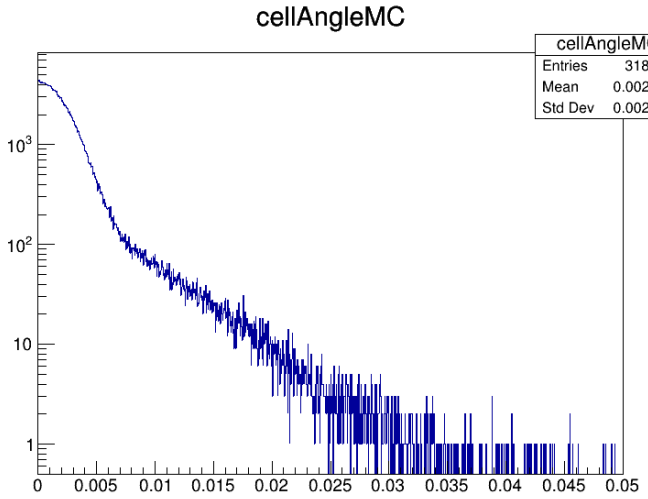
Report on tracking

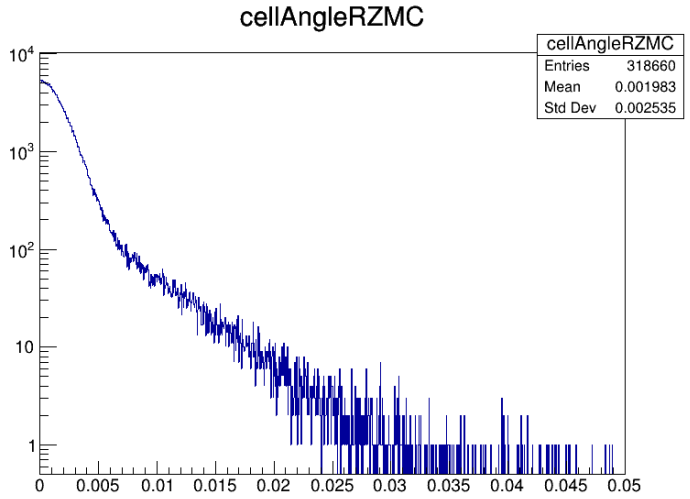
Massimo

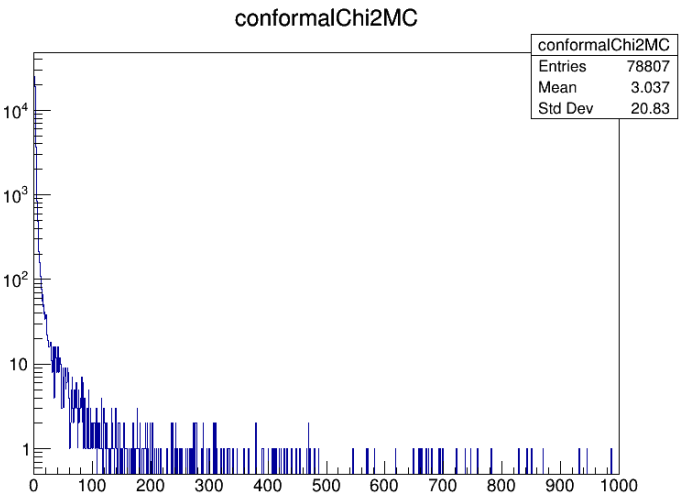
June 23, 2020

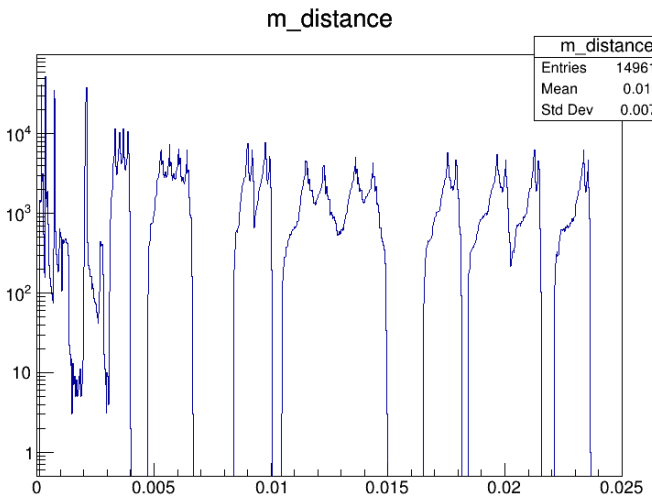
Conformal tracking par.: VXD barrel

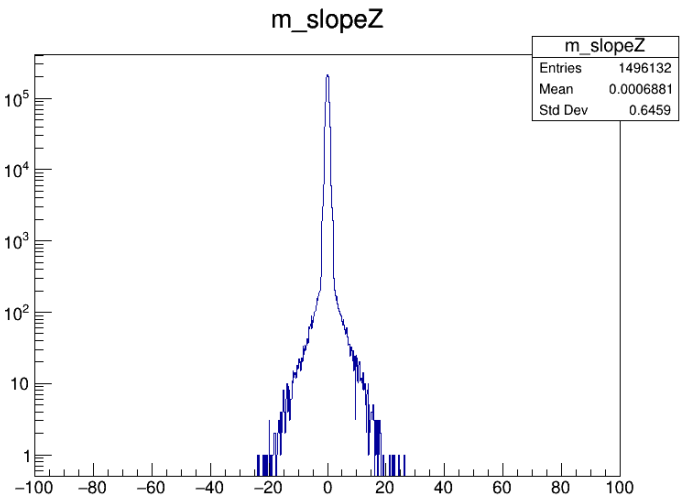
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.





