

# Muon system's studies

## Muon reconstruction update

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# BIB & gun signal:

## TO DO LIST

- Try gun+BIB
- Check results with the new version of the software & geometry

# Muon reconstruction:

## TO DO LIST

- Check matching
- Parameters tuning
- Study detector performances with:
  - Physics channel
  - Physics channel + BIB

## New version of software & geometry

ISSUE with Cmake during installation → incompatible version

- Not easily detectable (we had it when we compiled our processor)
- Easily fixable – remove cmake before starting the installation

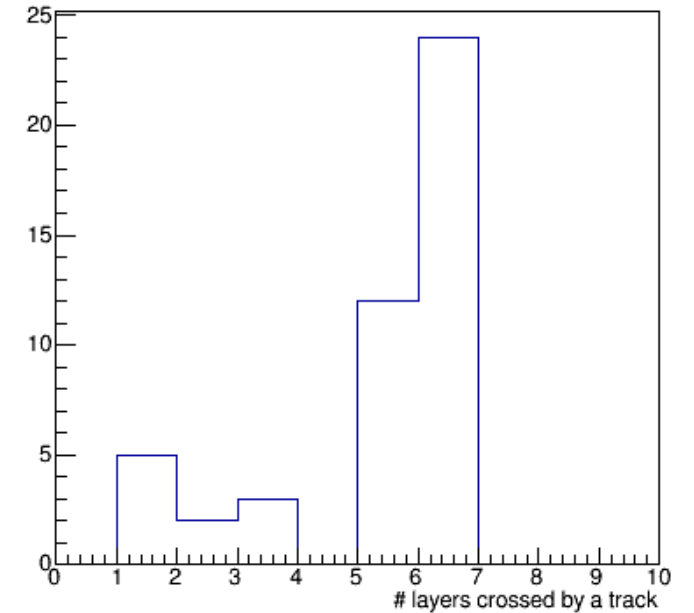
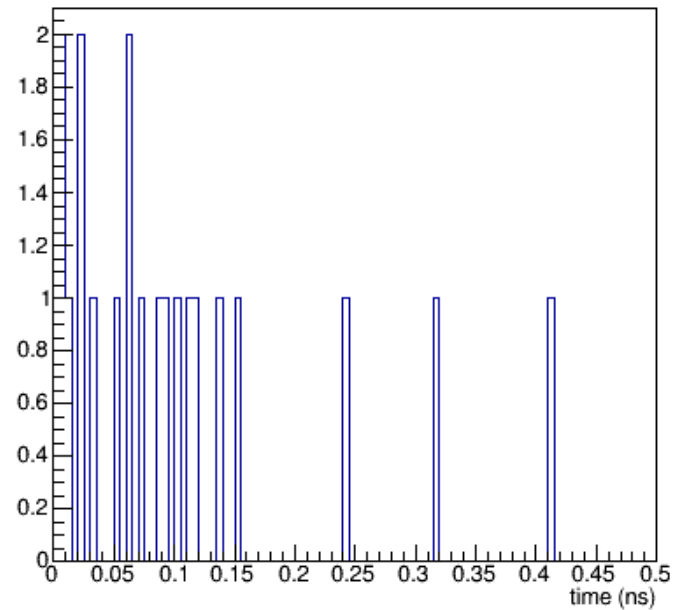
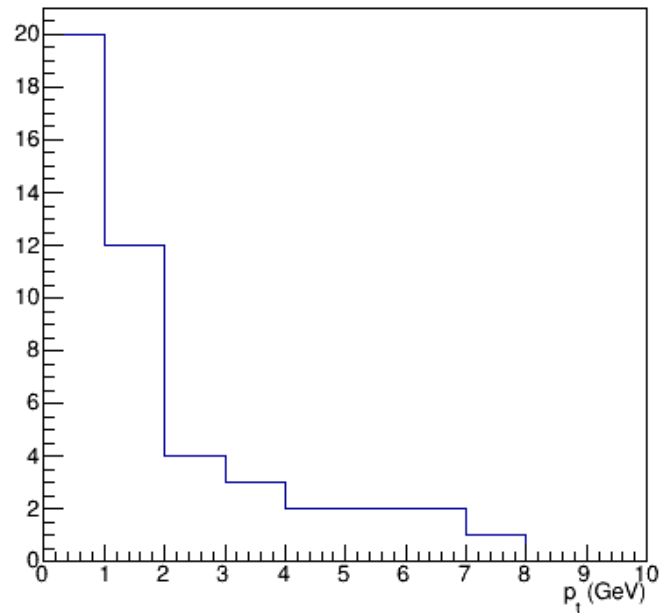
In the `reco_steer.xml` file (provided in the SoftCheck directory) the B field values are not updated

