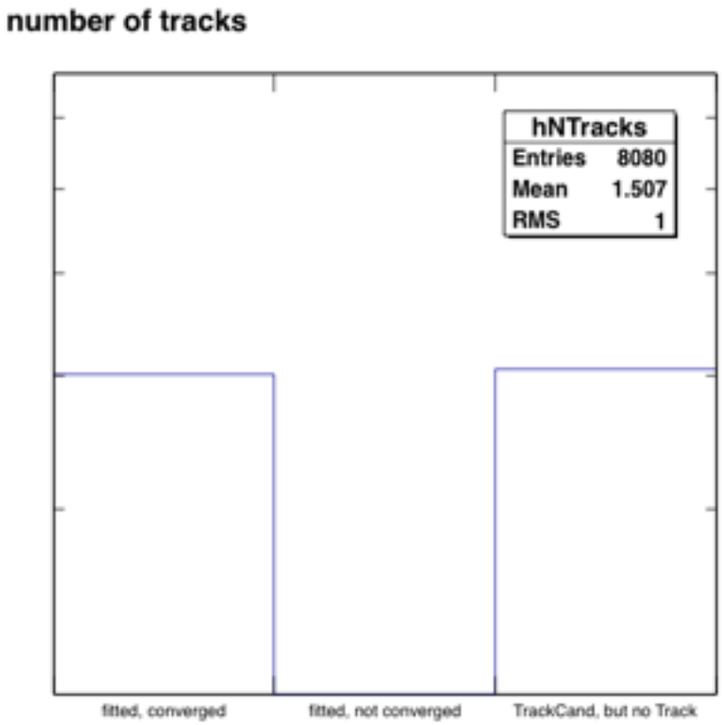


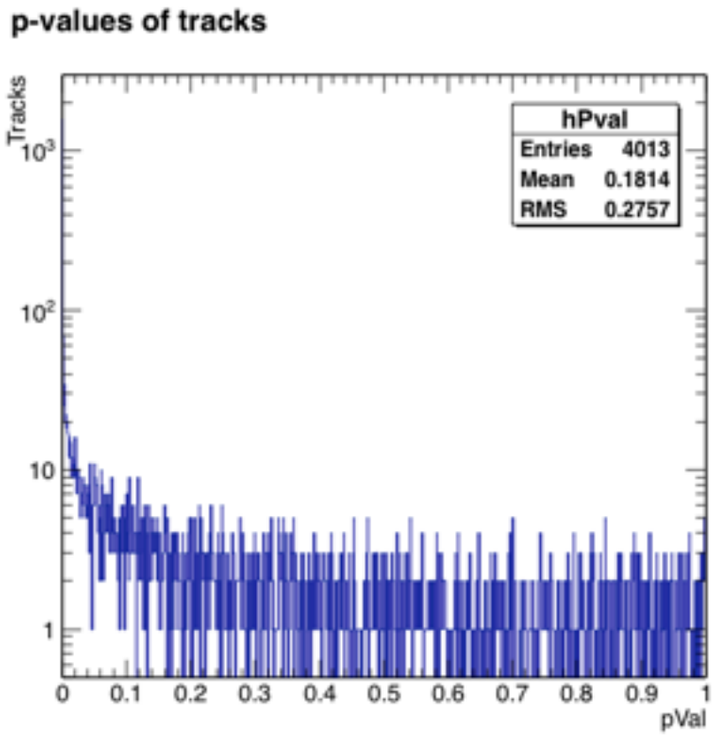


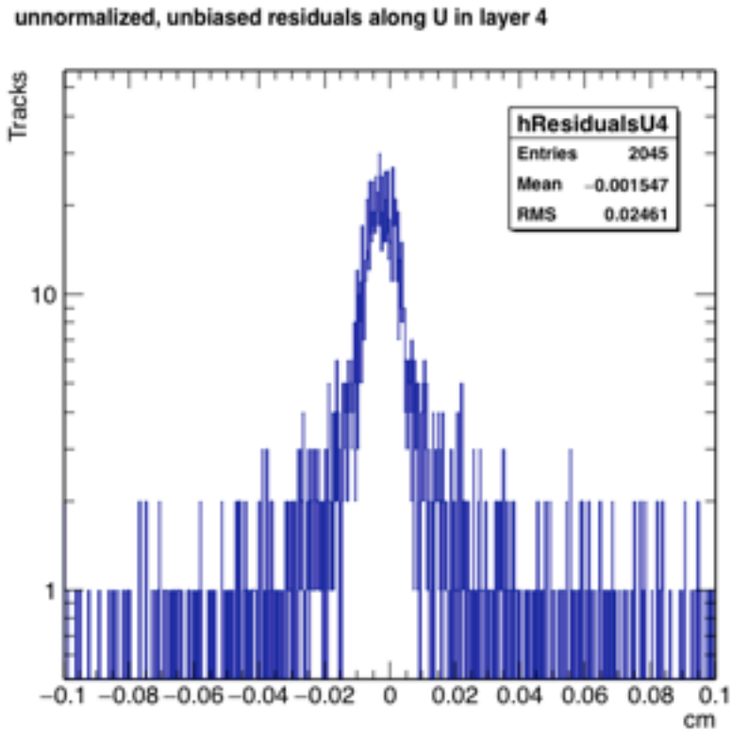


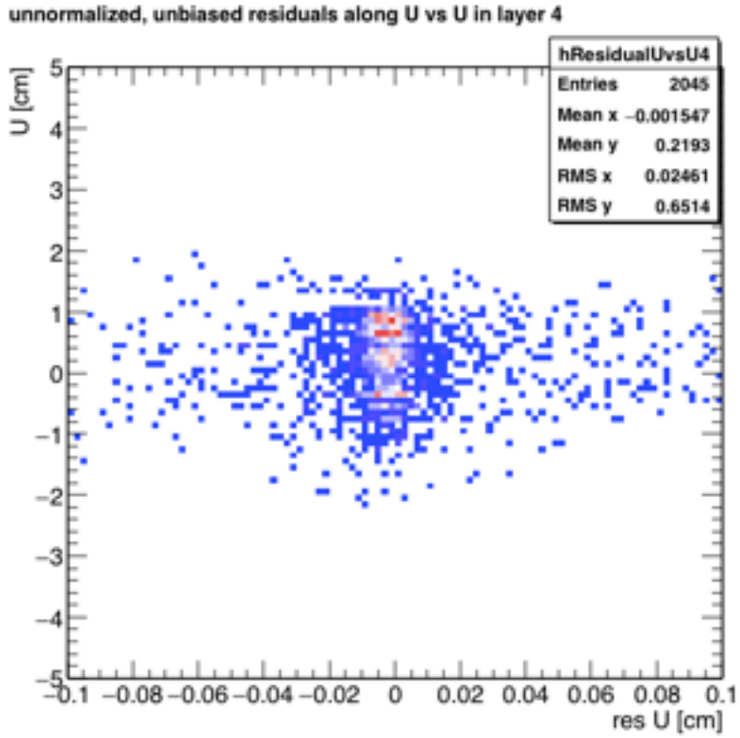
Track Fitter DQM @ DESY 2014

- DQM Modules developed for the 2014 test beam
  - VXD Track Finder
  - **Track Fitter** (histo: 10 + 8 x VXD layer + 2 graph)
  - Intercepts
  - ROIs



