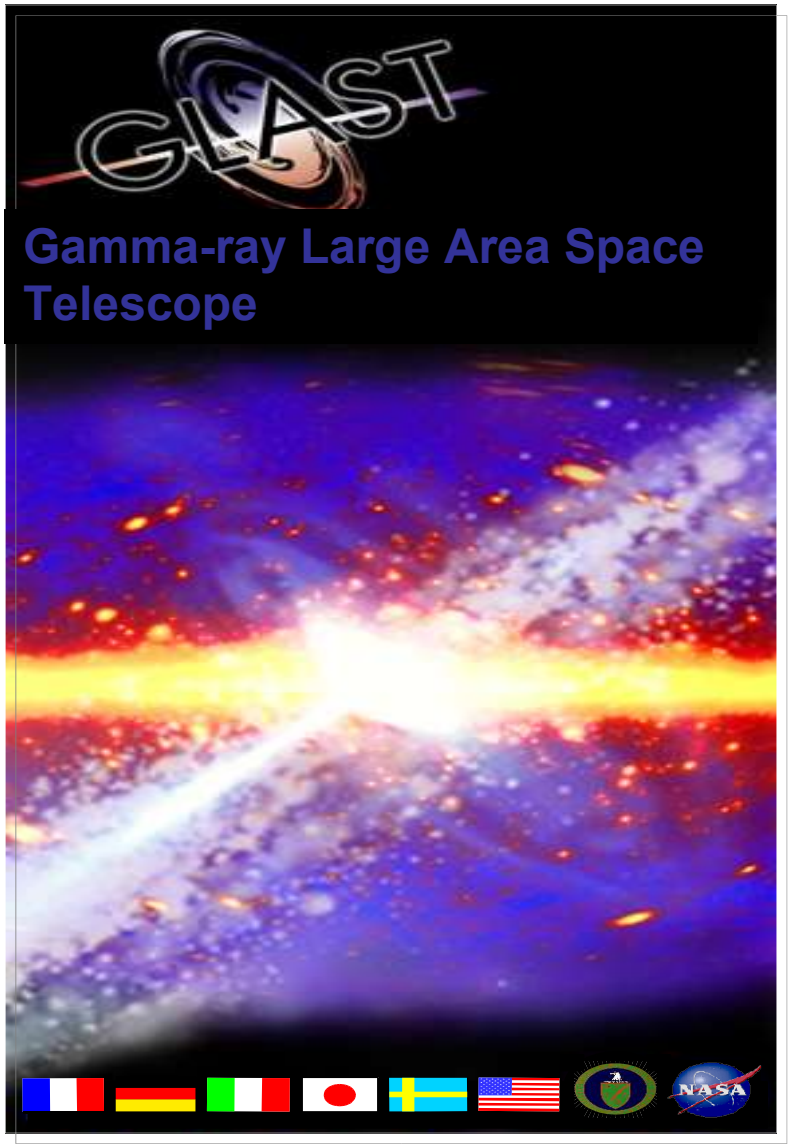


Study of the redudancy in the TKR readout: 2 towers analysis

Monica Brigida

Nico Giglietto

Silvia Rainò

INFN- Bari

Redudancy in the TKR readout

Outline

- Data samples: 2 towers runs
