

Tracker Software

D Adey

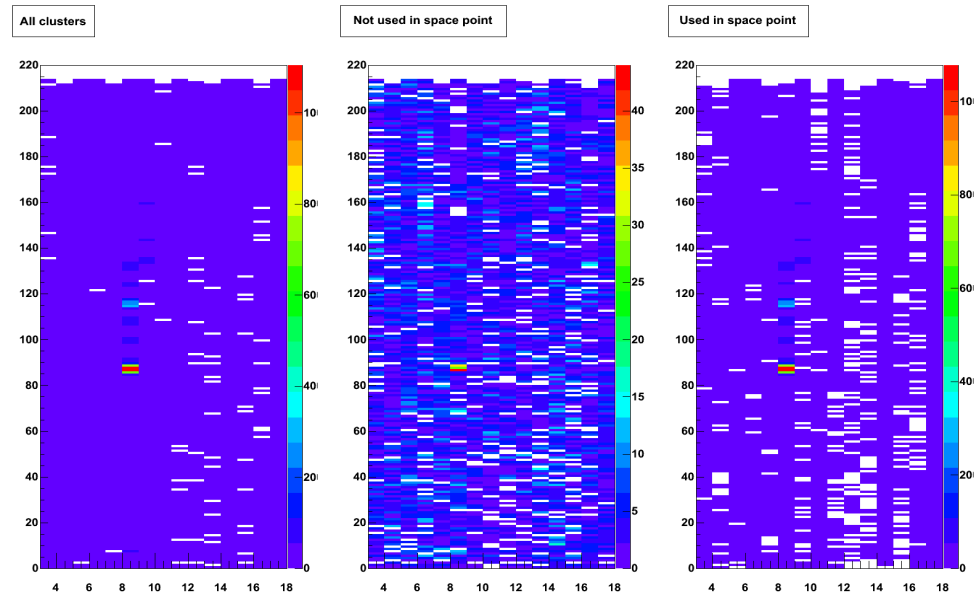
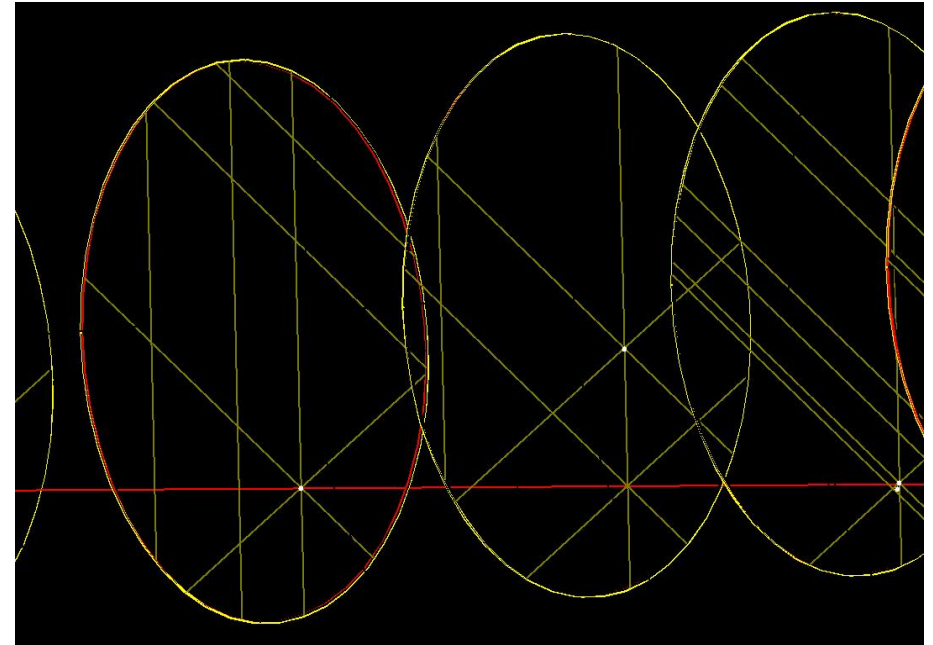
CM29 – Software Session

