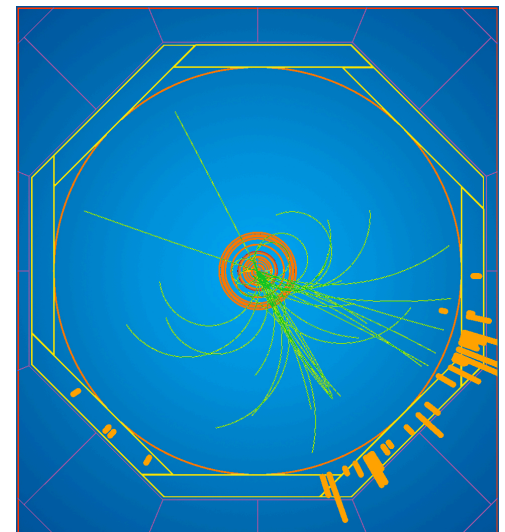


ILD Tracking Status

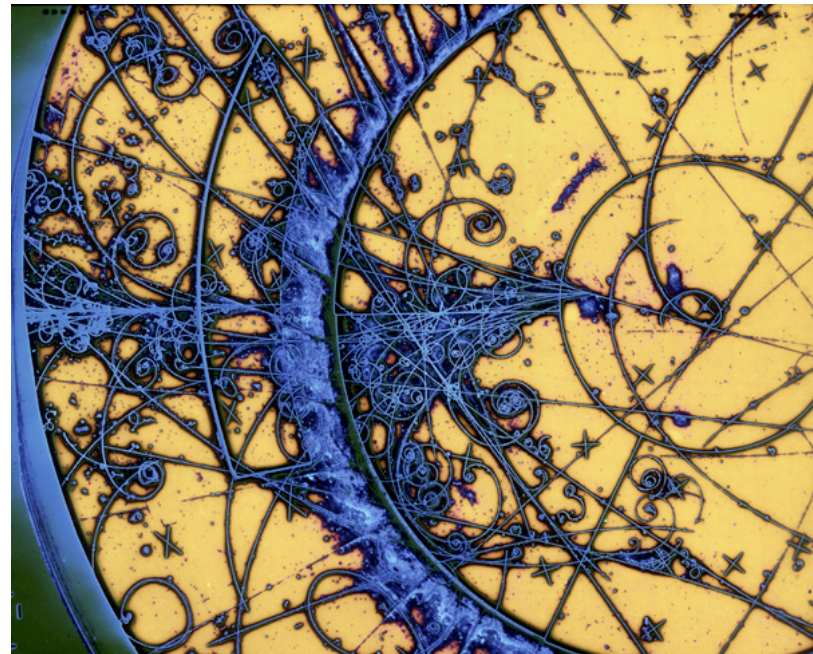
Steve Aplin

ILD Software and Integration Meeting
30th November 2011

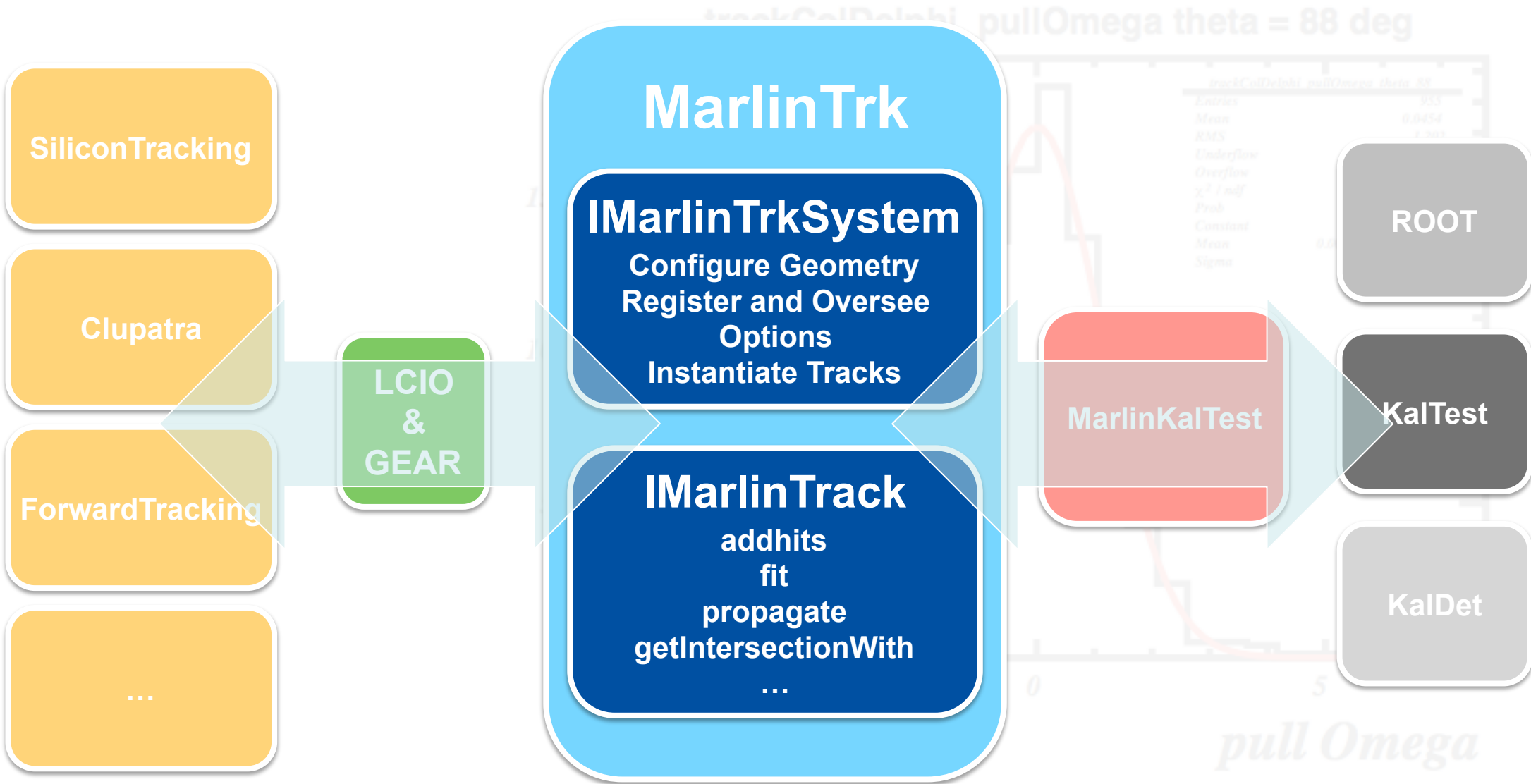


Overview

- Integration
- Track Reconstruction Chain
- Current Status
- Outstanding Issues

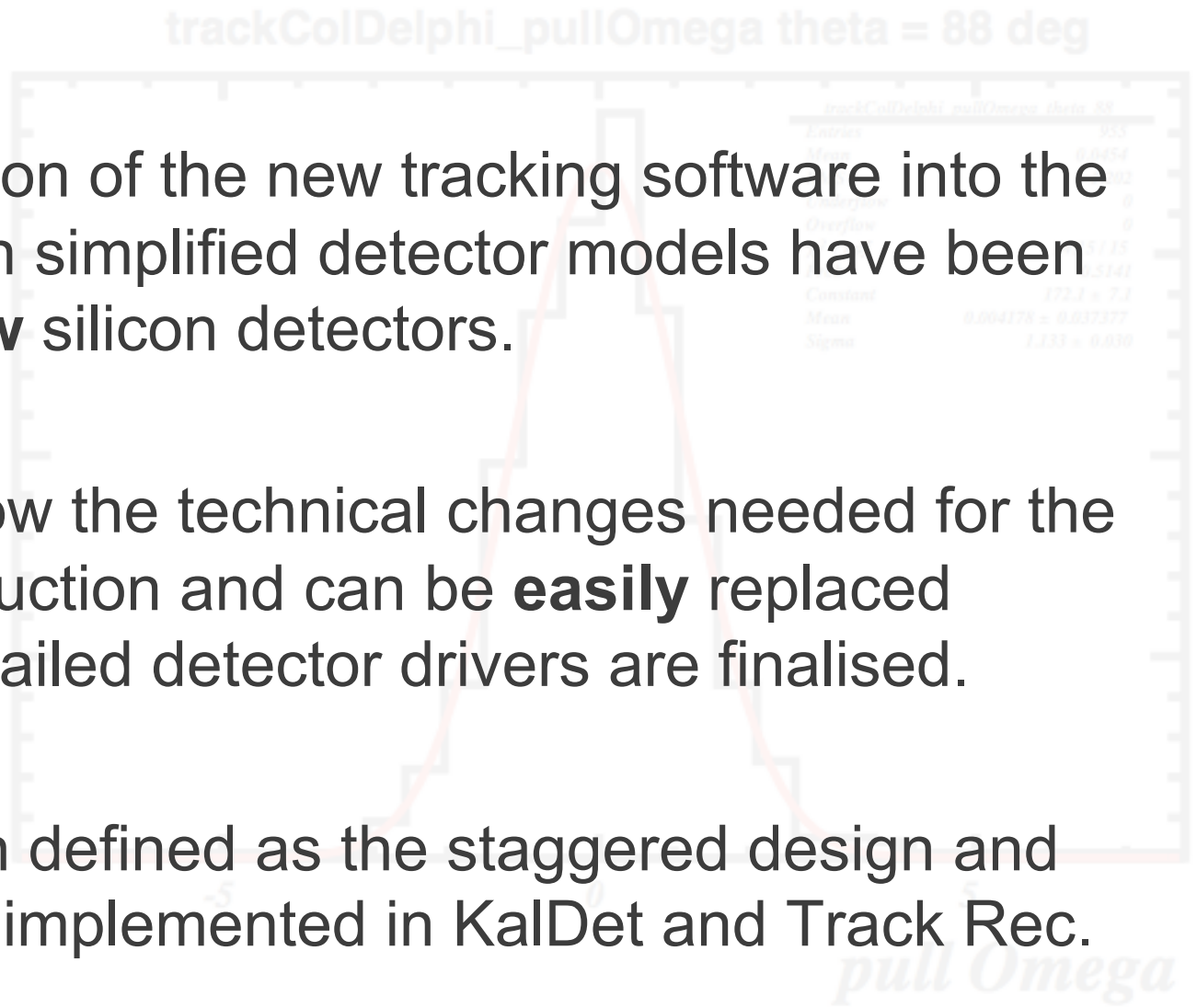


MarlinTrk KalTest Implementation



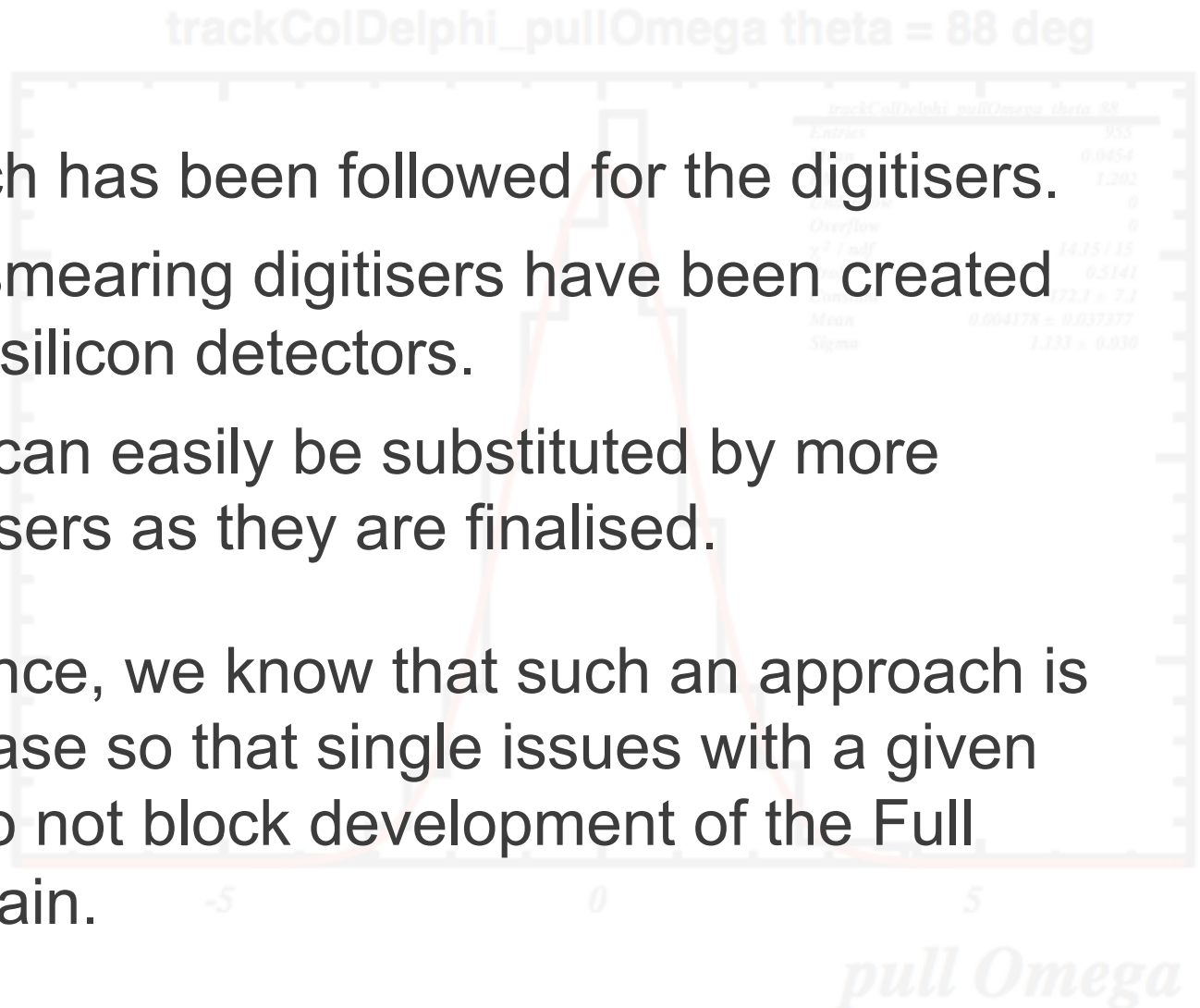
Integration

- To aid the integration of the new tracking software into the Full Reconstruction simplified detector models have been created for the **new** silicon detectors.
- These models follow the technical changes needed for the new track reconstruction and can be **easily** replaced when the more detailed detector drivers are finalised.
- FTD has now been defined as the staggered design and this has now been implemented in KalDet and Track Rec.