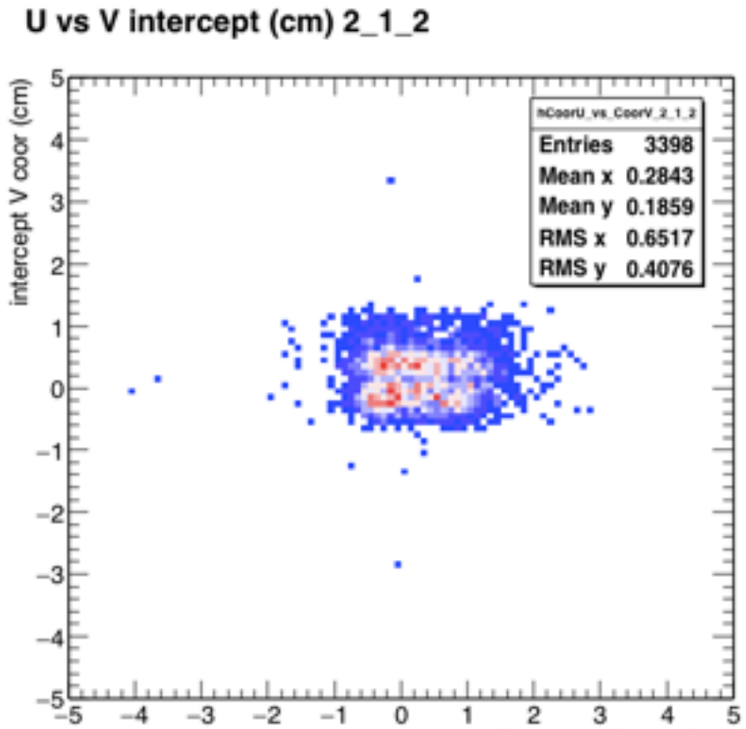


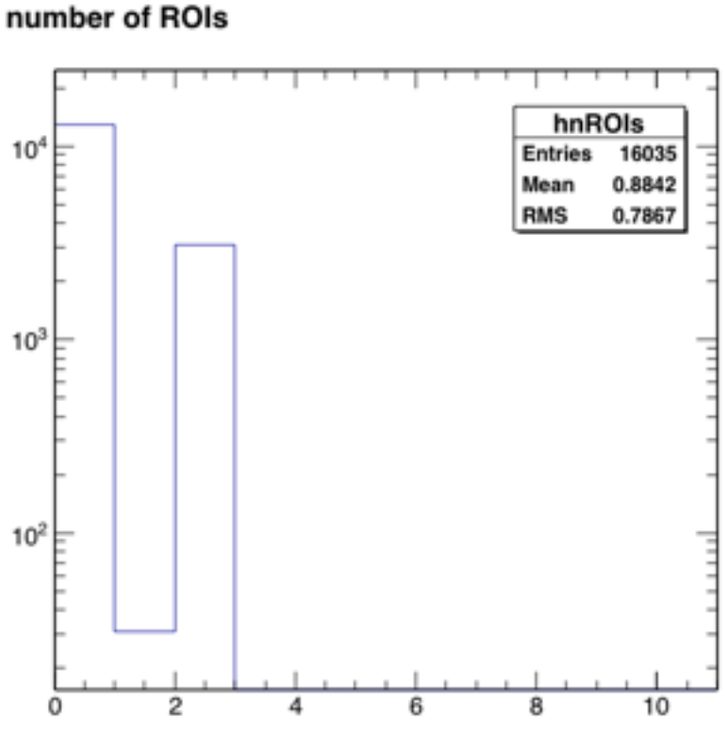


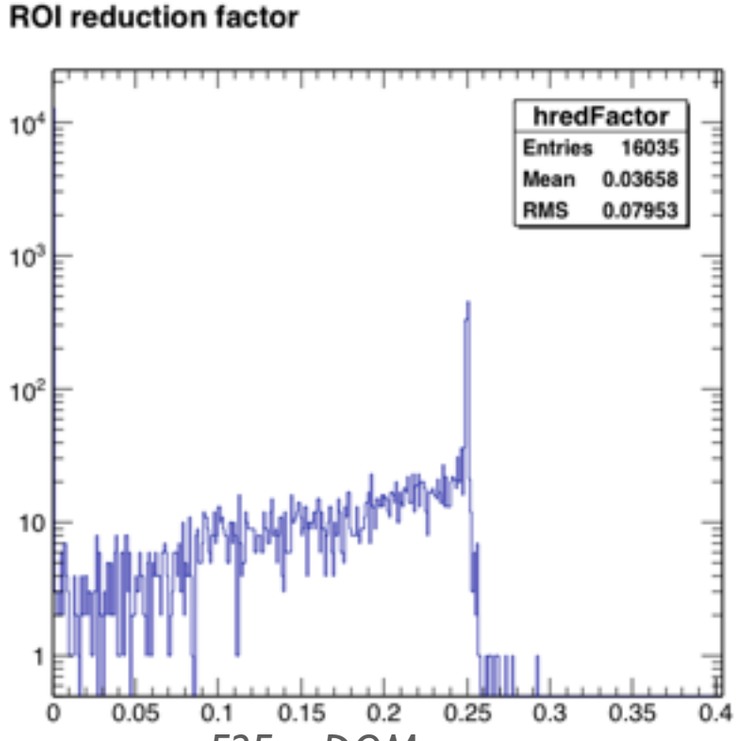


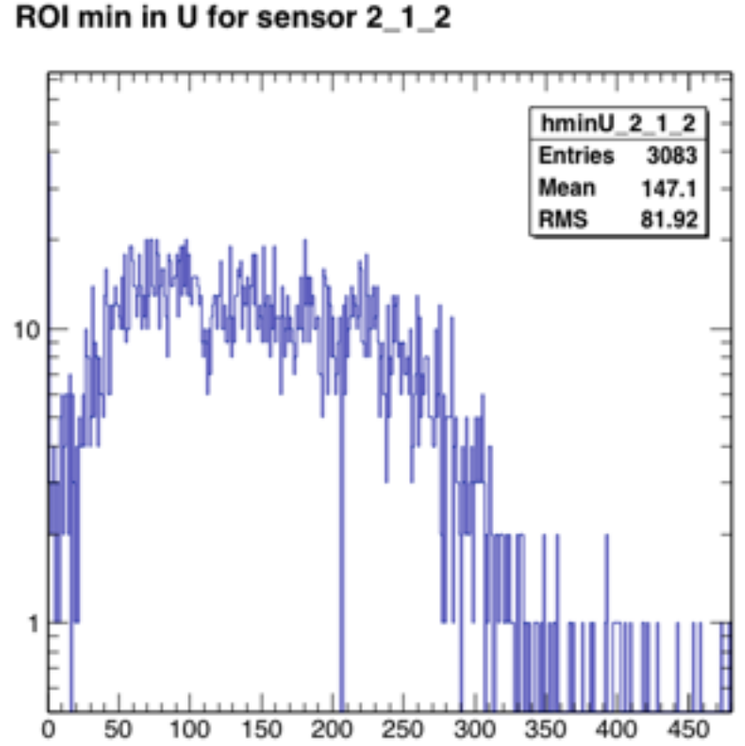
ROI finding DQM @ DESY 2014

- ➡ DQM Modules developed for the 2014 test beam
  - VXD Track Finder
  - Track Fitter
  - **Intercepts** (histo: 1 + 21 x PXD layer)
  - **ROIs** (histo:3 + 7 x PXD layer)









What's Needed from the Tracking

Each developer who has a module running on the HLT should:

1. Define the minimum set of observables that tell us if our system/module is
   - properly working / in development / not working
2. Define the limits on these observables that classify it in one of the three categories:
   - properly working / in development / not working
3. Define the *geometry* of application of these observables
   - e.g. one histogram per layer, one number per track, one histogram per event, …

➡ There will be people with different levels of expertise looking at these observables:

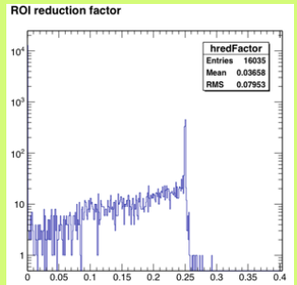
- standard shifter
- expert, called in case of emergency (not all the time one thing is not green)
- super-expert
- God

