Update on track reconstuction efficiency in jets

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- Tuning the embedded MC track
  - Hit residual
  - Hit merging
  - Hit efficiency
- Plan

Tuning the embedded MC track

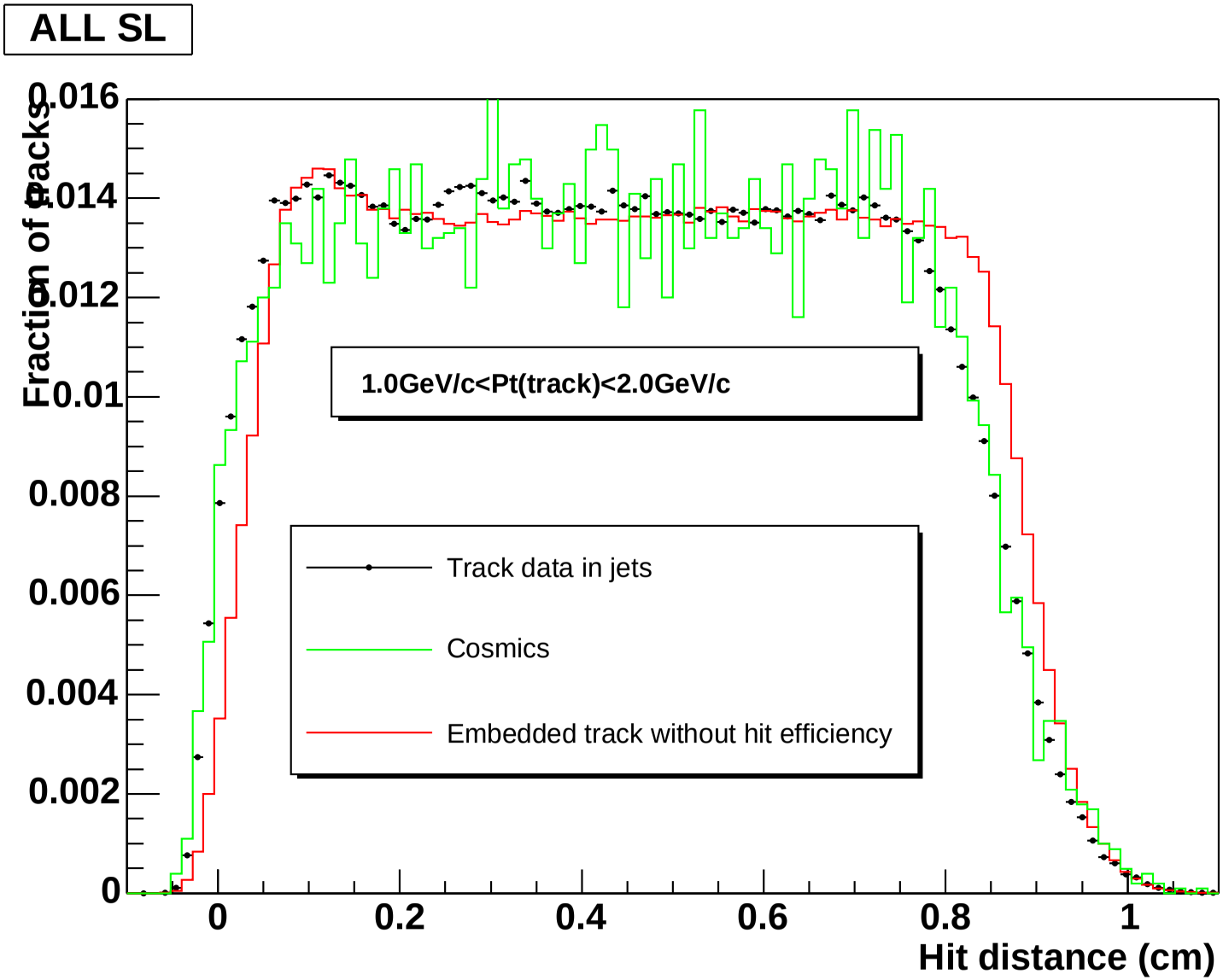
- Embedded tracks must be tuned to emulate data tracks in jets
  - Distribution of number of axial and stereo hits attached to track:
  - Hit merging: hit merge distance 20ns
  - Hit efficiency:

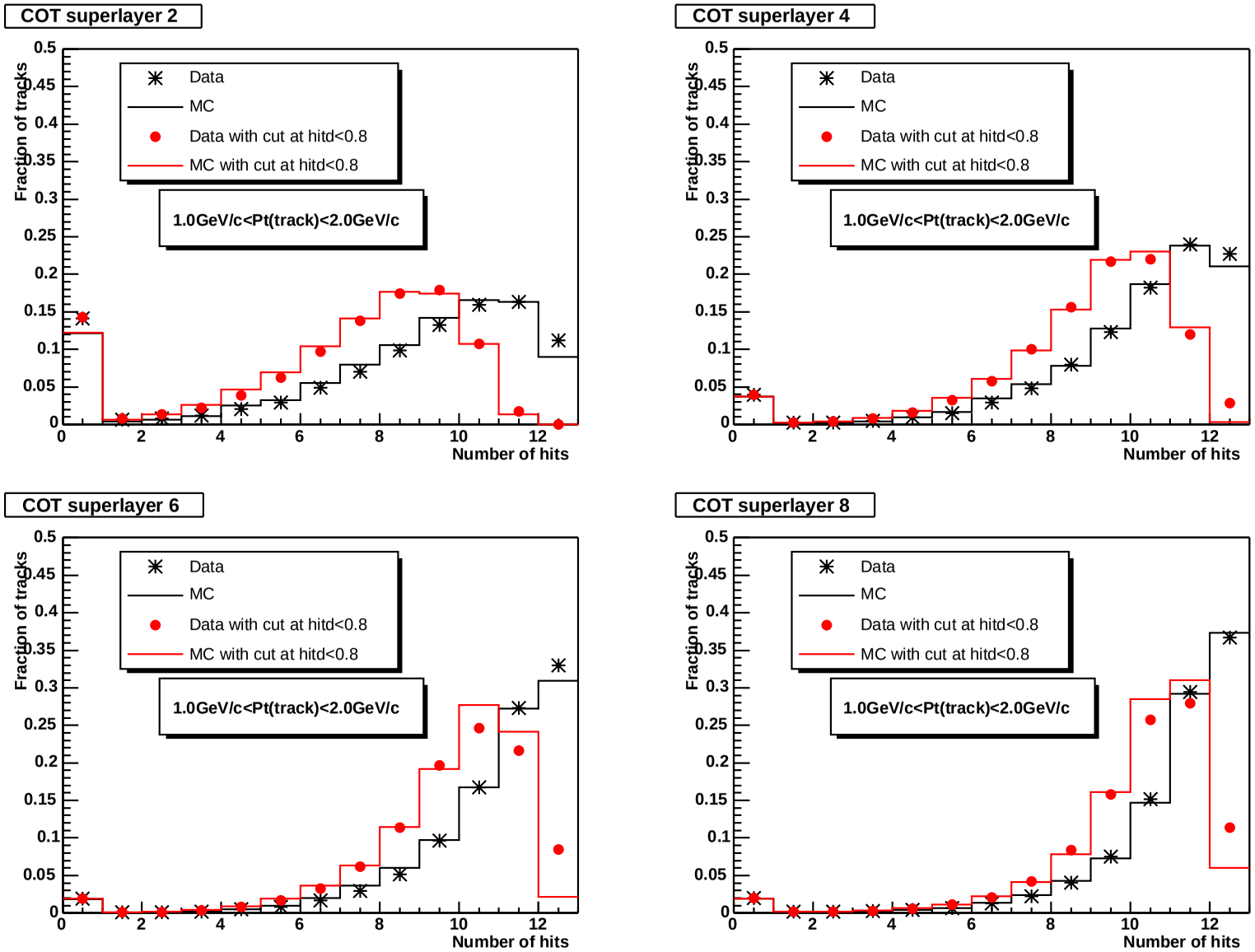
    $\Rightarrow$ Numerator: measure hit efficiency in cosmics from 90% in SL1 to 96% in SL8