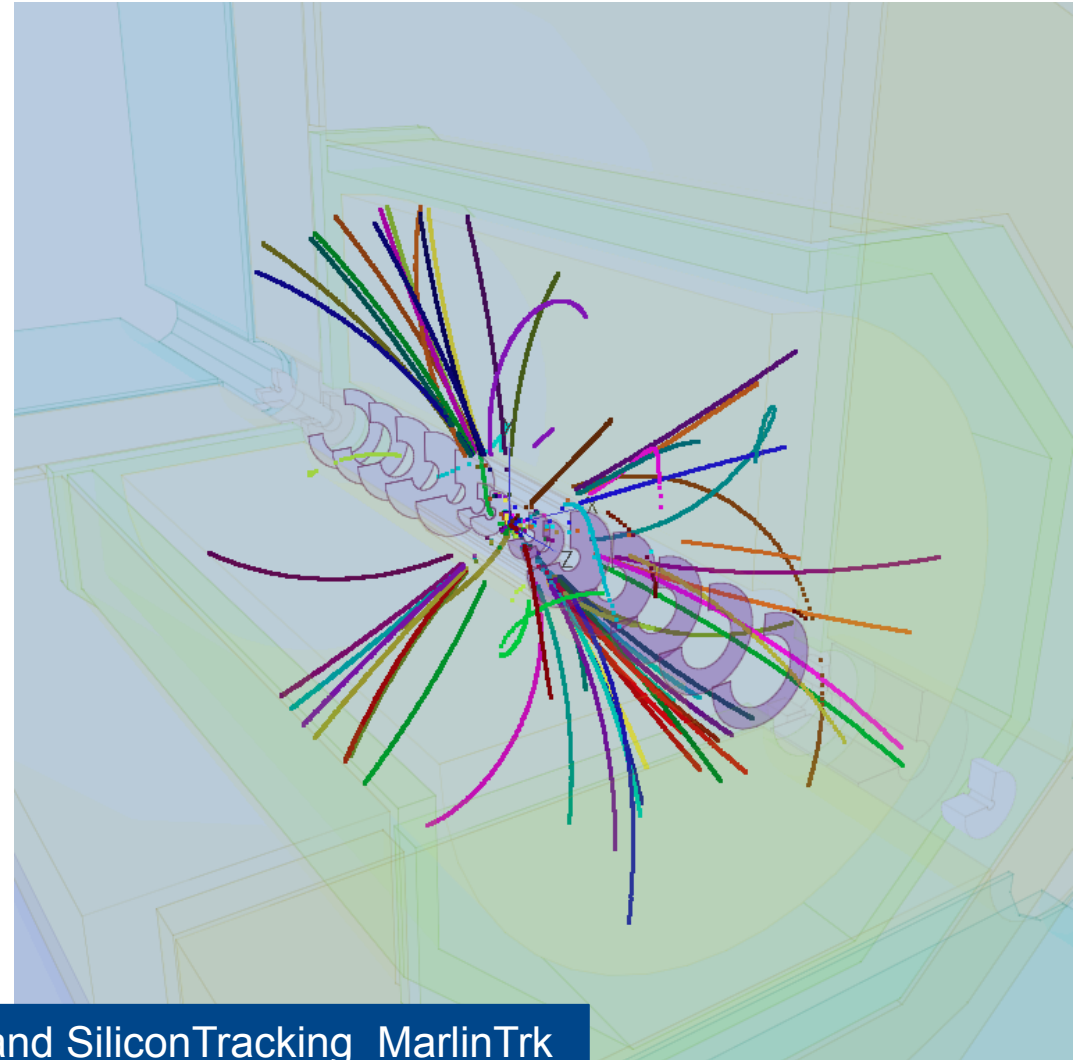
Integration

- The same approach has been followed for the digitisers.
- Simple Gaussian smearing digitisers have been created for the new planar silicon detectors.
- Once again these can easily be substituted by more sophisticated digitisers as they are finalised.
- From past experience, we know that such an approach is vital during this phase so that single issues with a given part of the chain do not block development of the Full Reconstruction Chain.



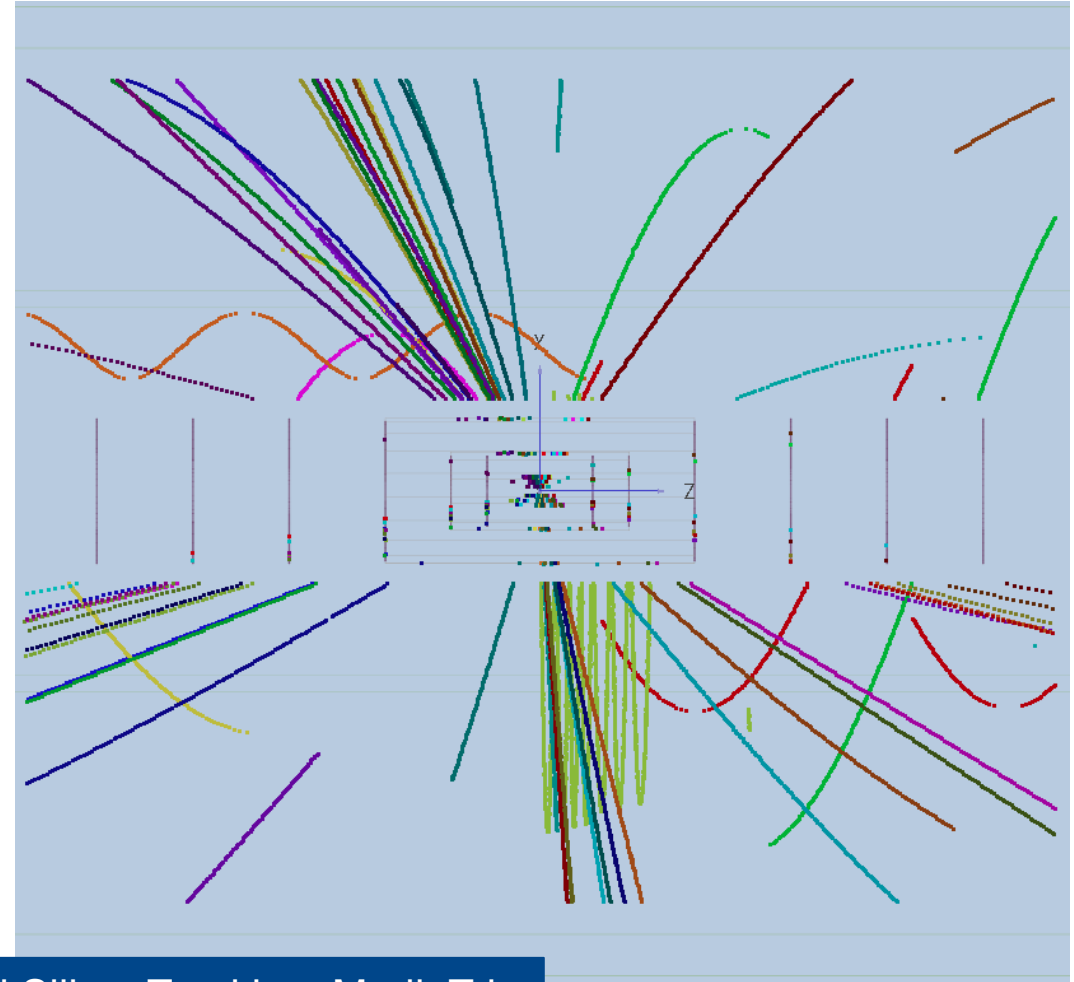
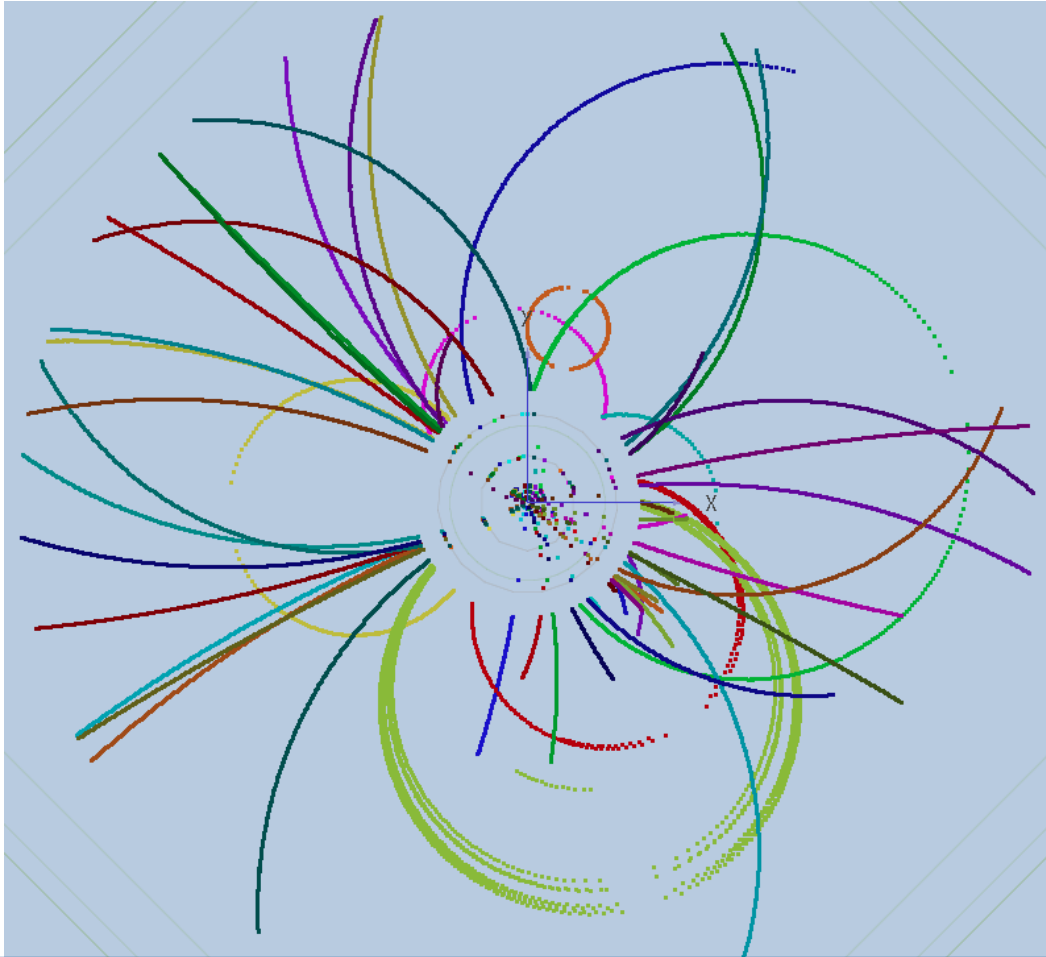
Complete Track Reconstruction

- Both SiliconTracking and FullLDCTracking have been fully adapted to use MarlinTrk and the correct use of the Hit ID's using CellID0 as described in ILDCConf.h
- Clupatra has been significantly revised for this release.
- The full chain will be available in the iLCSoft release next week.
(Currently available in the trunk)



ttbar event @ 500 GeV reconstructed using Clupatra and SiliconTracking_MarlinTrk then combined into full tracks using FullLDCTracking_MarlinTrk