RAL

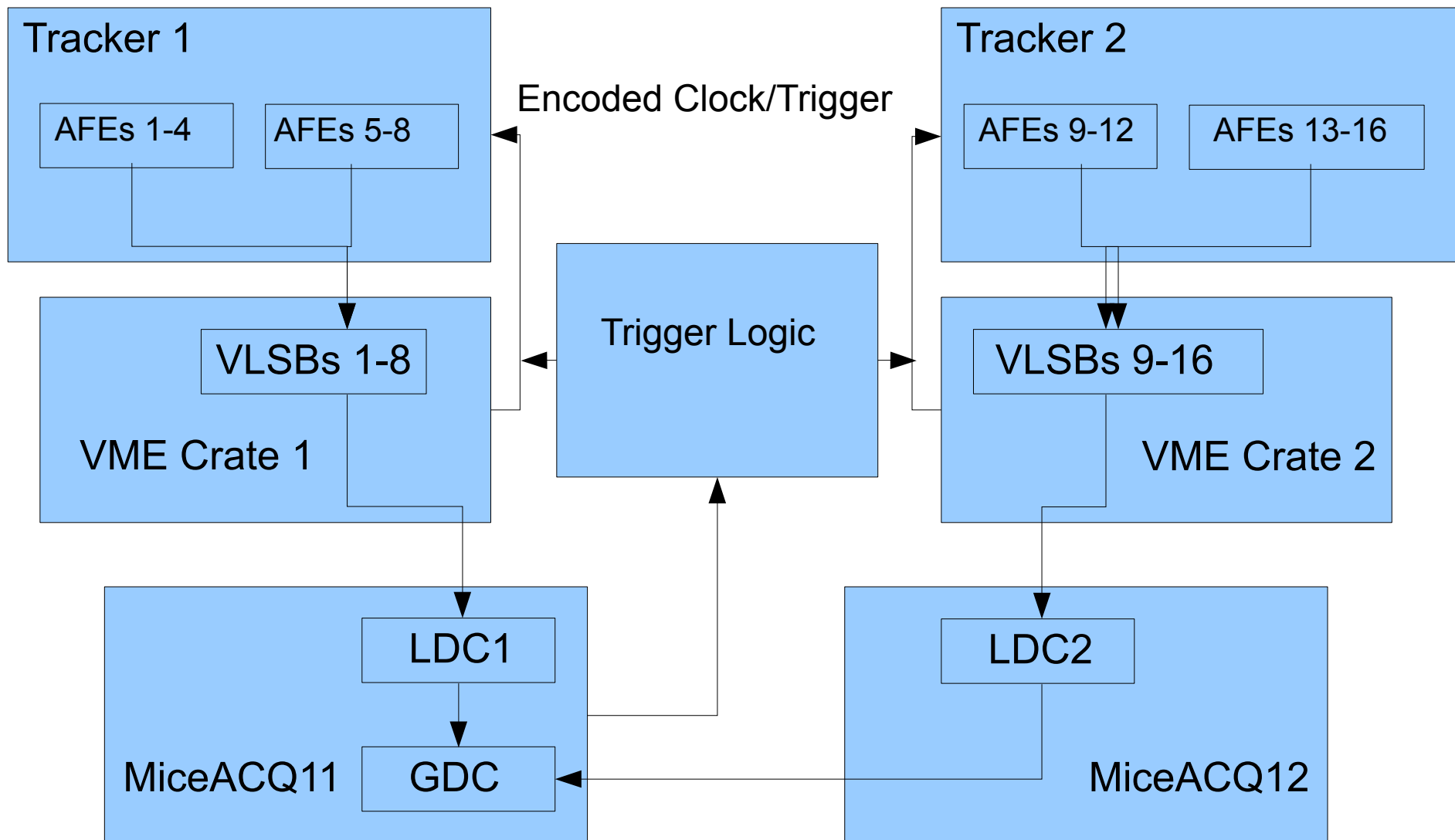
16/2/11

Since CM28

- Noise and adjacent clusters – no new data – thinking of merge/reject algorithm
- Investigations into helical fitting
- Implementation of cluster overlap
- Point recon clears low-level noise
- DATE DAQ implemented but not tested



Data Acquisition (DATE)



Arm/Event Arrived

Arm

- Trigger Receiver – Set DAQ busy
- VLSB – Trigger mode (receive from LVDS cables) enabled
- VLSBMaster – Set trigger, veto & spill parameters
- Trailer (same hardware as Trigger Receiver) - Set DAQ ready

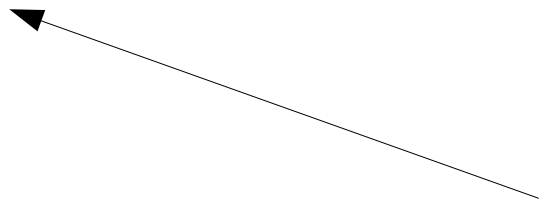
Event Arrived

Trigger Receiver:

- Case(Timer) - call Timer function which will then return a 1
- Case(Trigger) – Look for positive input on trigger receiver board and return 1
- Set DAQ ready to 0

VLSBMaster:

- On first call bit allowing external triggers set – encoded clock now fully enabled