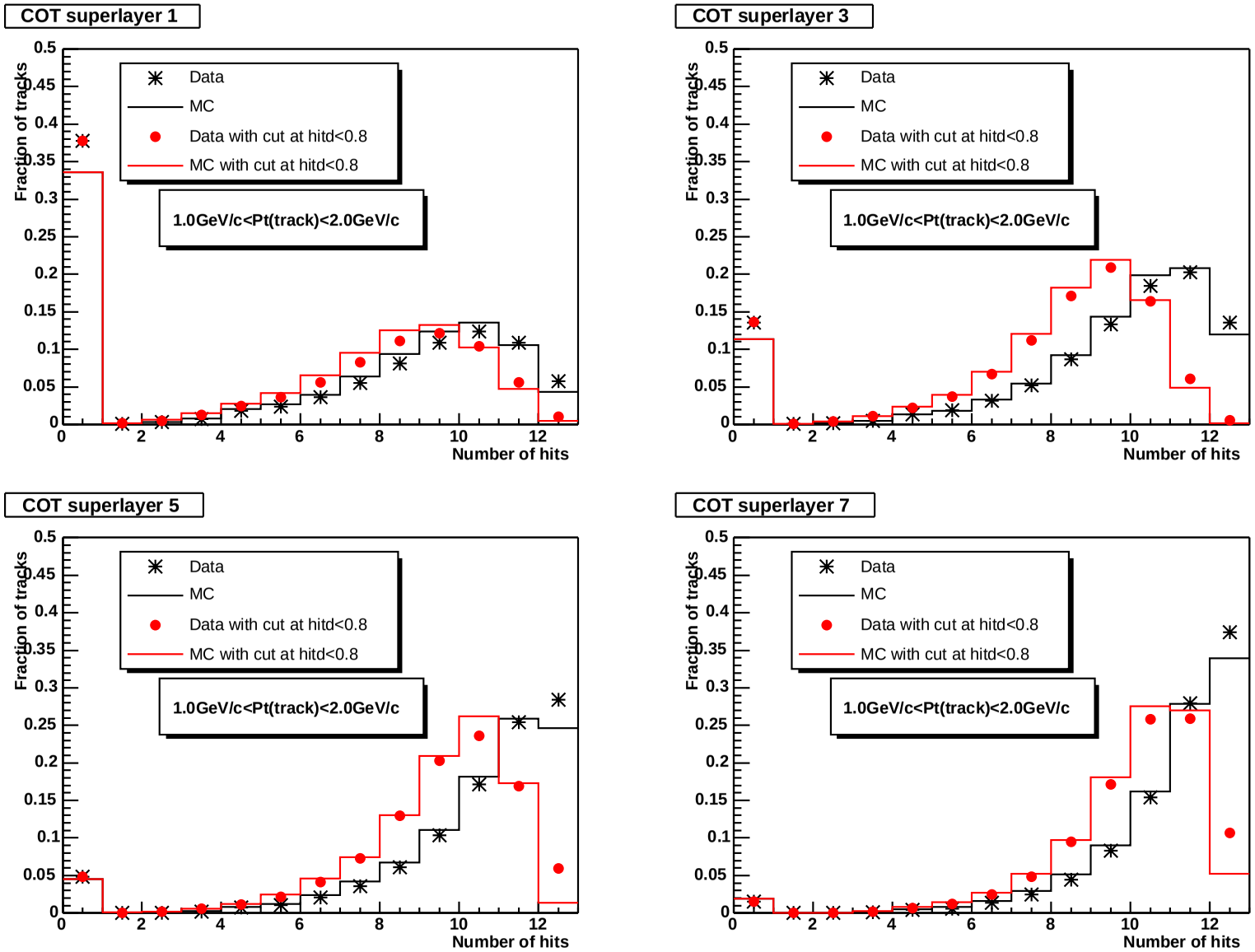
    $\Rightarrow$ Denominator: Hit efficiency while reconstructing a fake track: $\sim 98.5\%$ for all super layers