## Try BIB & gun

The Overlay takes a lot of time → we kept them separated

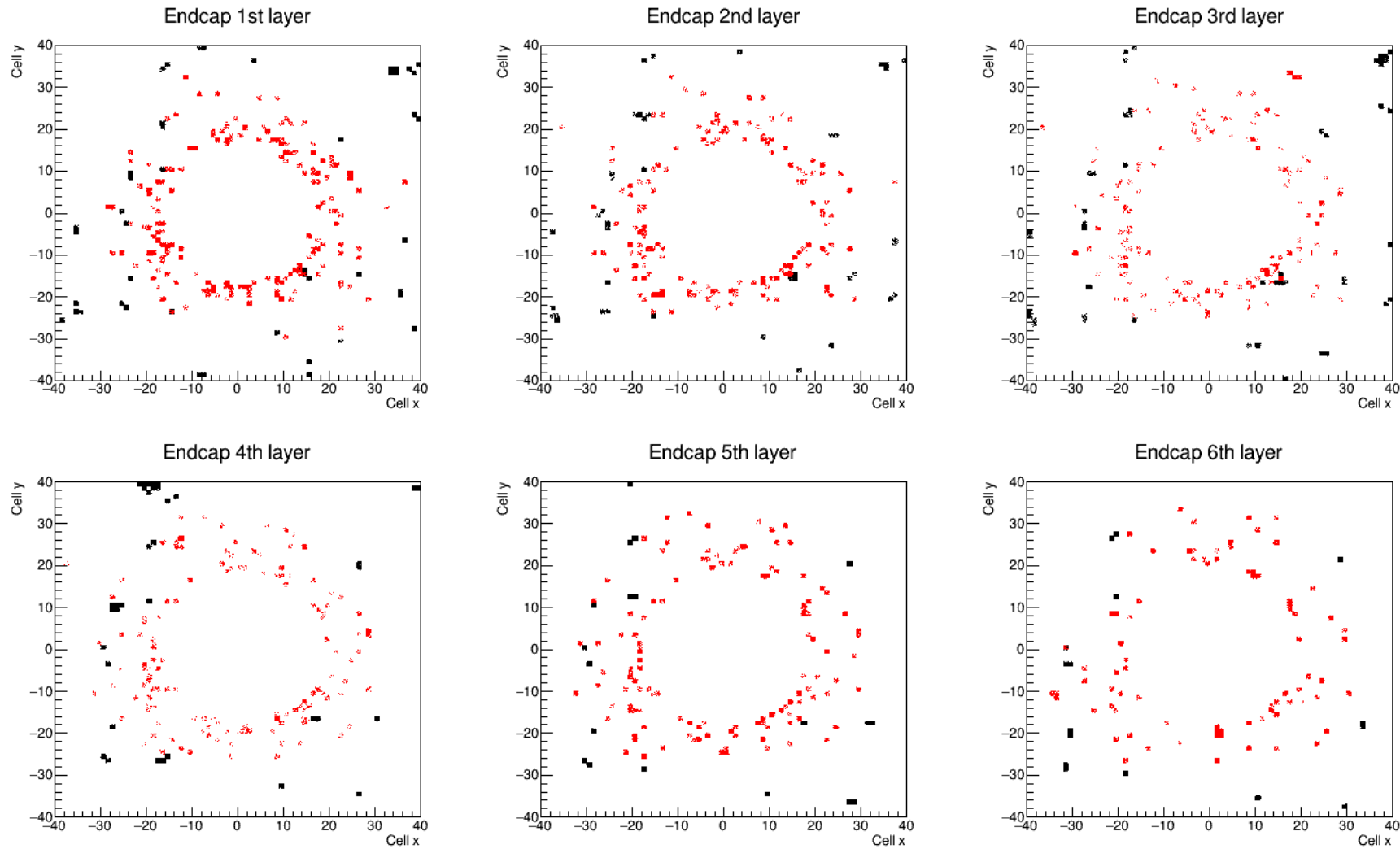
# BIB analysis

There are no tracks in the muon system barrel  $\rightarrow$  cuts needed for the endcap



