2D tracking efficiency and 3D tracking study

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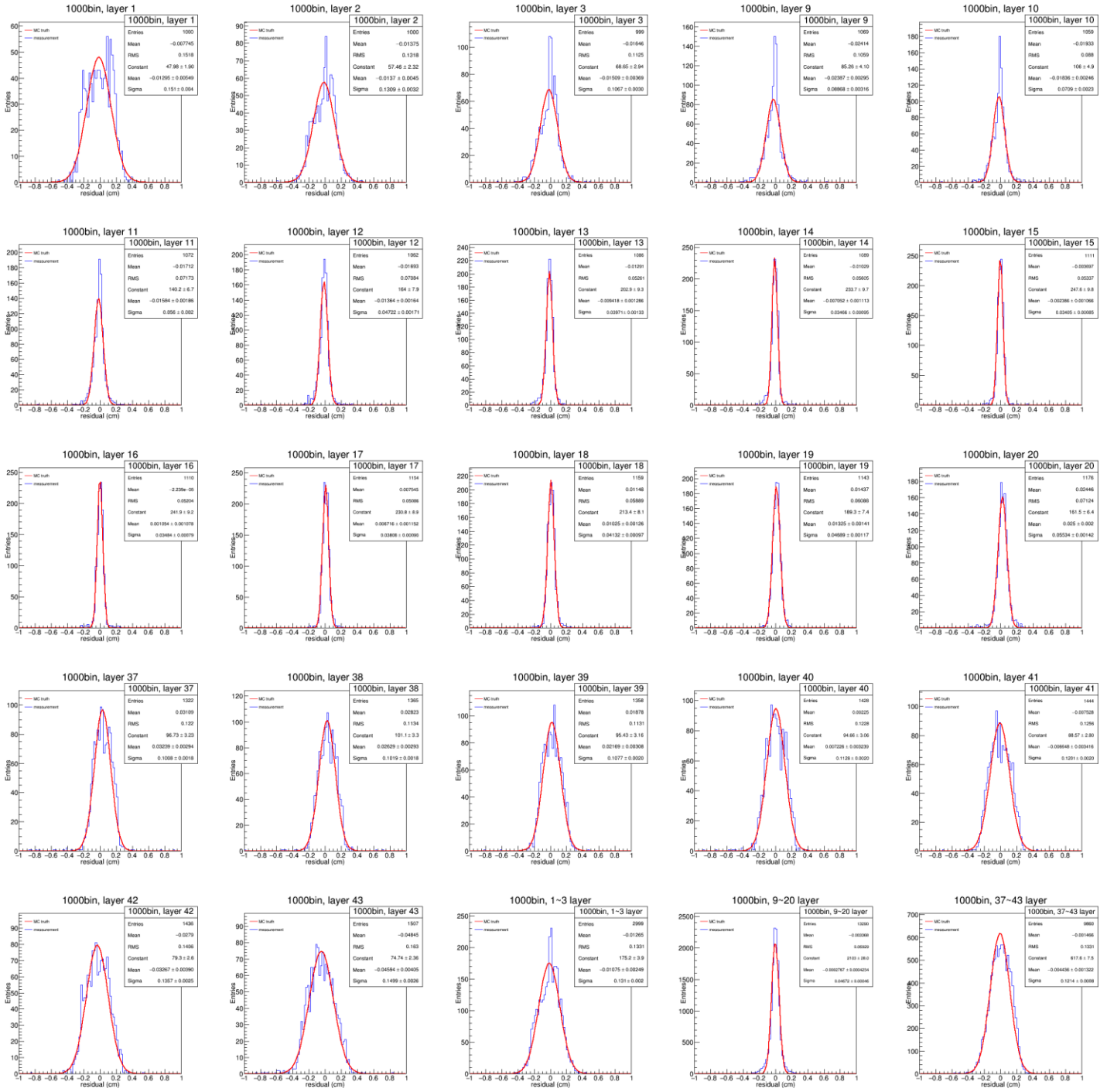
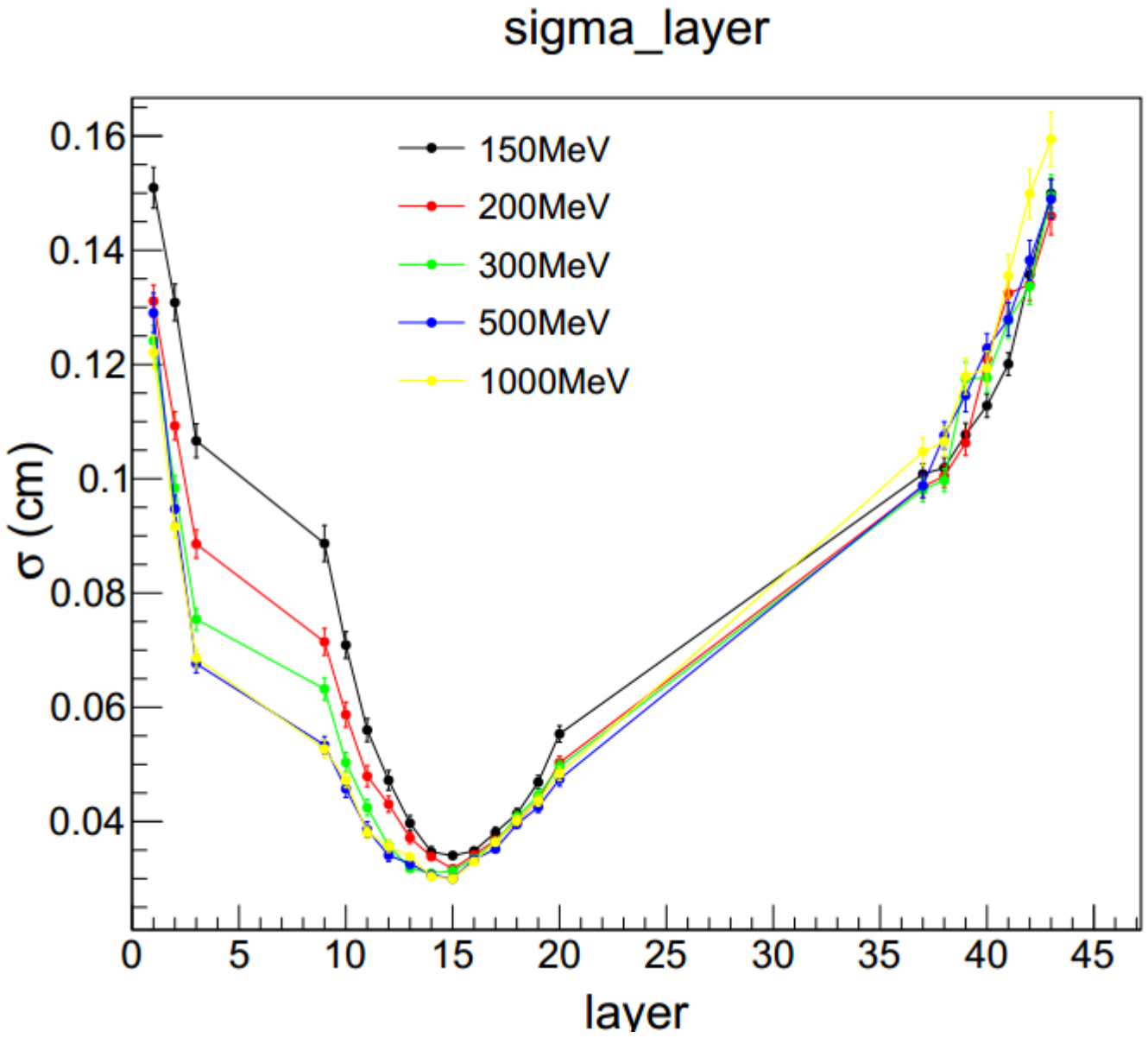
residual