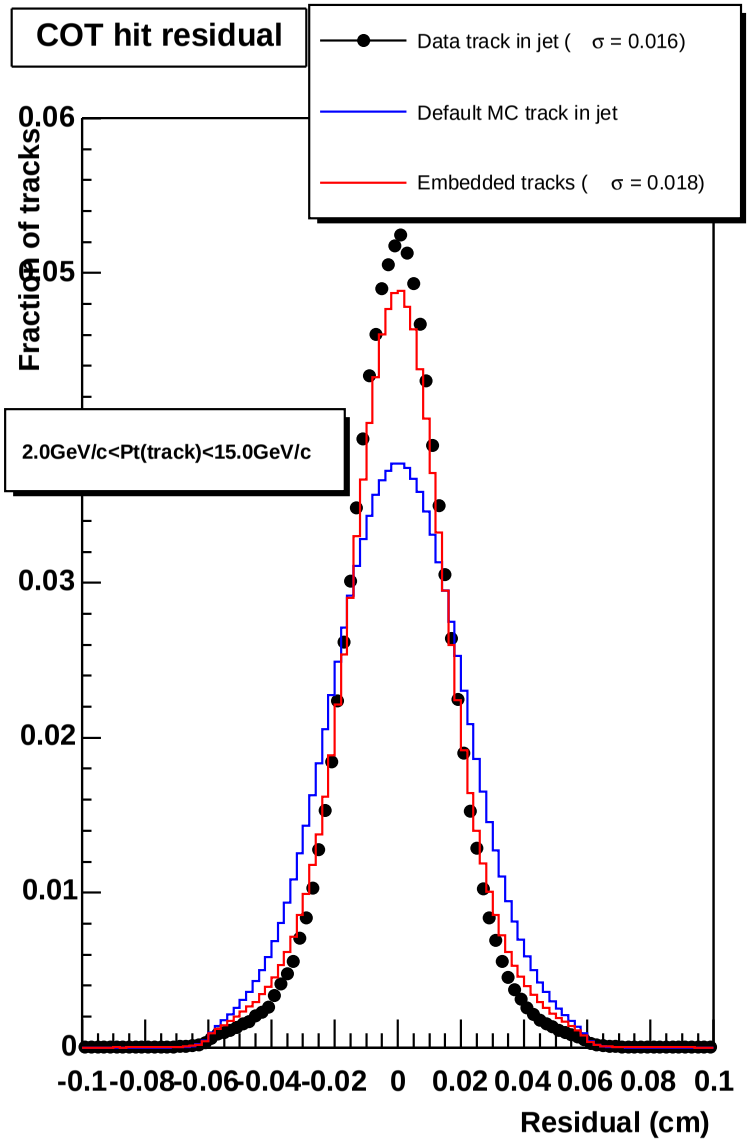
    $\Rightarrow$ Make cut a function of drift distance: 2 bins: $hitd < 0.775$ and $hitd > 0.775$

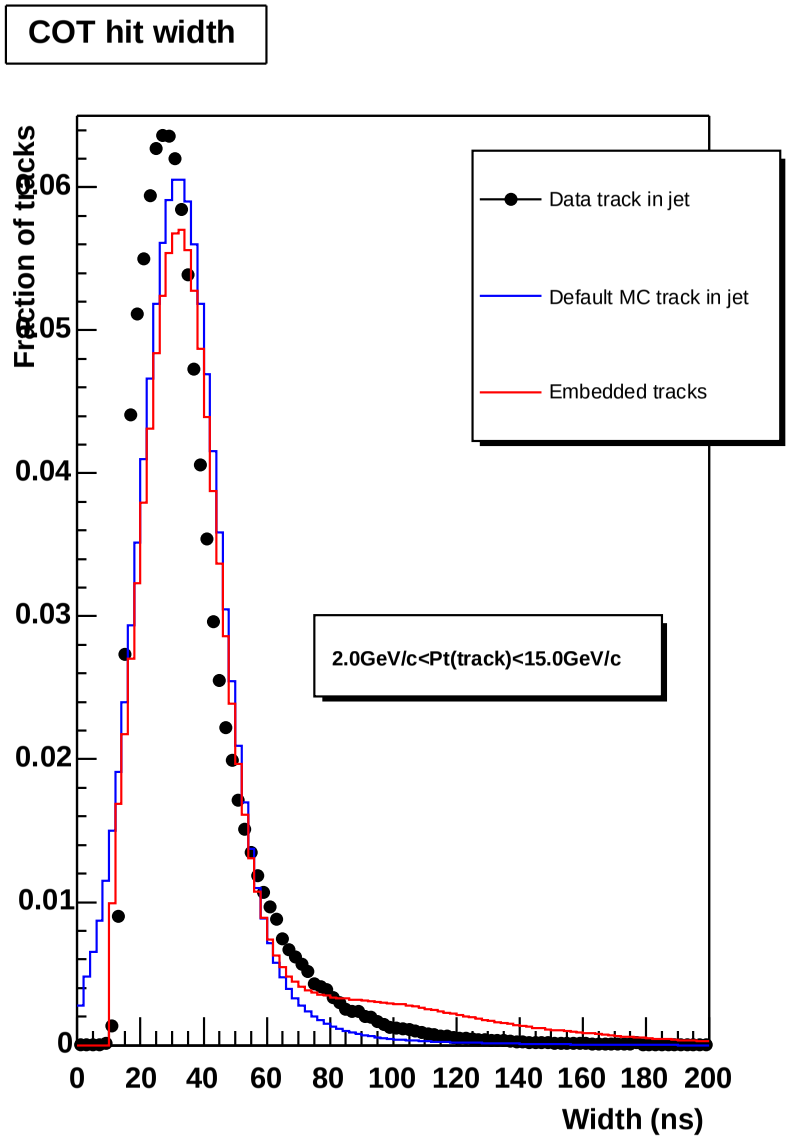
- For both data and MC, use track in 0.4 cone from highest p_t vertex
- Distribution of the track hit residual (smearing scale factor 0.8)
- Distribution of hit width