46 tracks per bunch crossing

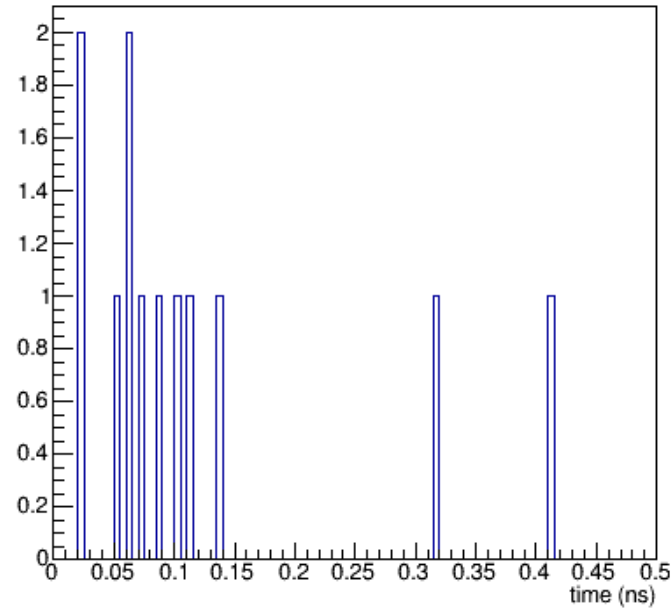
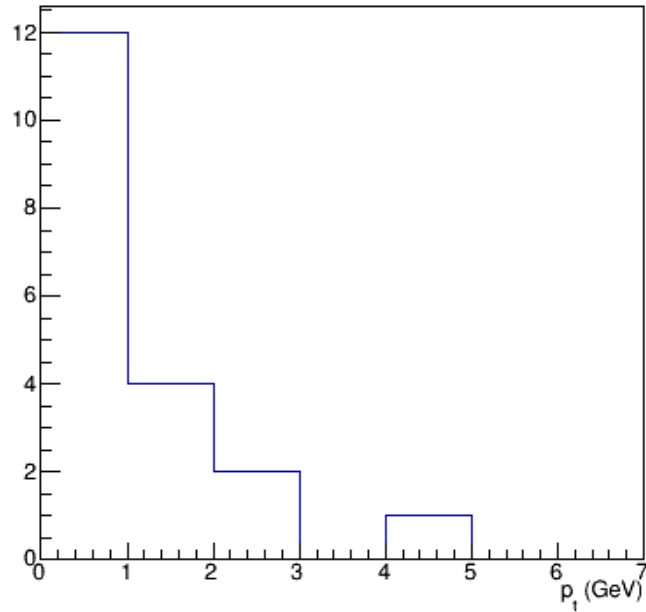
# BIB analysis



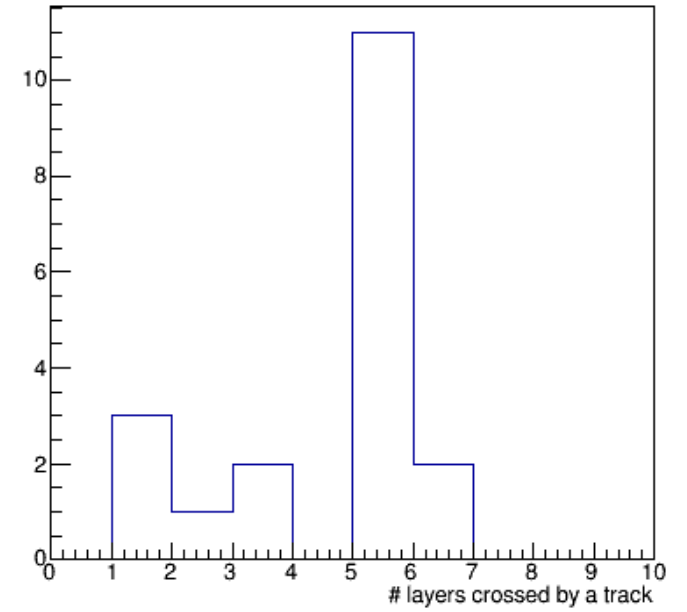
GEOMETRICAL CUT:  $8^\circ < \text{interesting region} < 172^\circ$