- In the 2D tracking of MdcHoughFinder, when we find a peak of the Hough map, we can get a 2D track. Then we find hits of this track by cuts of each layer. So we need a series of cut which will be calculated from the residual distribution of each layer.



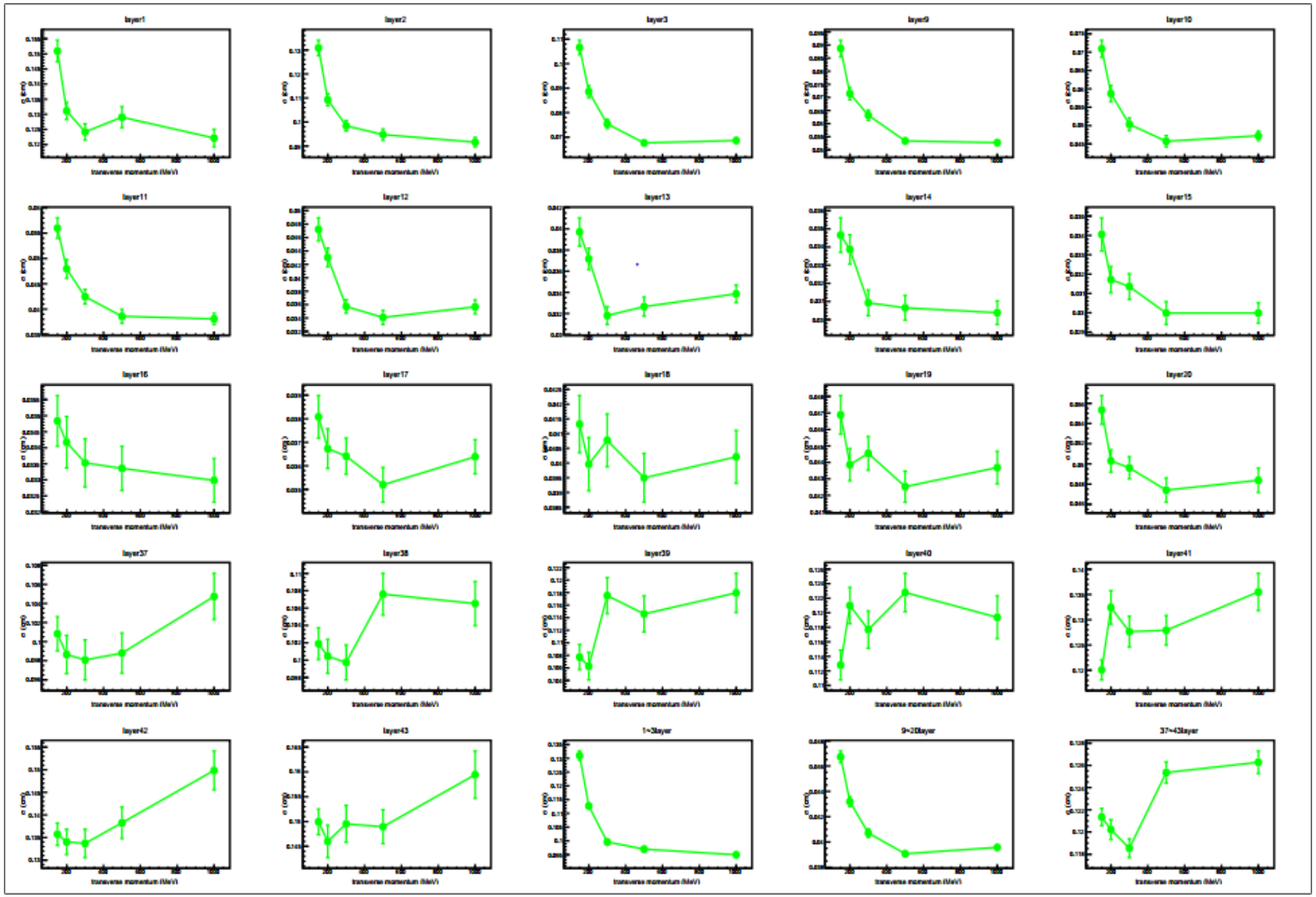
Sigma & layer

- We fit the residual distribution of each layer with Gaussian function and get its sigma as cut of that layer.
- we study severer fixed transverse momentum points