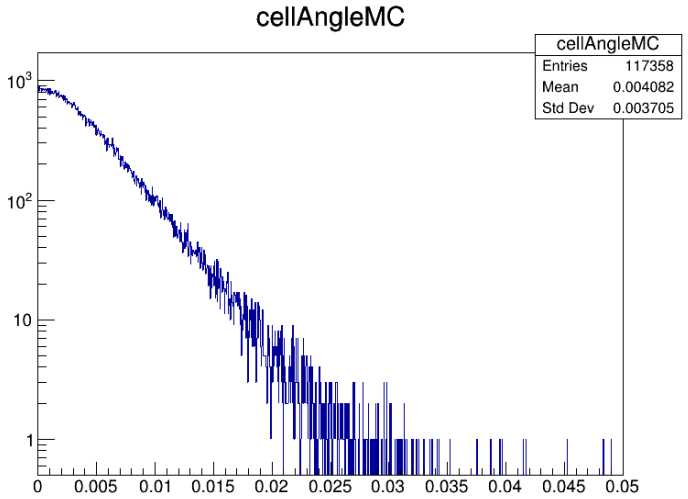


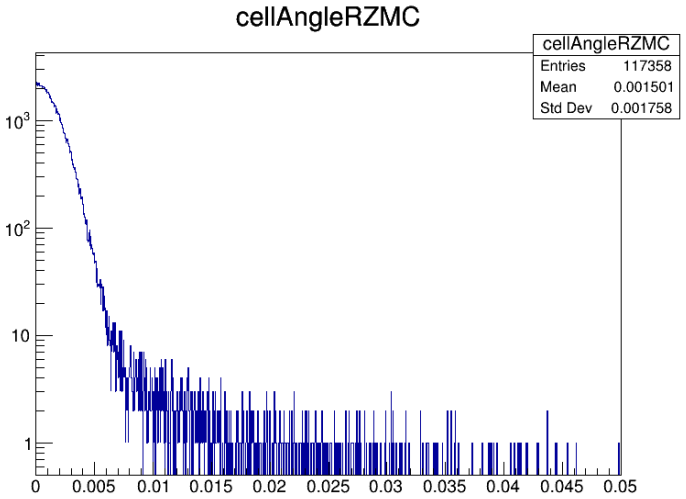


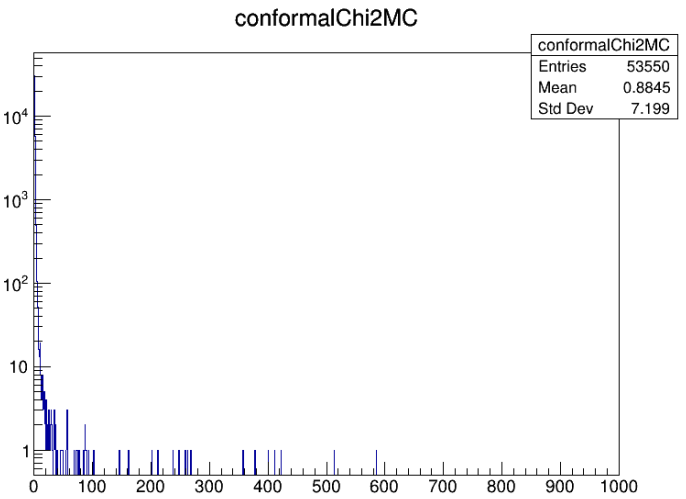


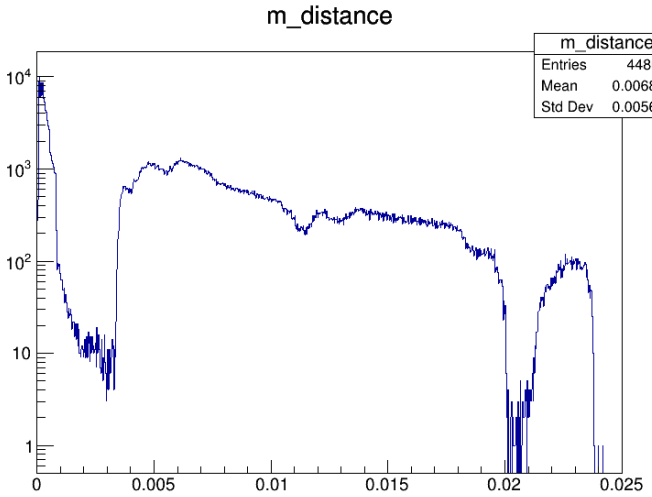
Conformal tracking par.: VXD endcap

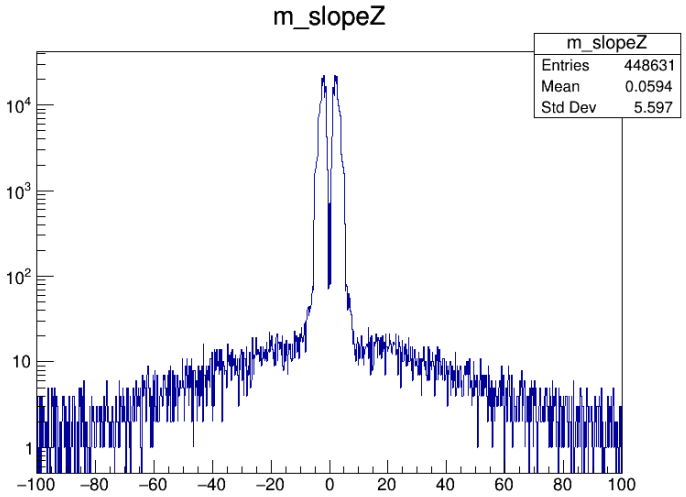
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.





