

Tracker Software Update

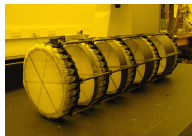
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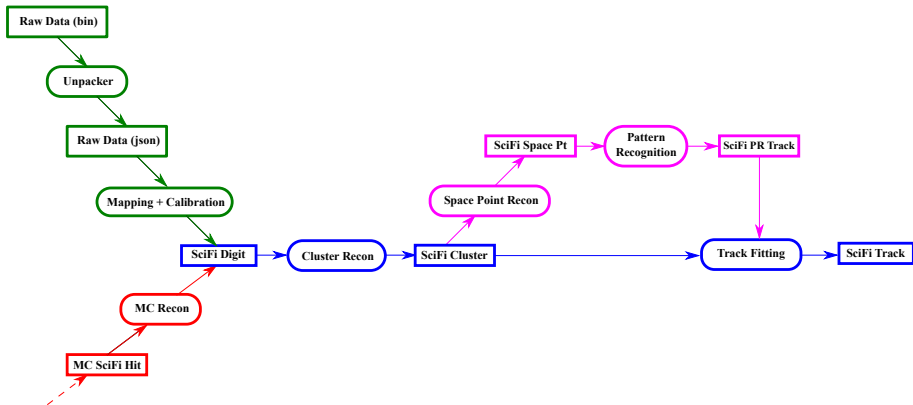
18th June 2013

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Software Overview



Present Status

Geometry and the CDB	●
MC Noise	●
MC Digitisation	●
Real Data Digitisation	●
Cluster Recon	●
Spacepoint Recon	●
Pattern Recognition	●
Kalman Fit	●
Online / Reducers	●
Unit tests	●
Integration tests	●
Documentation	●

Geometry and CDB

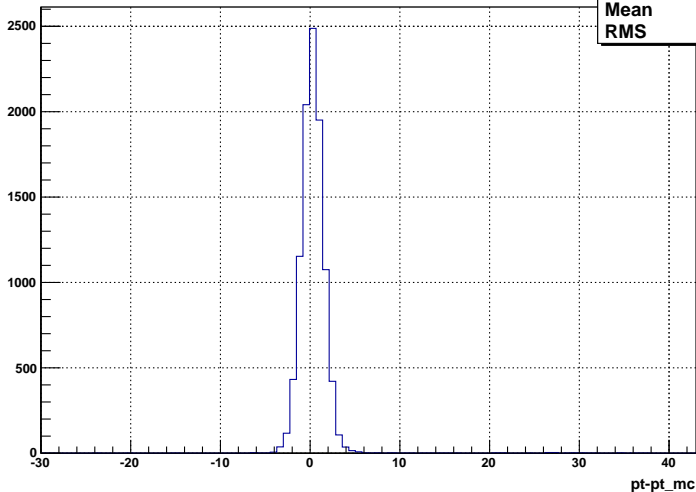
- The Configuration Database (CDB) holds tracker geometry and calibration data - should use this for MC and reconstruction
- Currently using legacy files
- Need to check geometry in CDB is good
- Need to convert XML to GDML
- Need to write conversion code for GDML to Mice Modules
- Point of greatest concern at present as relatively orphaned

Pattern Recognition

- No longer use initial 3 point circle and take residuals - try all spacepoints in circle fit until pass χ^2 cut
- Finds $\sim 99.5\%$ of tracks in MC
- $\sim 96\%$ of these are 5 point tracks
- Systematic error whereby number of turns between stations in small number of cases is overestimated (see p_z analysis)
- Code needs tidying and another code review
- Needs the Trigger MC to test in case of multiple tracks per trigger (made unit test for this, which passes)
- Needs spacepoint level efficiency study