- Event Selection
- Hit maps per layer

Comparison of

- Angular distributions,
- Hit multiplicity and ToTs

for runs readout by

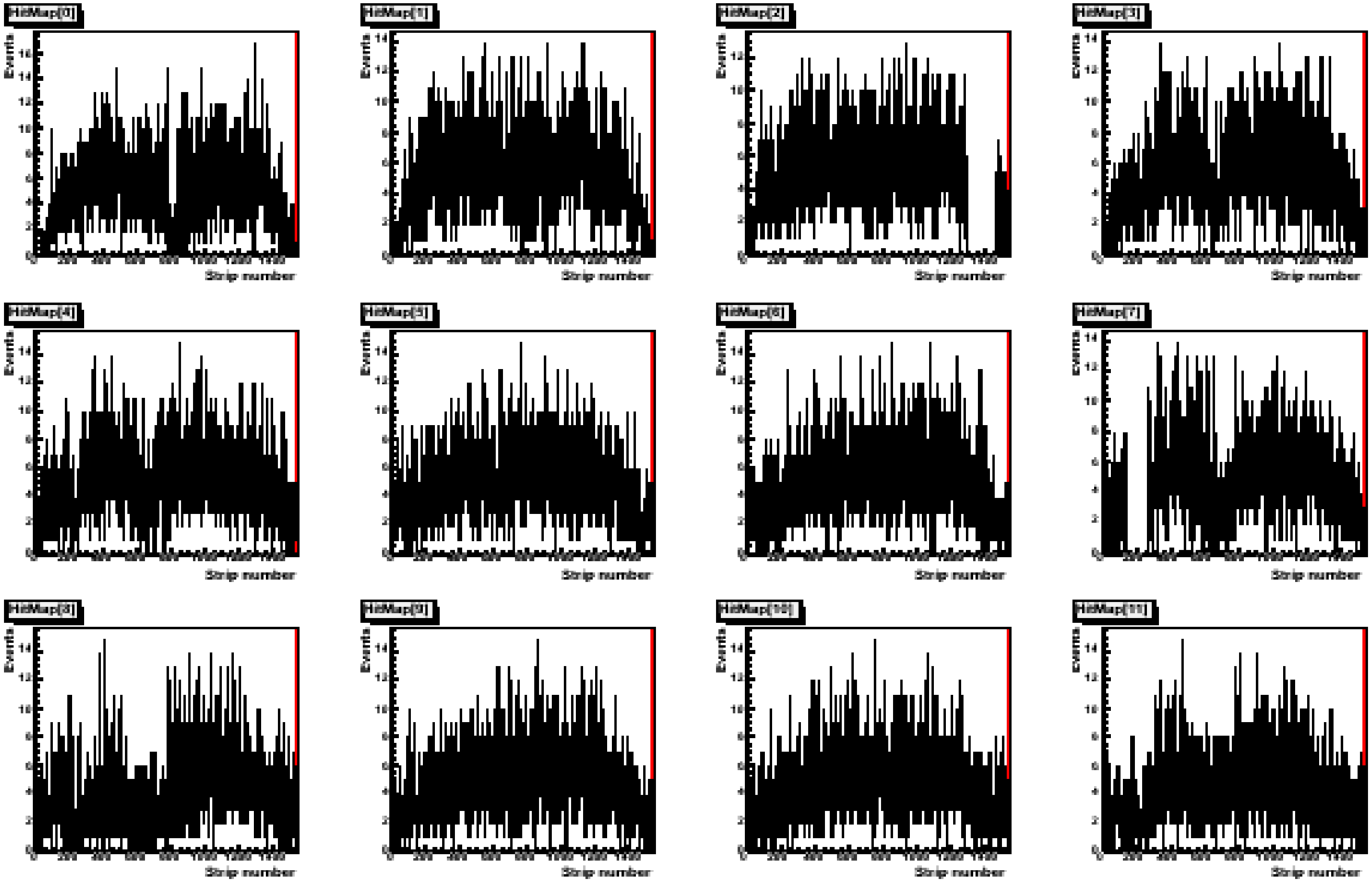
- LEFT/RIGHT cables only with those read out from both cables
- Conclusions