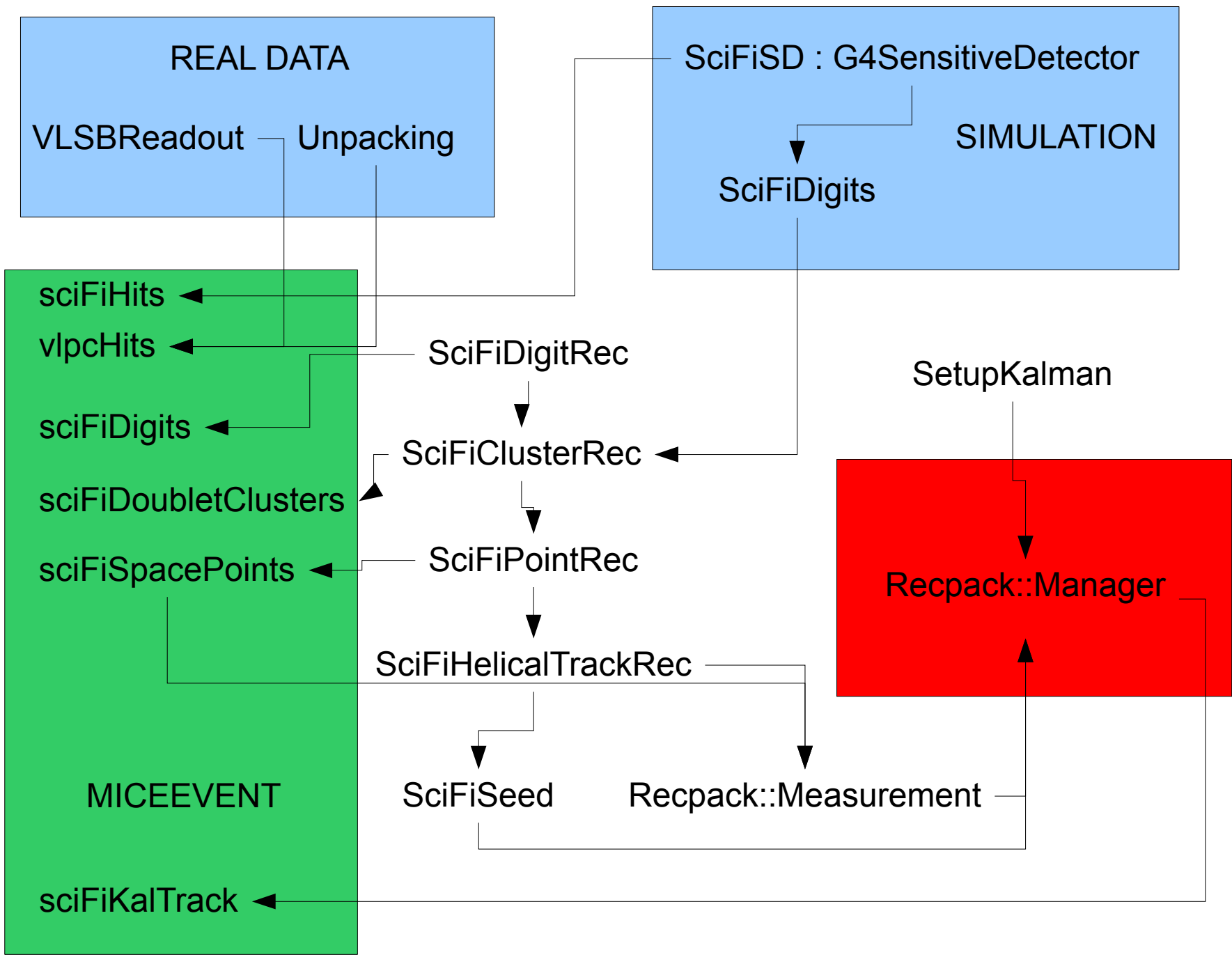
Read Event/Disarm

Read Event

- VLSB – Set into readout mode (ignore triggers)
- Retrieve number of triggers and size of banks
- Loop over each entry of each memory bank and pass value to data stream pointer
- Clear the banks
- Set back into trigger mode