Transverse Momentum Residual in Tracker 1

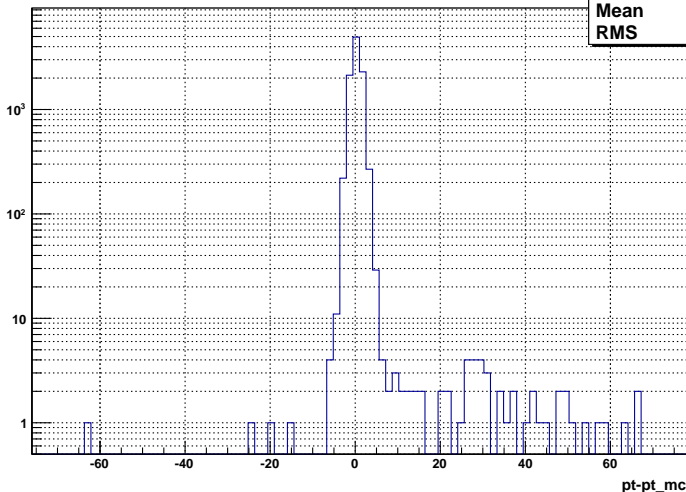
```
pt-pt_mc {trker_num==0&&pt-pt_mc<40&&pt-pt_mc>-40}
```



Transverse Momentum Residual (log scale) in Tracker 1

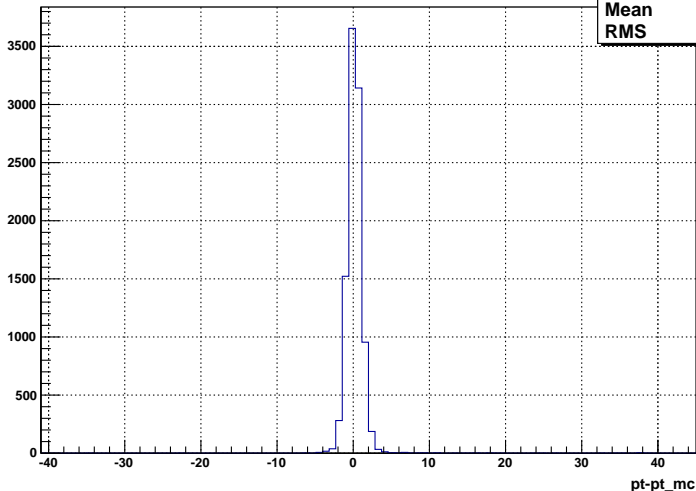
```
pt-pt_mc {trker_num==0}
```

htemp	
Entries	9953
Mean	0.435
RMS	2.921



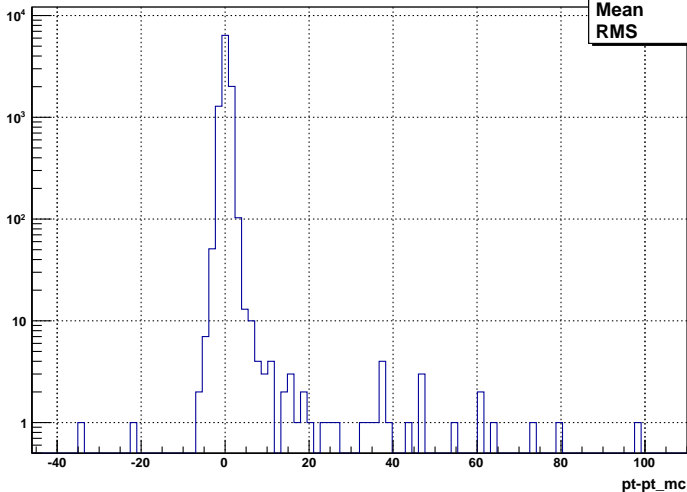
Transverse Momentum Residual in Tracker 2

pt-pt_mc {trker_num==1&&pt-pt_mc<40&&pt-pt_mc>-40}



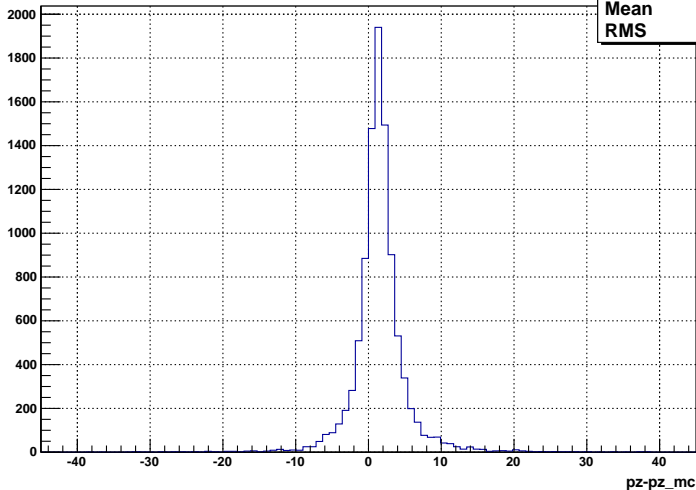
Transverse Momentum Residual (log scale) in Tracker 2