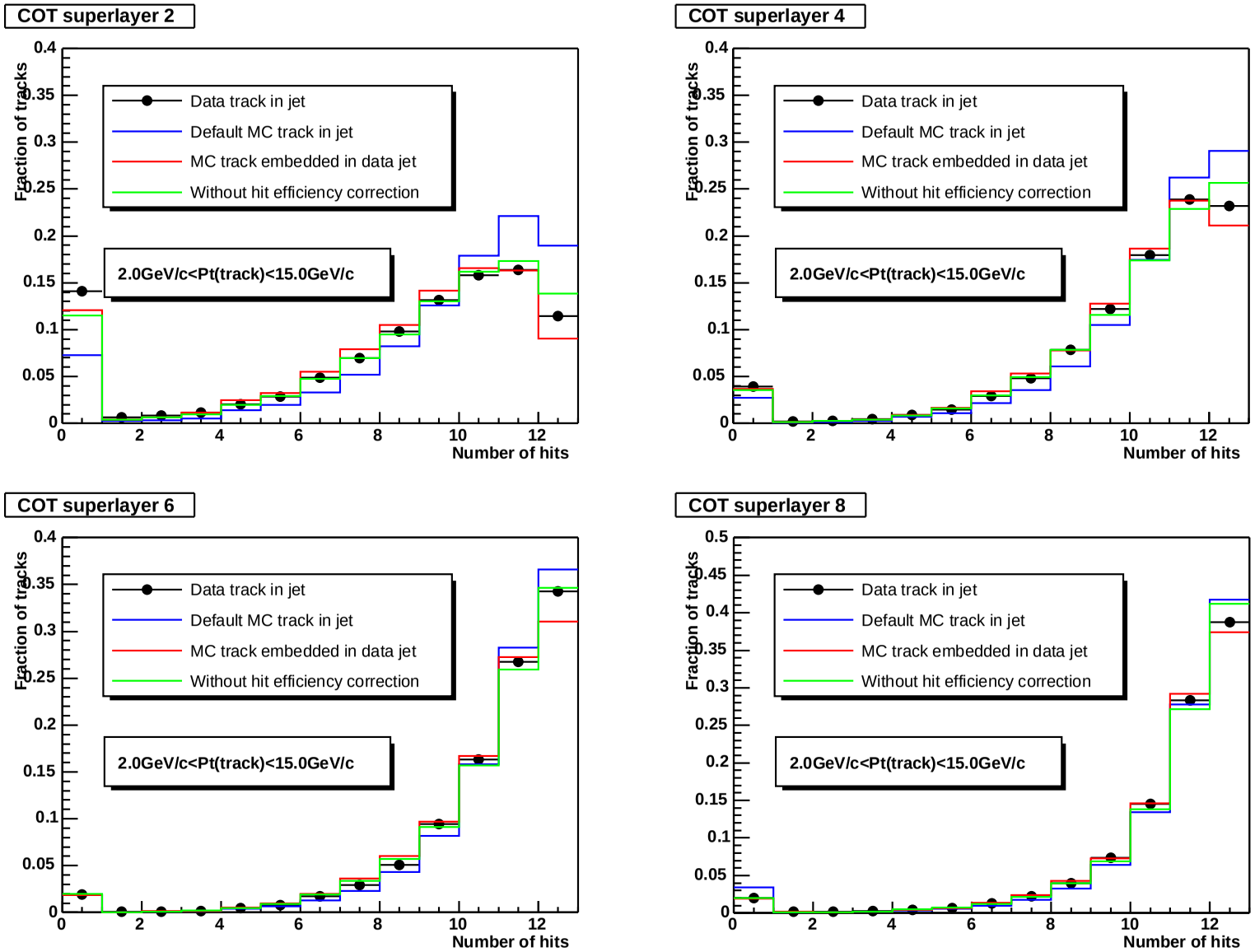

ALL SL
Fraction of tracks
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
0
0.2
0.4
0.6
0.8
1
Hit distance (cm)
1.0GeV/c<Pt(track)<2.0GeV/c
Track data in jets
Cosmics
Embedded track without hit efficiency