Data samples: 2 towers configuration

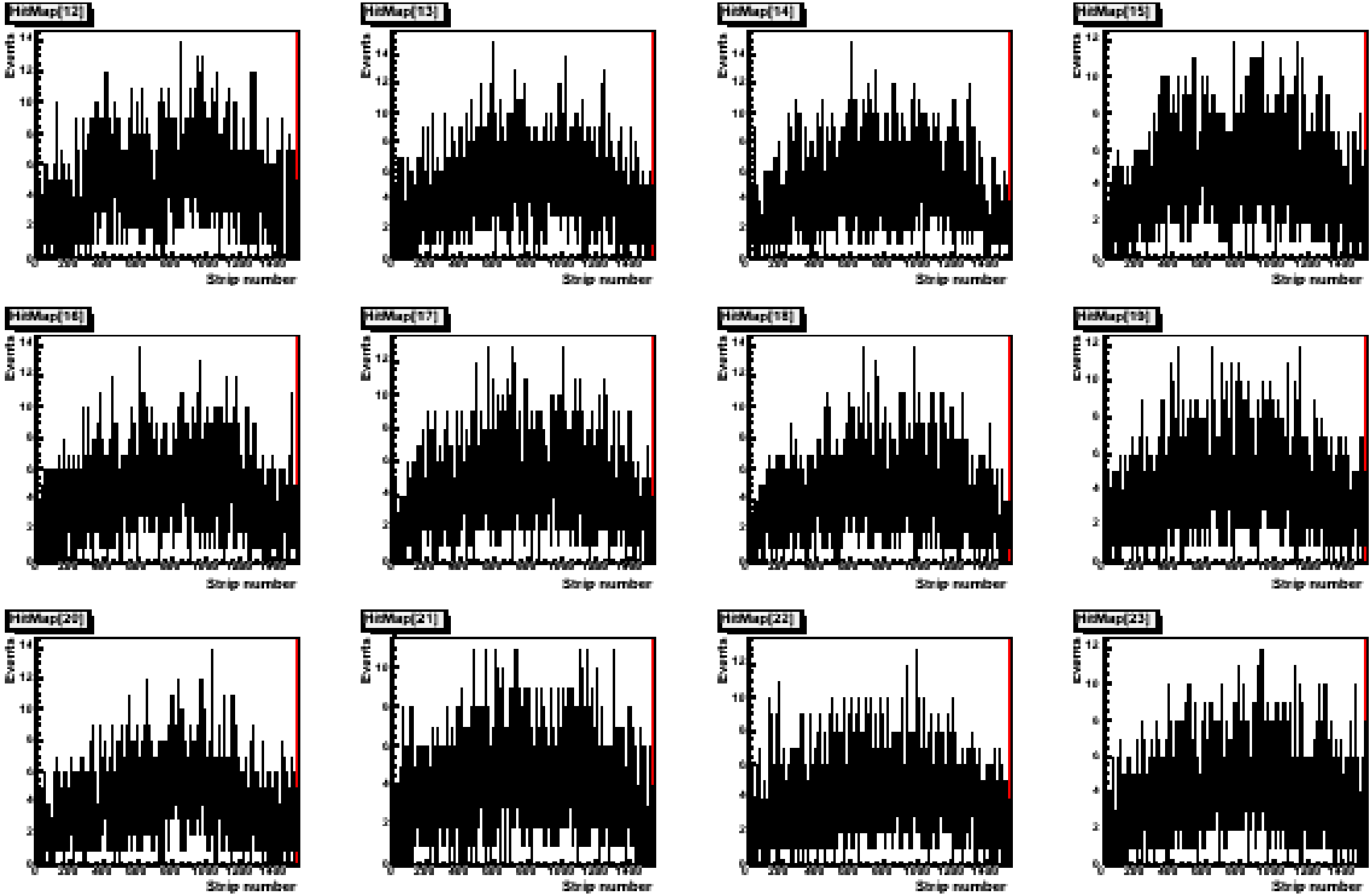
Runs analyzed:

- 135002057 (right run);
- 135002103 (left run);
- 135002052 (baseline run – both cables readout)