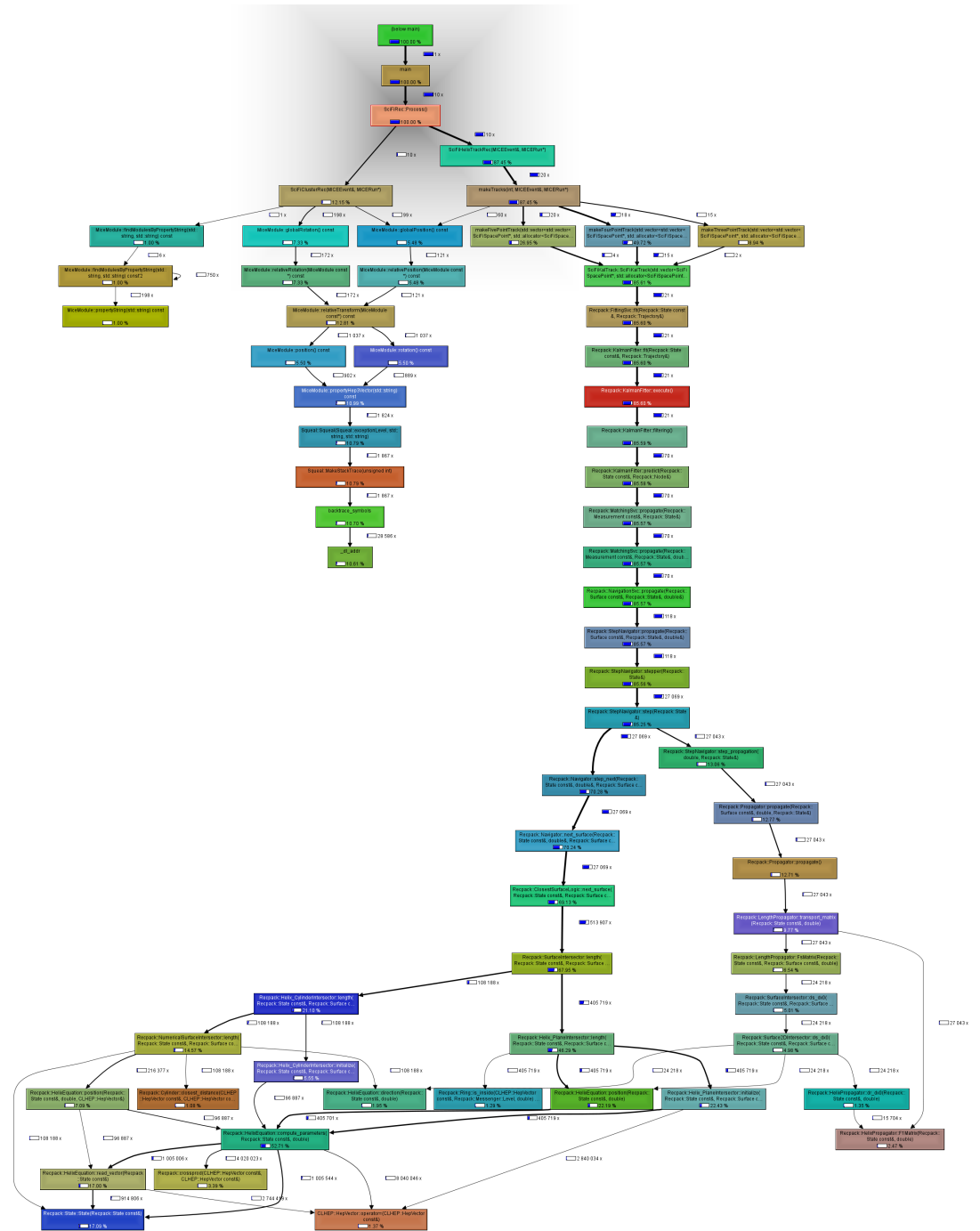
Disarm

- Trigger Receiver – Set DAQ ready to 0
- VLSB – Disable external access by LVDS
- VLSBMaster – Disable external triggers