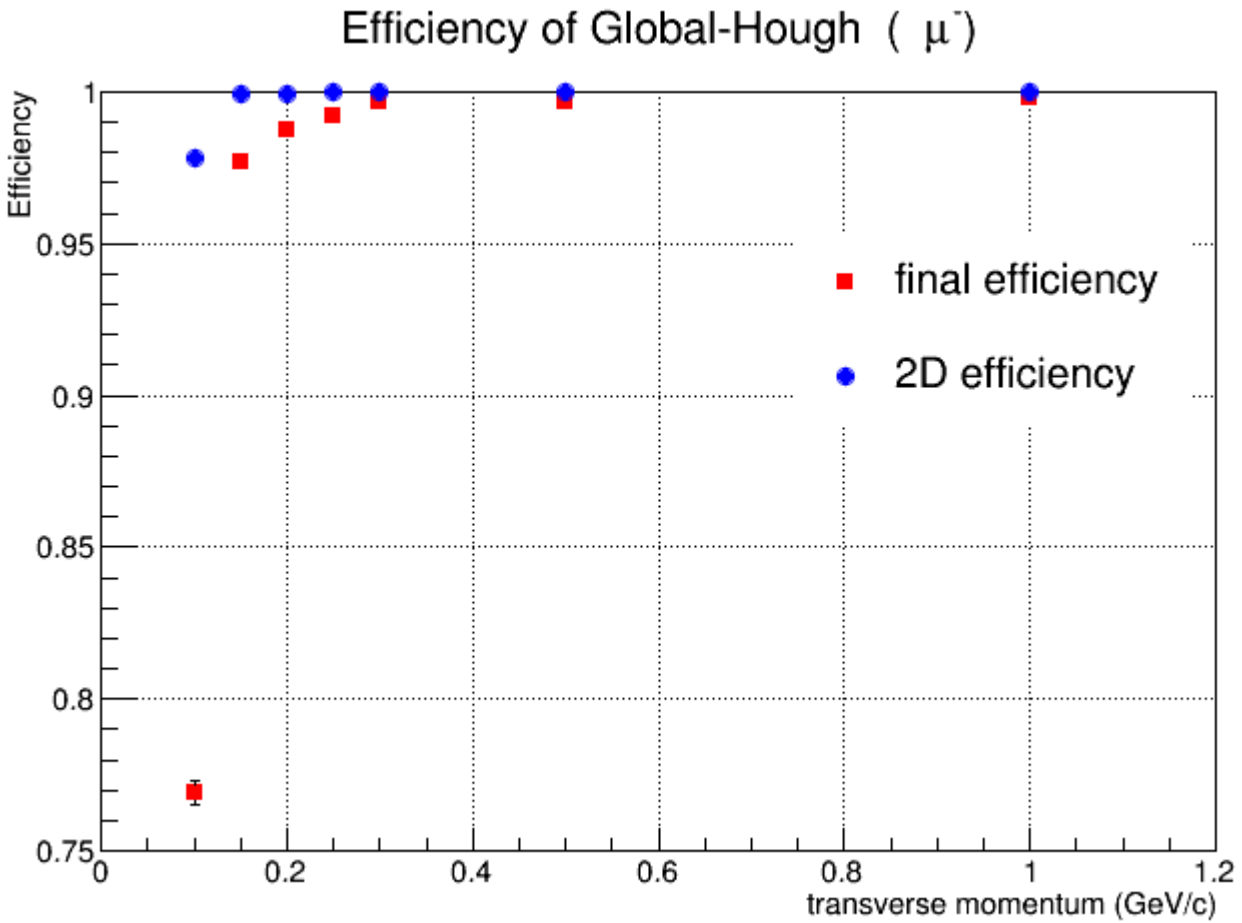


Sigma & Pt

- Outer 2 super layers of MDC behave different from the inner super layers and CGEM
- For now we temporarily take 5 sigma of each layer at 150 Mev/c as the cuts of MdcHoughFinder .



