Full LAT Muon PSF

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Data Files

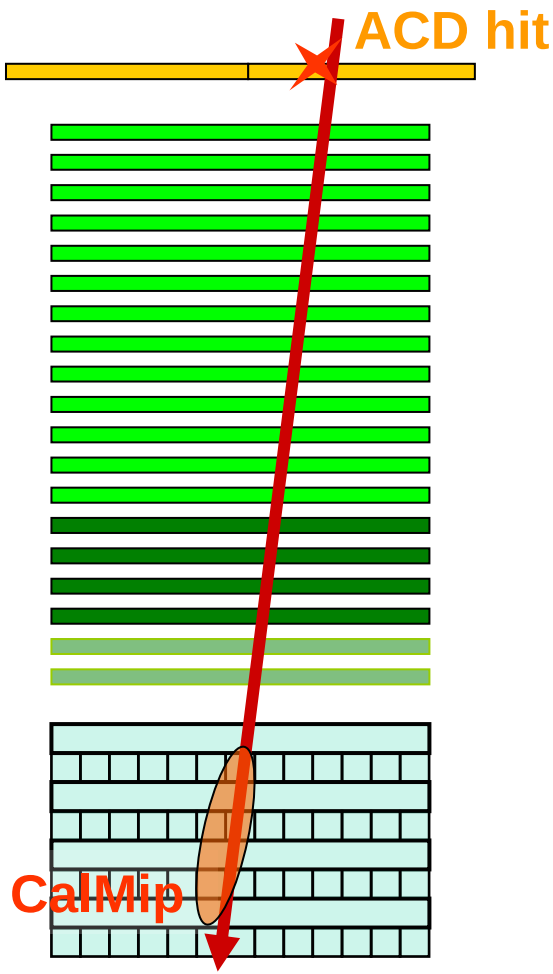
- We used following B2 runs pocessed with the Muon Hypothesis:
  - 135005345
  - 135005347
  - 135005349
  - 135005351
  - 135005353
  - 135005355
  - 135005357
  - 135005359
  - 135005361

working on SVAC Merit and Recon files

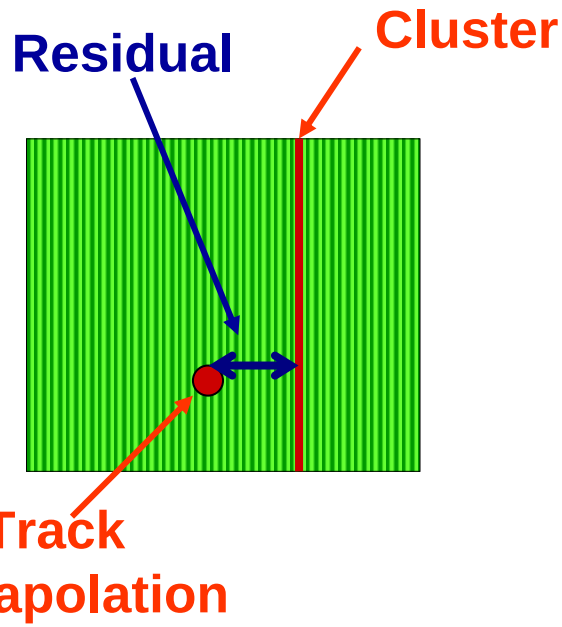
Muon Selection

- **Tracker Trigger and ACD Tile Hit**
  `GemConditionsWord = 3`
- **Tracker Trigger opens window**
  `GemCondArrivalTimeTkr = 0`
- **At least one Tkr Tower Trigger**
  `GemTkrVector[j]=1,  any j= 0 ➔ 15`
- **Accept only tracks ending in a hit Cal module**
  `nCalNumHit[EndingTower] > 0`
- **Track Mip match**
  `Associate track to nearest CalMip within 20 mm (one crystal)`
- **Track ACD match**
  `Accept only tracks intersecting hit ACD tiles`
- **Matched ACD hit over Veto Threshold**
  `AcdTkrInSecTileHit[intSec]>=4`
- **Use only Best Track**