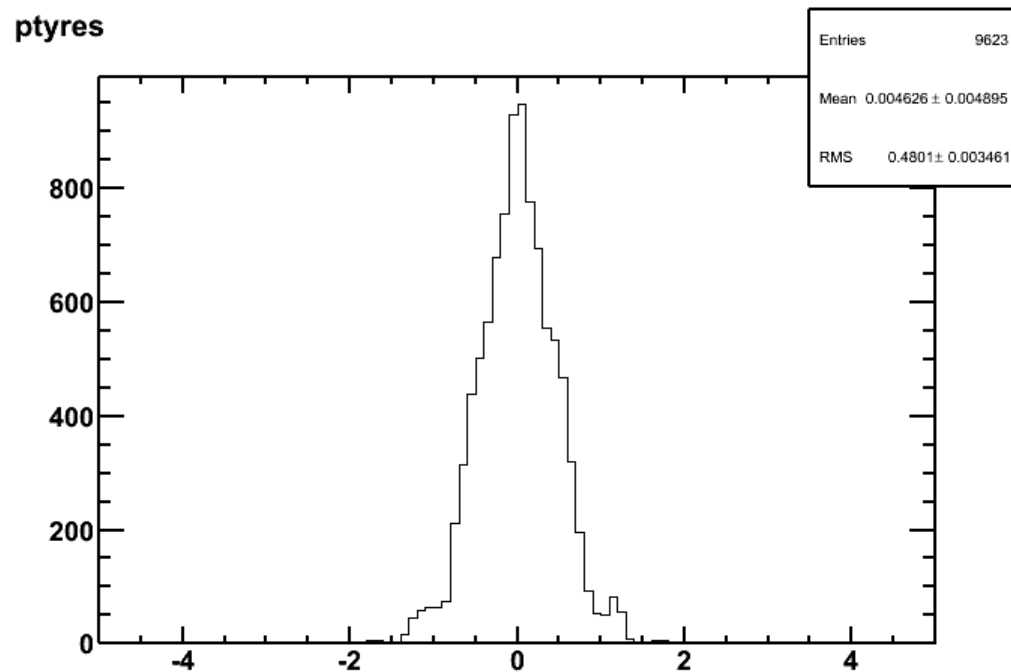
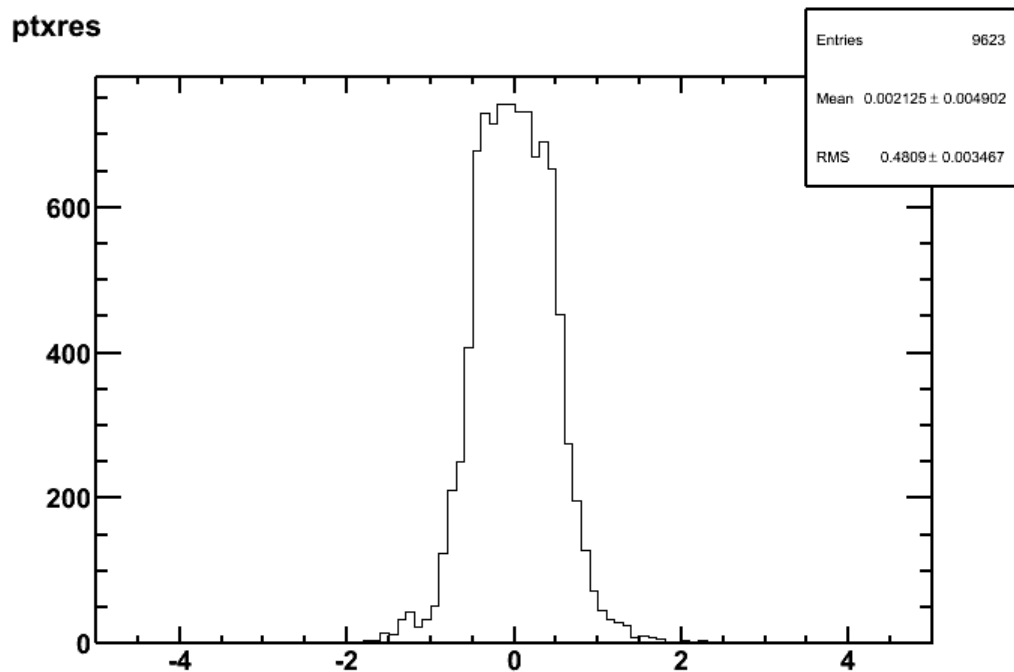


Performance

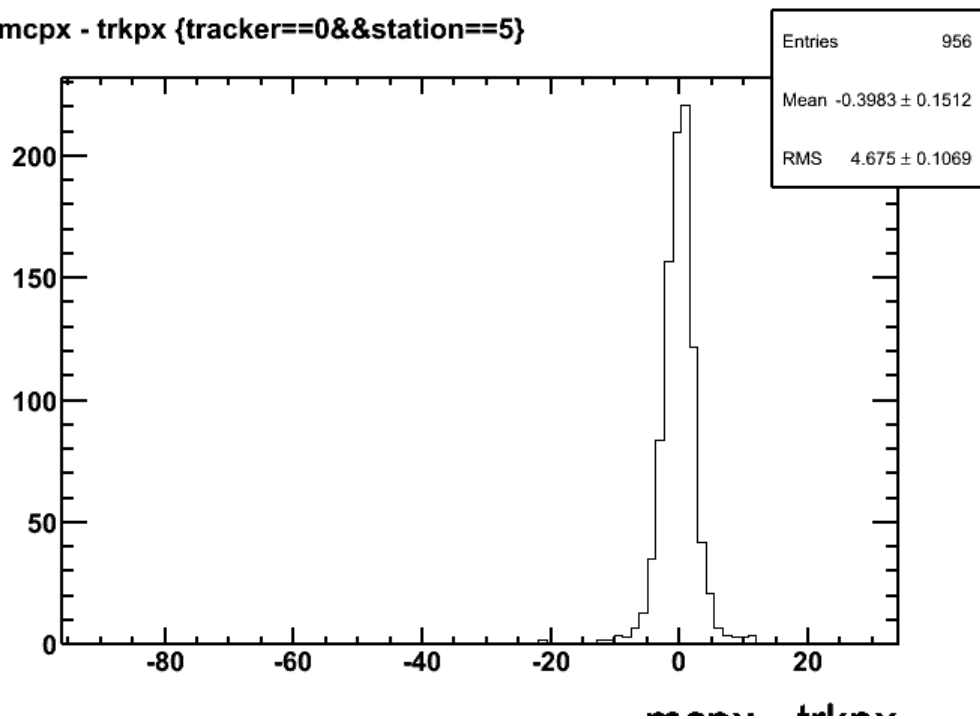
- Two tracker helical fitting ~ 1s/event
- Bulk of work in Recpack, especially helical propagation
- Digit, Cluster, Space Point reconstruction not processor heavy, but could do with other efficiency problems