2D tracking efficiency



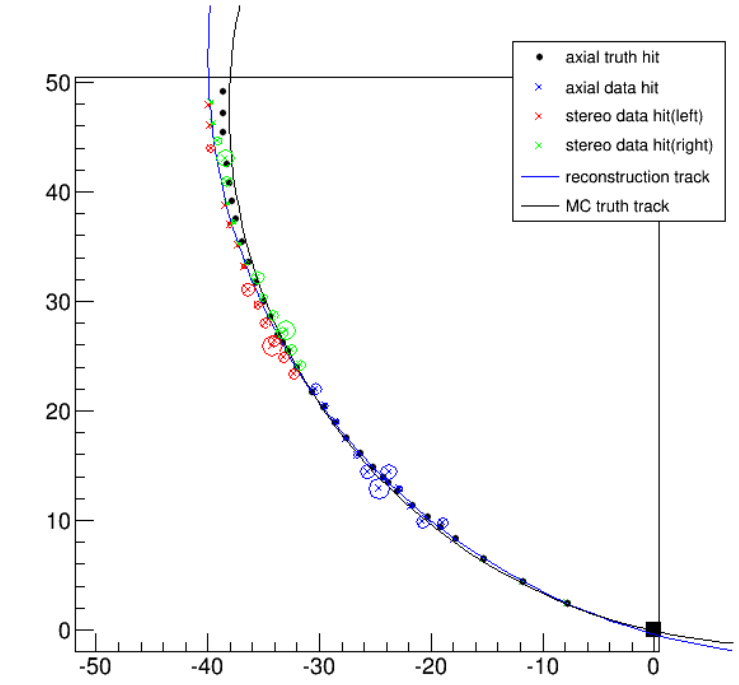
- 10,000 events of muon

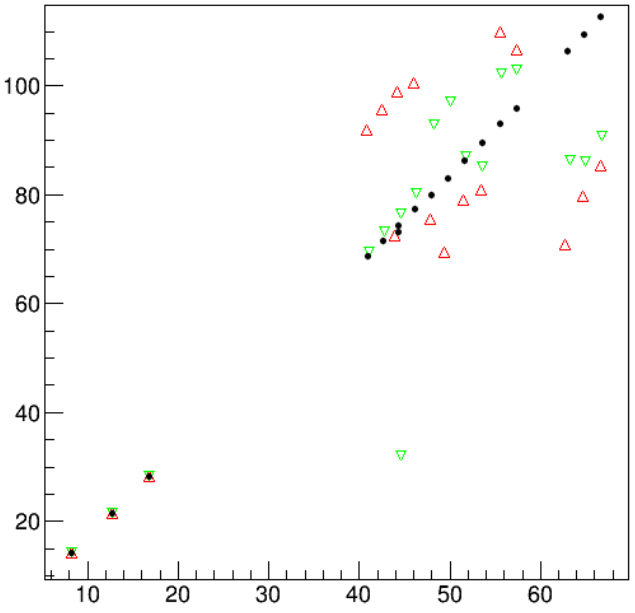
➢2D cuts:
|dr|<1.0 cm

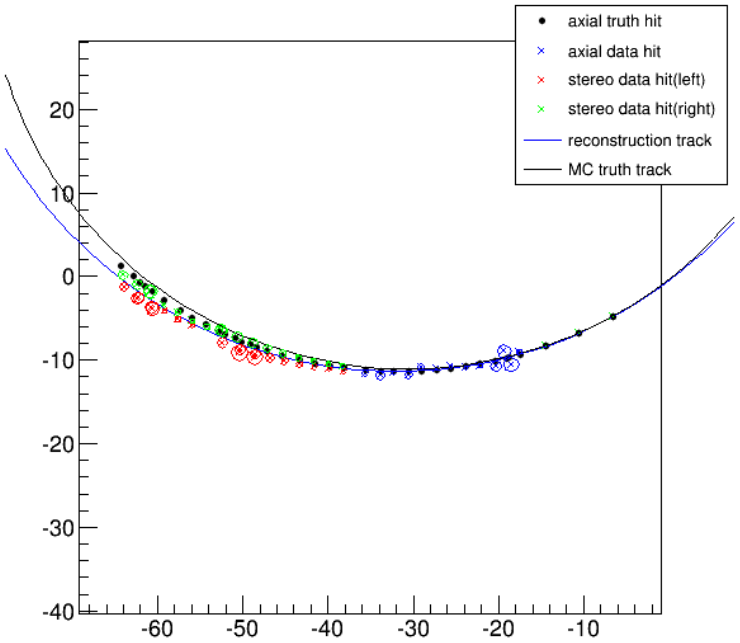
➢Final cuts:
|dr|<1.0 cm
|dz|<10.0 cm
gap <8 layers

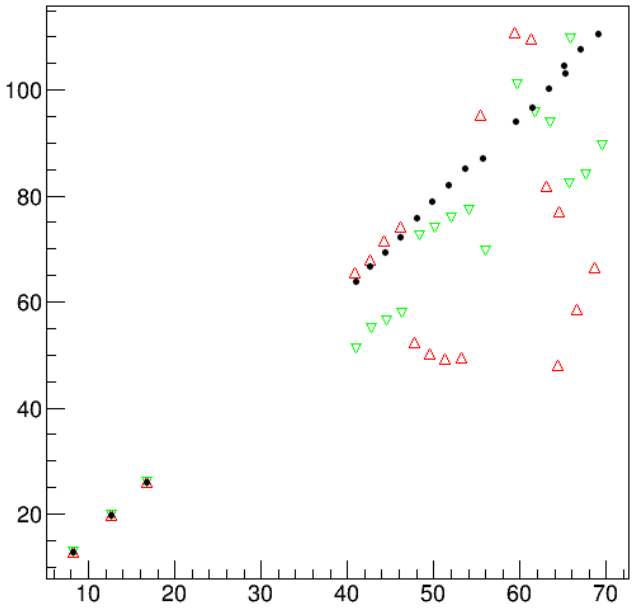
Track lost

- From last slice we find tha tracks are lost mostly after 2D tracking. More study shows that tracks are drop by |dz|<10.0 and gap <8 And most of these events have a common characteristic , that is they have less hits of outer 2 super layers.









3D tracking study

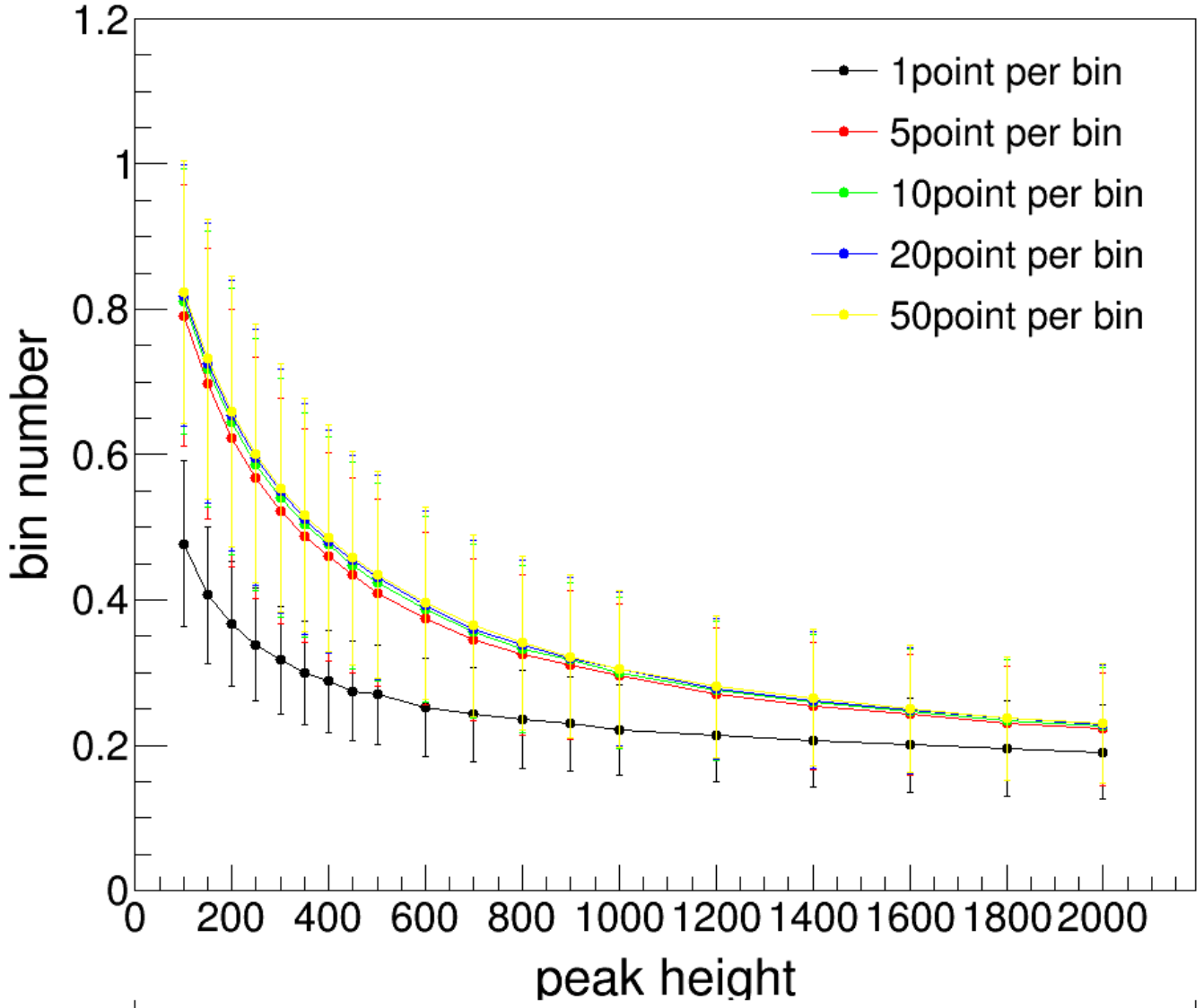
- Because S and Z should have a linear relationship, so we can also use the Hough transform method to reconstruct the 3D track.
- First we find candidates of stereo hits, then we calculate its S and Z by the 2D track.
- 2 kind of parameterization: k-b and rho-theta