Complete Track Reconstruction

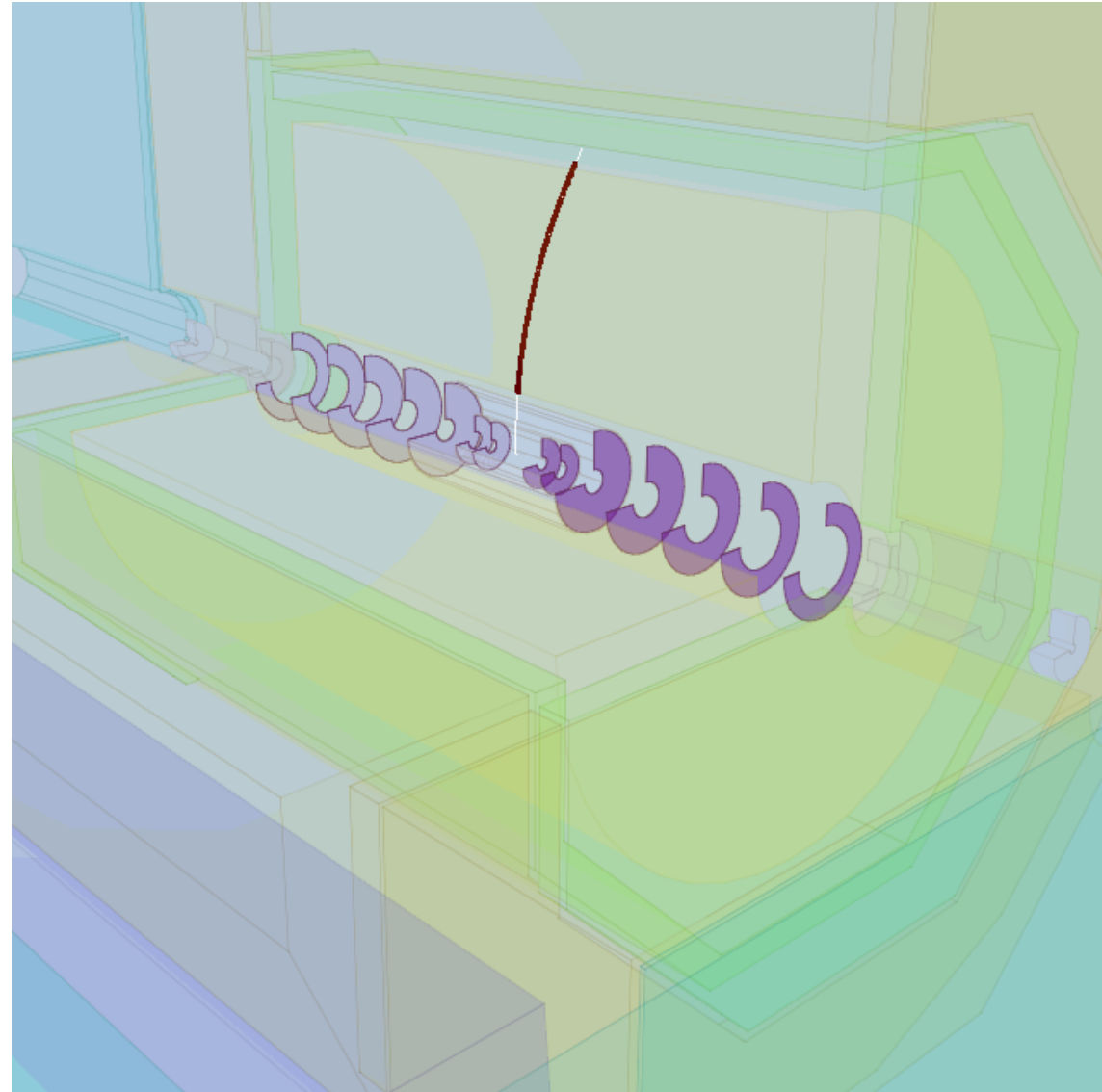


ttbar event @ 500 GeV reconstructed using Clupatra and SiliconTracking_MarlinTrk then combined into full tracks using FullLDCTracking_MarlinTrk

New Track States

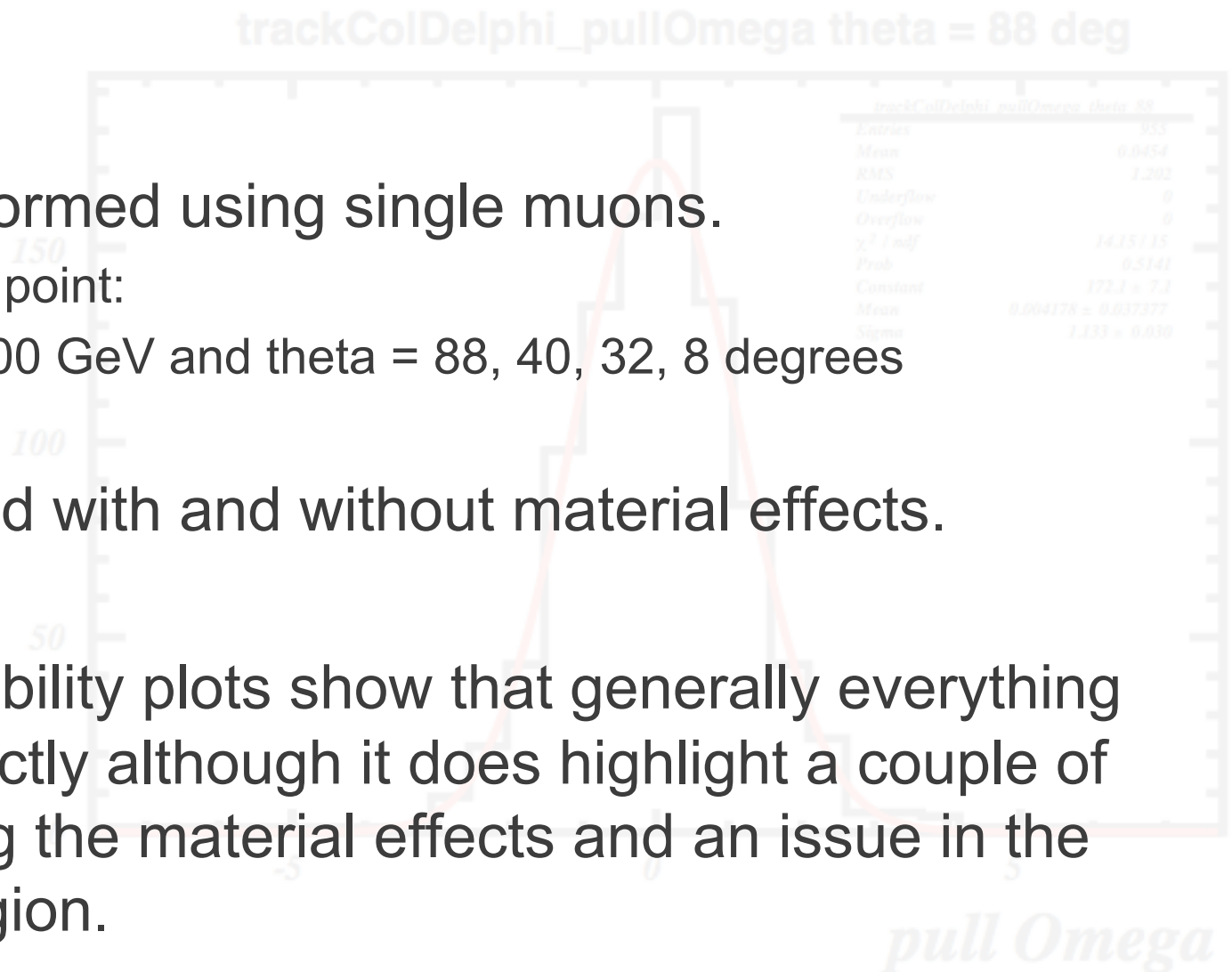
- Four canonical Track States are now written to the track collections:
 - @IP
 - @First-Hit
 - @Last-Hit
 - @Calo-Face
- These will prove very useful for track – cluster associations, and also for track merging.
- Access via:

```
trkstate = trk->getTrackState( TrackState::AtIP ) ;
```



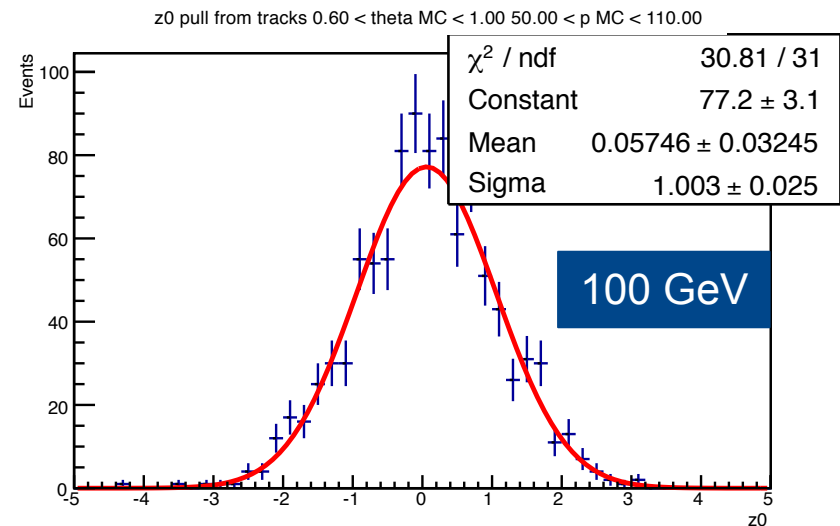
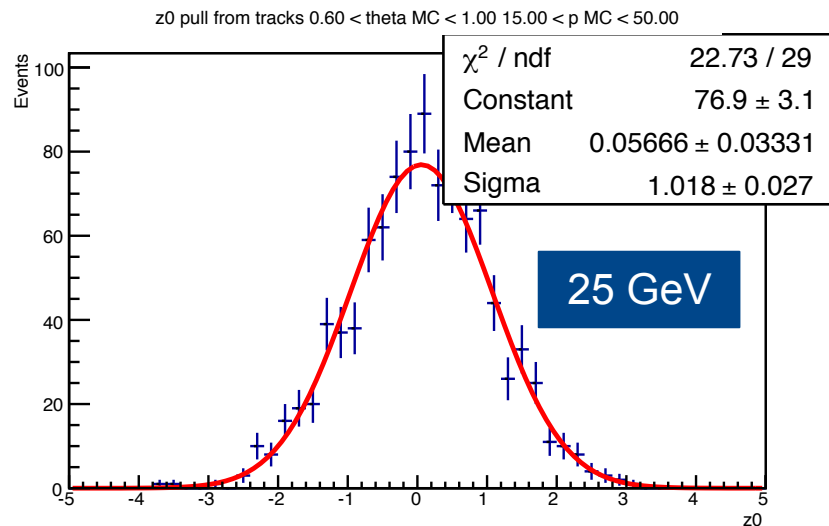
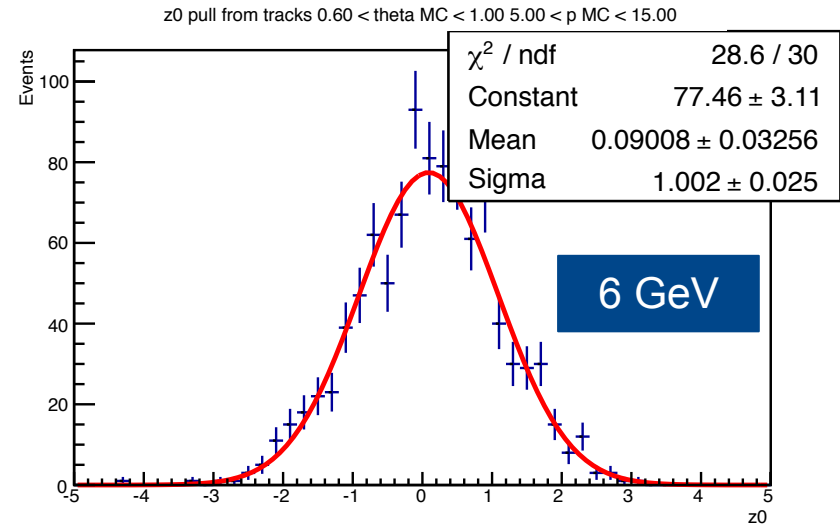
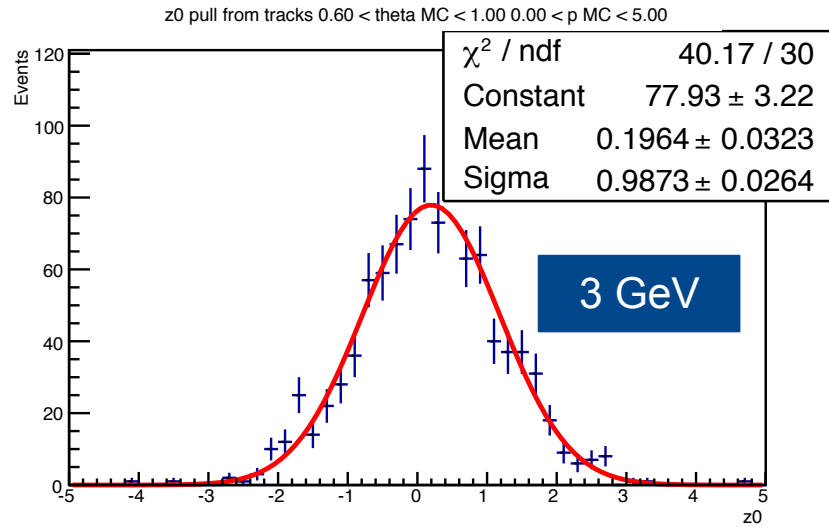
Track Parameter Accuracy

- Point Scan performed using single muons.
 - 1000 tracks per point:
 - $p = 3, 6, 40, 100$ GeV and $\theta = 88, 40, 32, 8$ degrees
- Scans performed with and without material effects.
- Pulls and Probability plots show that generally everything is working correctly although it does highlight a couple of issues regarding the material effects and an issue in the very forward region.