pt-pt_mc {trker_num==1}



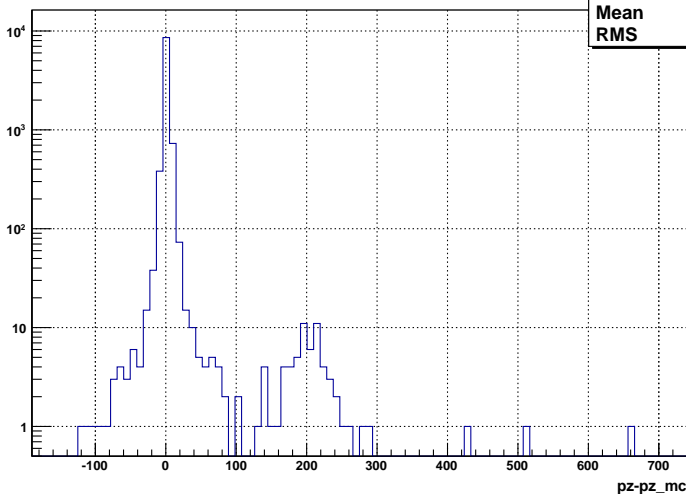
Longitudinal Momentum Residual in Tracker 1

pz-pz_mc {trker_num==0&&pz-pz_mc<40&&pz-pz_mc>-40}



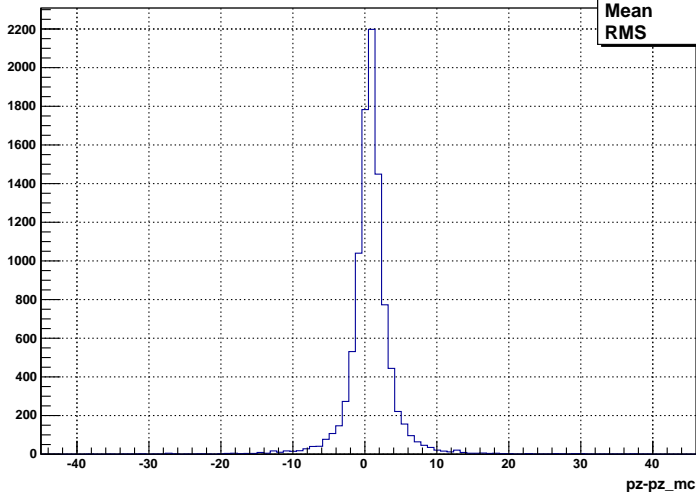
Longitudinal Momentum Residual (log scale) in Tracker 1

pz-pz_mc {trker_num==0}



Longitudinal Momentum Residual in Tracker 2

```
pz-pz_mc {trker_num==1&&pz-pz_mc<40&&pz-pz_mc>-40}
```