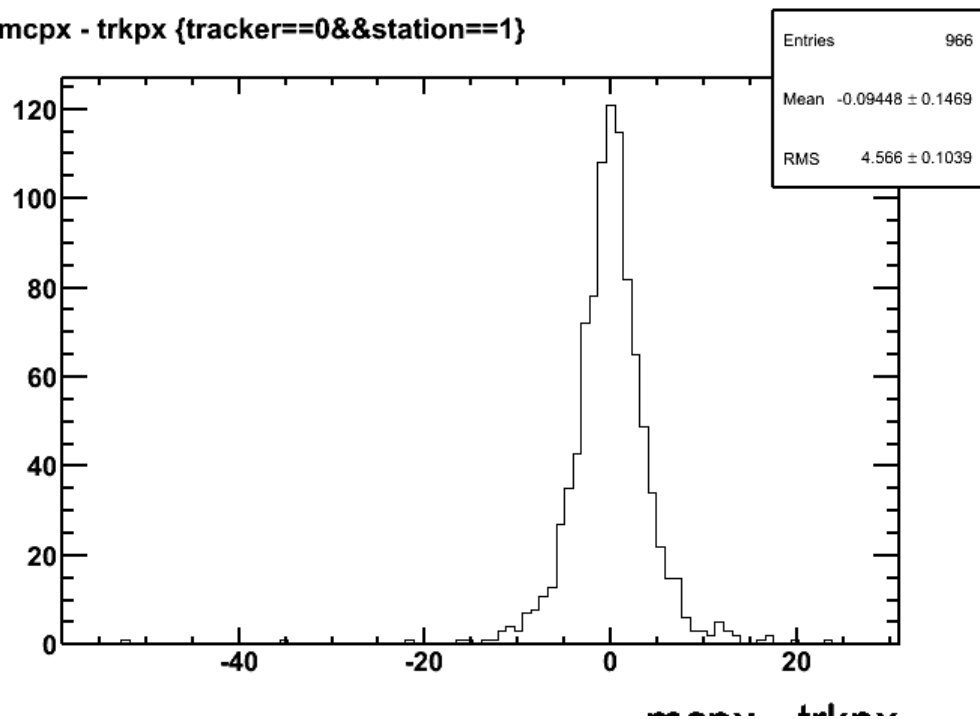
- Space point reconstruction seems quite reliable, even under additional stress of real data noise
- Cluster level reconstruction could use some fine tuning