Event Topology & PSF Definition

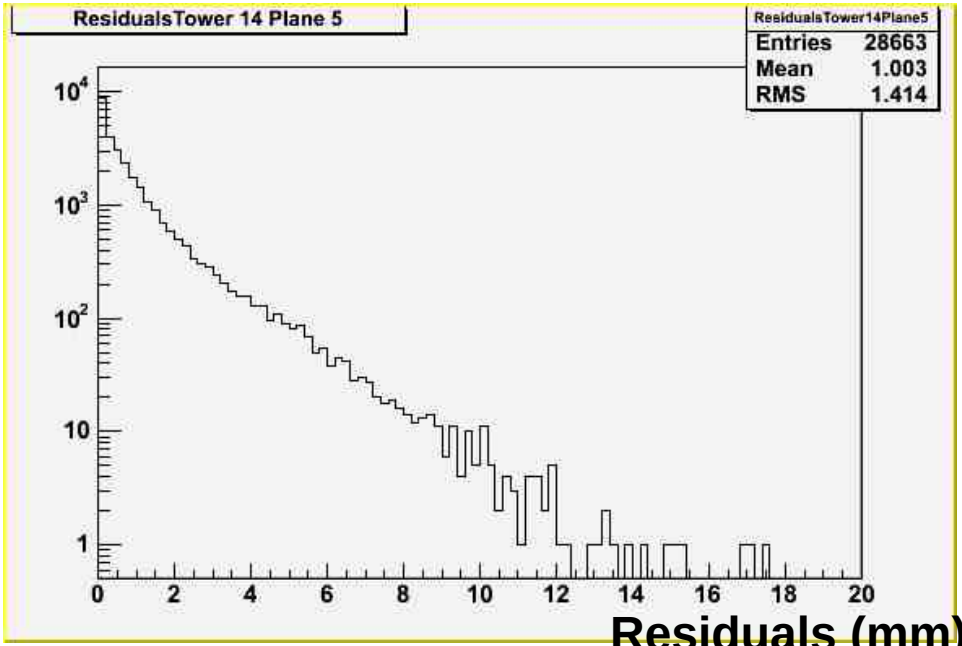


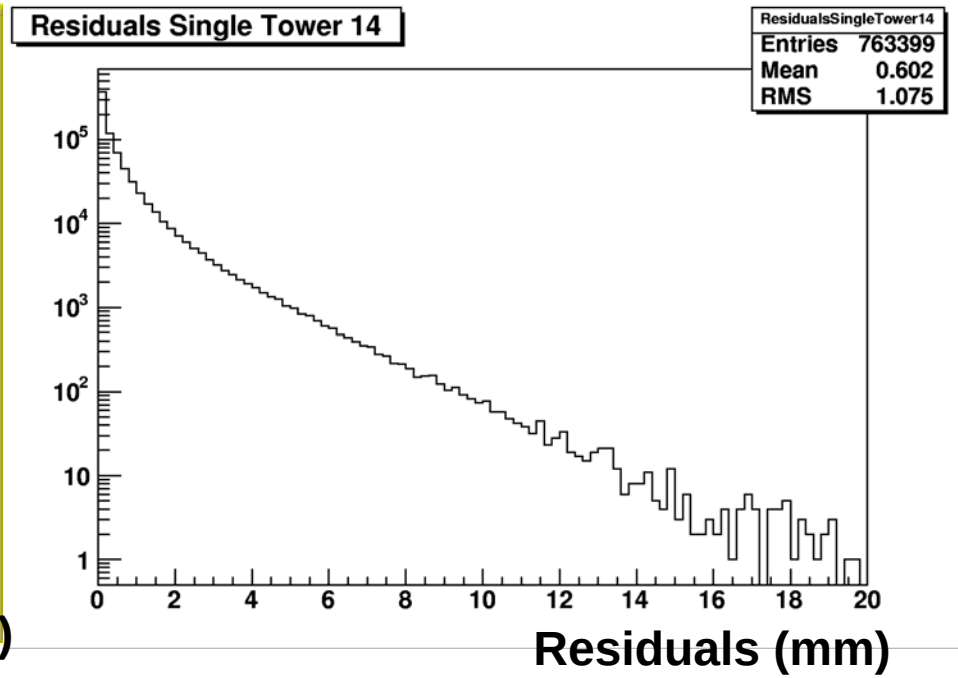
True muon direction
is unknown:
use **Residuals** to
estimate Tkr resolution



Extrapolate track to each layer (X or Y)
and compute **Residuals**:
distance between the measured cluster position
and the track extrapolation