# BIB cut chosen

Geometrical cut +



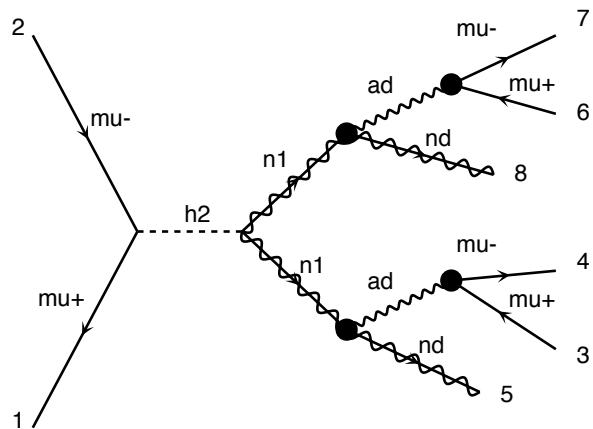
Still 19 tracks (~41%) per bunch crossing



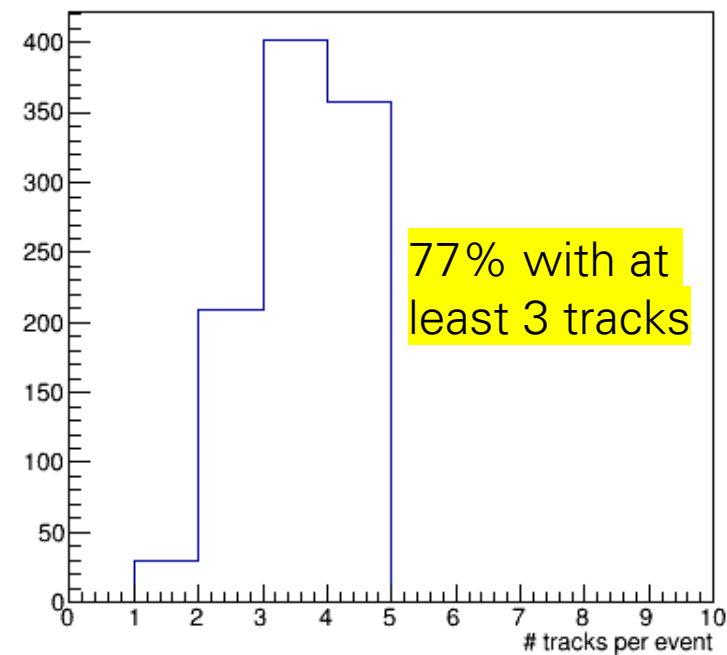
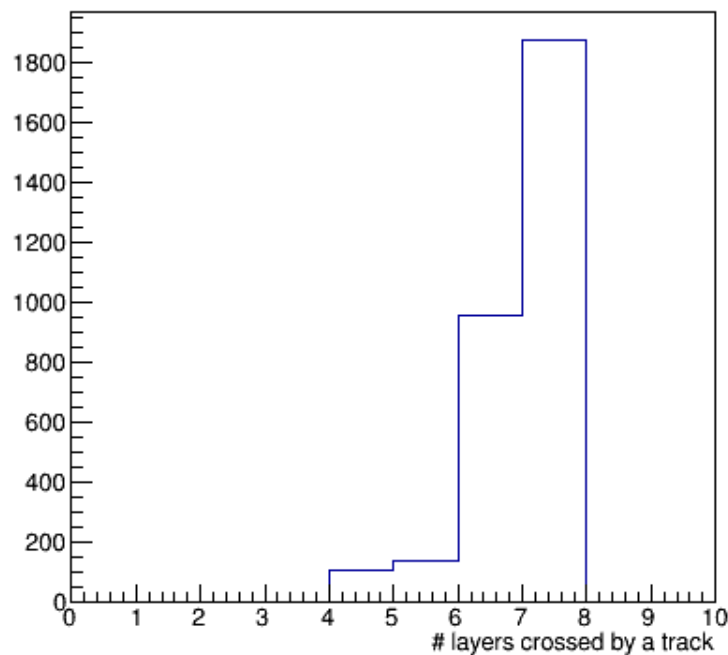
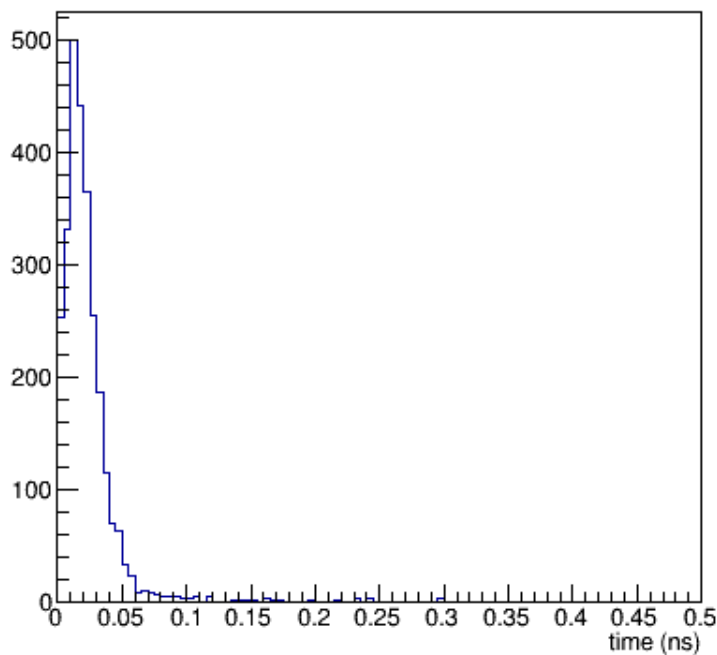
- $p_t > 5$  GeV
- $p_t > 3$  GeV & # layers crossed  $> 2$
- ... possible time cut