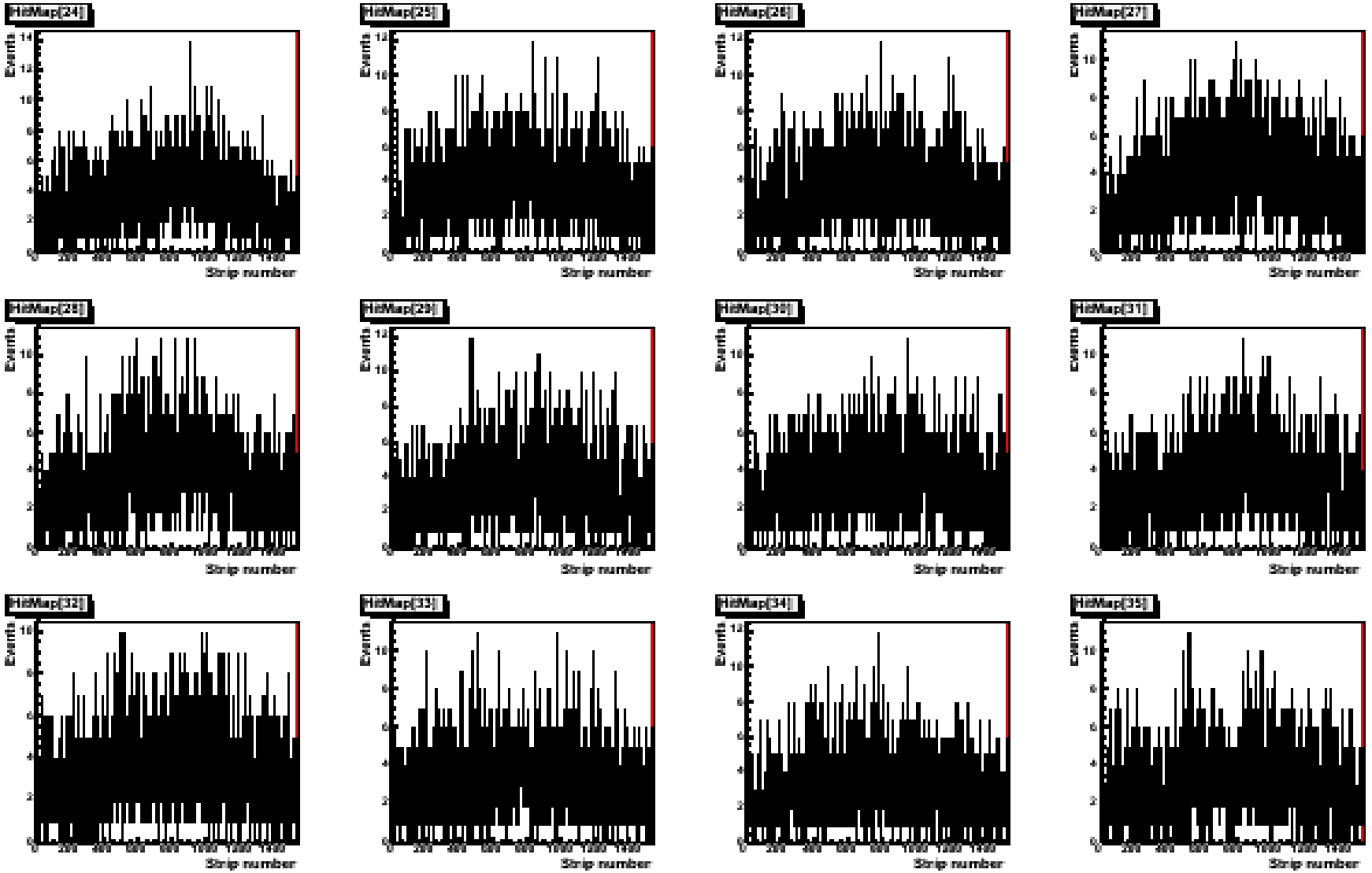
Hit maps (bottom - Tower 0)



Hit maps (centre – Tower 0)



Hit maps (top - Tower 0)



Event Selection

Events triggered by TKR in Tower0/Tower4

Cut1 = GemTkrVector[0/4] ==1 && GemTkrVector[4/0] ==0

and trigger from 3 consecutive layers:

Cut2 =Cut1 && GemCondWord ==2 (50% of events selected)