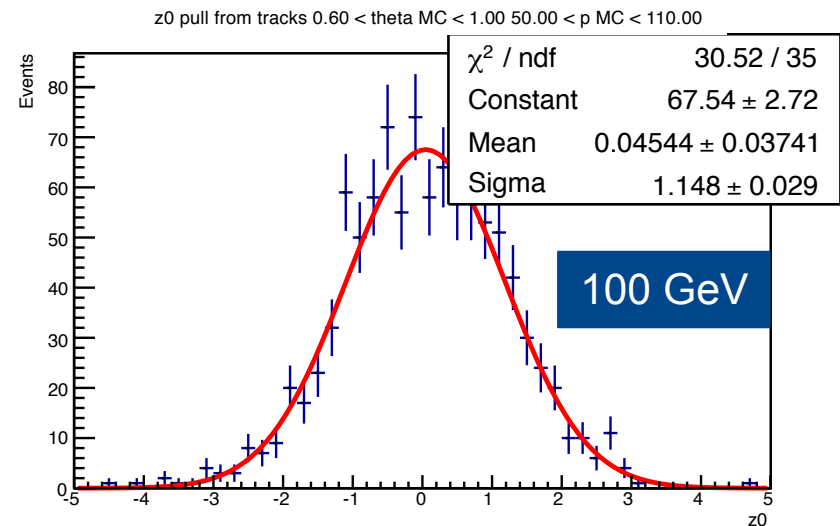
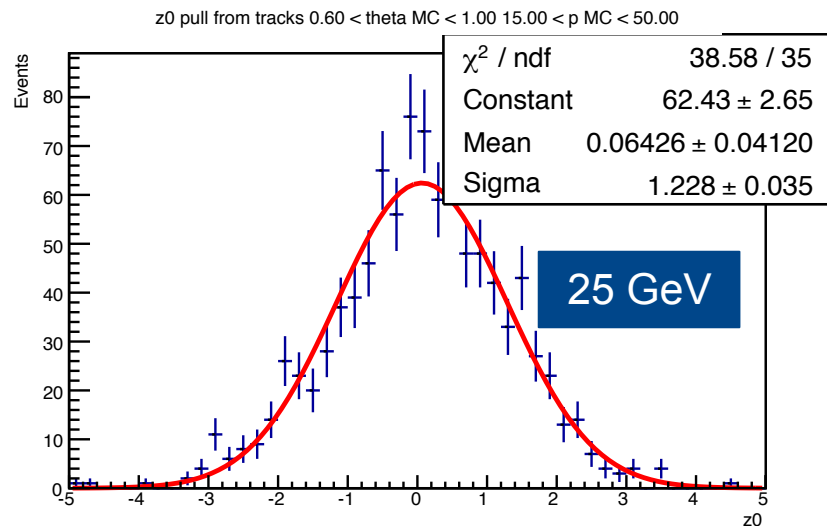
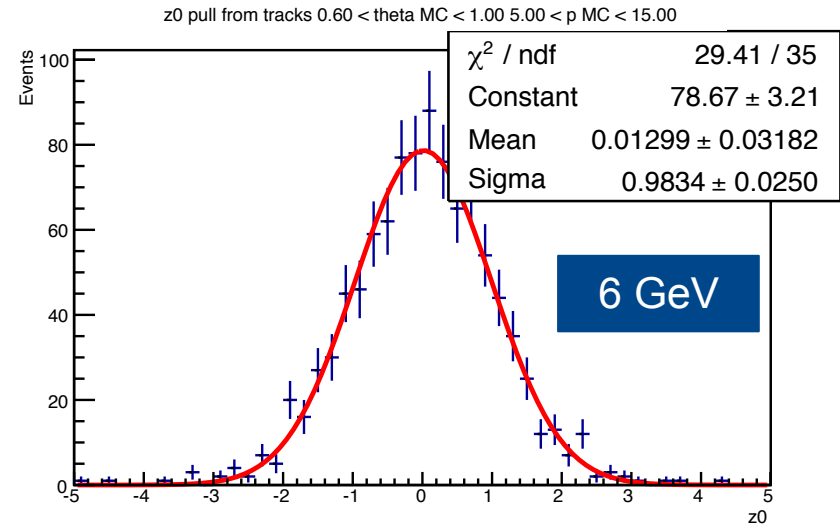
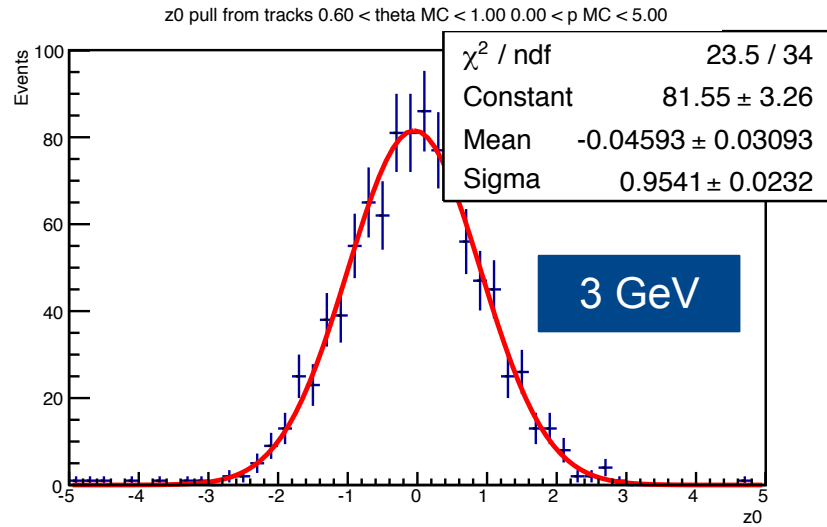
Track Parameter Pulls – z0 without material

40 Deg



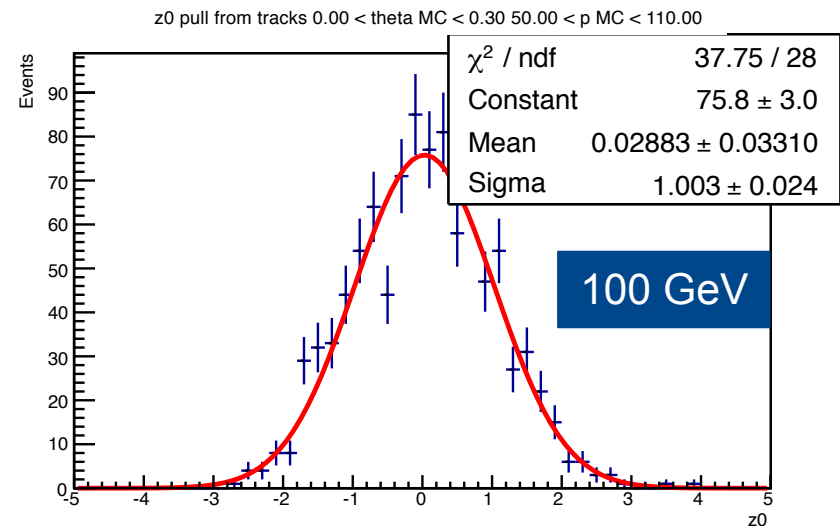
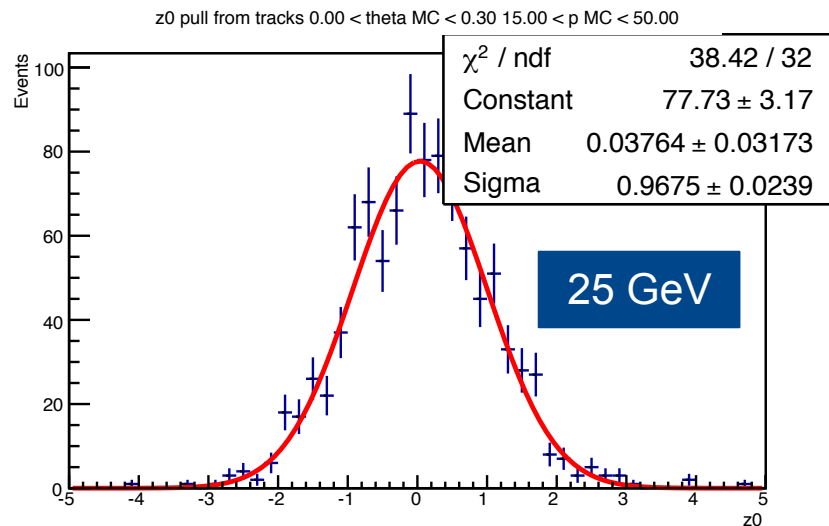
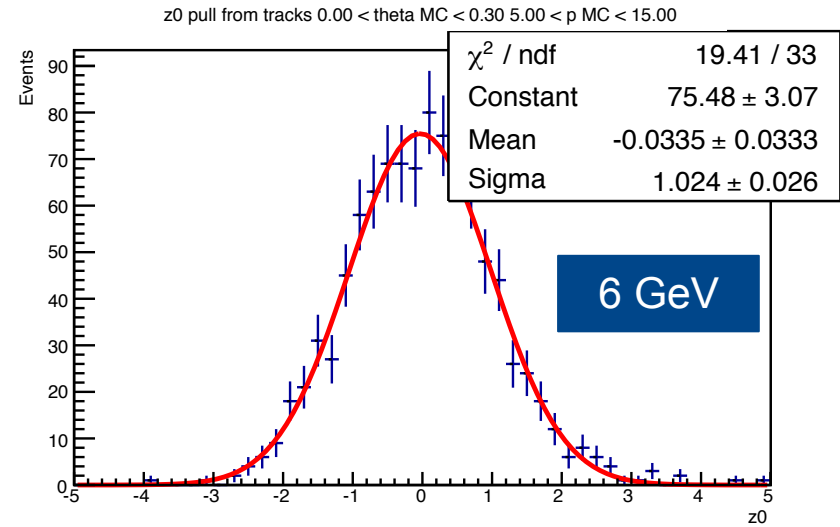
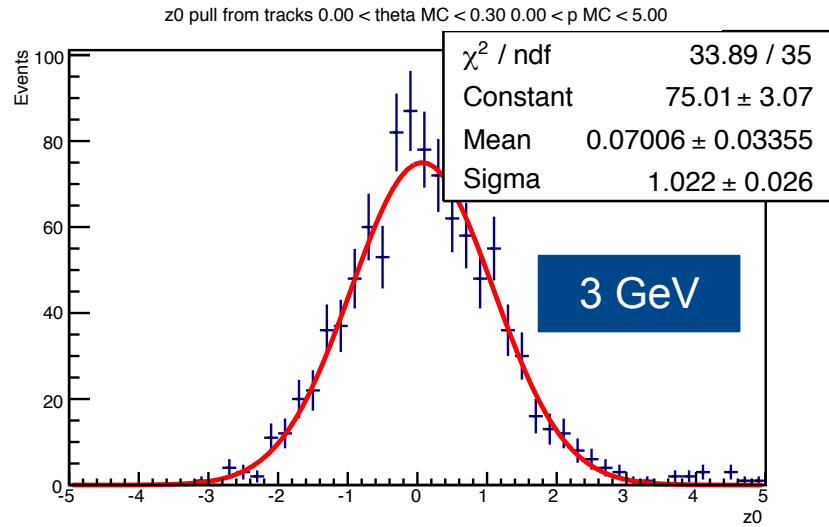
Track Parameter Pulls – z0 with material