**➡** No more BIB tracks in the muon system

# Physics channel



MinMuonTrackSegmentHit	5
First Layer	1
ClusterSeedStrategy	2
MinClusterOccupiedLayer	5
MinClusterLayerSpan	5
NClusterLayerToFit	100
MaxDistanceToTrack	200
MinHelixClusterCosAngle	0.98
MinTrackCandidateEnergy	7

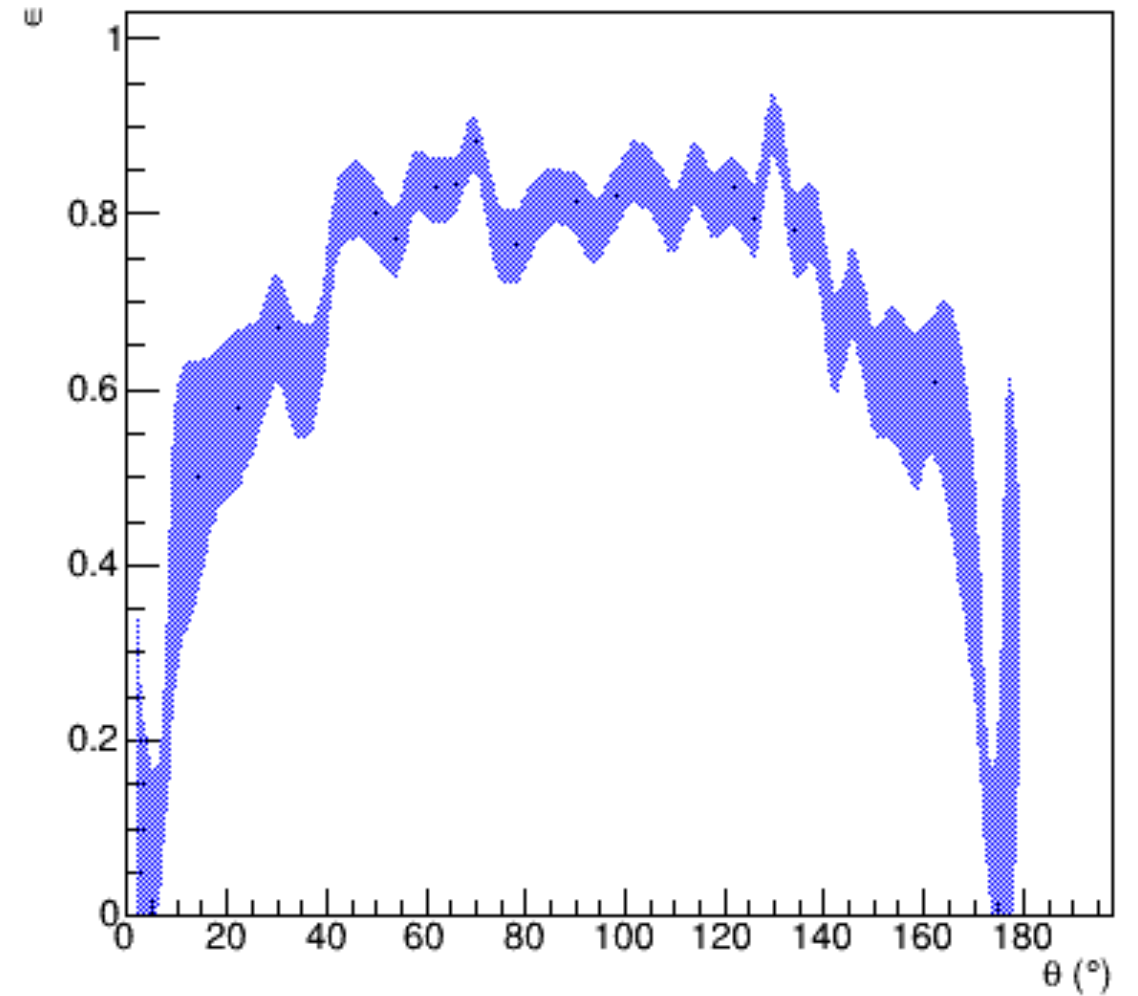
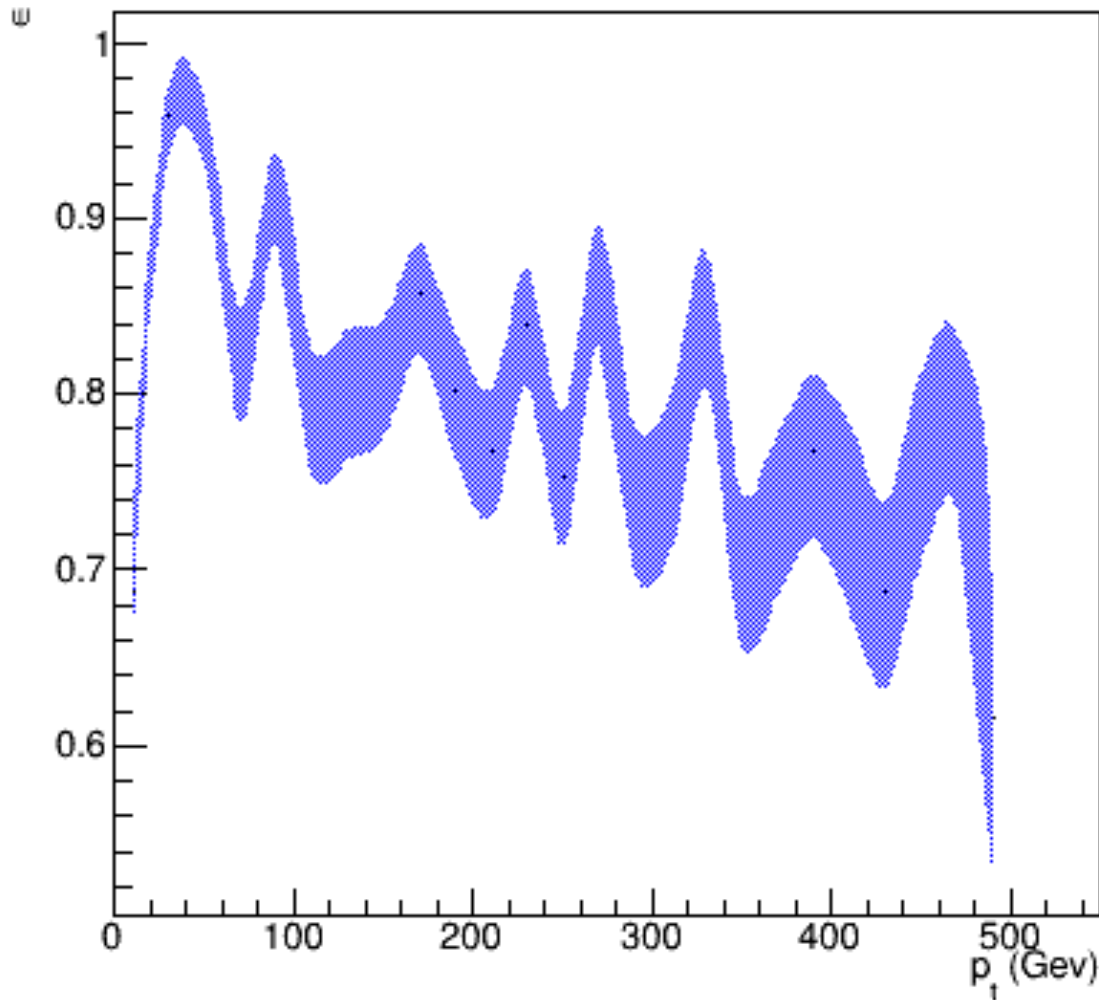


# Physics channel – cuts efficiency

Cuts	Reconstructed muons/ reconstructed without cuts
Geometrical	99,90%
Geometrical + $p_t > 5 \text{ GeV}$	99,67%
Geometrical + $p_t > 3 \text{ GeV}$ + #lay>2	99,84%