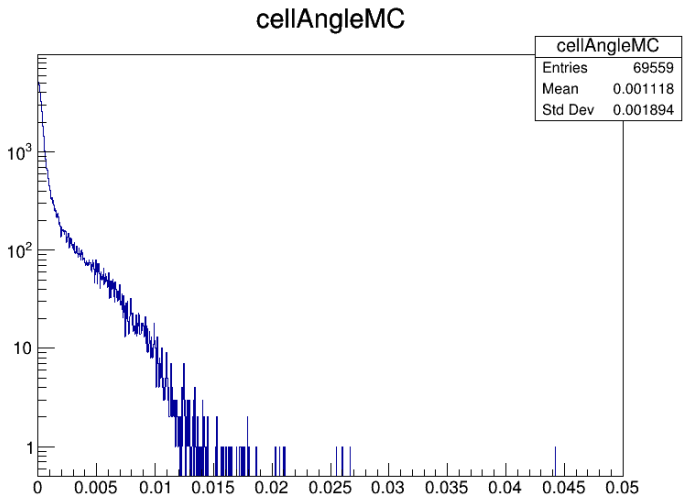


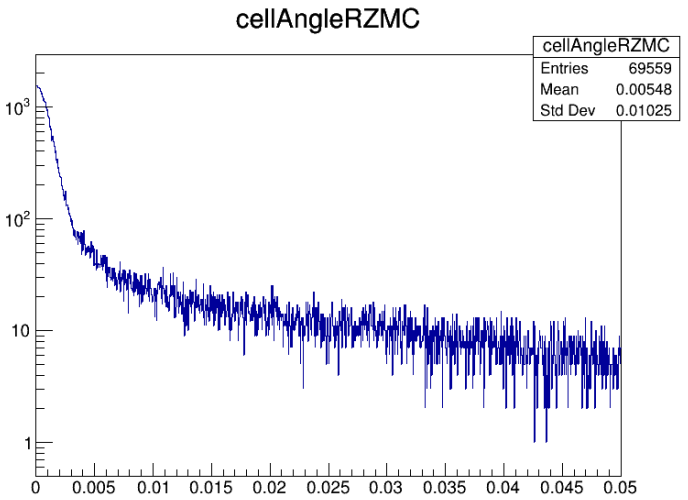


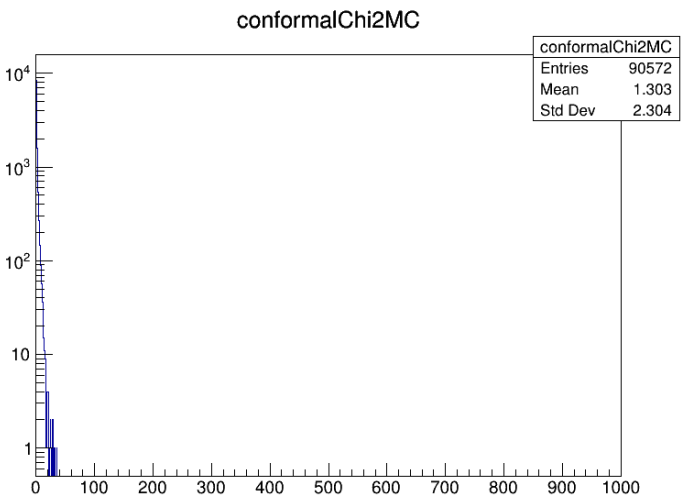


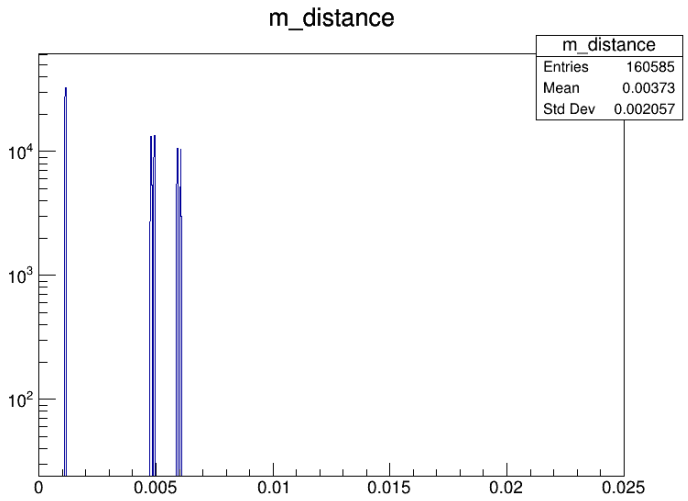
Conformal tracking par.: IT barrel

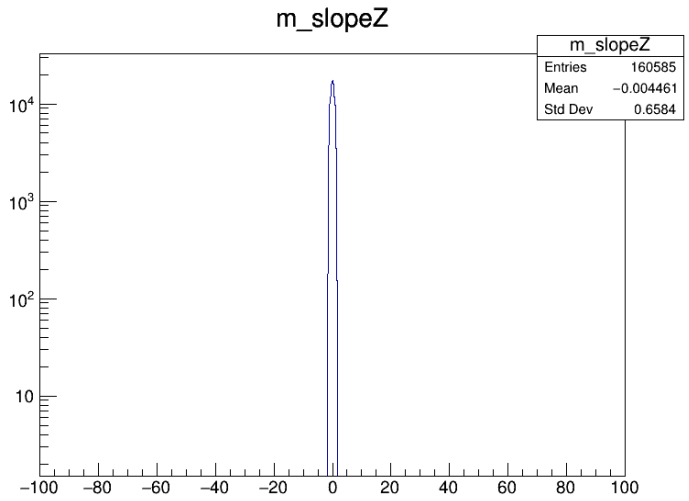
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.





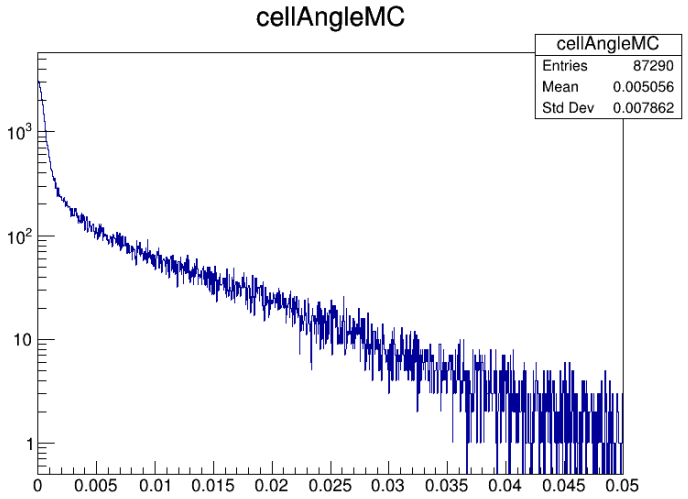


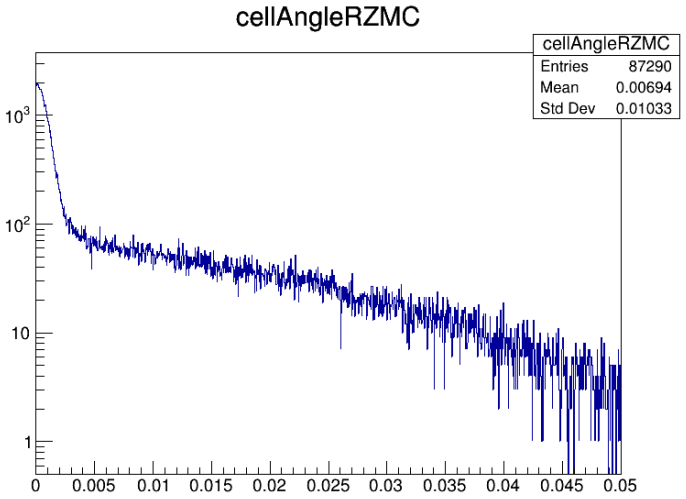


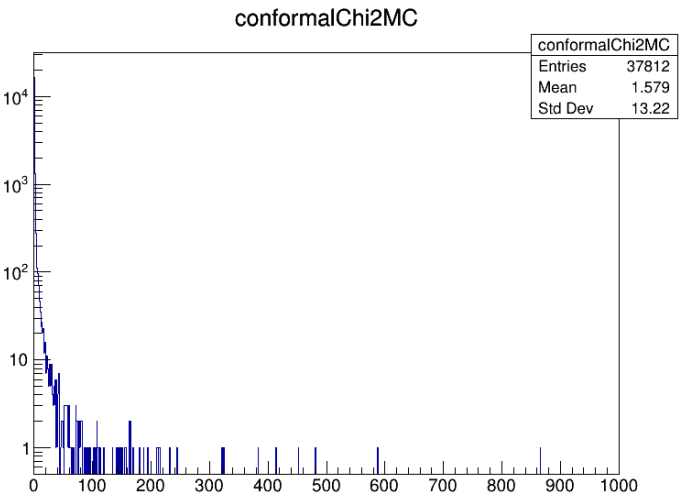


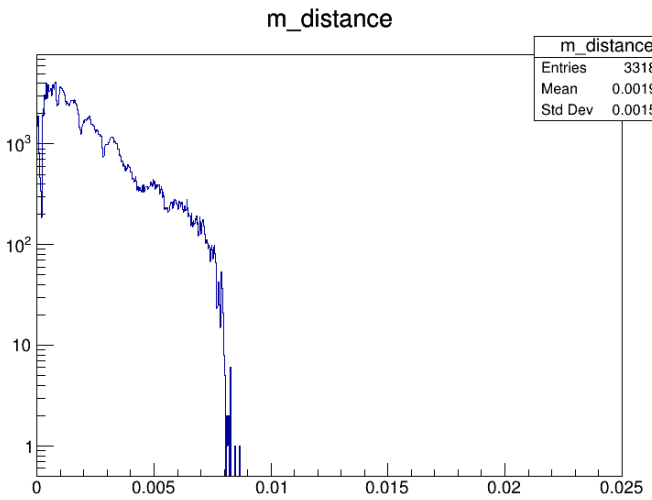
Conformal tracking par.: IT endcap

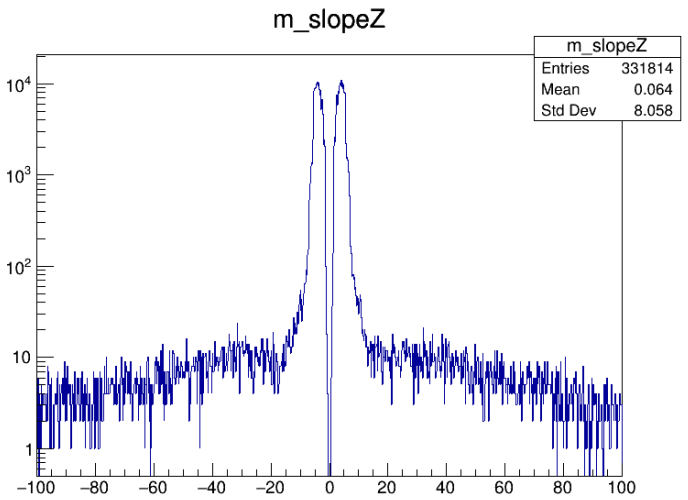
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.