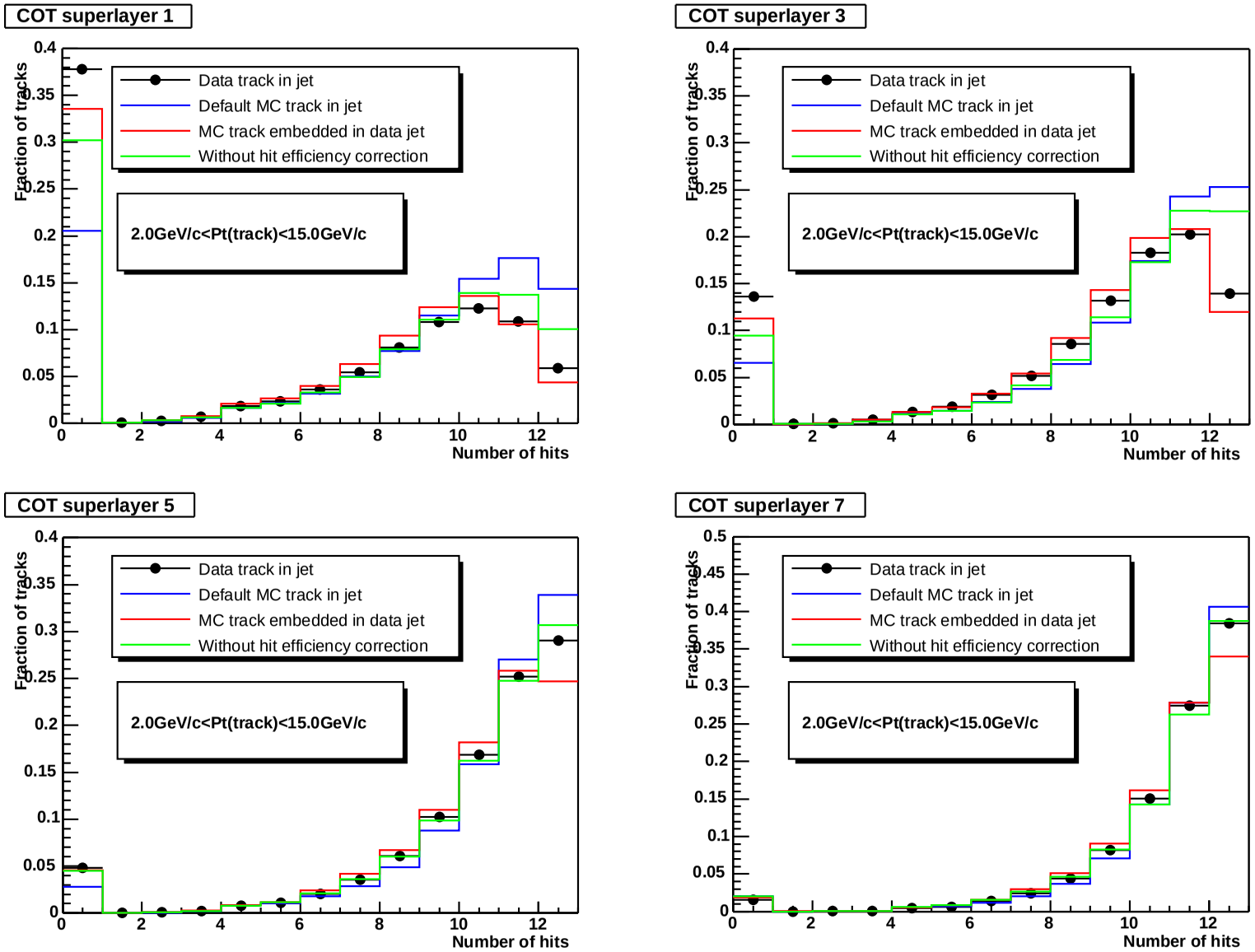

COT superlayer 2
COT superlayer 4
COT superlayer 6
COT superlayer 8
Data
MC
Data with cut at hitd<0.8
MC with cut at hitd<0.8
1.0GeV/c<Pt(track)<2.0GeV/c
Fraction of tracks
Number of hits