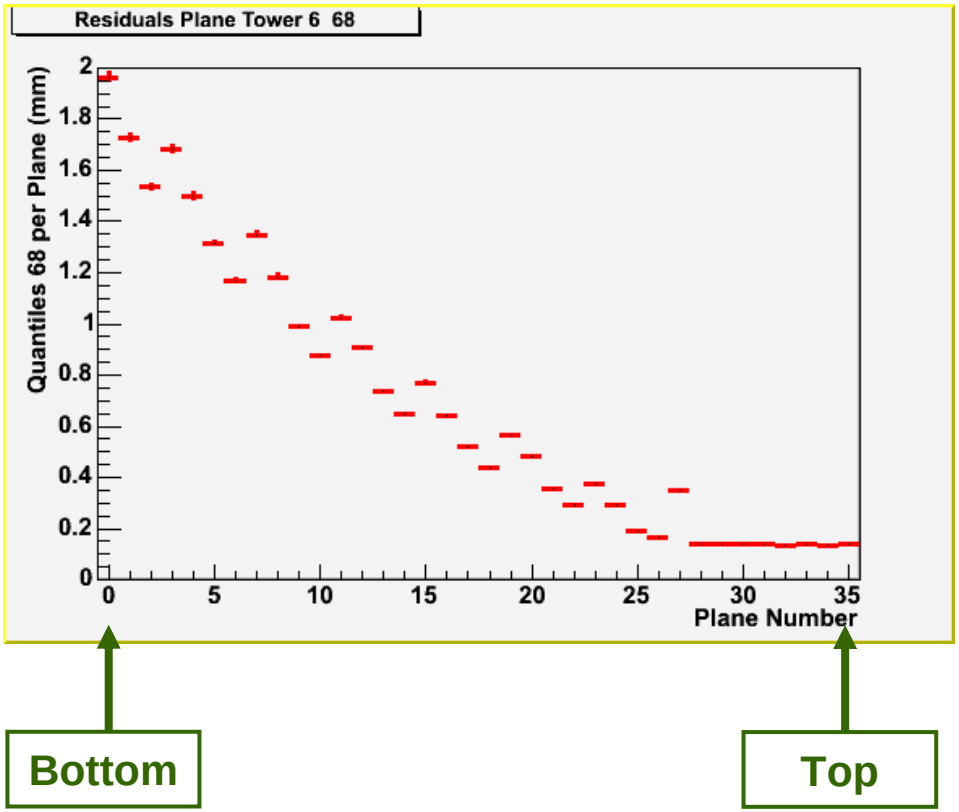
Residual distribution





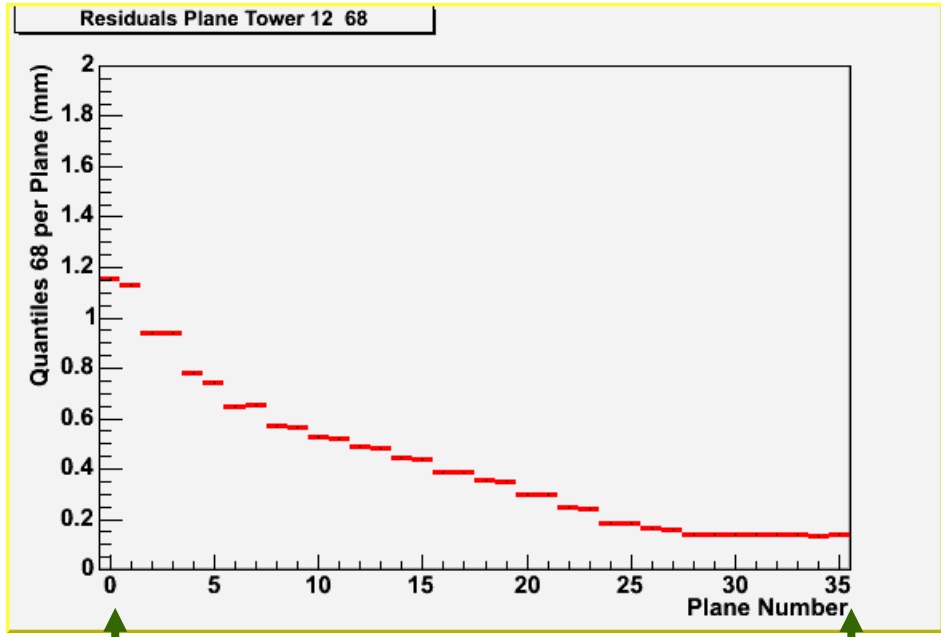
Use quantiles 68% and 95% of these distributions