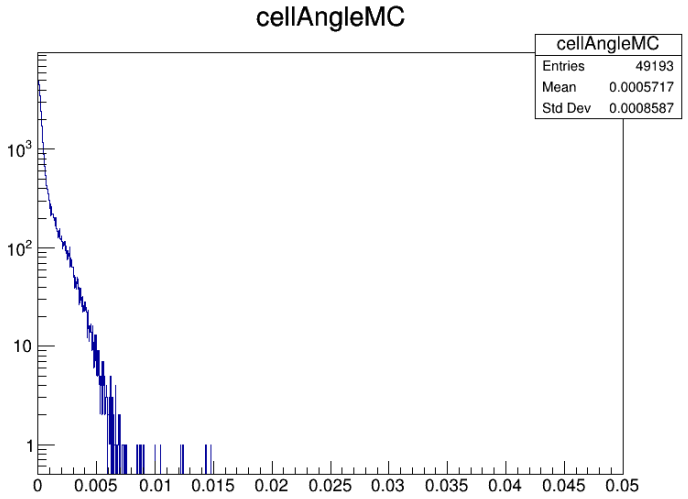


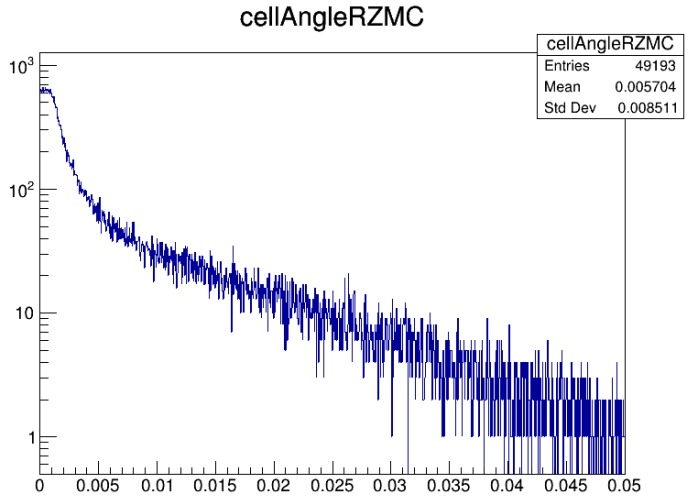


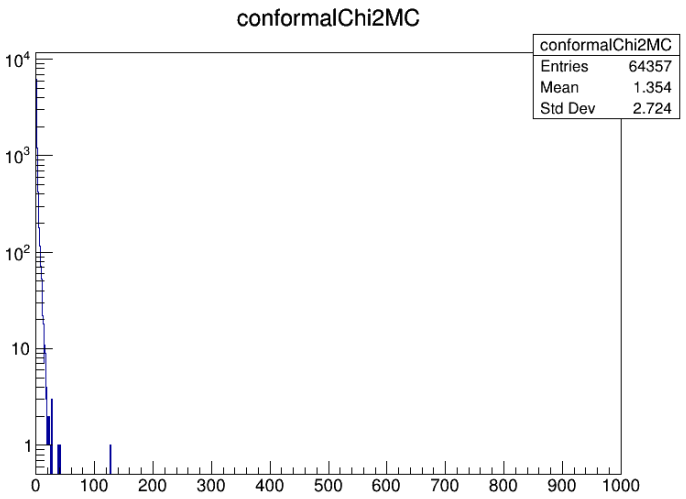


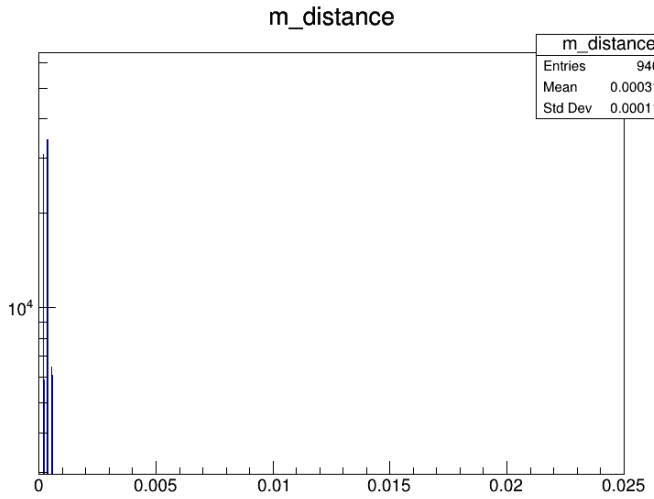
Conformal tracking par.: OT barrel

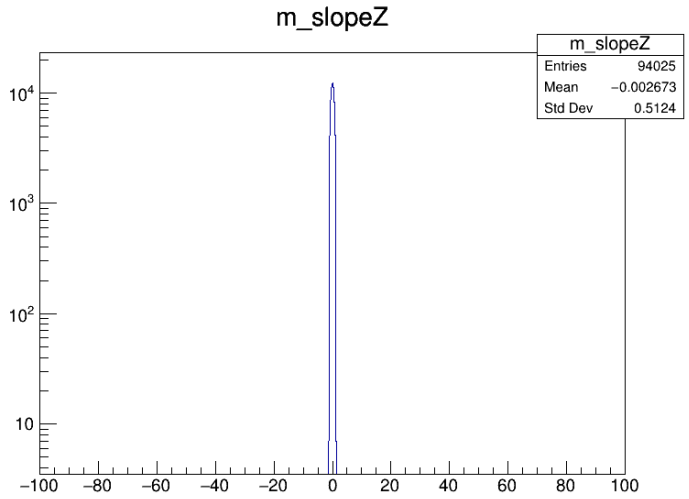
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.