40 Deg



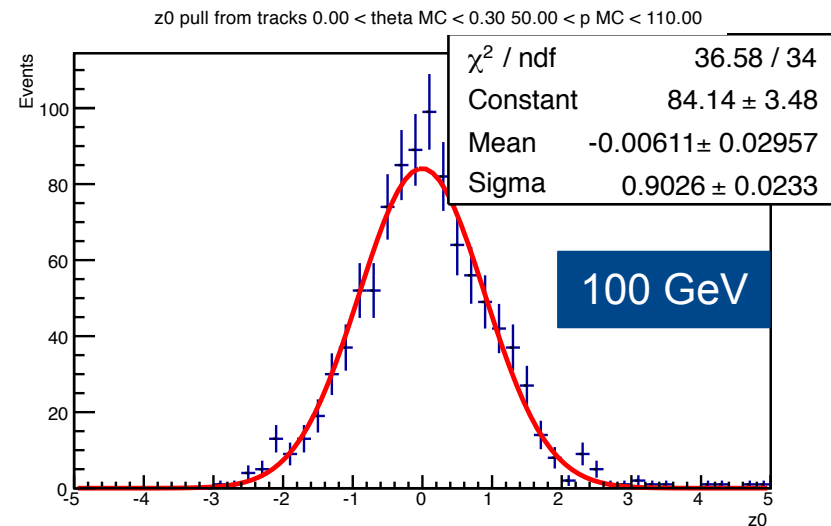
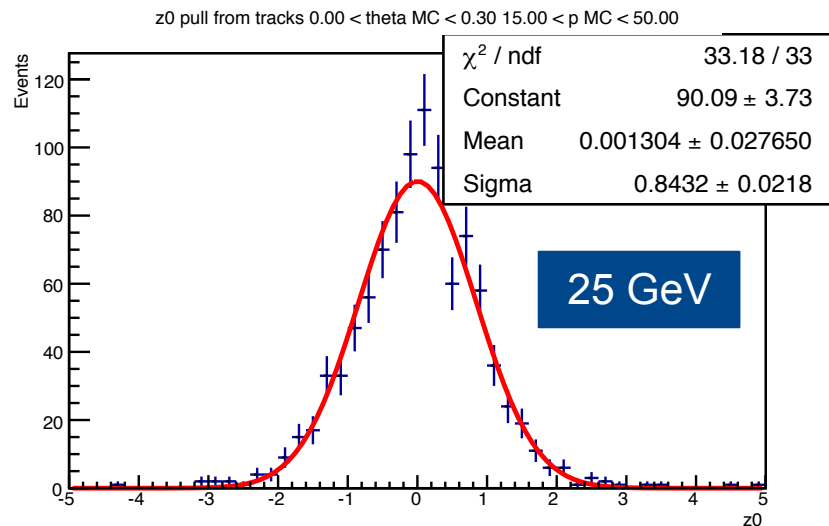
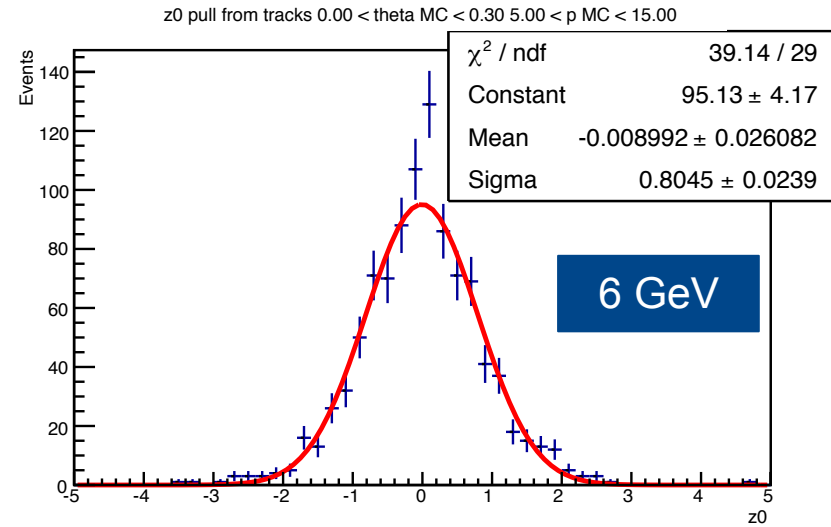
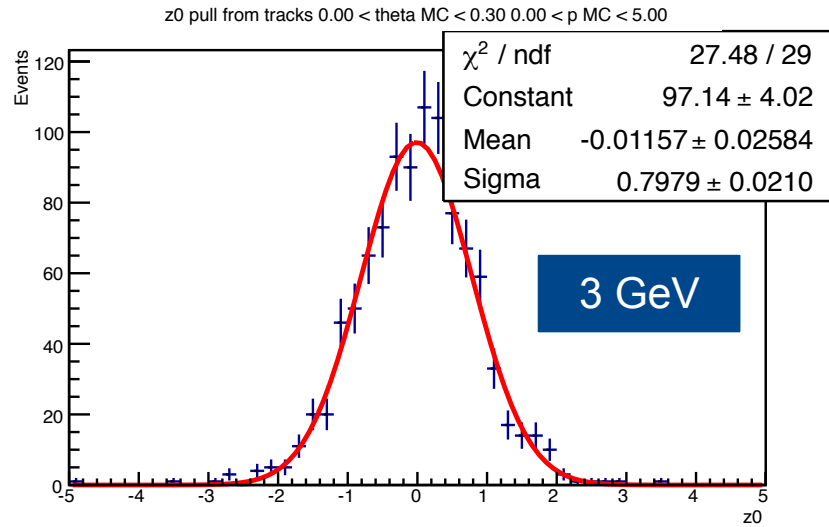
Track Parameter Pulls – z0 without material

8 Deg



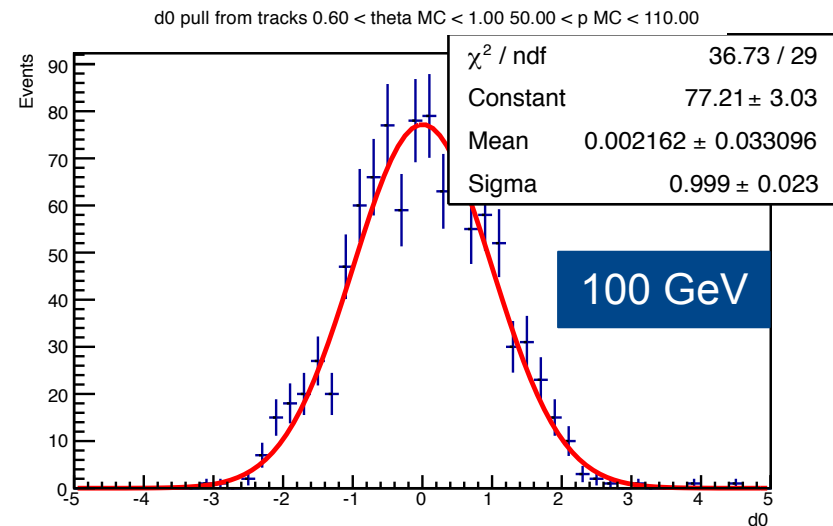
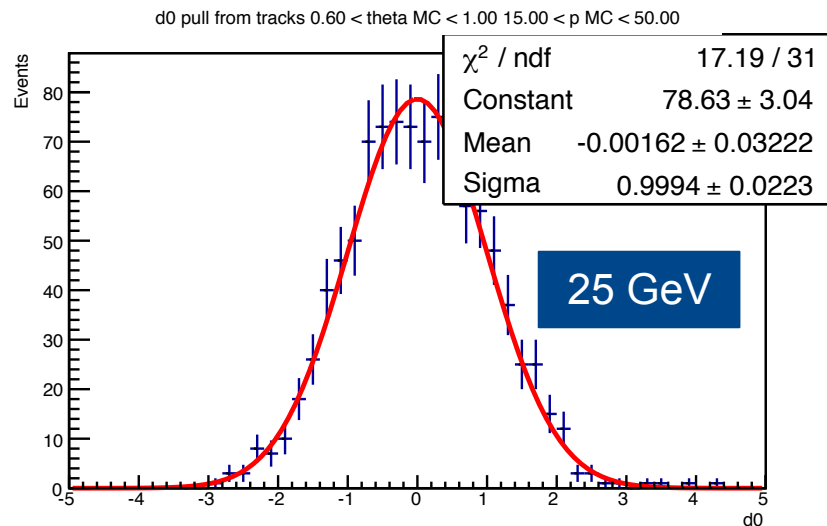
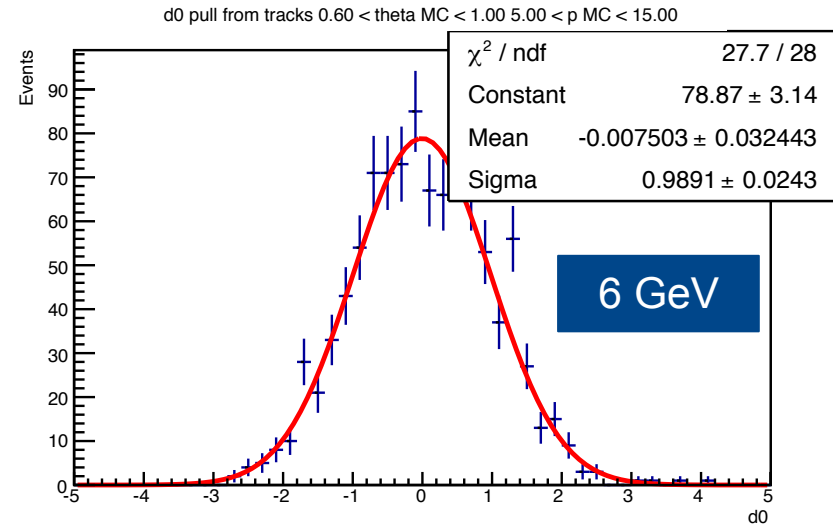
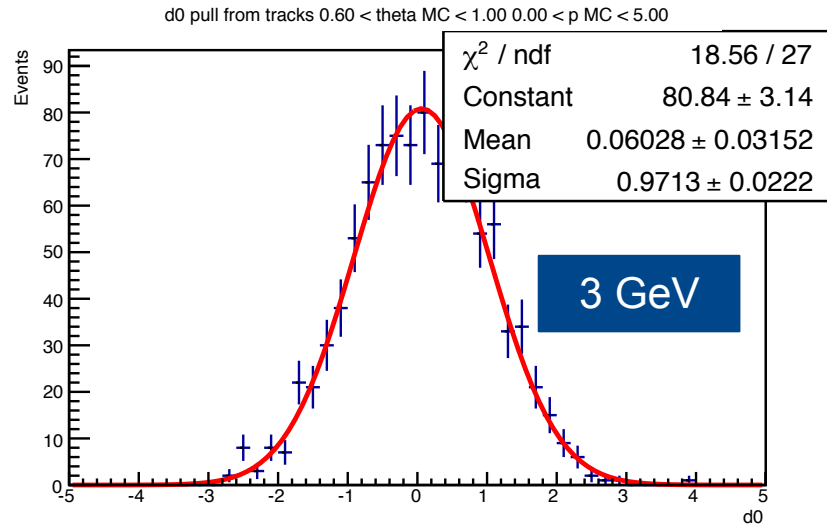
Track Parameter Pulls – z0 with material

8 Deg



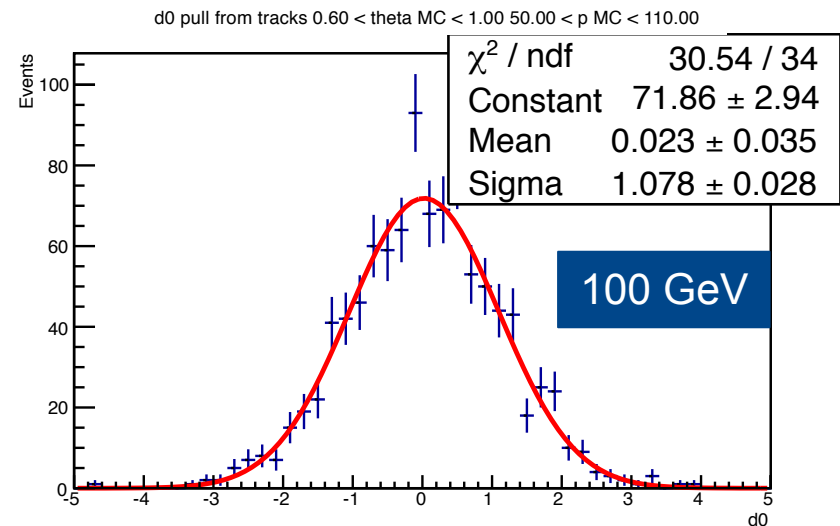
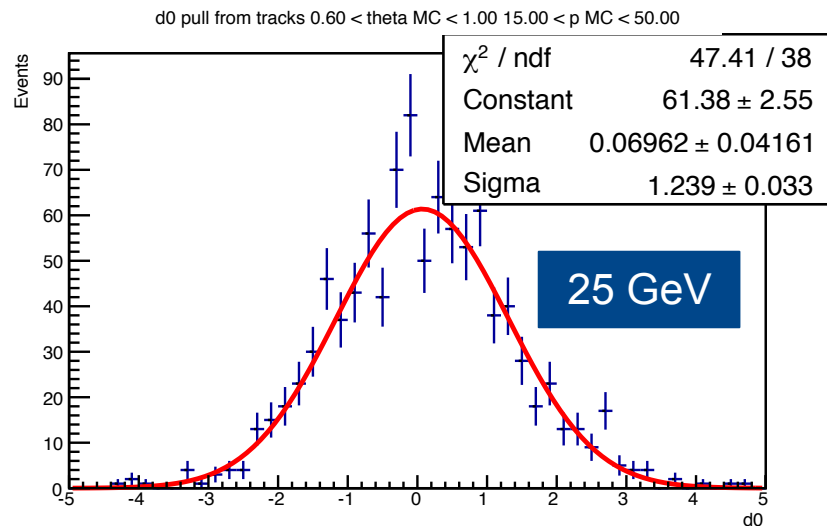
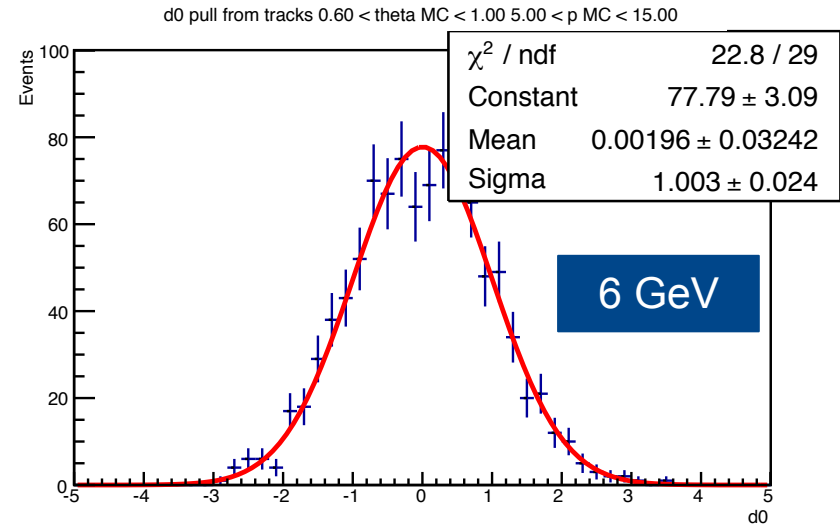
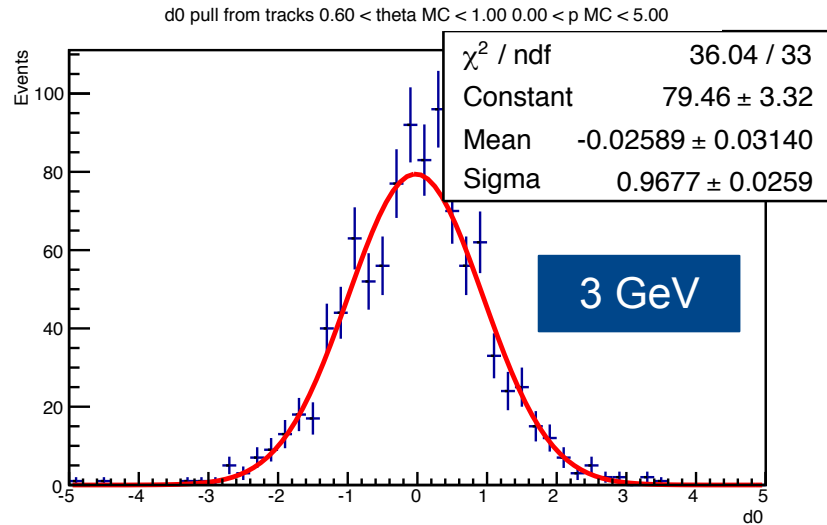
Track Parameter Pulls – d0 without material