Single muon tracks in the TKR:

Cut3 = Cut1 && TkrNumTracks == 1 (40% of events selected)

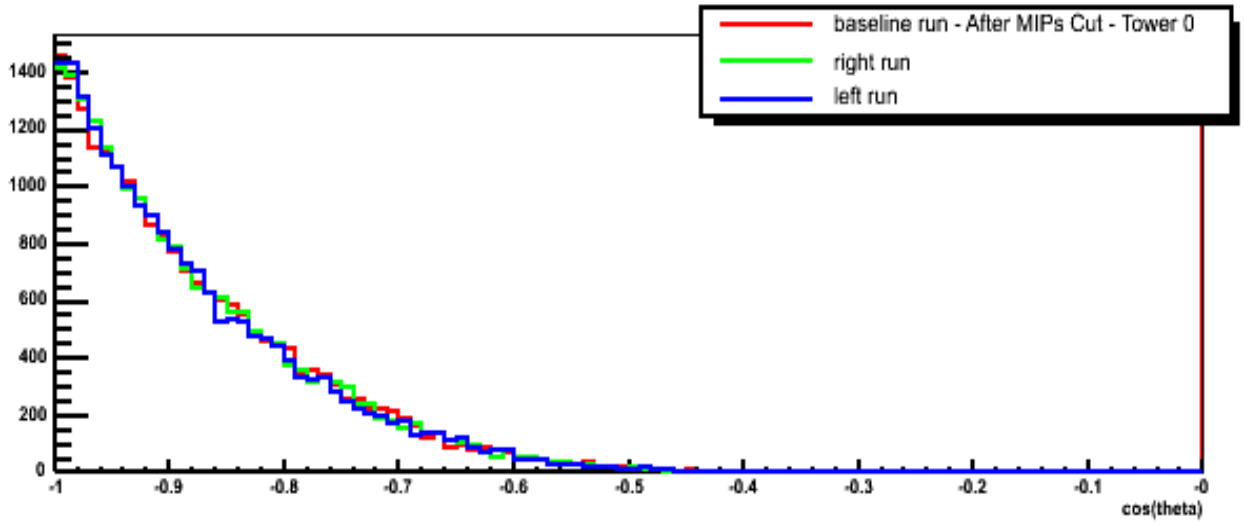
To select MIPs we used the CalMIPRatio variable

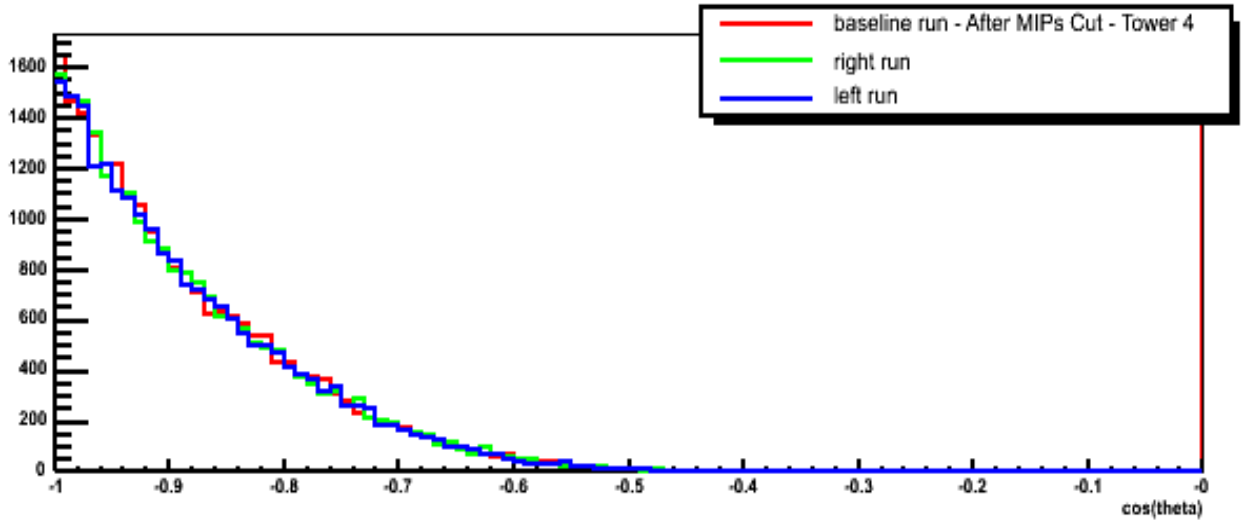
Cut4 = Cut2 && (CalMIPRatio <1.3 && CalMIPRatio >0.6)
&& CalNumHit[4]==0 (10% of events selected)