$$Z = \tan\lambda \cdot S + dz$$

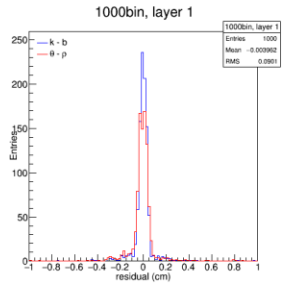
$$\rho = S \cdot \cos\theta + Z \cdot \sin\theta$$

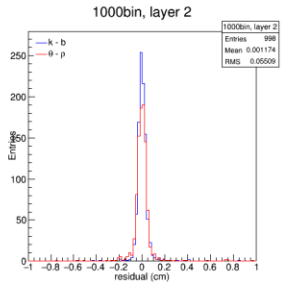
Bin study of Hough map

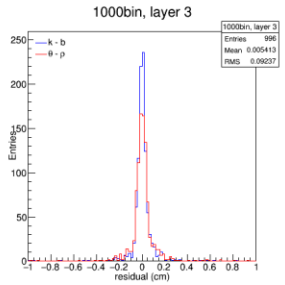
- As in 2D study, we study the binning of Hough map first to get a proper bin number of Hough map.
- The hit rate of peak is too low so we add points of each bin.

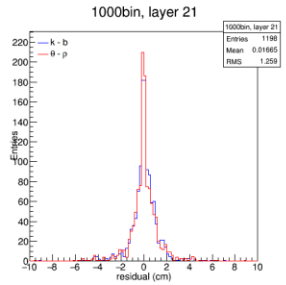


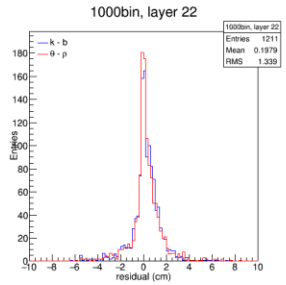