40 Deg



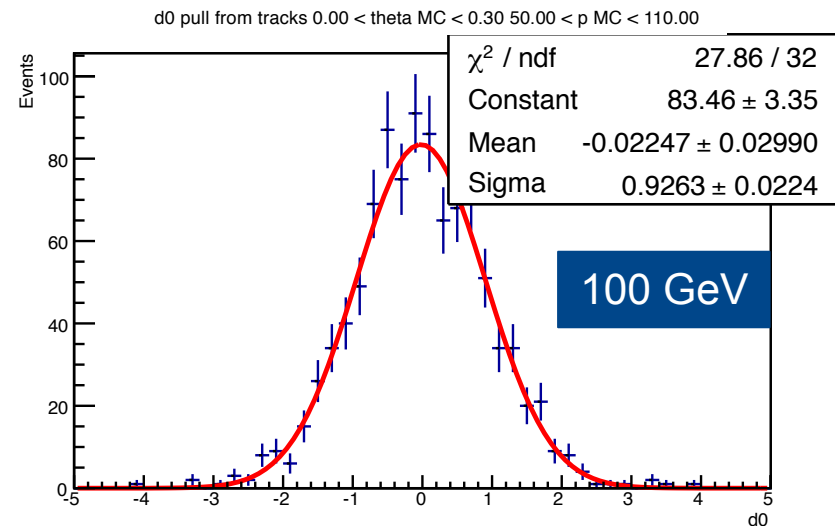
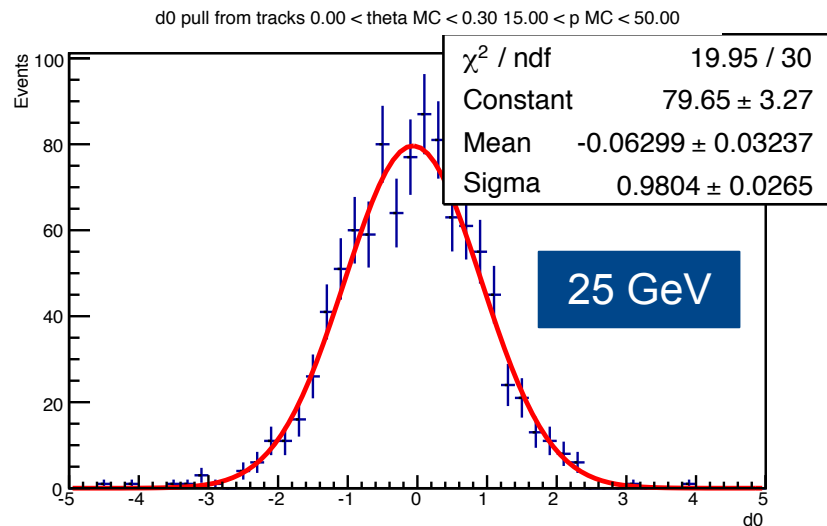
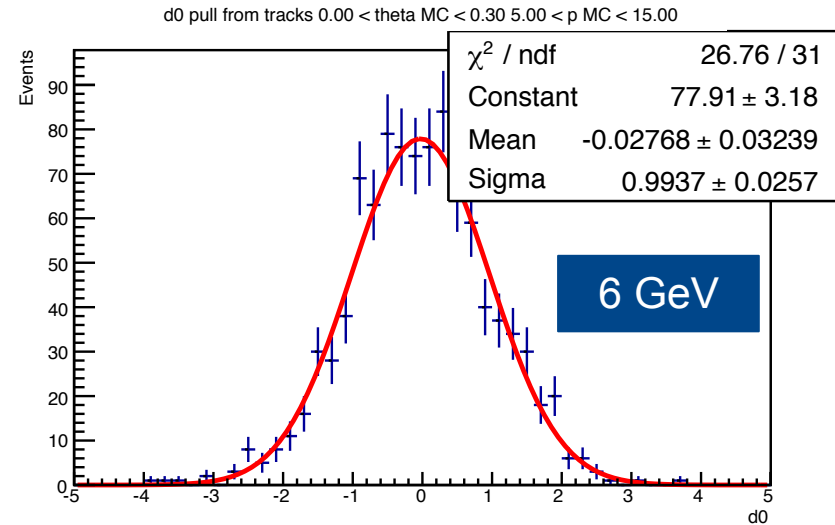
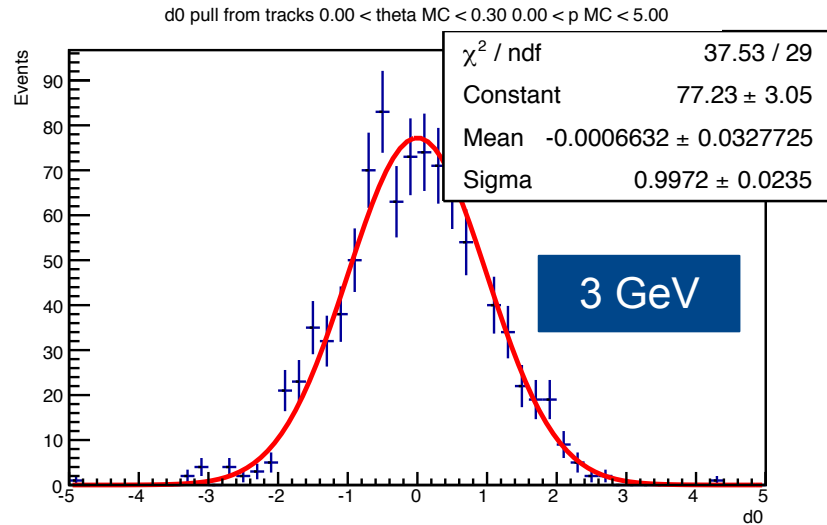
Track Parameter Pulls – d0 with material

40 Deg



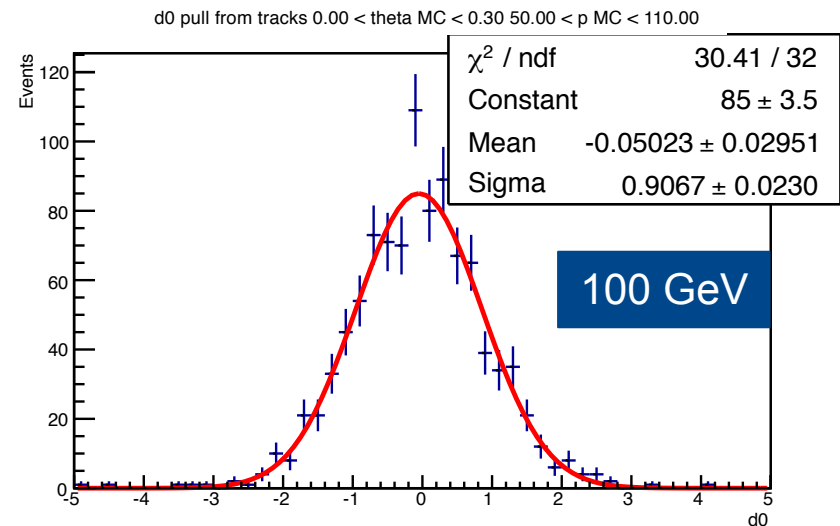
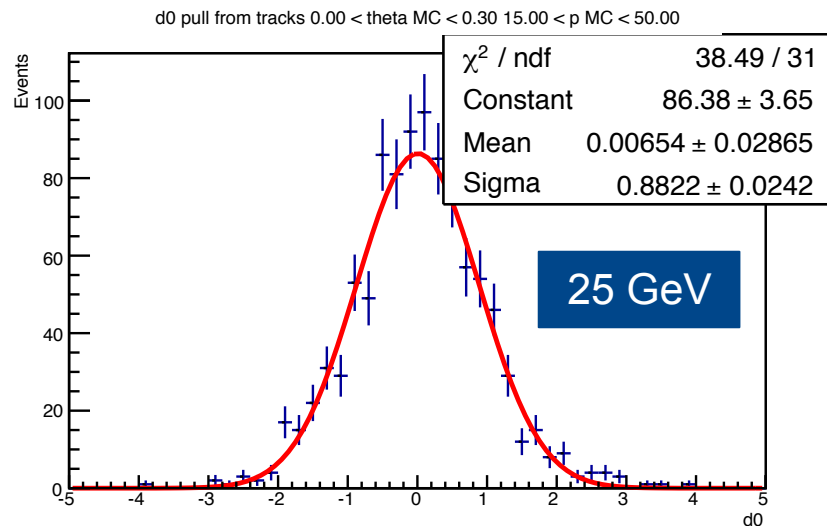
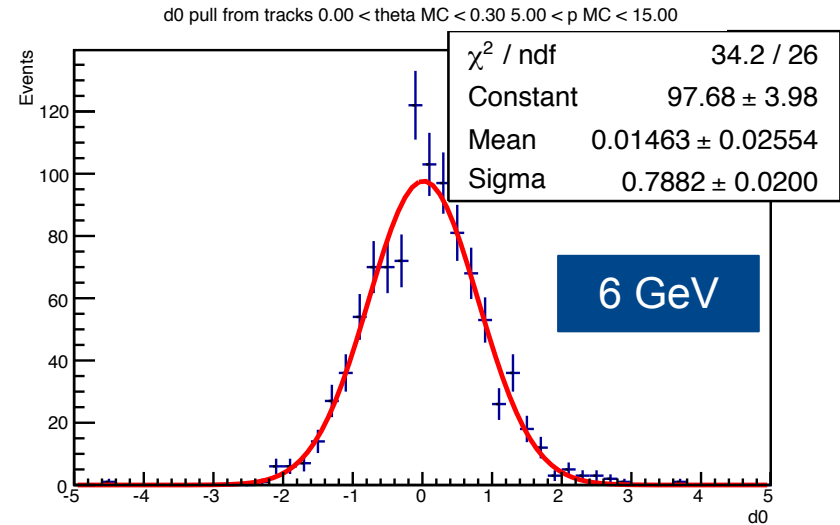
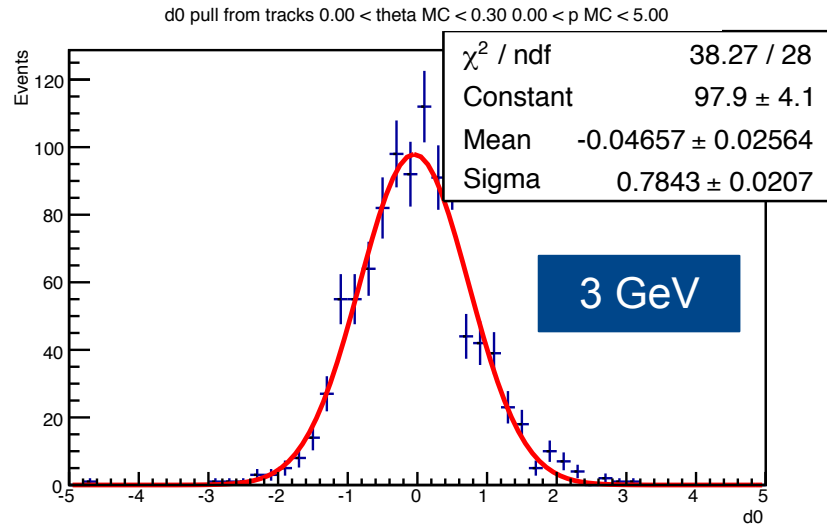
Track Parameter Pulls – d0 without material