Normal tracks selected

Cut5 = Cut3 && VtxZDir < -0.95 (3% of events selected)

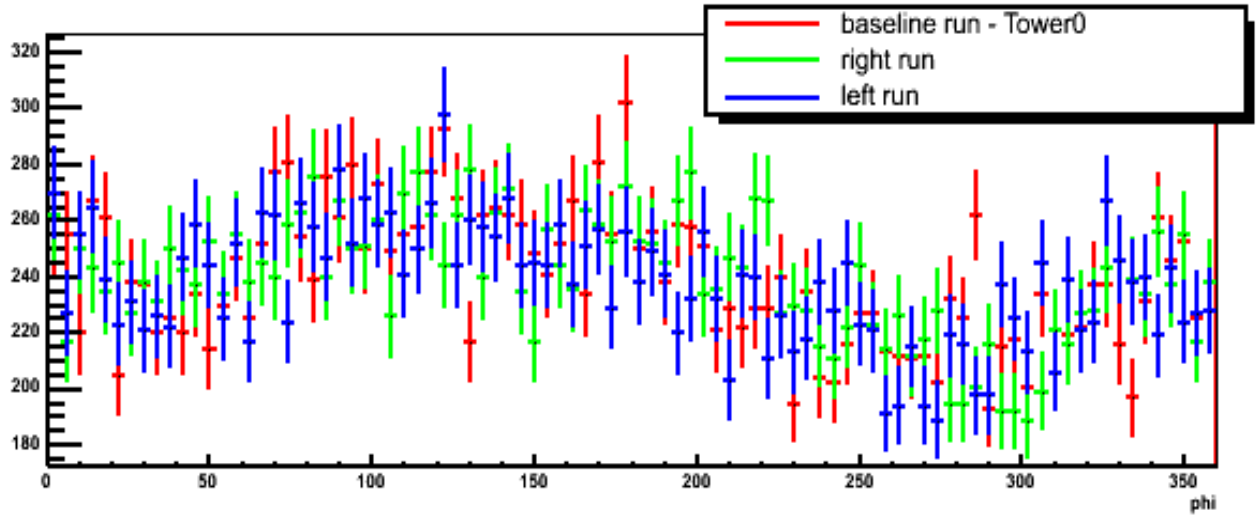
Arrival directions: events vs cos(θ)