Residual Z dependence 68%



Bottom

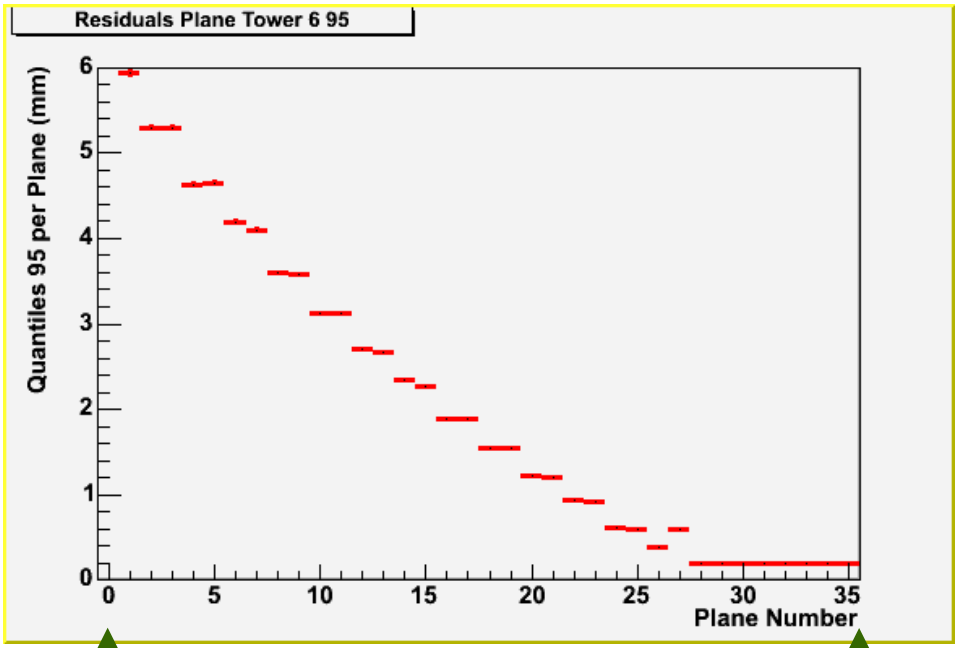
Top



Bottom

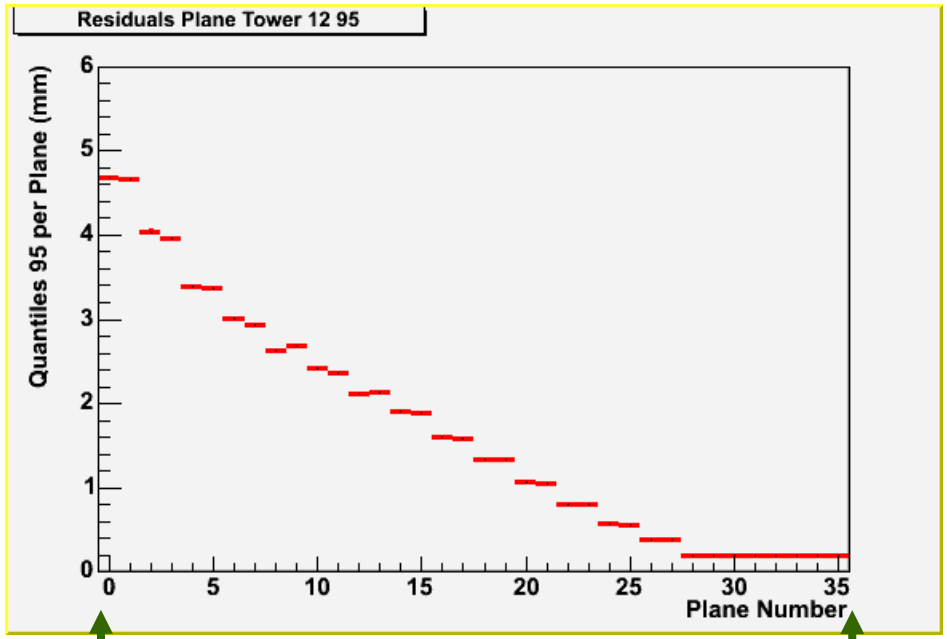
Top

Residual Z dependence 95%



Bottom

Top

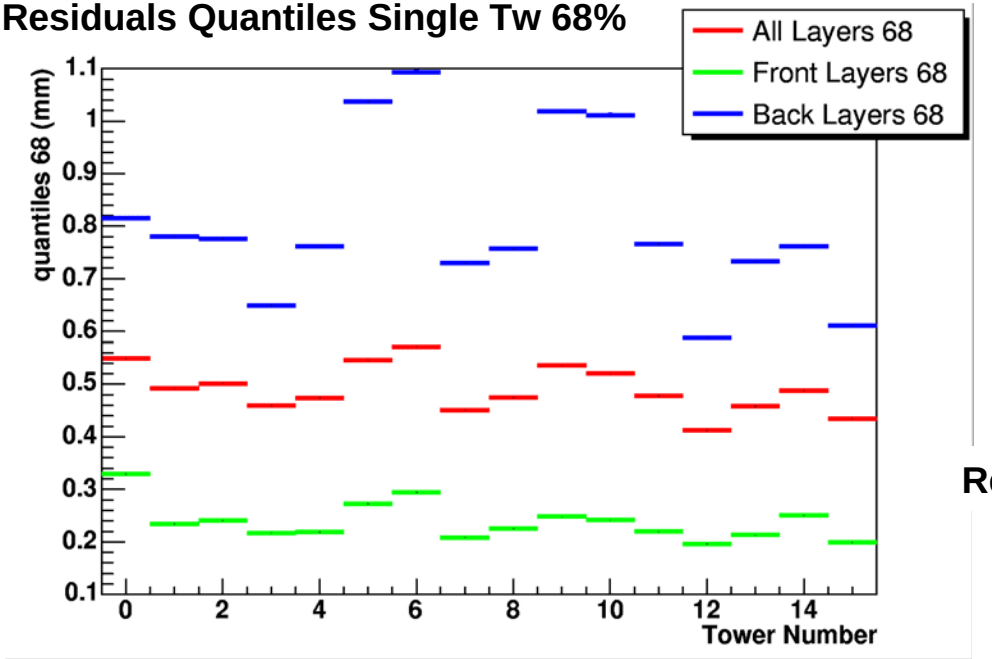


Bottom