8 Deg



Track Parameter Pulls – d0 with material

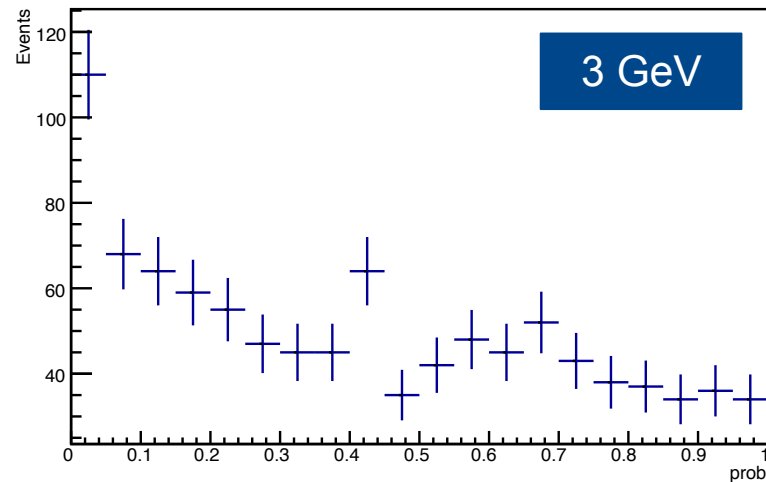
8 Deg



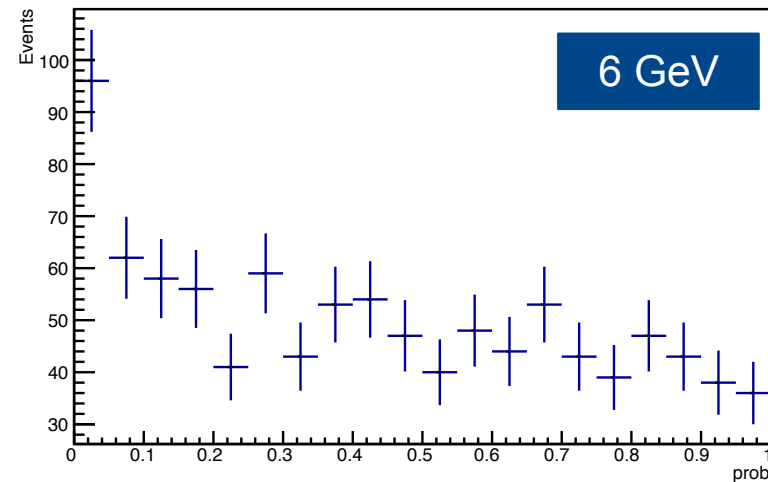
Probability plots for Chi2/NDF with material

40 Deg

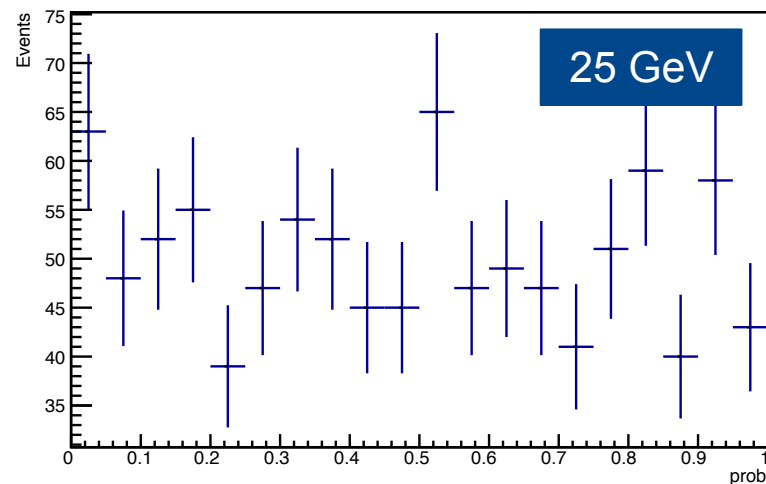
prob from tracks $1.00 < \theta_{MC} < 1.60$ $0.00 < p_{MC} < 5.00$



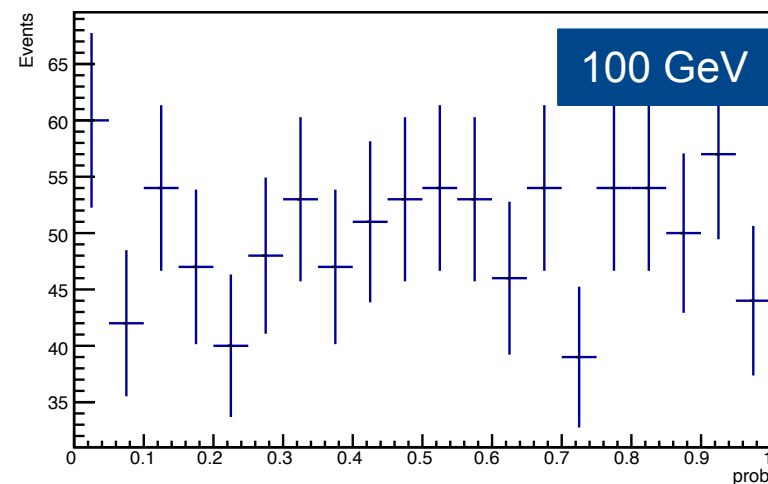
prob from tracks $1.00 < \theta_{MC} < 1.60$ $5.00 < p_{MC} < 15.00$



prob from tracks $1.00 < \theta_{MC} < 1.60$ $15.00 < p_{MC} < 50.00$

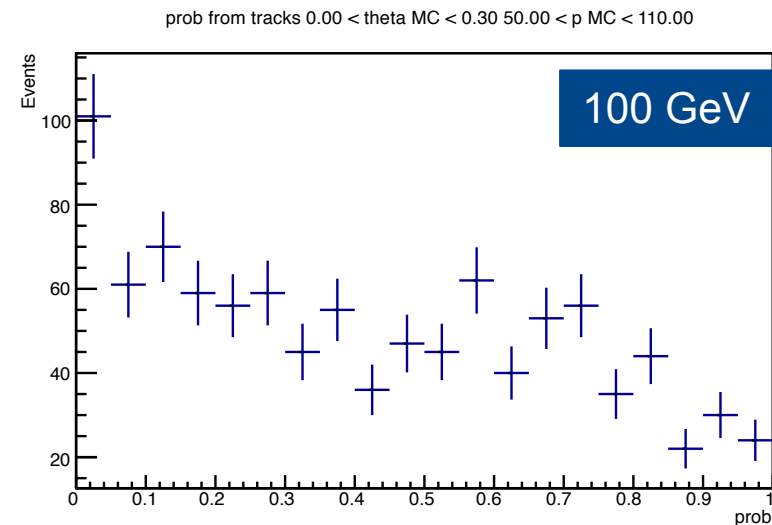
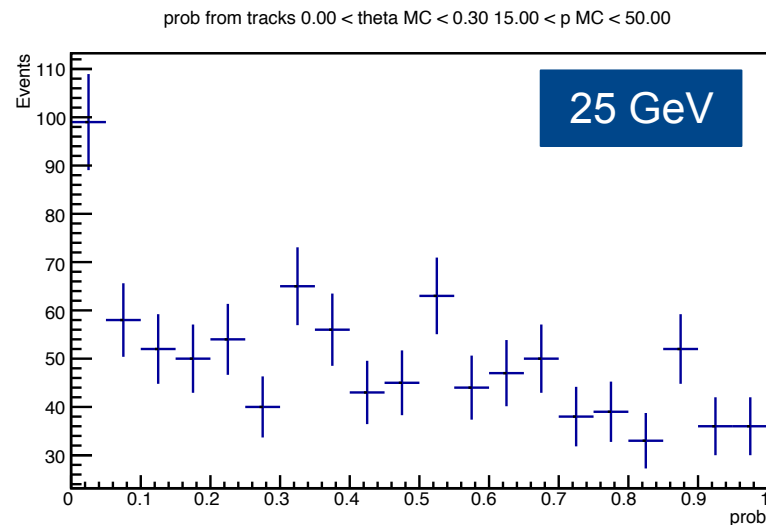
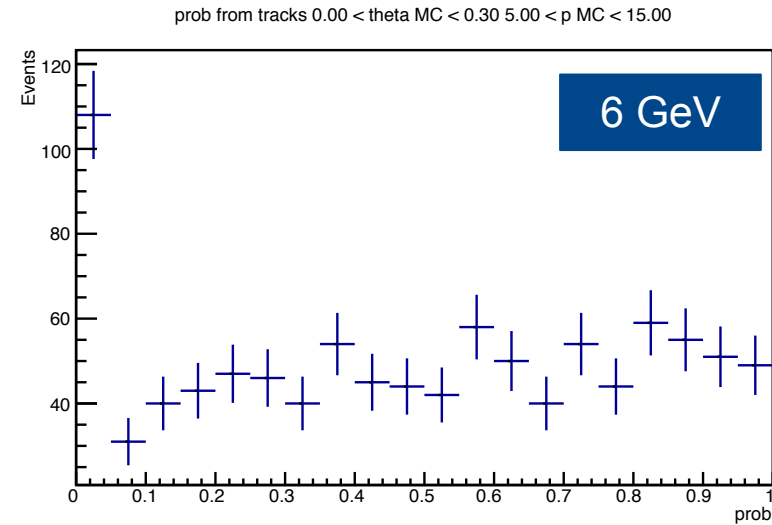
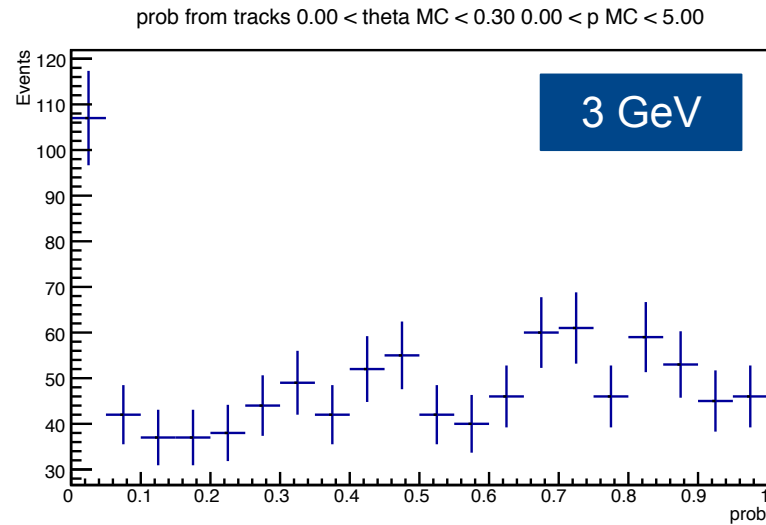