Residual of Z

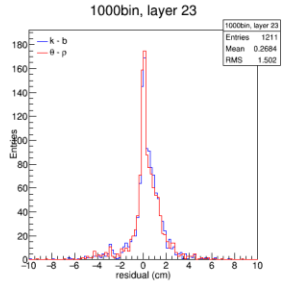


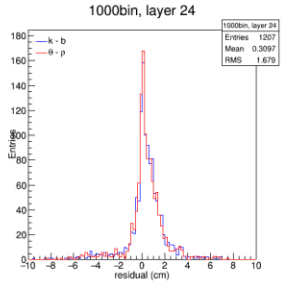


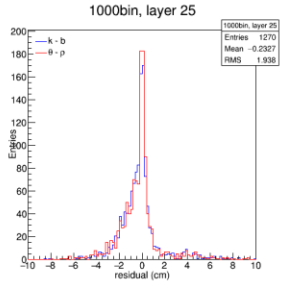


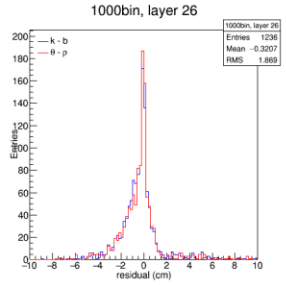


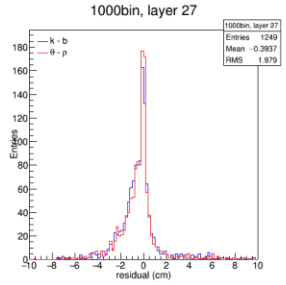


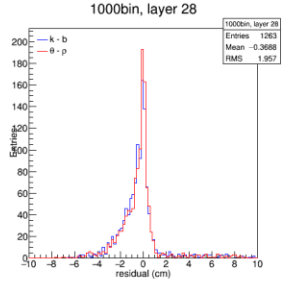


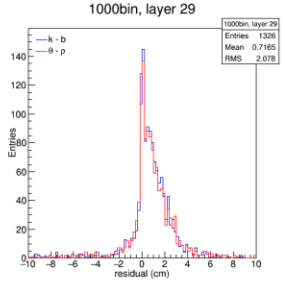


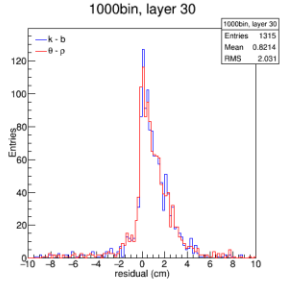


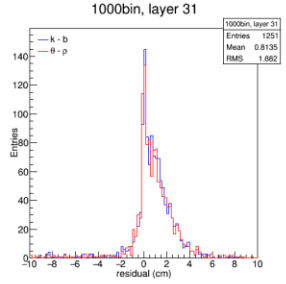


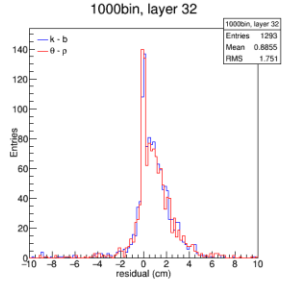