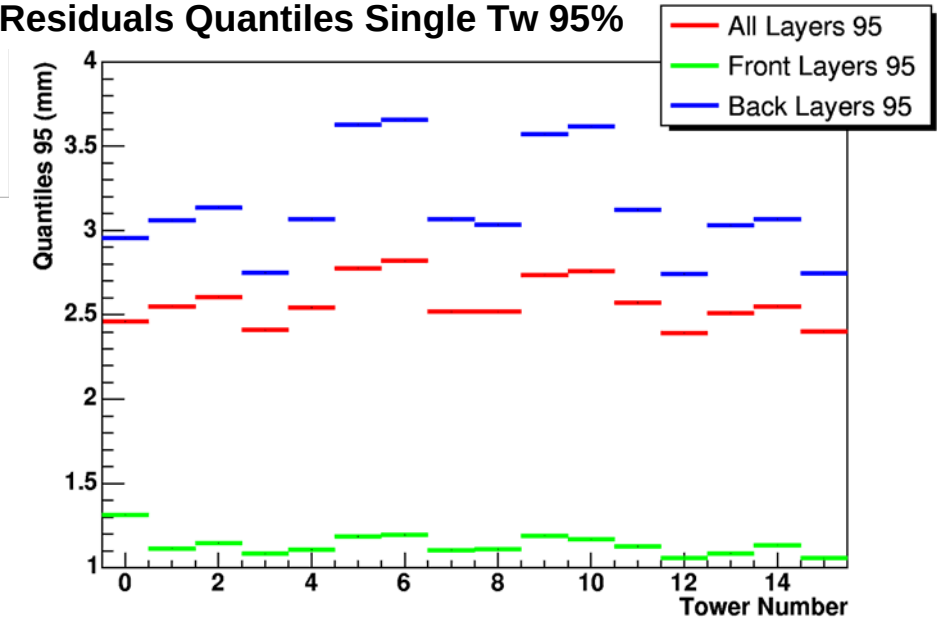
Top

Single Tower

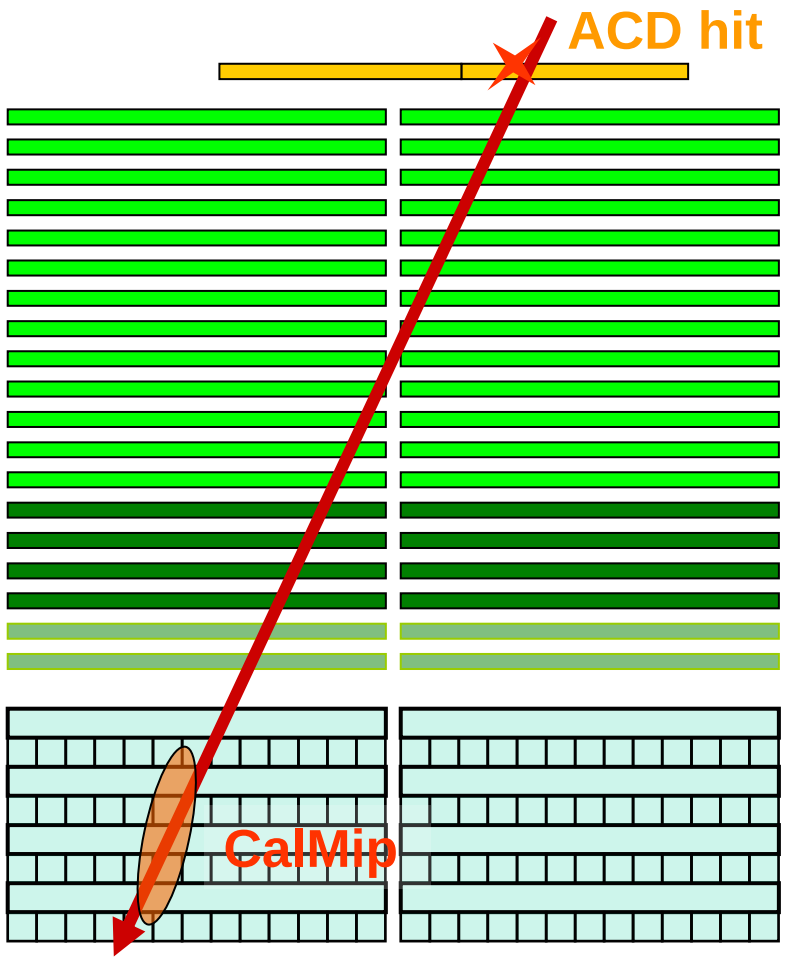
Residuals Quantiles Single Tw 68%



Residuals Quantiles Single Tw 95%



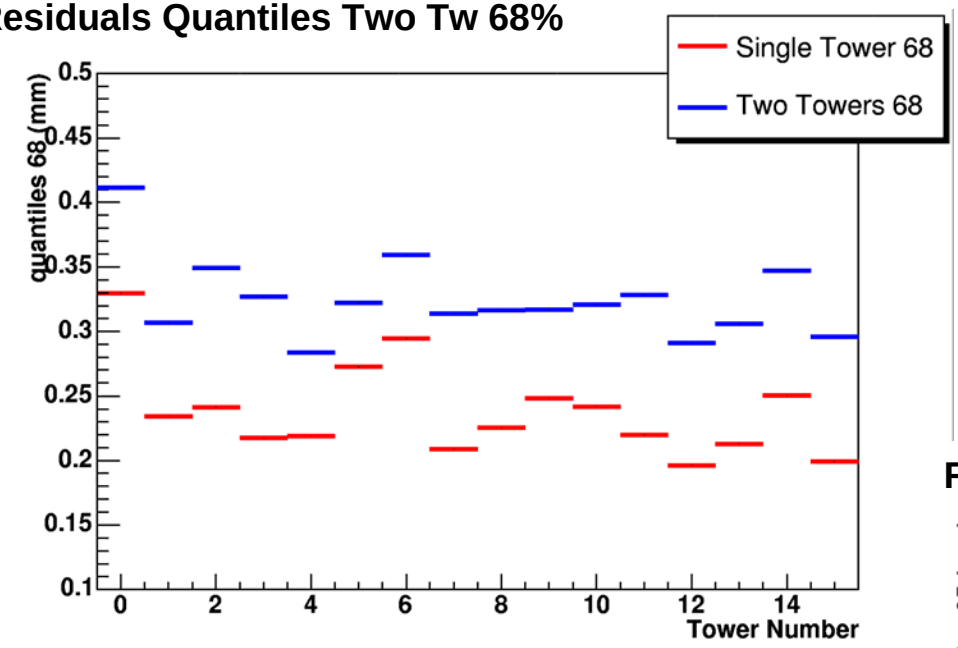
Two Towers



- Muon selection is the same