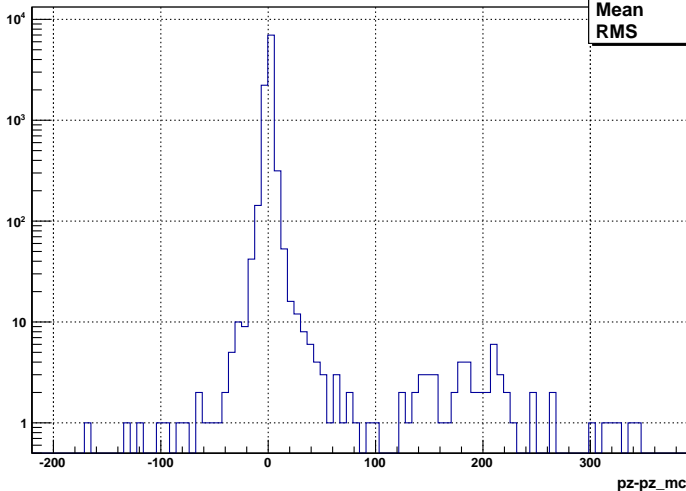
**htemp**

Entries	9824
Mean	0.8006
RMS	3.705

Longitudinal Momentum Residual (log scale) in Tracker 2

pz-pz_mc {trker_num==1}

htemp	
Entries	9909
Mean	1.892
RMS	16.32

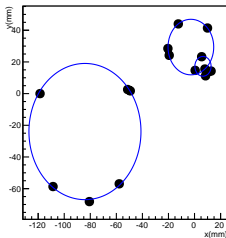


Kalman

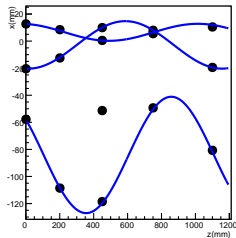
- Code review completed successfully in last fortnight
- Collaborating well with requirements of Global fit
- Code well advanced, now being prepared for the trunk, but still needs a lot of sanding down

XYZ View

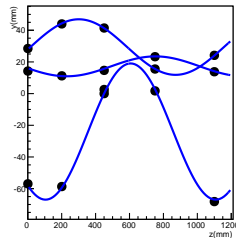
Spacepoint x-y plot for tracker 1



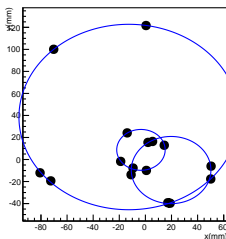
Spacepoint z-x plot for tracker 1



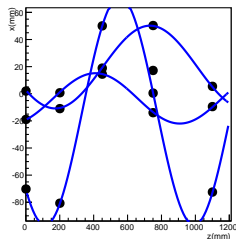
Spacepoint z-y plot for tracker 1



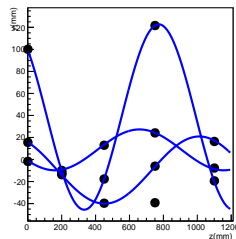
Spacepoint x-y plot for tracker 2



Spacepoint z-x plot for tracker 2

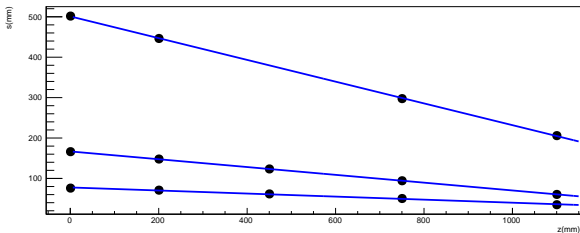


Spacepoint z-y plot for tracker 2

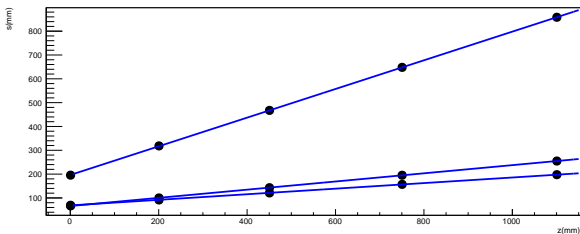


SZ View

Seed s-z plot for tracker 1



Seed s-z plot for tracker 2



All found
spacepoints
look good
here, but one
spacepoint has
been missed in
T1

Info Box

Tracker	1	2
Spill num	1	1
Events	3	3
Digits	51	53
Clusters	48	47
Spacepoints	16	16
Str Tracks	0	0
Helical Tracks	3	3
Total Spoints	16	16
Total Str Tracks	0	0
Total Helical Tracks	3	3

The infobox displays data for the current spill

Question

What data / plots would people like to see, both online and offline?

Goals

- Get unit test coverage up to $\sim 80\%$ or better, expand integration tests, remove compiler warnings, etc
- Sort out CDB / geometry issues
- Pattern Recognition spacepoint efficiency study
- Test with full trigger MC and realistic noise
- Improve online / offline analysis tools
- Merge kalman, updated pattern recognition, etc into trunk
- Optimise performance
- Data challenge
- Produce a paper for CHEP
- Produce a technical journal paper
- Code in working form **in a MAUS release** for Step IV