a Top-Down Approach

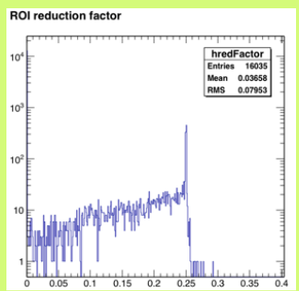
SVD system layer

shifter

VXD SYSTEM



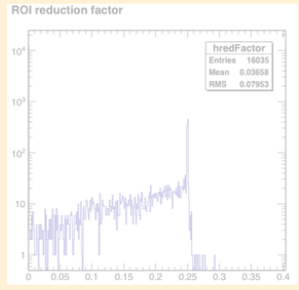
CDC SYSTEM



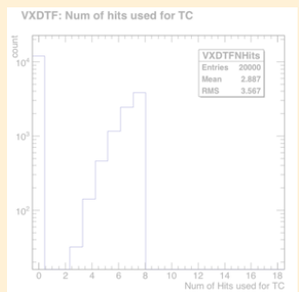
HLT SYSTEM

PXD SYSTEM

VXD layer



SVD SYSTEM



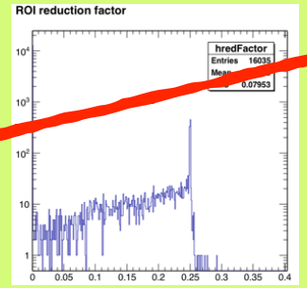
COOLING SYSTEM

a Top-Down Approach

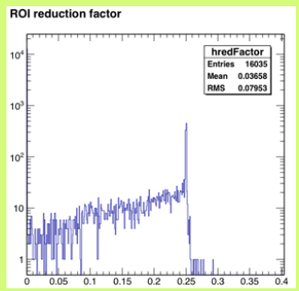
SVD system layer

shifter

VXD SYSTEM



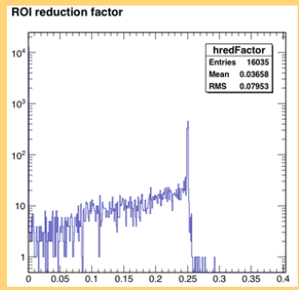
CDC SYSTEM



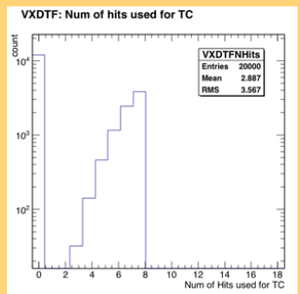
HLT SYSTEM

PXD SYSTEM

VXD layer



SVD SYSTEM



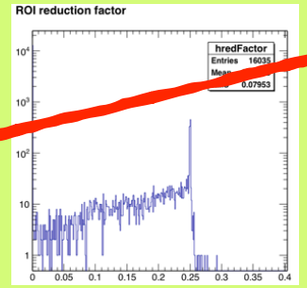
COOLING SYSTEM

a Top-Down Approach

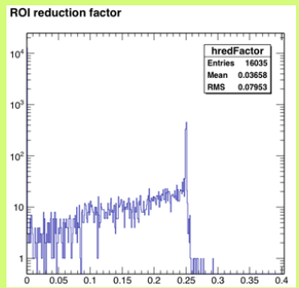
SVD system layer

shifter

VXD SYSTEM



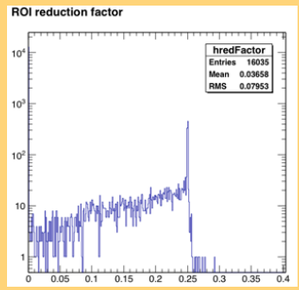
CDC SYSTEM



HLT SYSTEM

PXD SYSTEM

VXD layer



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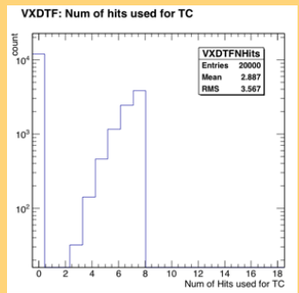

COOLING SYSTEM

Conclusions

➡ We ask you to think:

minimum set of *observables* with *limits* and *geometry* that tell us if the tracking / VXD track finder / CDC track finder / fitter / ROI finding is

- properly working / in development / not working

with a top-down approach in principle the observable does not have to be related to a single module

➡ Next test-beam (April 2017) could be an opportunity to test the first version of the Mainz-DQM