

Tracker Data Analysis - Present Status

C. Hunt

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The People

In the trenches - so to speak. . .

- Melissa Uchida - Tracker Alignment
- Ed Overton - Tracker Hardware and Electronics
- Chris Heidt - Tracker Digitisation and Simulation
- Chris Hunt - Tracker Higher Level Recon and Analysis

With support from :

- Paul Kyberd - Head of Tracker Software
- Adam Dobbs - Head of MAUS
- Chris Rogers - Head of Analysis



Recent History

In the last 2 months the trackers have been turned on inside the spectrometer solenoids for the first time, with beam.

A vast effort of comissioning immediately followed. Including LED test of the channels, channel calibration, channel mapping, issues with the unpacker, additions to the MAUS data structure, bug fixes and patches.

After a couple of worried weeks we finally had two trackers, up and running, in the muon beam, reading out data. Run 07155 - I think?

Since this time all efforts have been on investigating the reconstruction at all stages to ensure that what we are seeing is correct and logical.



Found Bugs

- **Known Hot or Dead Channels**

Ed and Chris Heidt both have lists of “bad channels”. Chris is working on automating the location procedure and the inclusion in the CDB and Reconstruction

- **ADC Saturation**

Ed and I found that approx 0.4% of events produce 100% noise. It appears that an issue in the front end electronics is causing nearly every ADC to saturate, corrupting the entire event. These events can be easily vetoed using the amended data structure in an experimental branch of MAUS, while the problem is addressed.



Found Bugs

- **Errors from DAQ Bank 24**

On bank was found to repeated fail when reading out data - causing the entire event to be discarded. This bank is currently disconnected while the problem is fixed. Ed and Paul are at RAL to look at Hardware and Electronics from today.

- **Discrepancies seen in Track Recon**

Comparing Pattern Recognition fits to Kalman is yeilding a surprisingly large discrepancy between the two.

A first pass tracker alignment also produces results that are not in agreement with simulation. Seems the fit is not quite working. Currently under investigation.



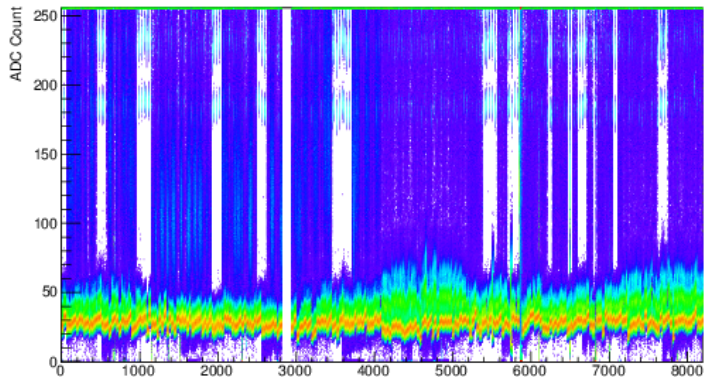
Analysis Outline

1. Channel Mapping and Calibration
2. ADC Counts and NPE Plots
3. Digits Produced
4. Clusters Produced
5. Spacepoints Produced
6. Updated Calibration
7. “Bad Channel” Lists and CDB interface
8. Final Track Fit and Pattern Recognition
9. Inter-tracker alignment
10. Intra-Tracker Alignment and Advanced Methods
11. MCS Studies
12. PID Studies

And many more still to come ...



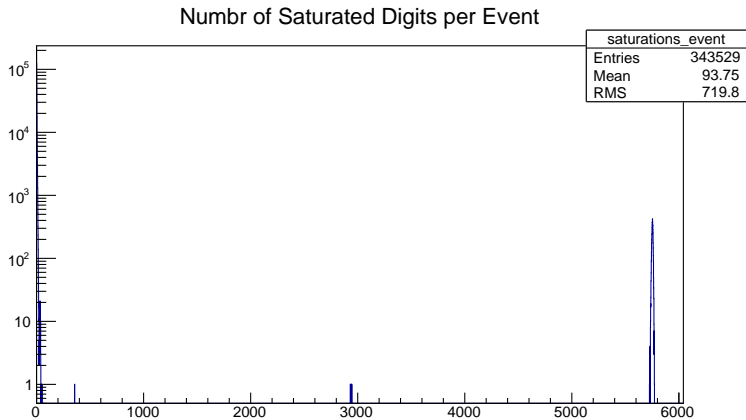
Plots!



Discovery of the issues with the front end electronics



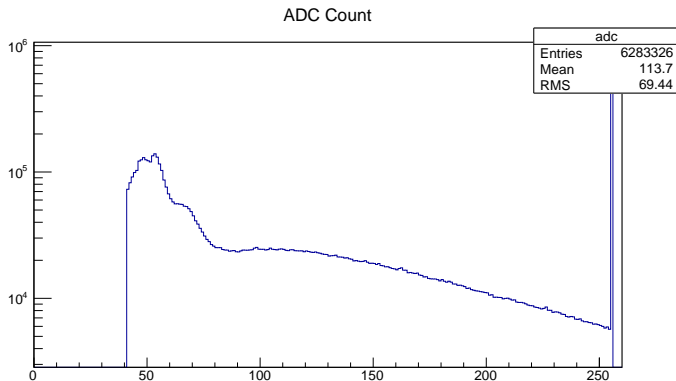
Plots!