- Consider Tracks starting in one tower but ending in a neighbour tower (no matter which one)
- Consider only front layers for comparison

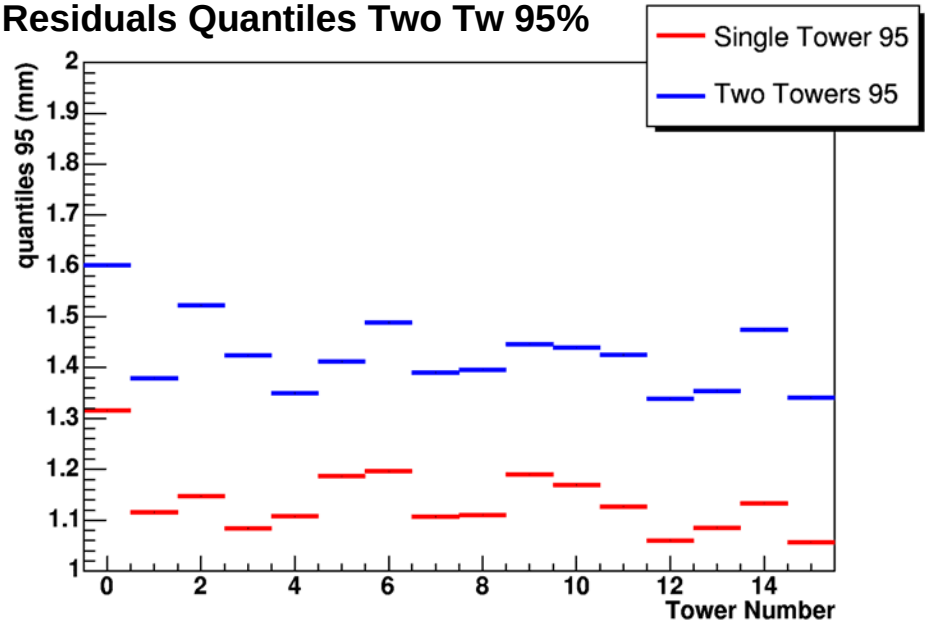
Two Towers

Residuals Quantiles Two Tw 68%



Only Front Layers!