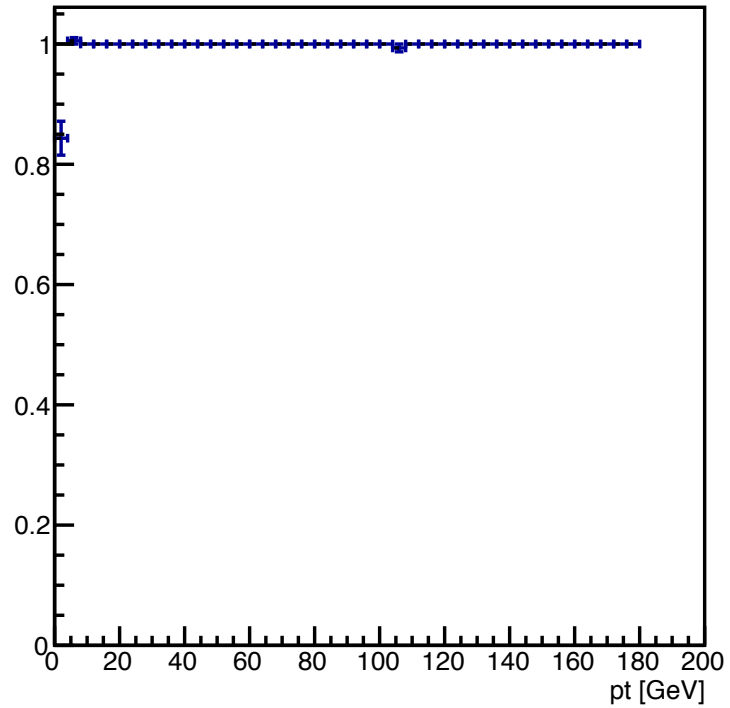
# Efficiency of muons from decay $a_d \rightarrow \mu^+ \mu^-$



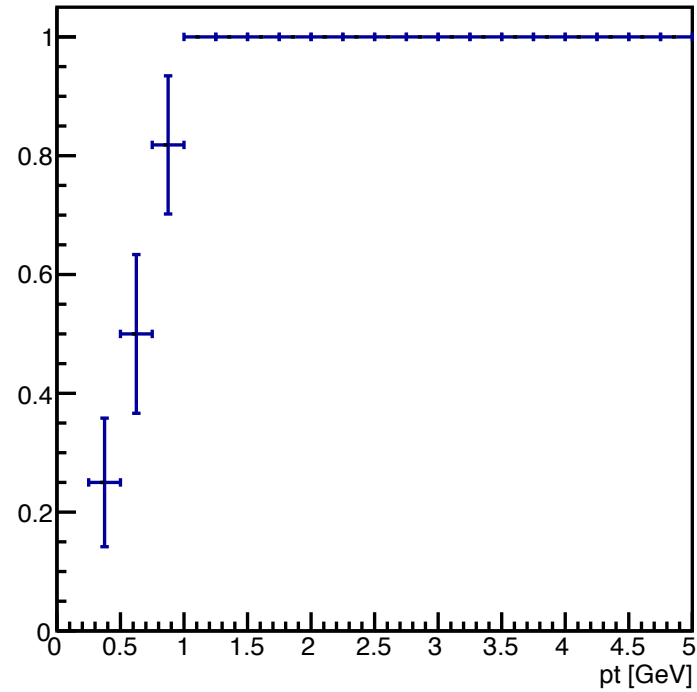
Low efficiency at low and very high  $p_t$