Discovery of the issues with the front end electronics



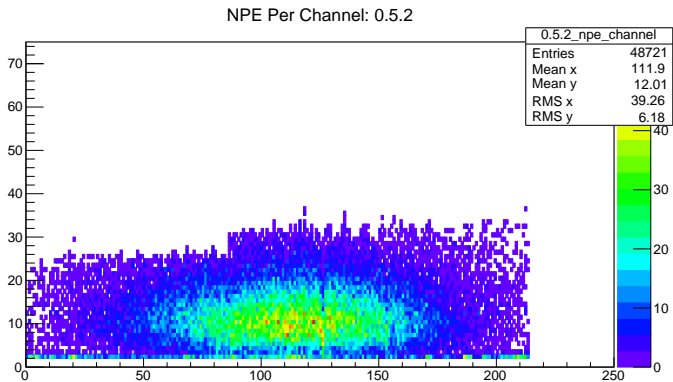
Plots!



Total ADC Counts Accross Tracker



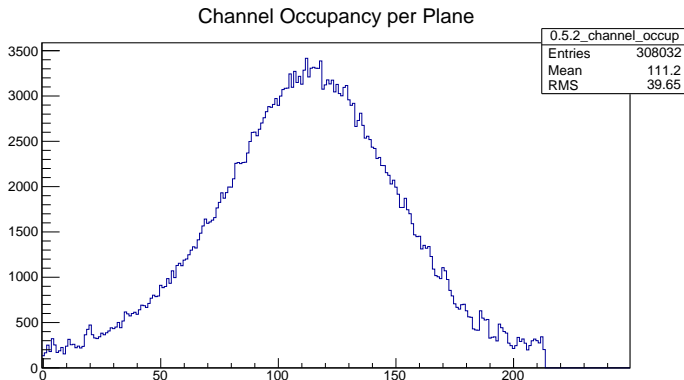
Plots!



Recorded Number of Phot Electrons per Channel at first plane



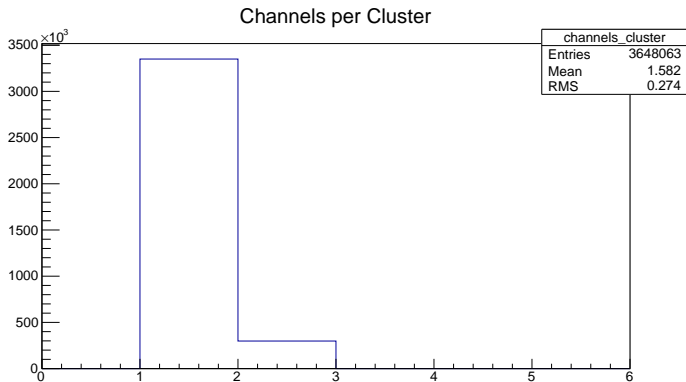
Plots!



Digit locations in the first plane.
Look a beam!



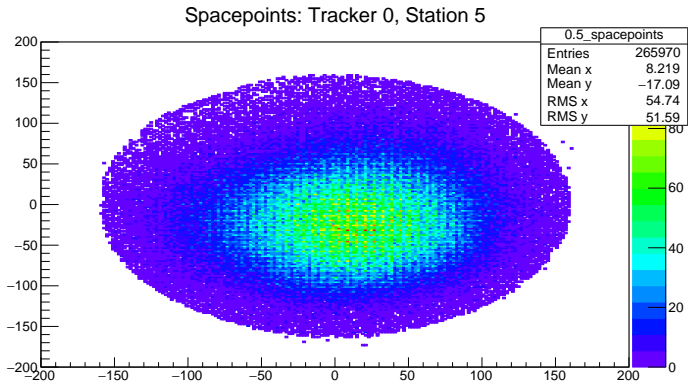
Plots!



How many channels go in to each cluster.
We would expect mostly 1!



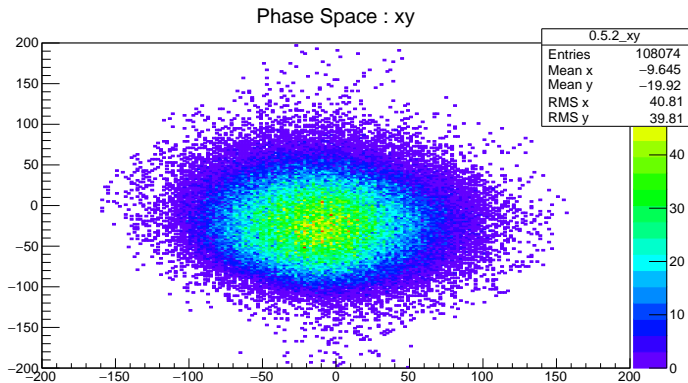
Plots!



Spacepoints in the first station



Plots!

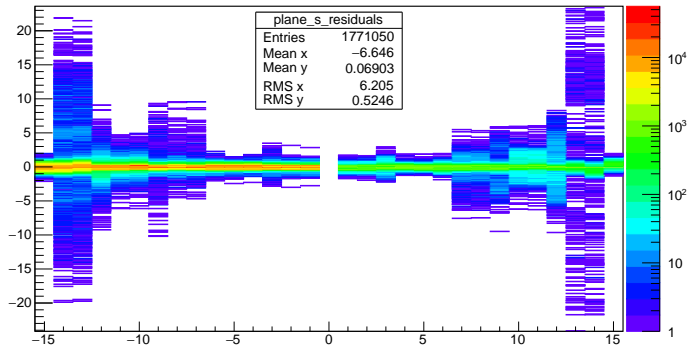


Kalman Trackpoints in the first plane.



Plots!

Smoothed Residuals per Plane



Kalman Smoothed Residuals.



Current Task List

My Personal To-Do List:

- Finish tests and push updates from latest Scifi Recon Development software
- Perform detailed Pattern Recognition - Kalman Comparisons
- Perform more detail MC - Data comparisons for trackers
- Finish tweaks and bug fixes for Kalman Reconstruction Code
- Finish tracker offline verification program

Still a lot to do for the coming months - but its a good start!