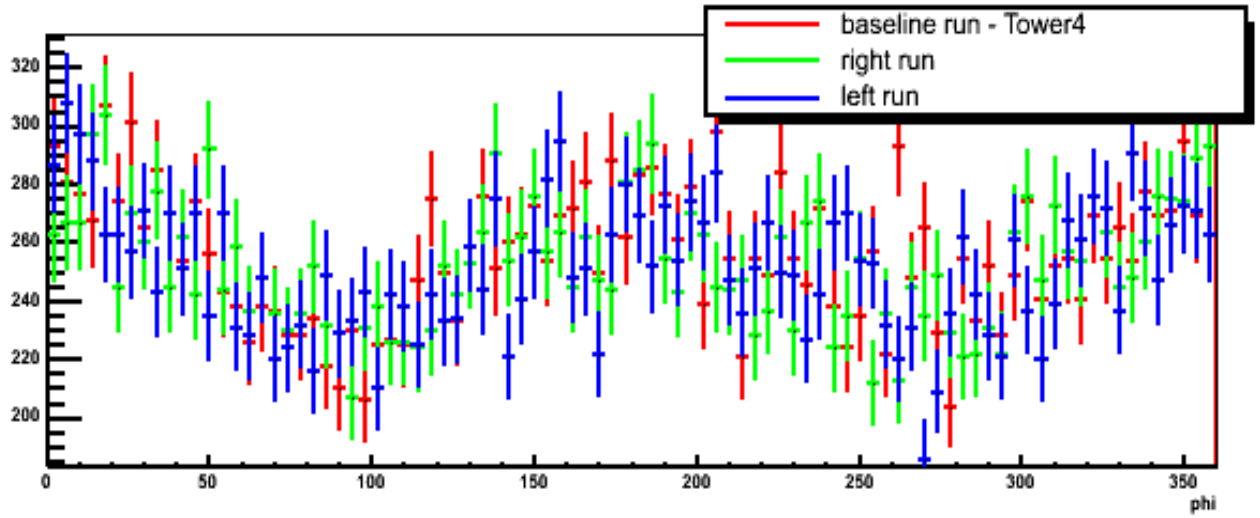




No significant differences between baseline, left and right cables readout

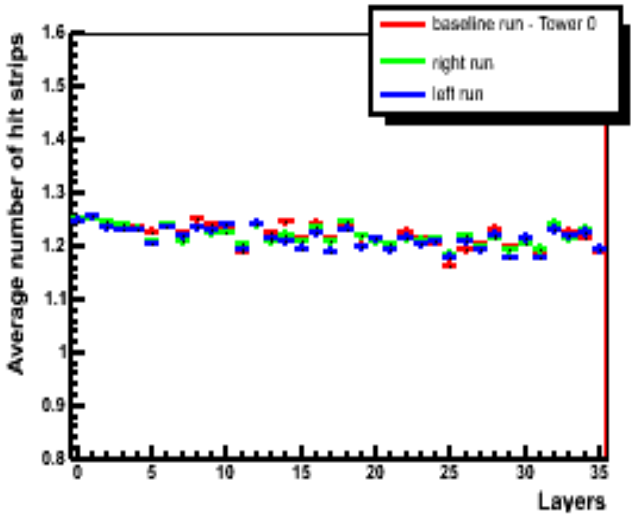
Arrival directions: events vs φ

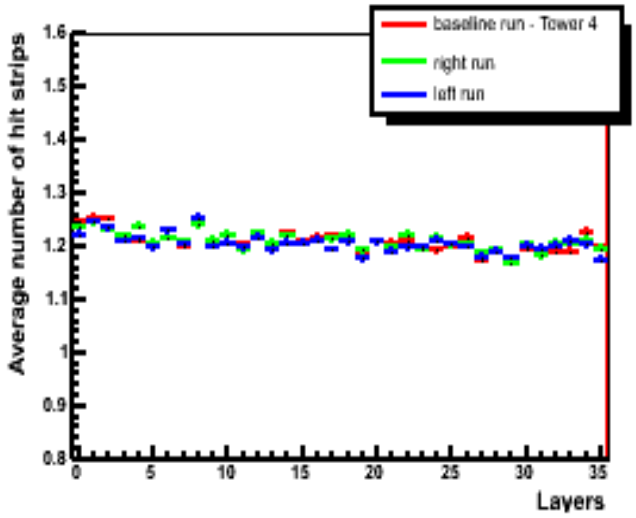