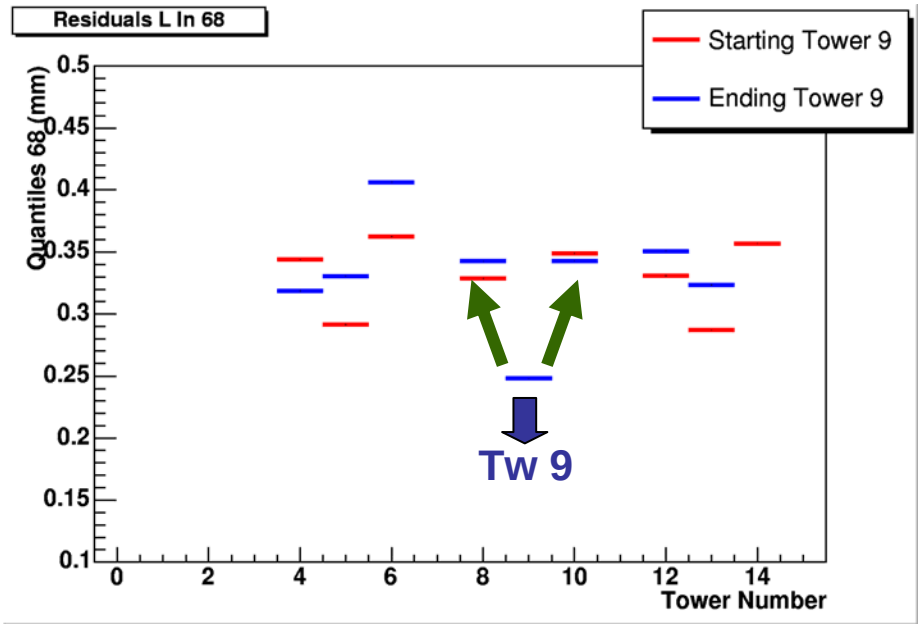
Residuals Quantiles Two Tw 95%

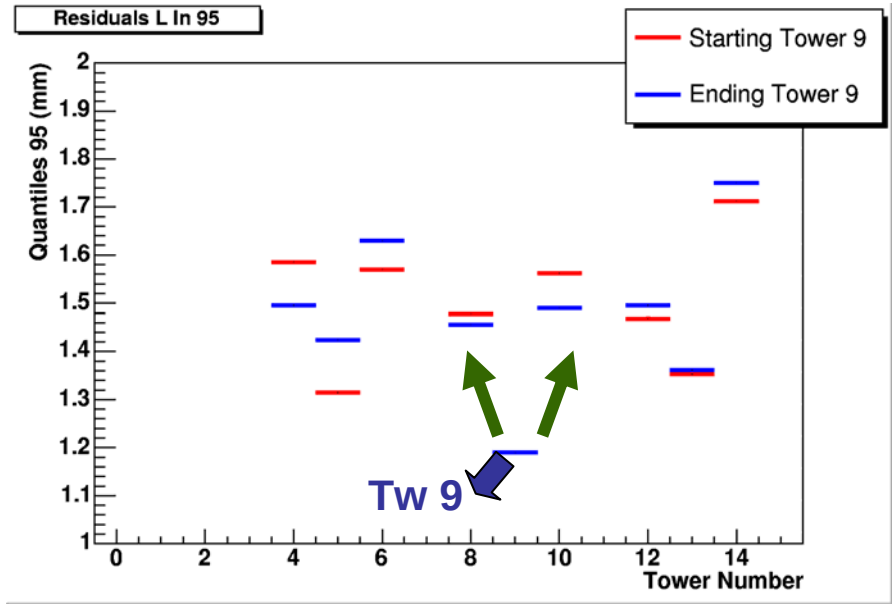


Two Towers Tracks have bigger Residuals

Crossed Towers

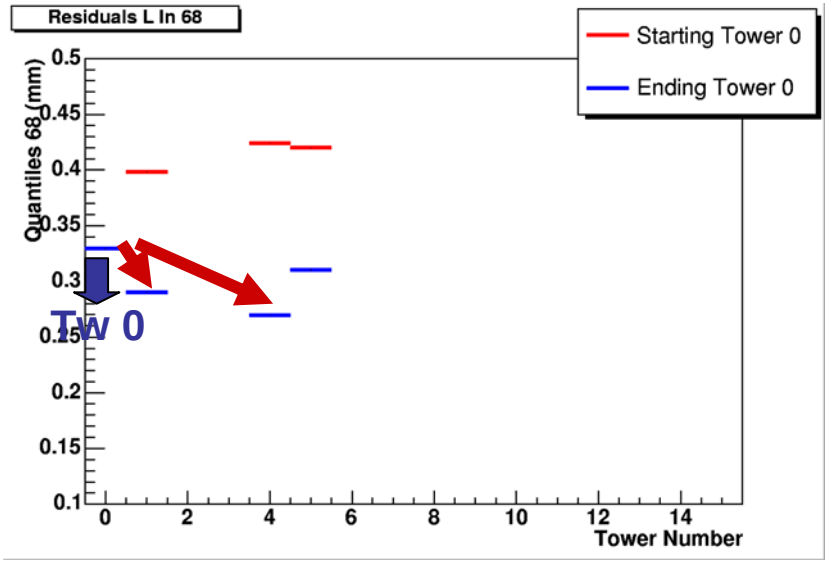
Tracks crossing one single tower have smaller residuals than tracks crossing one tower and any of the neighbour tower