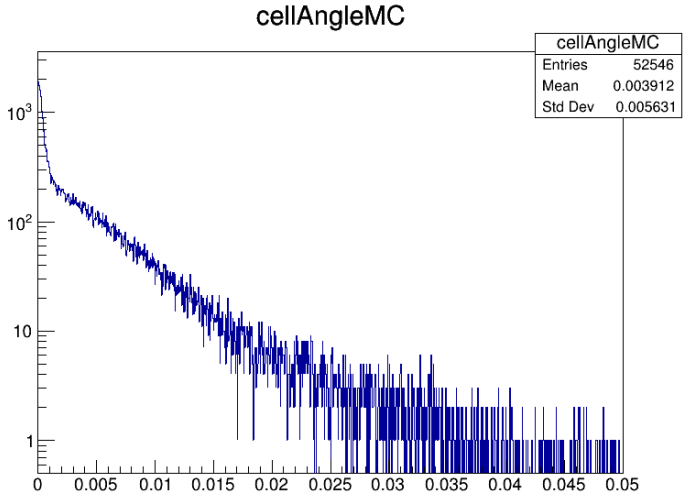


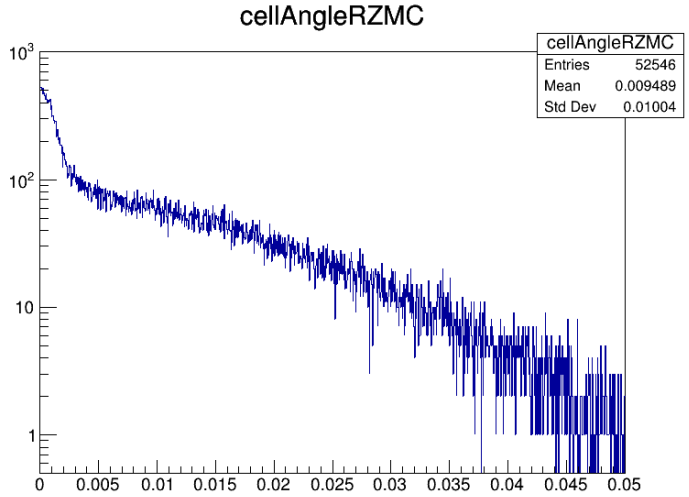


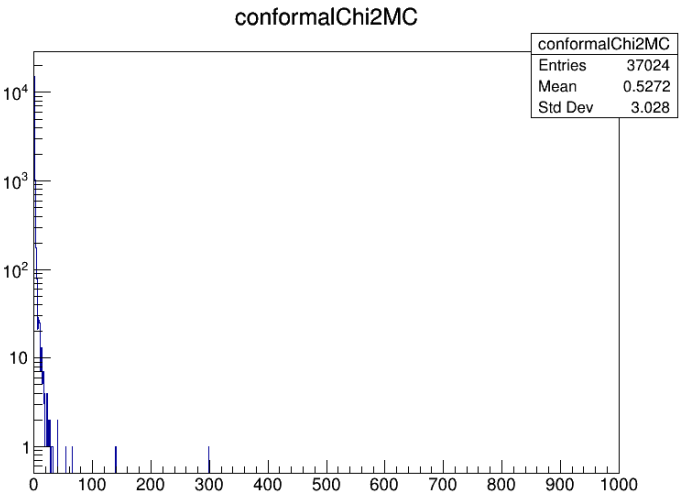


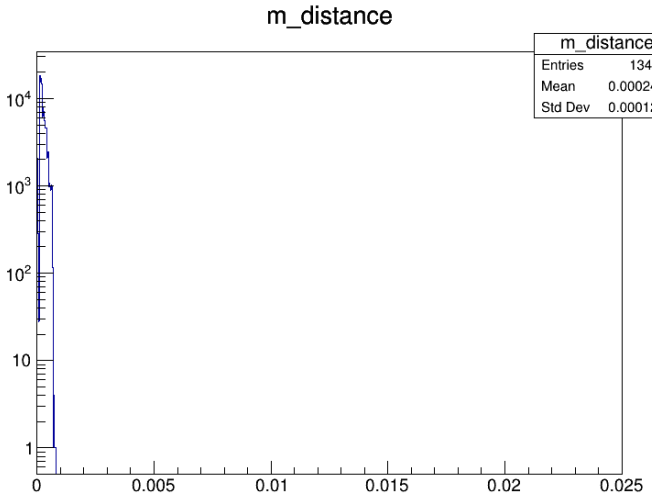
Conformal tracking par.: OT endcap

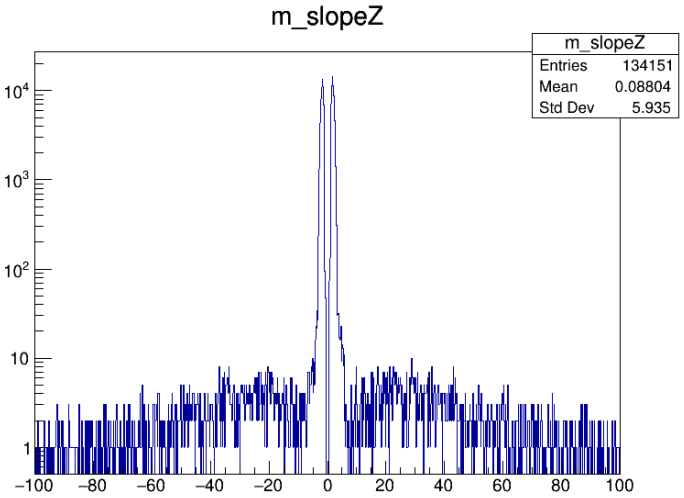
- 100k single muon sample with $0.1 < p_T < 10$ GeV/c.



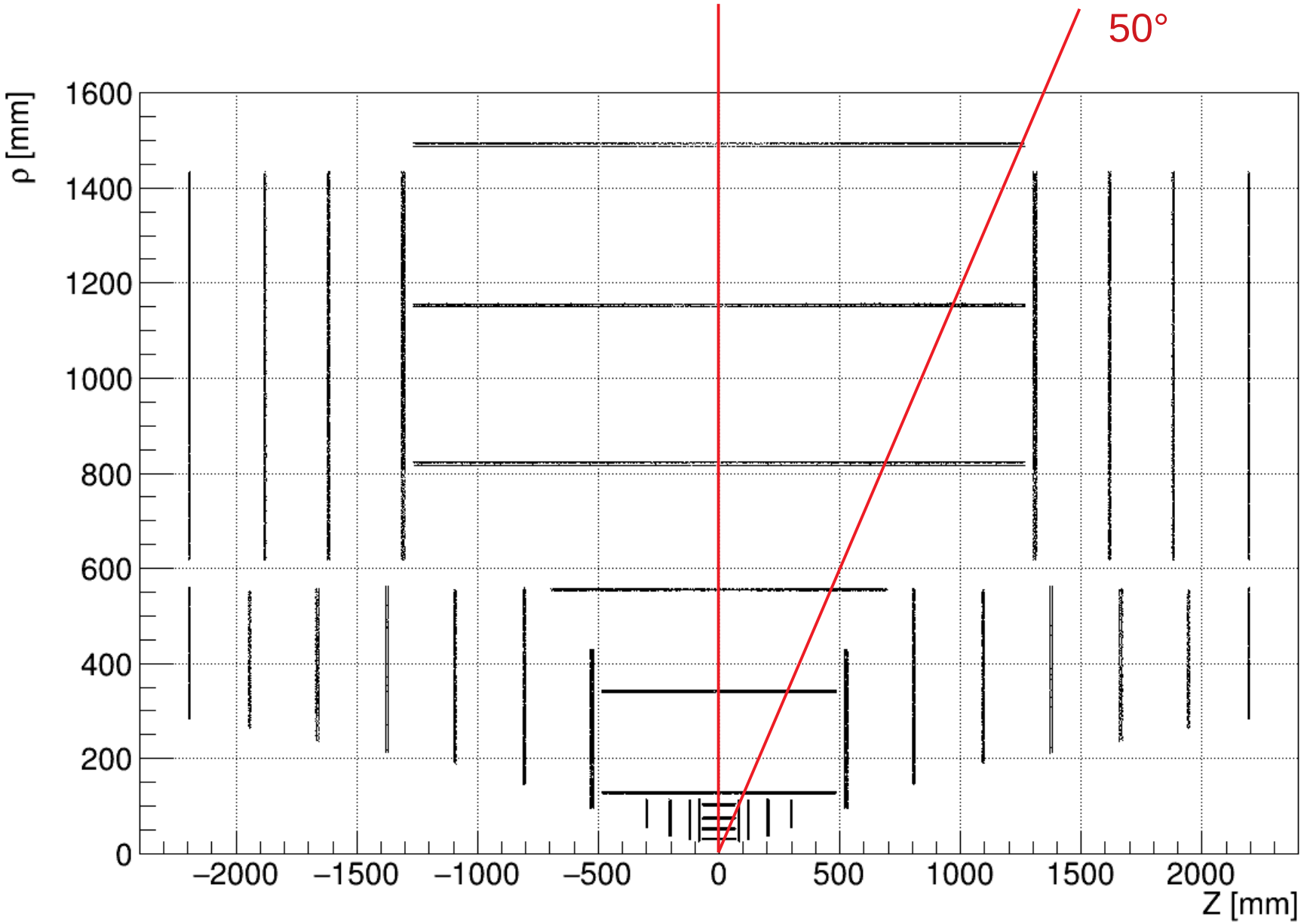








Track finding range



Conformal tracking configuration

- Config A:

```
[Tracker]
@Collections : ITrackerHits, OTrackerHits
@Parameters : MaxCellAngle : 0.025; MaxCellAngleRZ : 0.035; Chi2Cut : 100;
              MinClustersOnTrack : 4; MaxDistance : 0.009; SlopeZRange: 10.0; HighPTCut: 1.0;
@Flags : HighPTFit, RadialSearch
@Functions : CombineCollections, BuildNewTracks

[VXDBarrel]
@Collections : VXDTrackerHits
@Parameters : MaxCellAngle : 0.007; MaxCellAngleRZ : 0.007; Chi2Cut : 100; MinClustersOnTrack : 4;
              MaxDistance : 0.025; SlopeZRange: 10.0; HighPTCut: 1.0;
@Flags : HighPTFit
@Functions : CombineCollections, ExtendTracks
```