# Efficiency muon gun

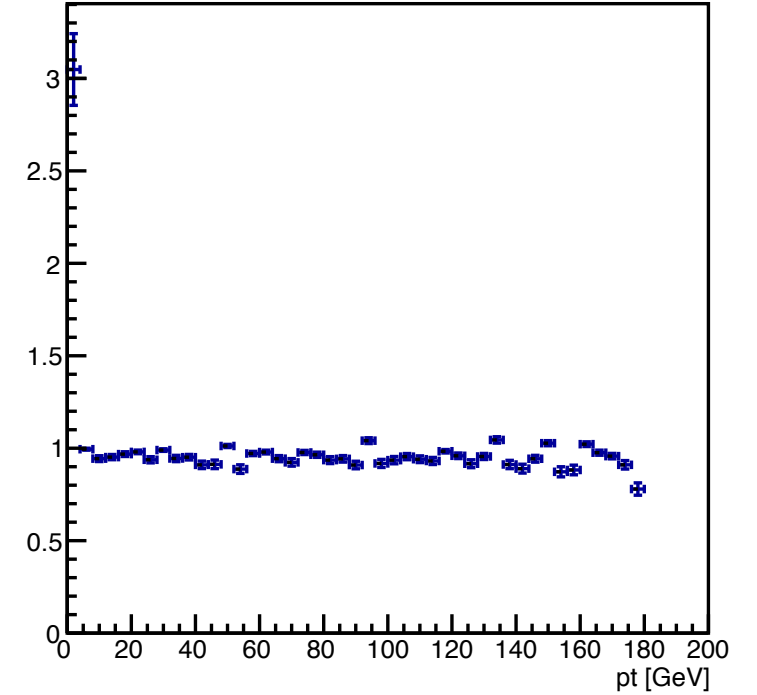
ptrel



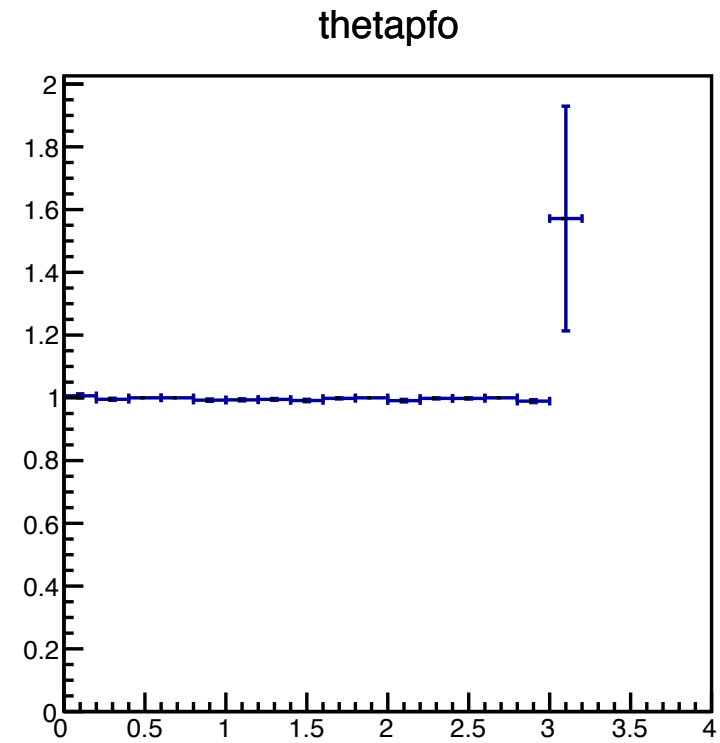
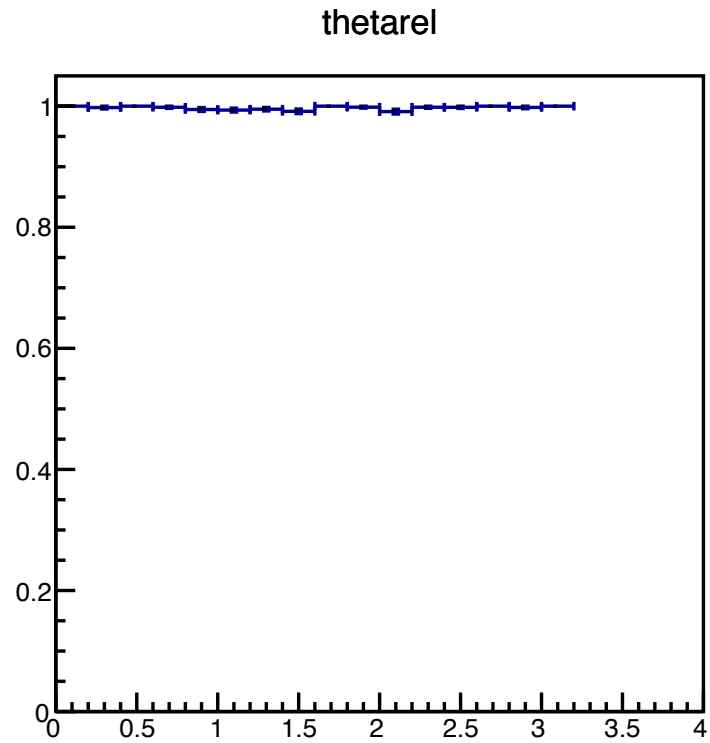
ptrel\_zoom



ptpfo



# Efficiency muon gun



# Matching

LCRelation between:

- PFO & MCParticle at track level
- Pandora Cluster hits & SimCalorimeter Hit at hit level