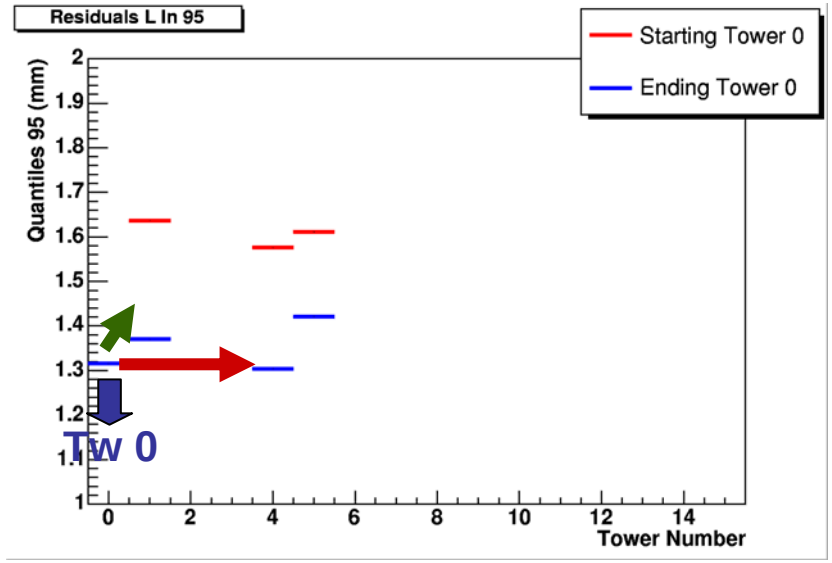




This is the same for all towers except …

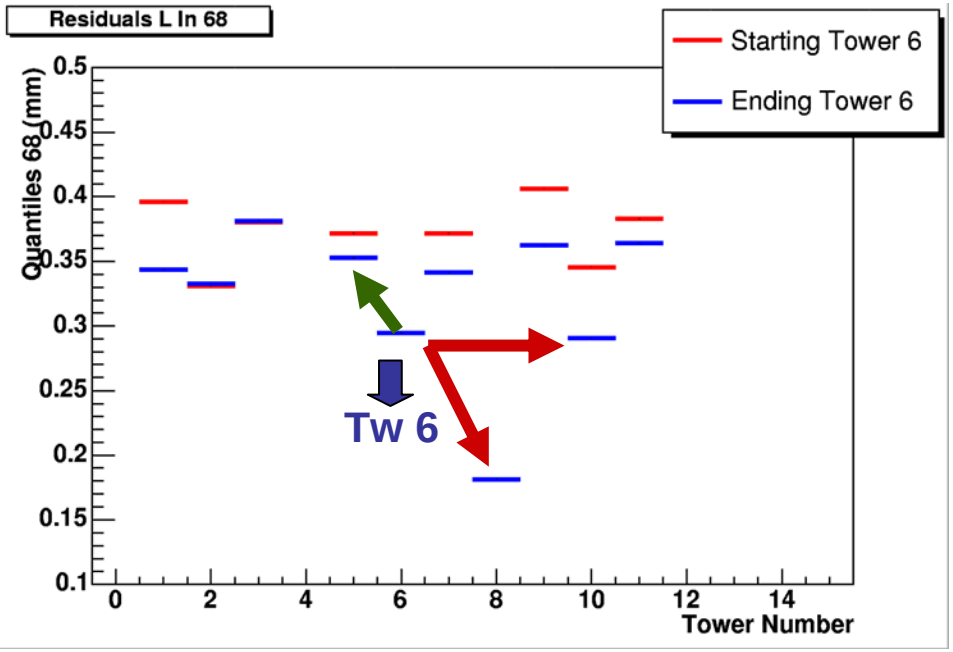
Crossed Tower 0

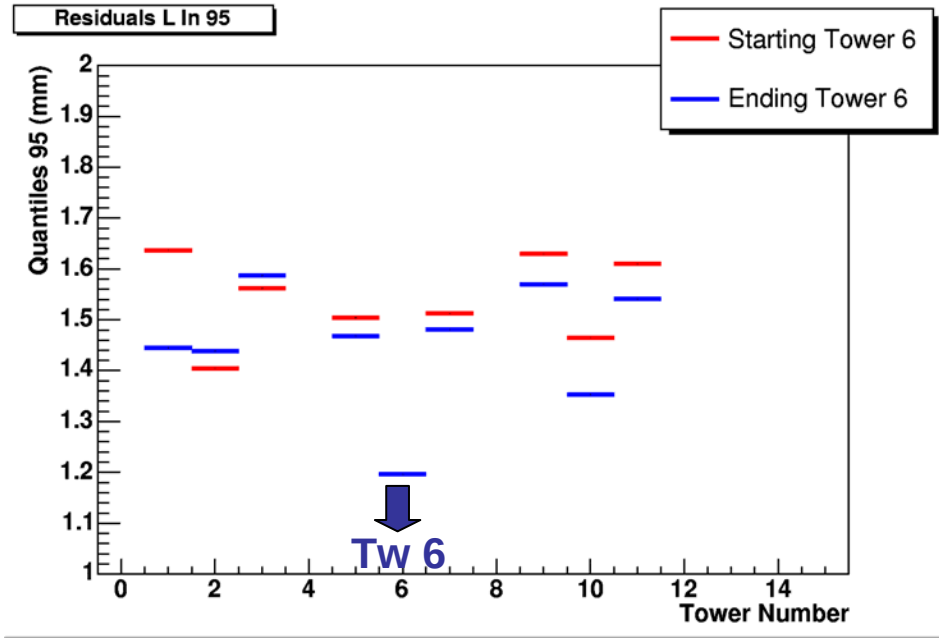




and …

Crossed Towers 6





Are tower 0 and 6 different from the others?

Conclusions

- Muon events used to study “spatial resolution” of the LAT tracker
- Z dependence has been observed as expected due to MS
- Tracks crossing two towers have worse resolution than single tower ones
  - Could be due to intra-tower alignement (correction is possible) or to higher thickness of traversed material

- Tower 0 and 6 seems to behave differently from the others and seems to have the worst resolution