prob from tracks $1.00 < \theta_{MC} < 1.60$ $50.00 < p_{MC} < 110.00$



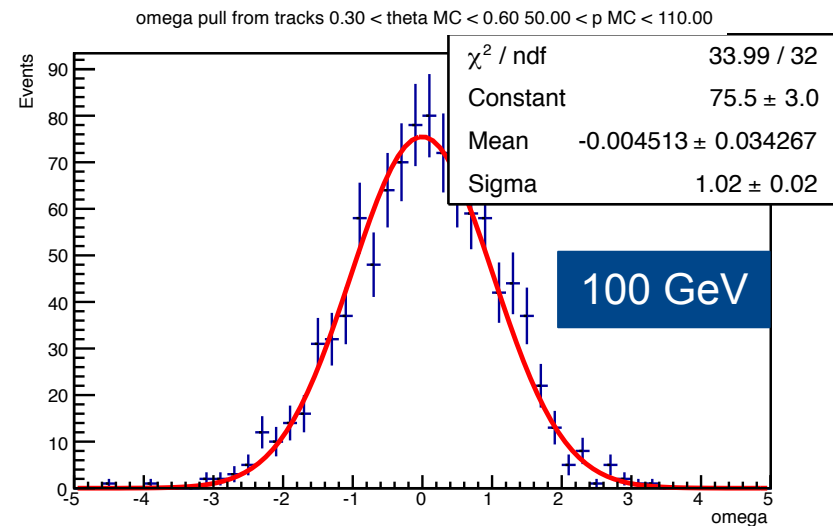
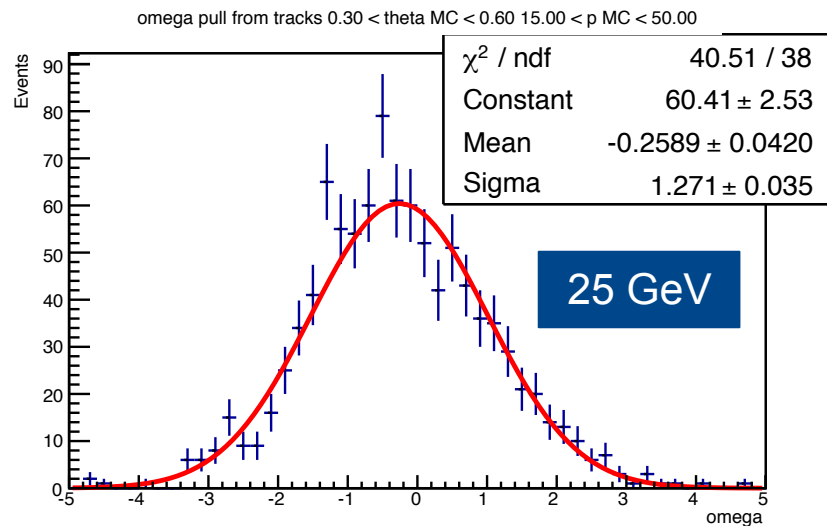
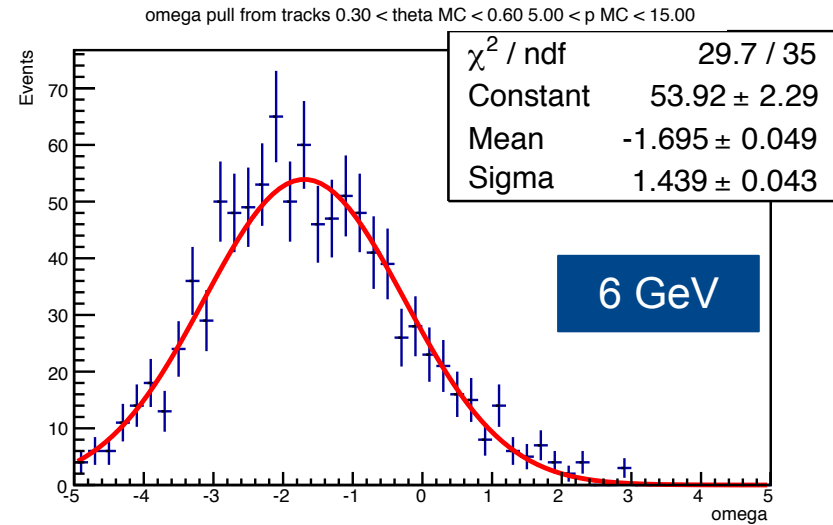
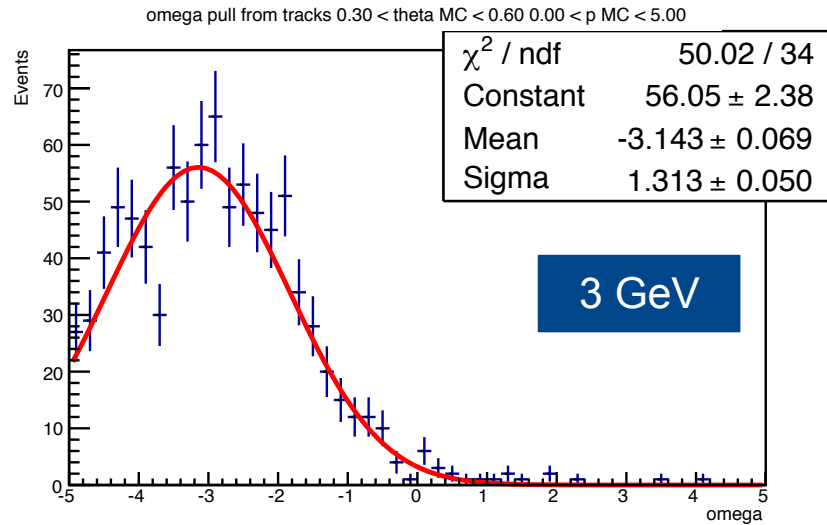
Probability plots for Chi2/NDF with material

8 Deg



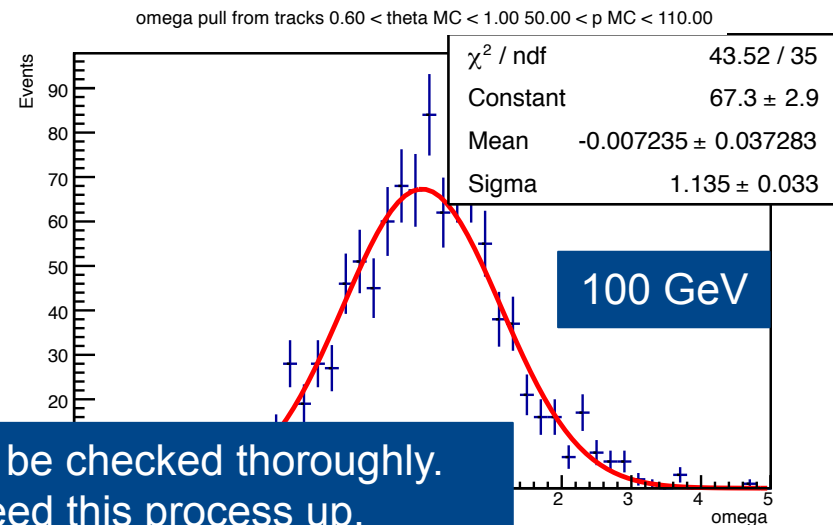
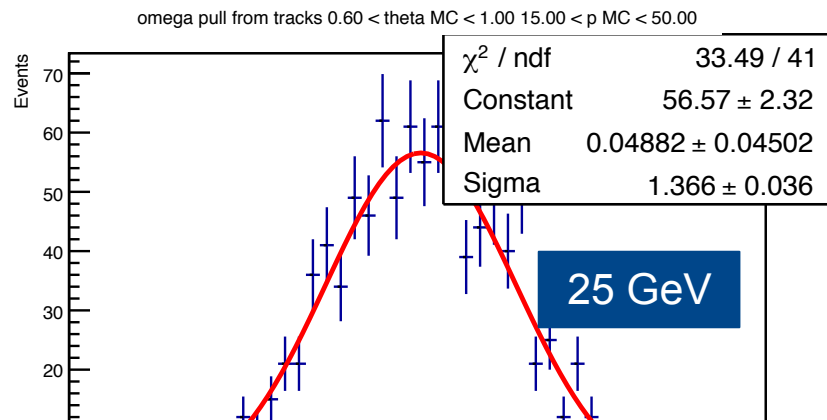
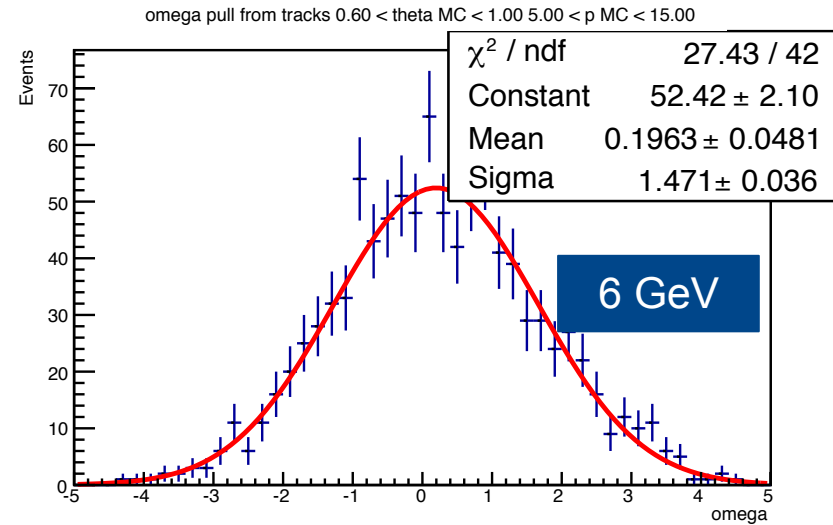
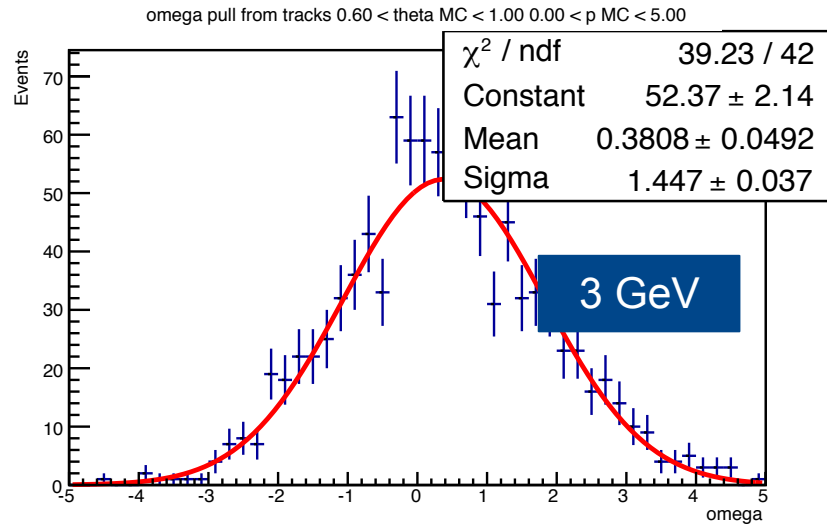
Material Budget Still Needs Some Optimisation

32 Deg



Material Budget Still Needs Some Optimisation

40 Deg



With the more detailed models, the material will need to be checked thoroughly.
An Automated method needs to be developed to speed this process up.

Forward Tracking (Robin Glattauer)

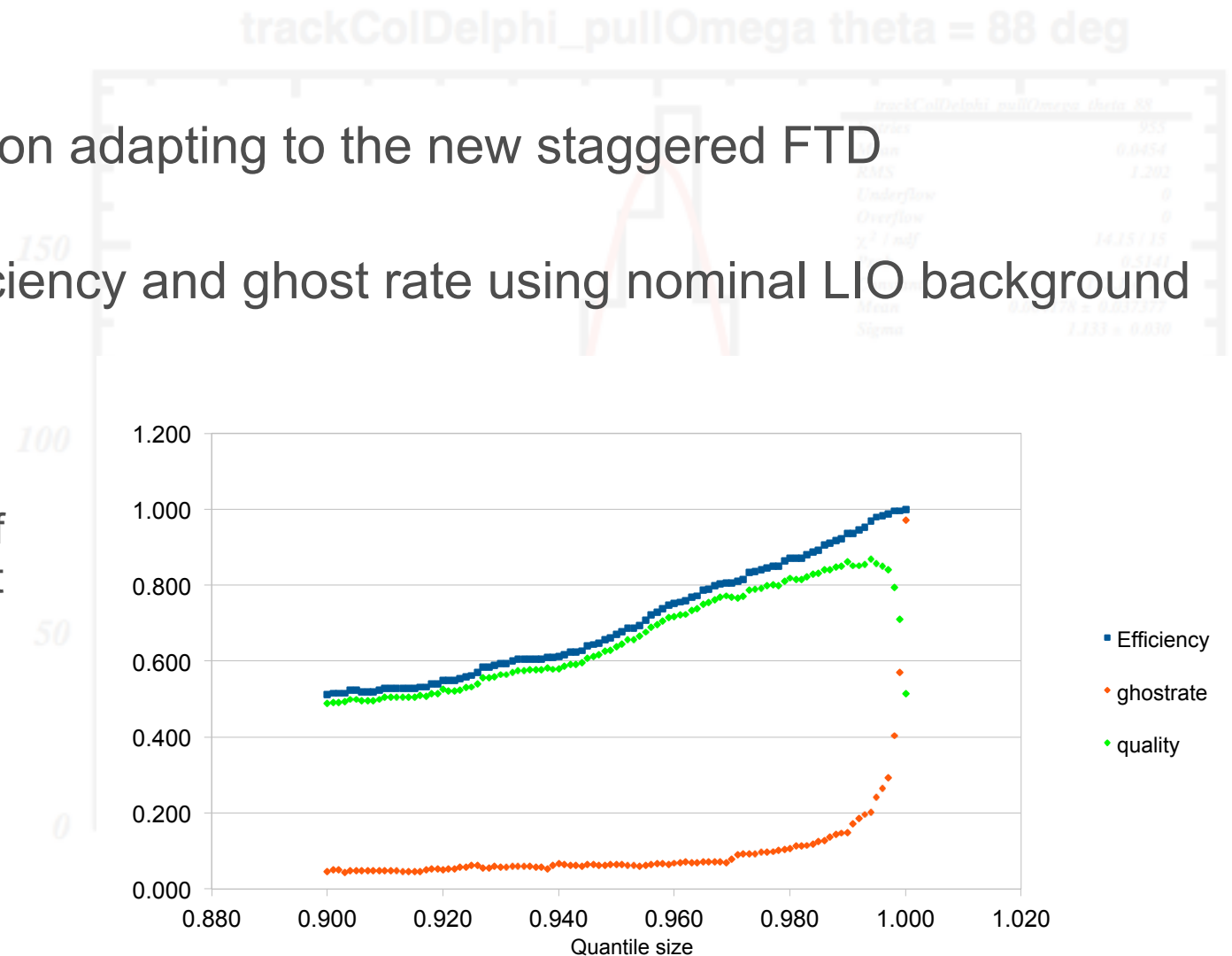
- Currently working on adapting to the new staggered FTD implementation.
- Studies of the efficiency and ghost rate using nominal LIO background levels.

Quantile size is a measure of the allowed range of different criteria used in the cellular automaton.

Quality defined as:

$\text{efficiency} - \text{ghostrate} * 0.5$

Used a test different criteria



Summary

- Full Track Reconstruction Chain now available.
- Will be release in next week's iLCSoft release v01-13
- This needs to be thoroughly tested on a large sample of events, especially as input to PFA and Vertex Reconstruction.
- Digitisation development needs to be finalised.
- Need to focus on bringing the ForwardTracking package, into the Full Track Reconstruction Chain.
- Need to focus on incorporating the hits from strips detectors into the pattern recognition.