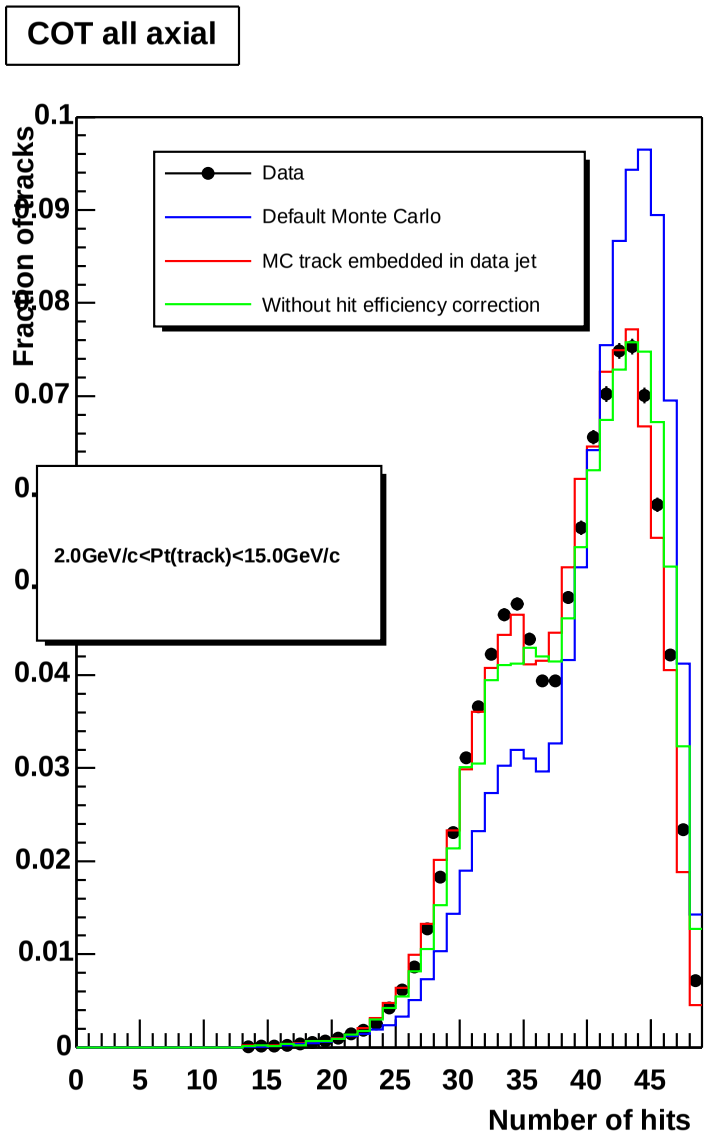

COT superlayer 1
COT superlayer 3
COT superlayer 5
COT superlayer 7
Data
MC
Data with cut at hitd<0.8
MC with cut at hitd<0.8
1.0GeV/c<Pt(track)<2.0GeV/c
Fraction of tracks
Number of hits