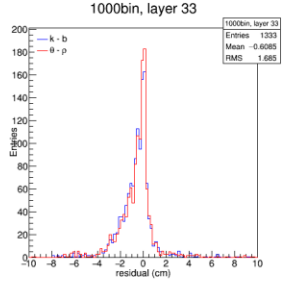


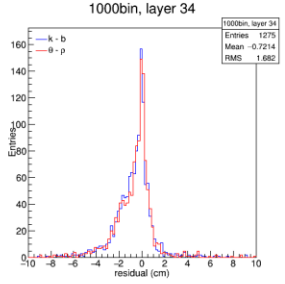


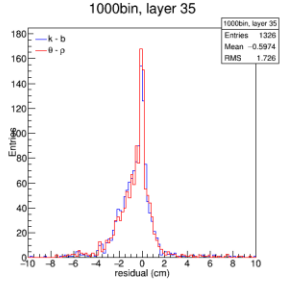


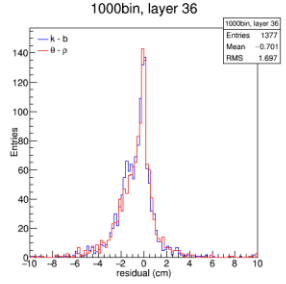


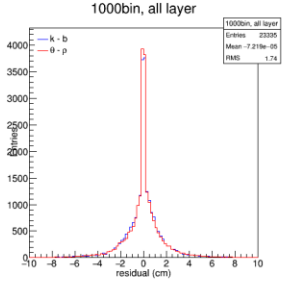




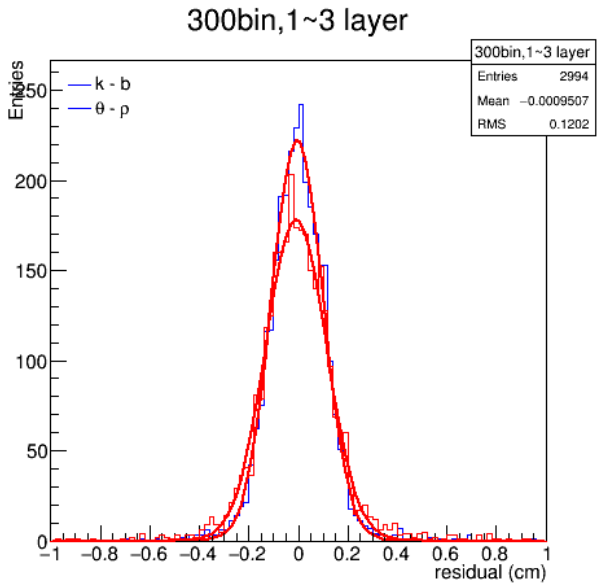


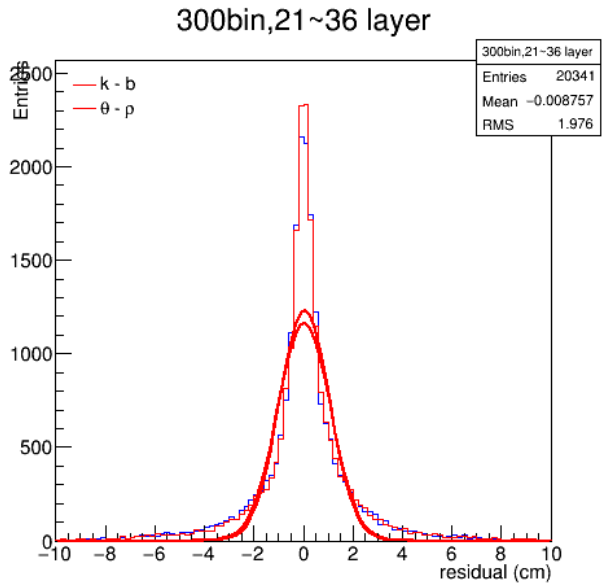


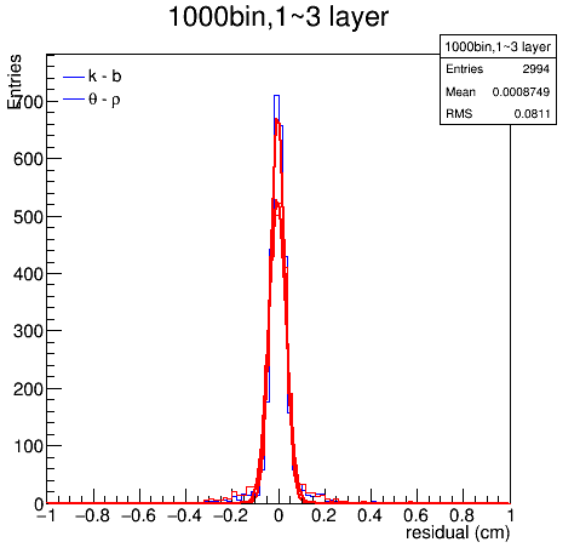


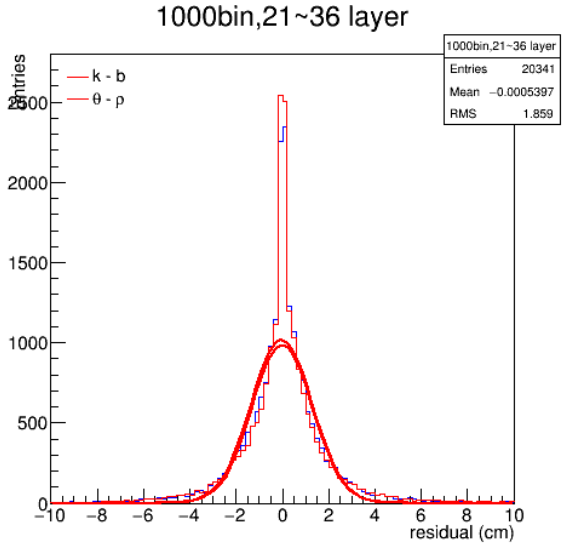


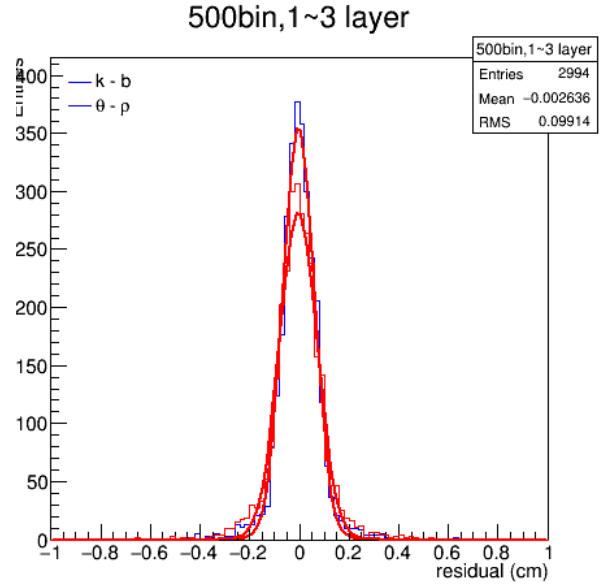
Residual of Z