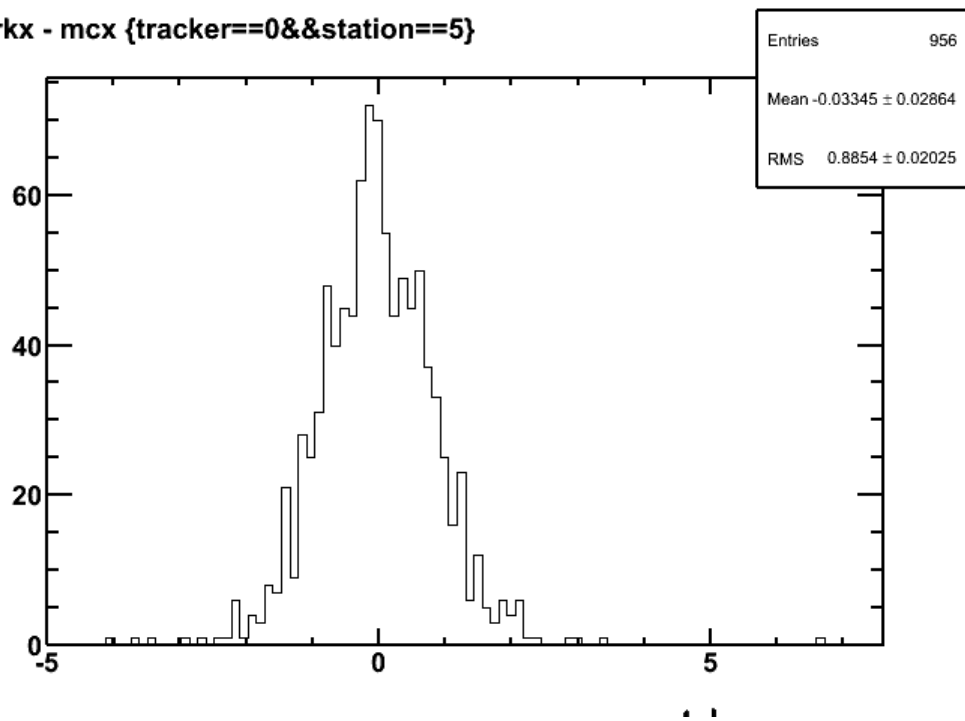
mcpX - trkpx {tracker==0&&station==5}



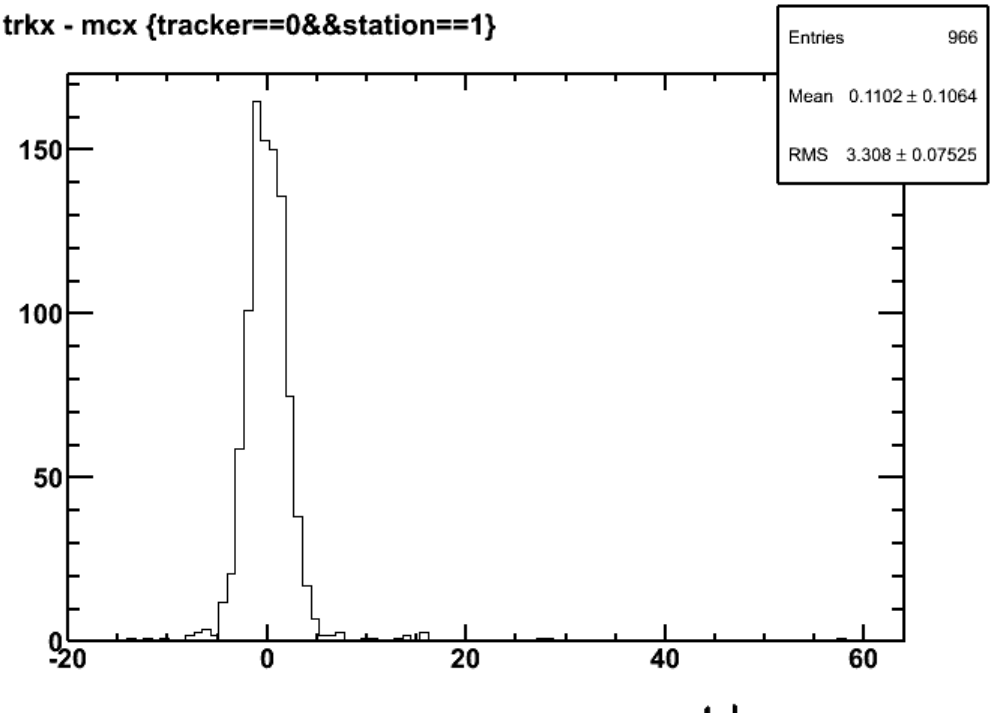
mcpX - trkpx {tracker==0&&station==1}



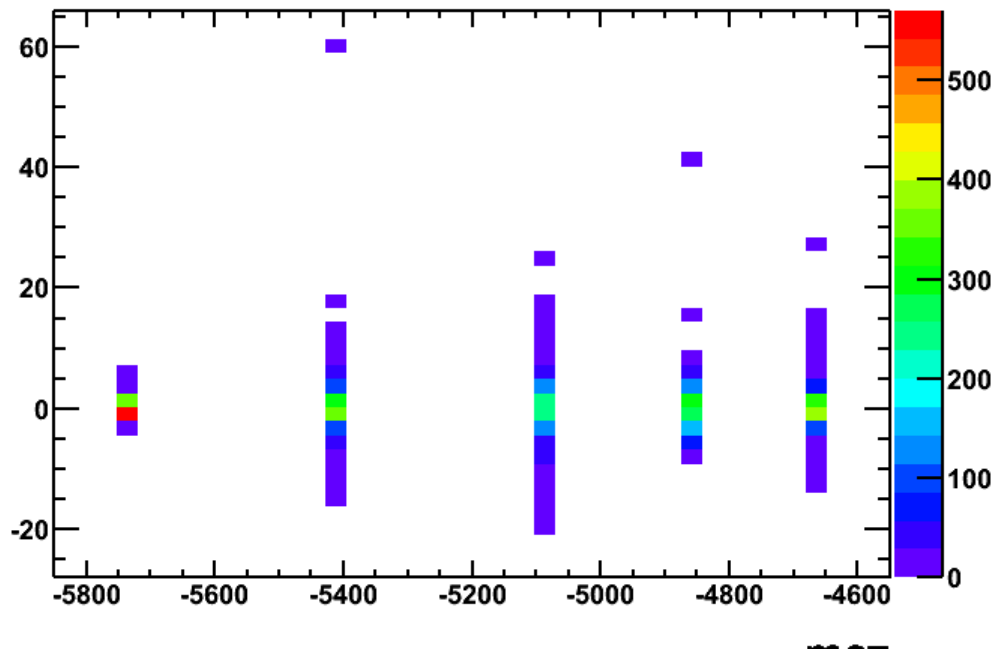
trkx - mcx {tracker==0&&station==5}



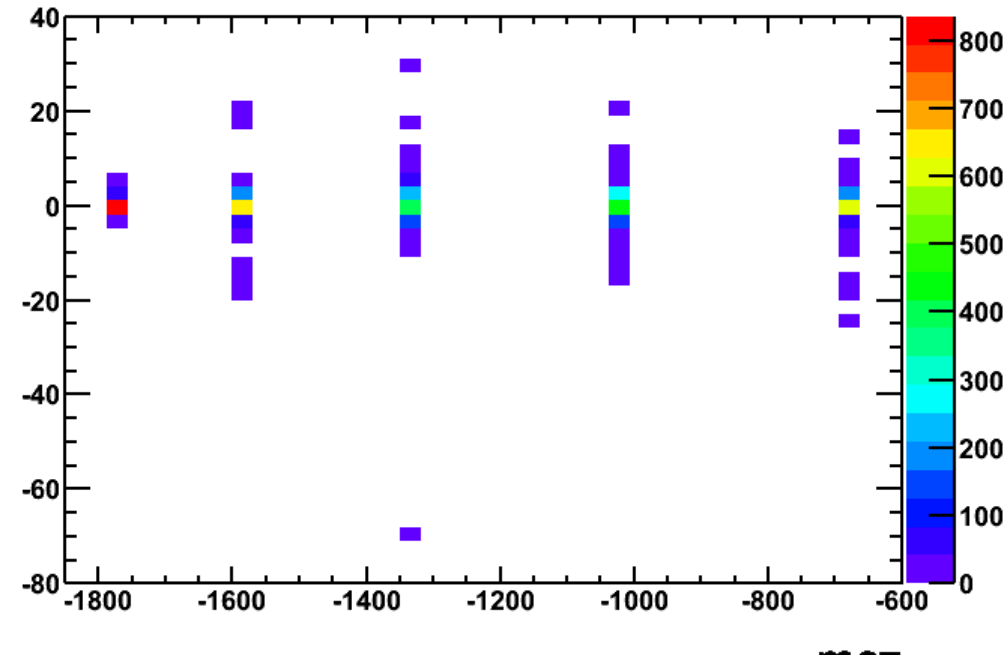
trkx - mcx {tracker==0&&station==1}



(trkx - mcx):mz {tracker==0&&numpoints==5}



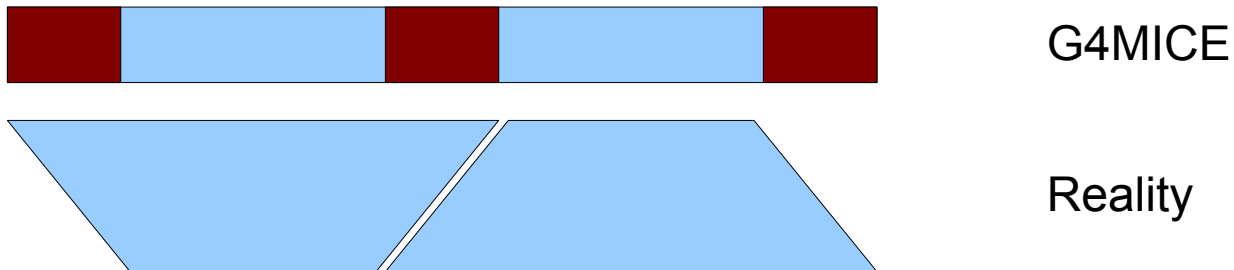
(trkx - mcx):mz {tracker==1&&numpoints==5}



Difference of experience with helical fitting
Position resolution becomes poorer with z
(distance from seed)
Momentum resolution doesn't vary

Cluster Reconstruction

- Individual fibre ribbons are not modelled
- Two adjacent clusters are merged and channel number given to the channel with highest light yield – this skews the position
- Position (and error) of 2 channel clusters should appreciate overlap
- Thinking of weighting according to light yield, but will need better electronics model to test with MC



Cosmic Test Software Requirements

Acquisition

- Unpacking (VlsbReadout2011) to test new firmware with Excel DAQ
- Modifications to DATE functions to meet new firmware
- DATE Unpacking

Offline

- Straight track analysis
- Offline monitoring GUI (ADC - LY/chan – SP/Plane – track info)
- MC for comparison

Applications

- TrackerRec written to test/confirm helical tracking after the modifications to the space point algorithms.
- DAQ work delayed this
- It is an internal debugging application not intended for user analysis

To Dos

Plans

- Improved cluster reconstruction
- Electronics model
- Space Point error expansion
- Fast helical fit

Requirements

- Tests
- Comments
- Documentation
- Cleanup (both for style and poor coding eg. Hard coded numbers...)