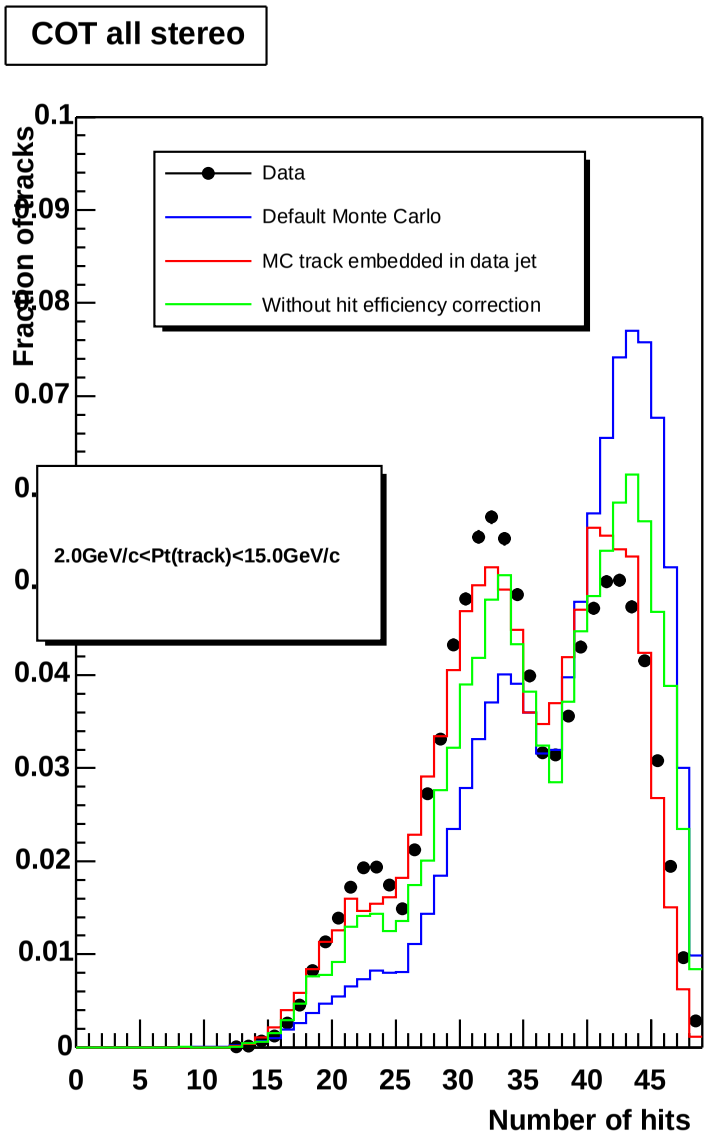

COT hit residual
Data track in jet (σ = 0.016)
Default MC track in jet
Embedded tracks (σ = 0.018)
Fraction of tracks
2.0GeV/c<Pt(track)<15.0GeV/c
0.06
0.05
0.03
0.02
0.01
0
-0.1 -0.08 -0.06 -0.04 -0.02 0 0.02 0.04 0.06 0.08 0.1
Residual (cm)


COT hit width
Data track in jet
Default MC track in jet
Embedded tracks
Fraction of tracks
2.0GeV/c<Pt(track)<15.0GeV/c
0.06
0.05
0.04
0.03
0.02
0.01
0
0 20 40 60 80 100 120 140 160 180 200
Width (ns)


COT superlayer 2
COT superlayer 4
COT superlayer 6
COT superlayer 8
Fraction of tracks
Number of hits
Data track in jet
Default MC track in jet
MC track embedded in data jet
Without hit efficiency correction
2.0GeV/c<Pt(track)<15.0GeV/c


COT superlayer 1
COT superlayer 3
COT superlayer 5
COT superlayer 7
Data track in jet
Default MC track in jet
MC track embedded in data jet
Without hit efficiency correction
2.0GeV/c<Pt(track)<15.0GeV/c
Fraction of tracks
Number of hits


COT all axial
Data
Default Monte Carlo
MC track embedded in data jet
Without hit efficiency correction
2.0GeV/c<Pt(track)<15.0GeV/c
Fraction of tracks
Number of hits


COT all stereo
Data
Default Monte Carlo
MC track embedded in data jet
Without hit efficiency correction
2.0GeV/c<Pt(track)<15.0GeV/c
Fraction of tracks
Number of hits

Plan

- Use 5.3.0
- Refine the track reconstruction criteria (χ^2 based on covariant error matrix of the track)
- Try hit efficiency, hit merging for MC
- Compare track multiplicity in MC and data