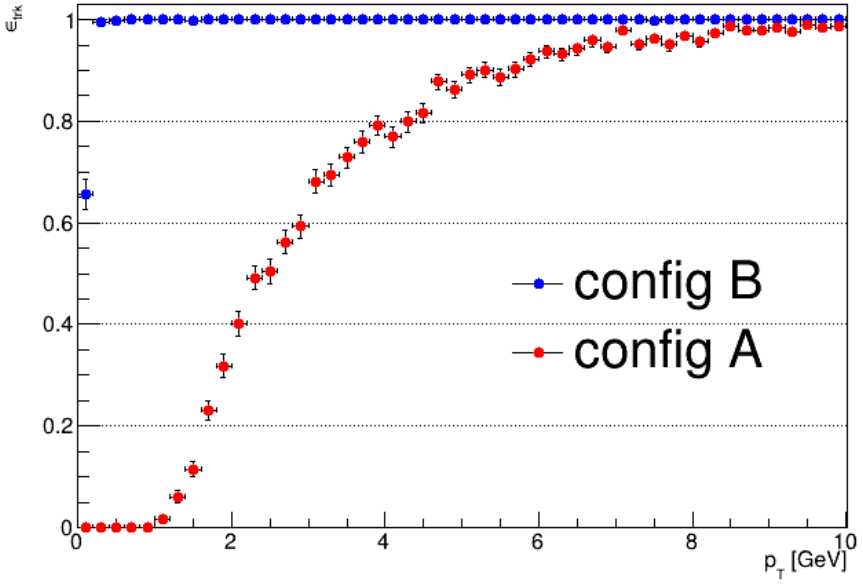
- Config B:

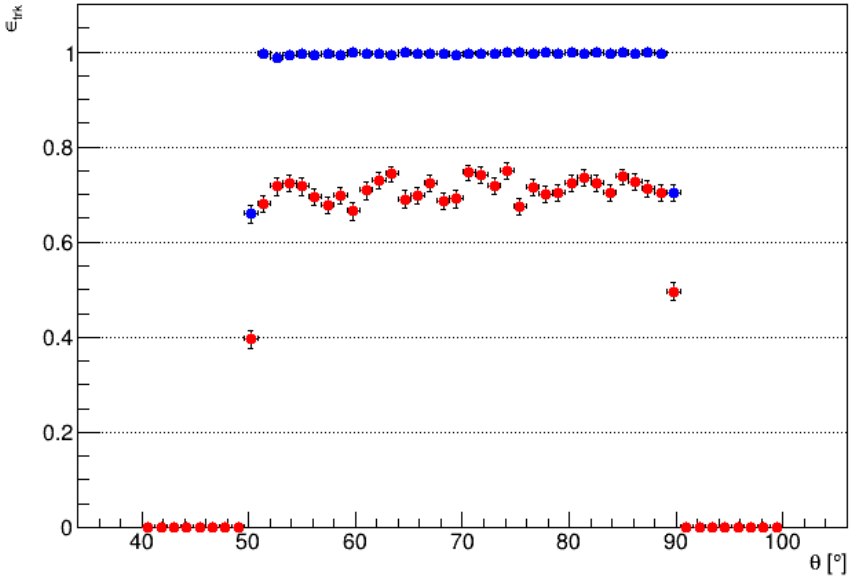
```
[VXDBarrel]
@Collections : VXDTrackerHits
@Parameters : MaxCellAngle : 0.007; MaxCellAngleRZ : 0.007; Chi2Cut : 100;
              MinClustersOnTrack : 4; MaxDistance : 0.025; SlopeZRange: 10.0; HighPTCut: 1.0;
@Flags : HighPTFit
@Functions : CombineCollections, BuildNewTracks

[Tracker]
@Collections : ITrackerHits, OTrackerHits
@Parameters : MaxCellAngle : 0.025; MaxCellAngleRZ : 0.035; Chi2Cut : 100; MinClustersOnTrack : 4;
              MaxDistance : 0.009; SlopeZRange: 10.0; HighPTCut: 0.0;
@Flags : HighPTFit, VertexToTracker, RadialSearch
@Functions : CombineCollections, ExtendTracks
```

Performace with single muons

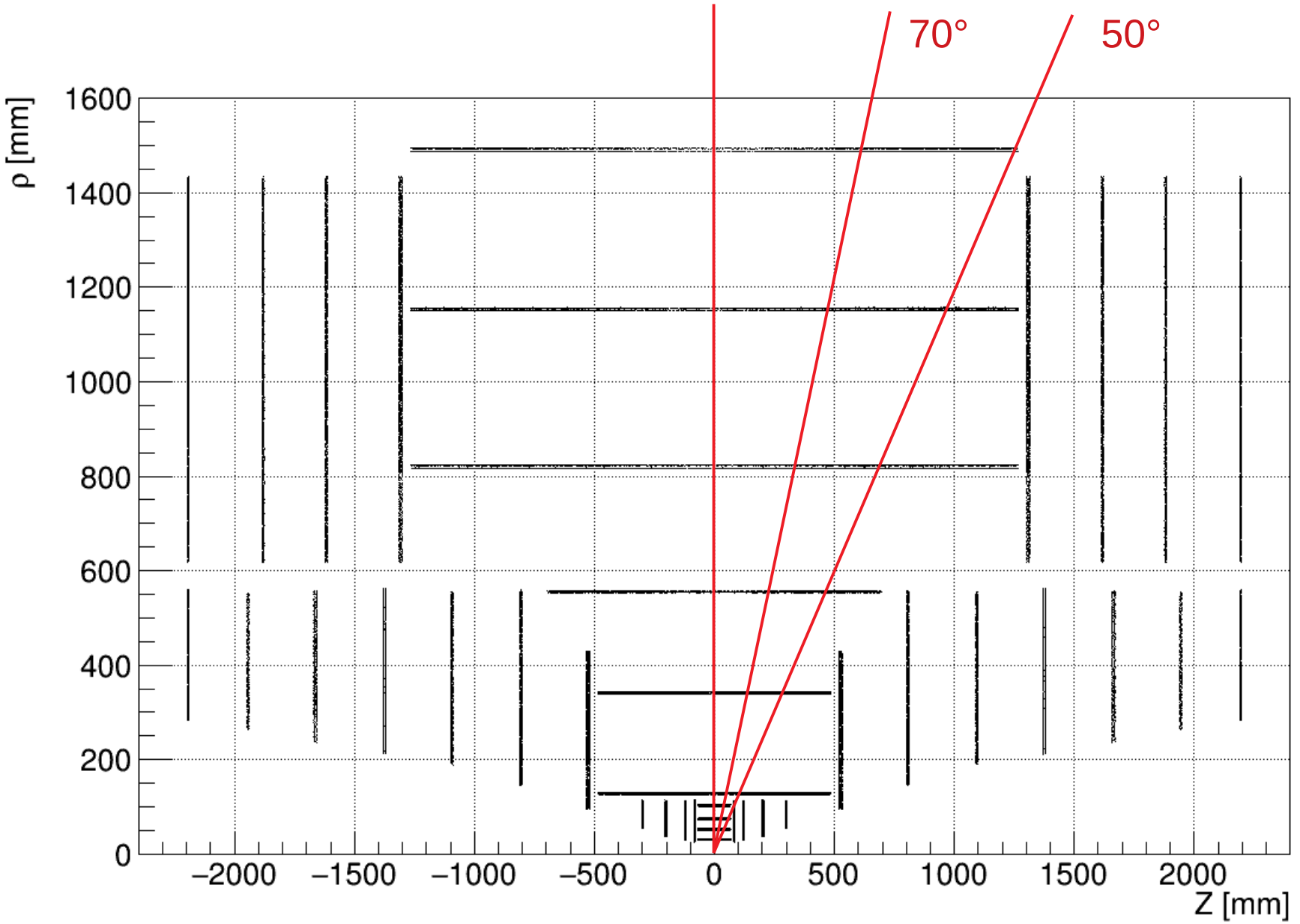
- 100k single muon sample: with $0.1 < p_T < 10$ GeV/c:





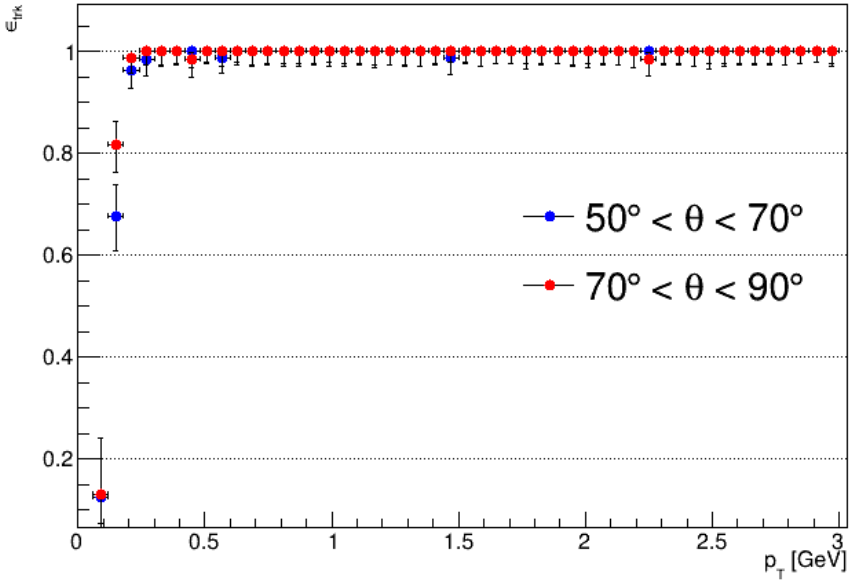
Performance with BIB

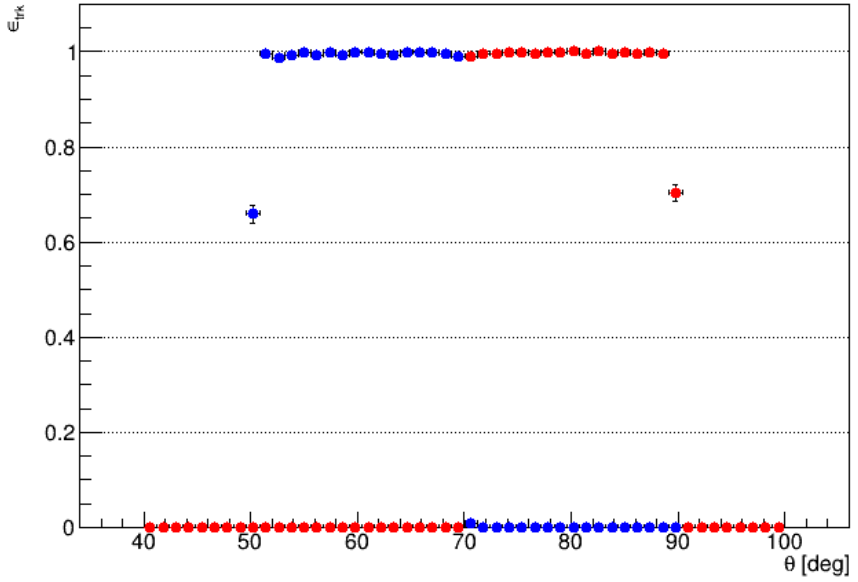
Divide et impera



Performace with single muons

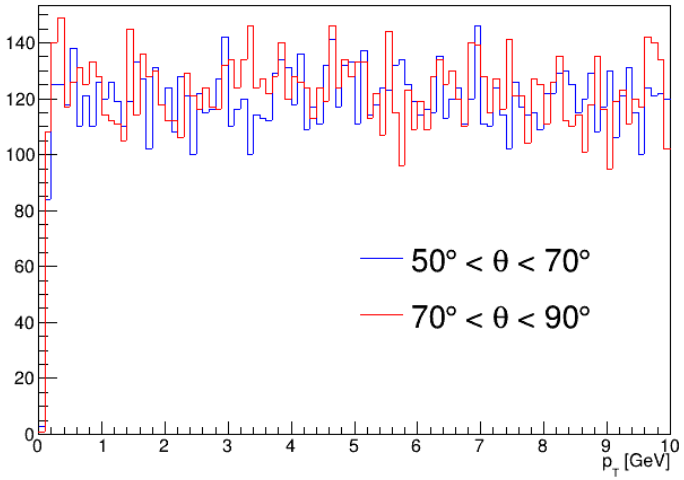
- 100k single muon sample: with $0.1 < p_T < 10$ GeV/c:

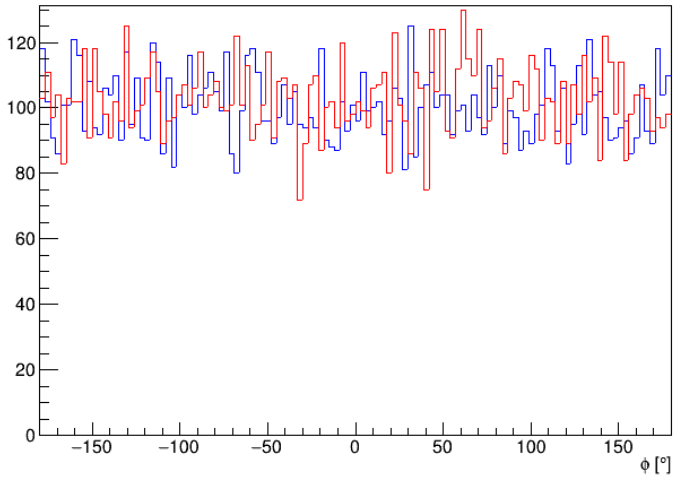


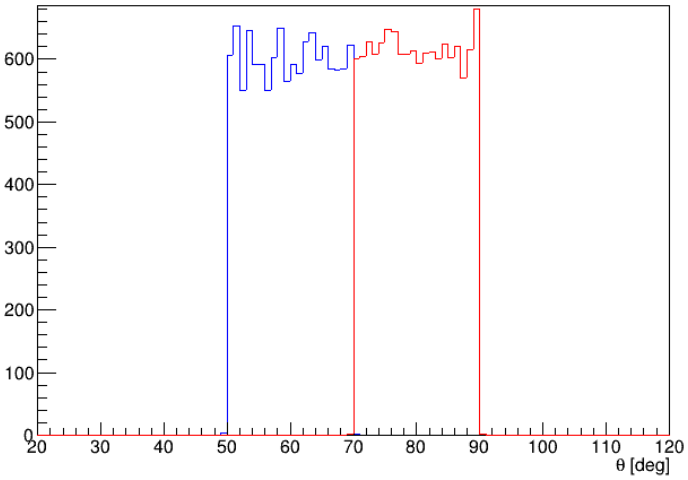


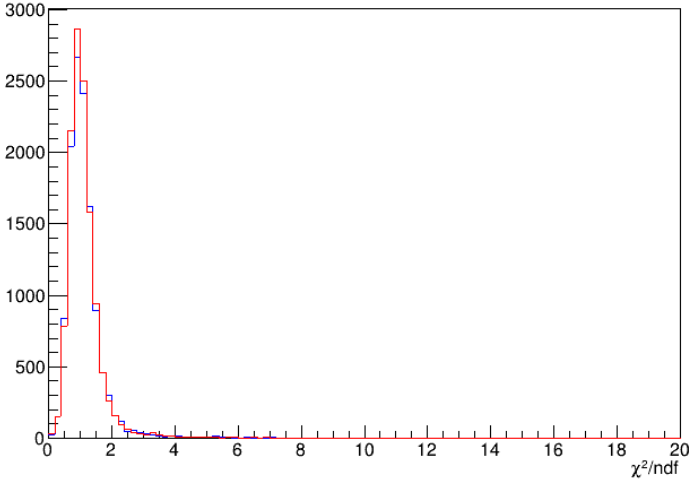
Reconstructed muon tracks

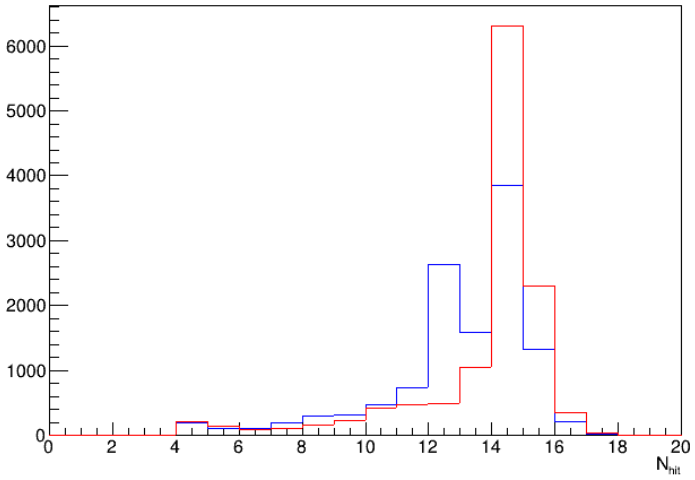
- 100k single muon sample: with $0.1 < p_T < 10$ GeV/c:





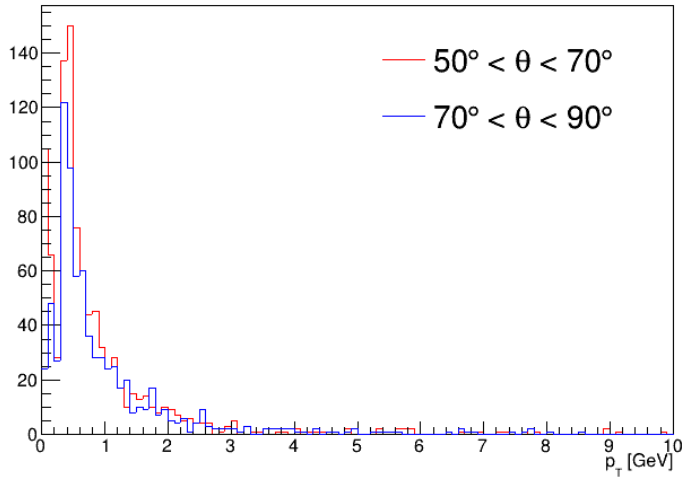


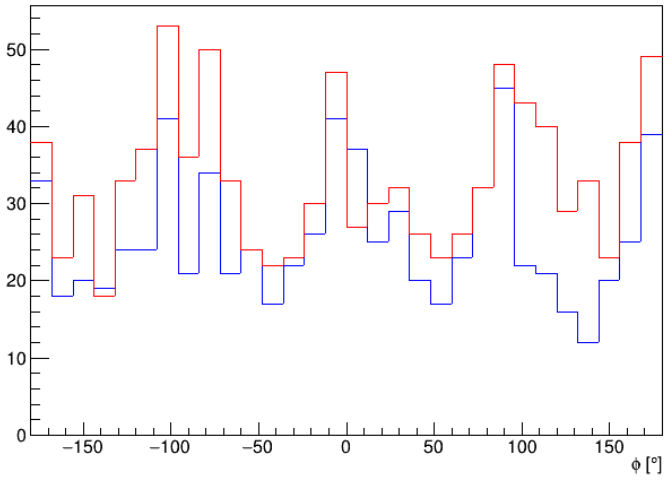


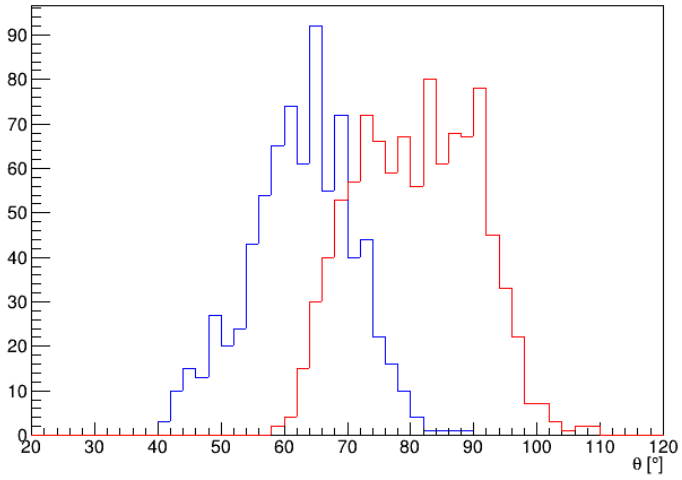


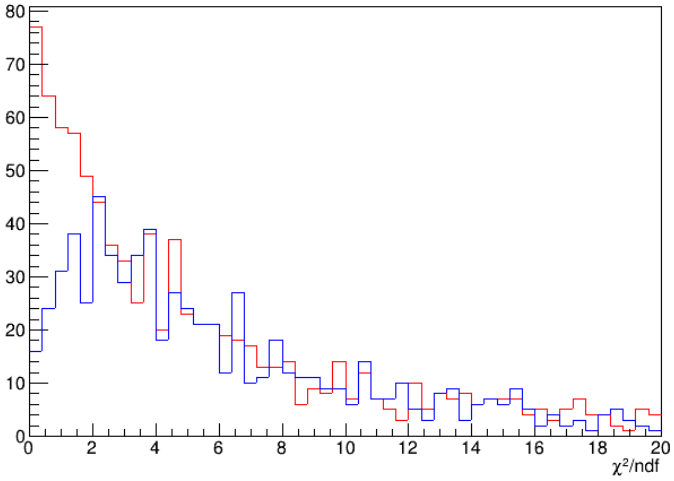
Reconstructed BIB tracks

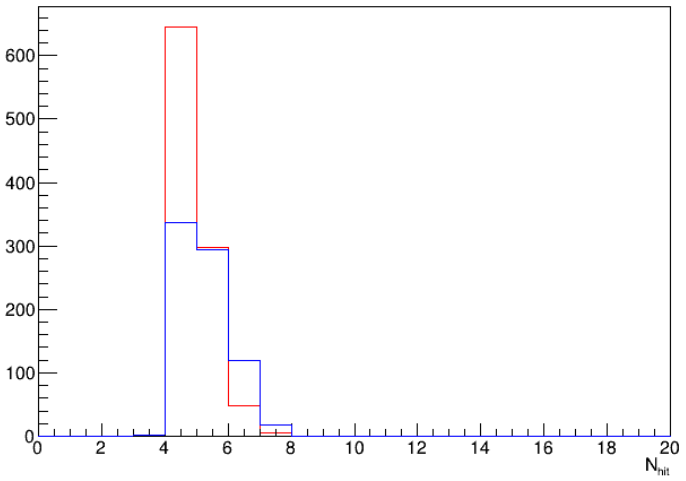
- One muon + full BIB overlaid.











- Execution time/sector: ~6000 s

Conclusion

- A viable way to fully track the BIB is to perform the track finding in contiguous tracker ϑ sectors (with some overlap + duplicates removal?):
  - if this is the way to go, we probably have to rethink the tracker geometry accordingly.
- Software issues:
  - all the subdetector hit collections are loaded even if tracking is performed on a subset => a dedicated processor to create sector hit collections could help;
  - ran into the so-called Gianelle's Malloc problem #71 => must review the collections saved to disk.