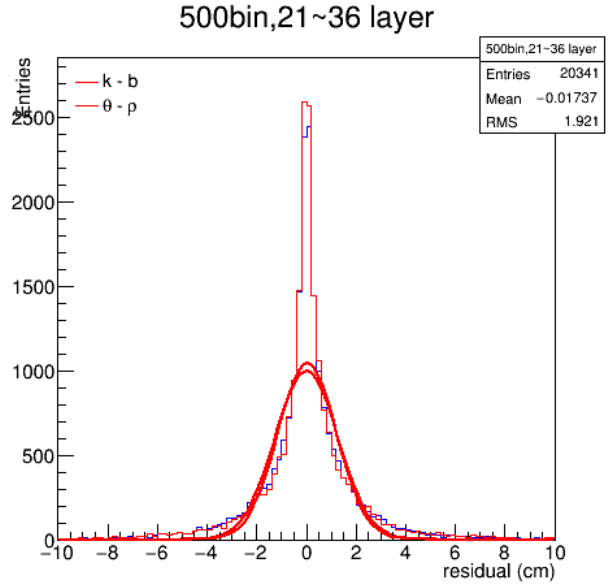




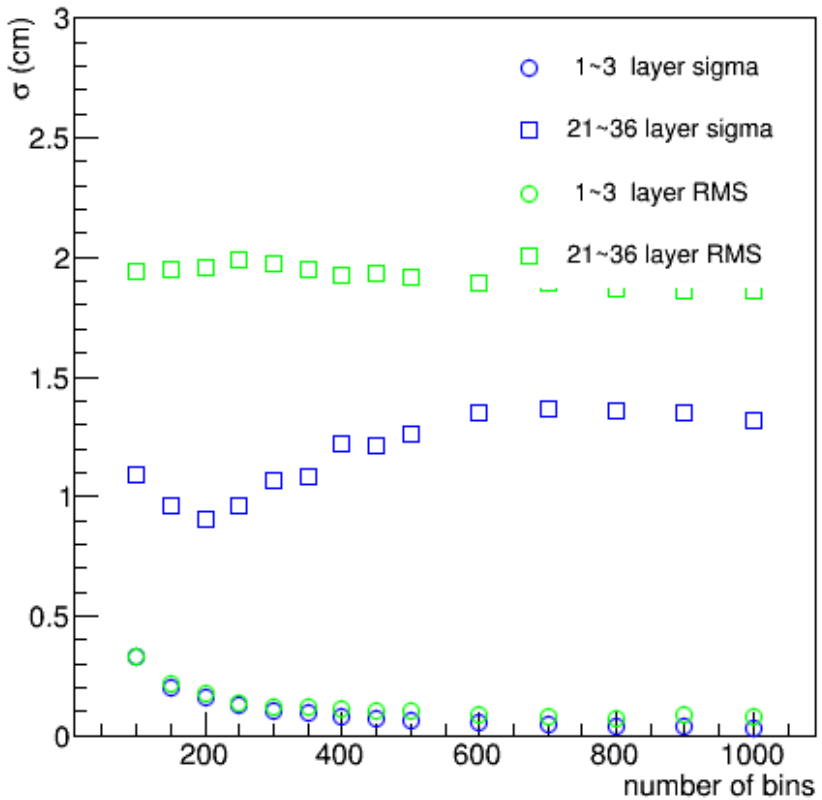


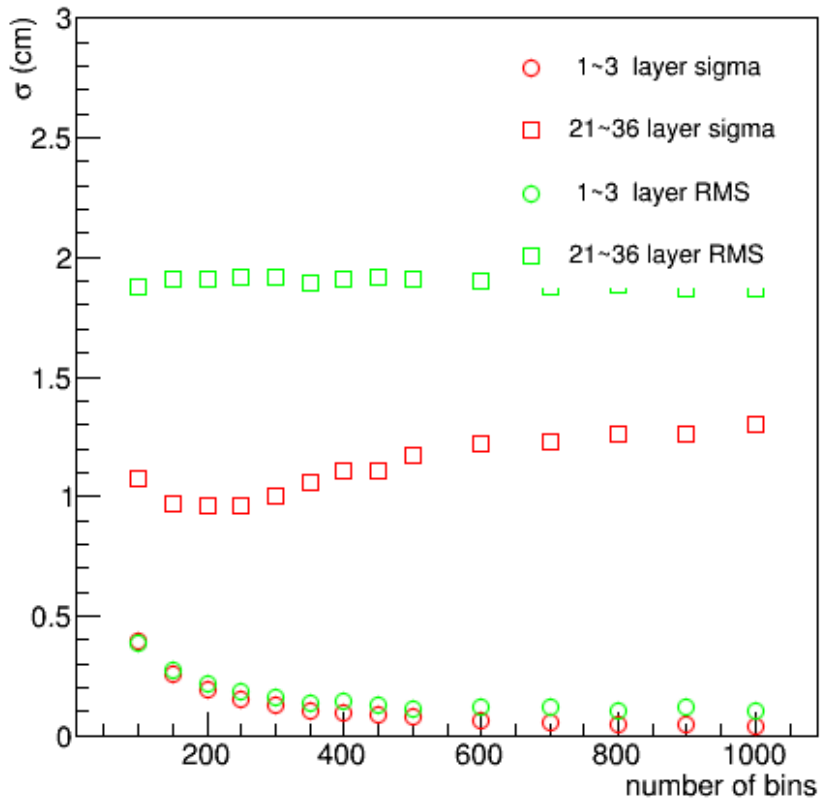




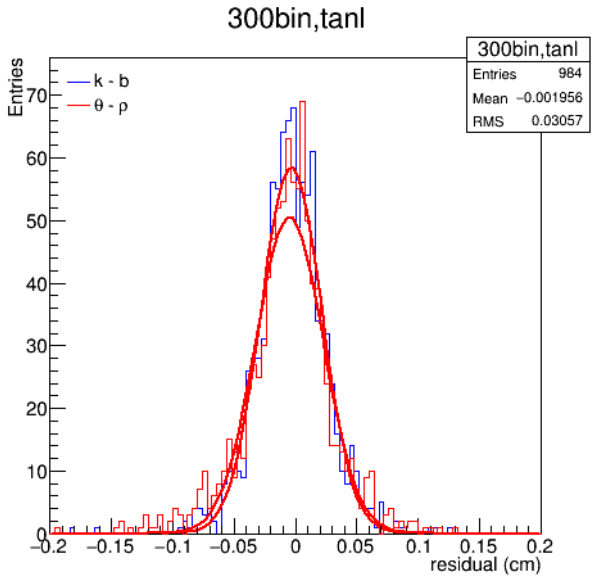


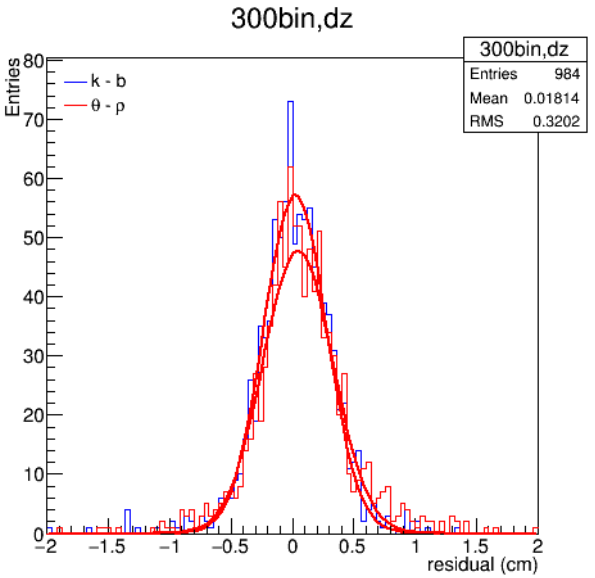
Sigma of residual & bin

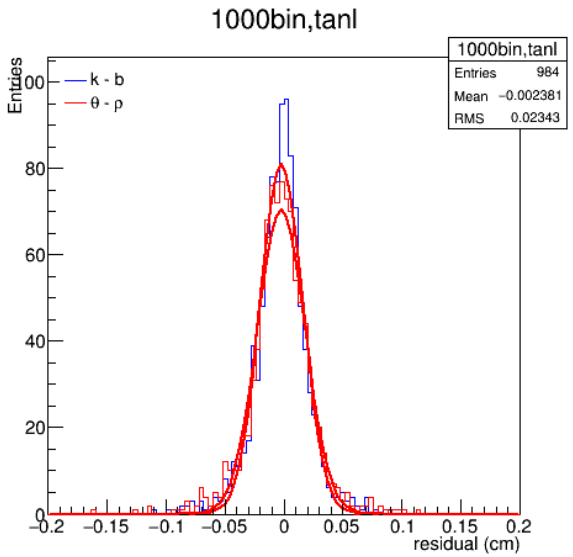


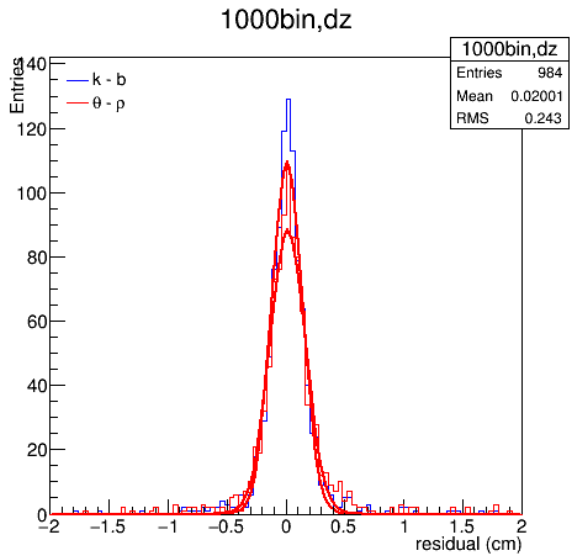


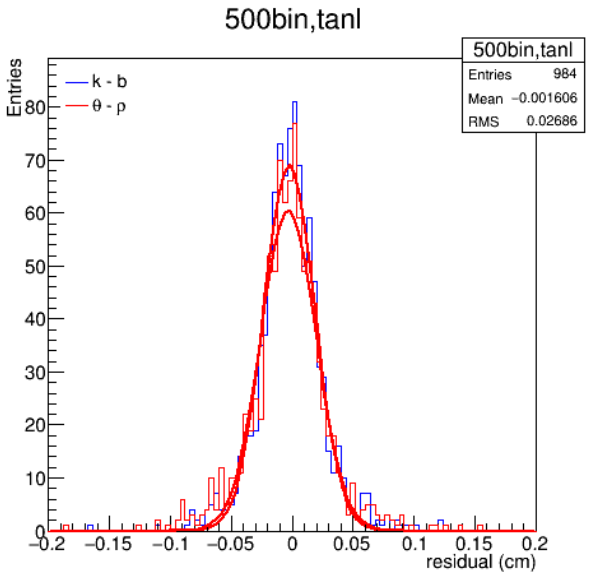
Residual of tanl , dz

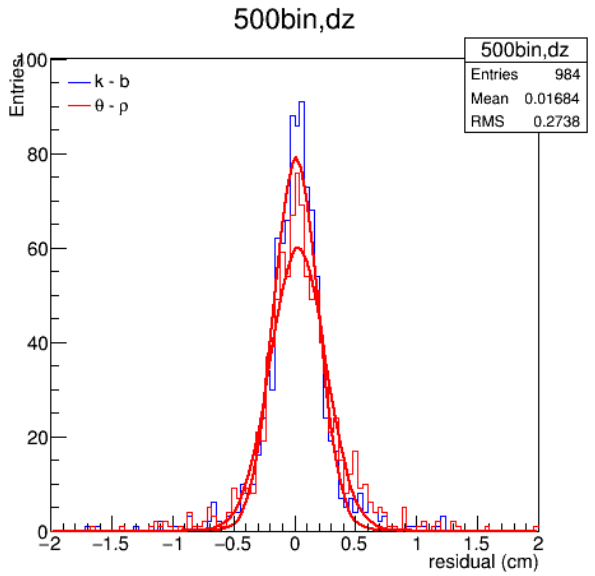












Sigma of residual of Tanl,dz & bin