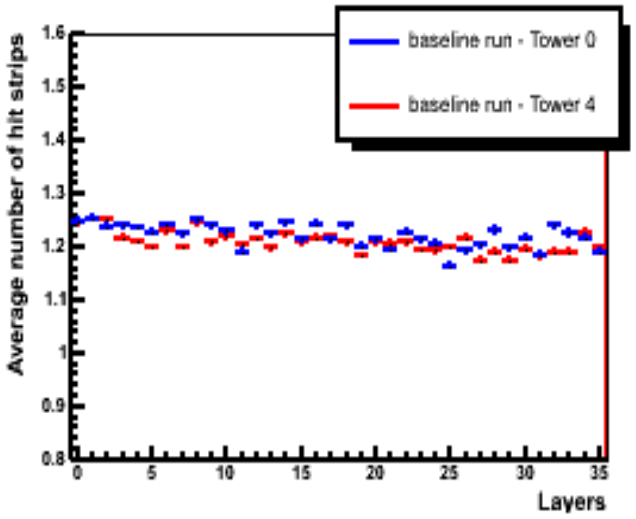


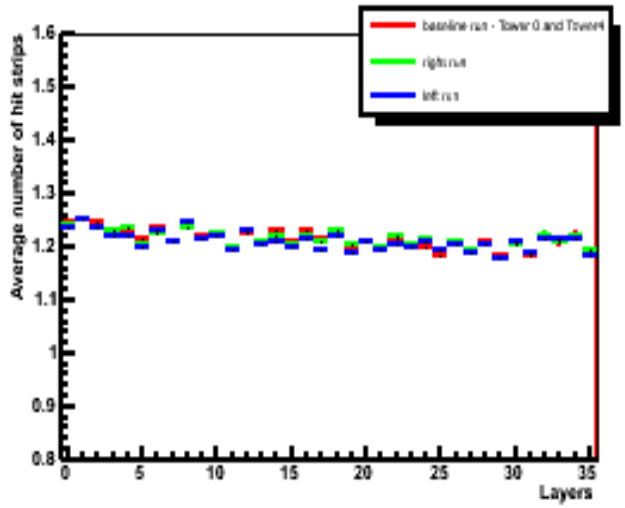
No significant differences between baseline, left and right cables readout

Hit Strip Multiplicity



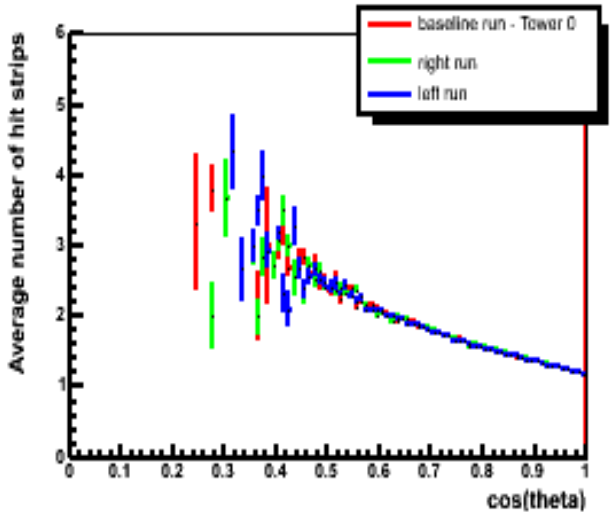


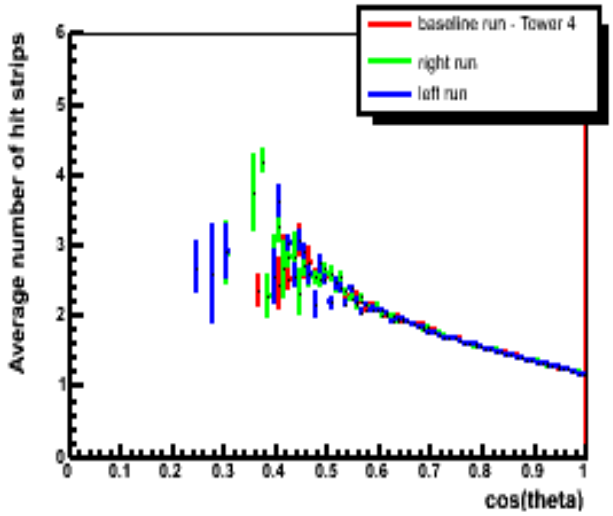


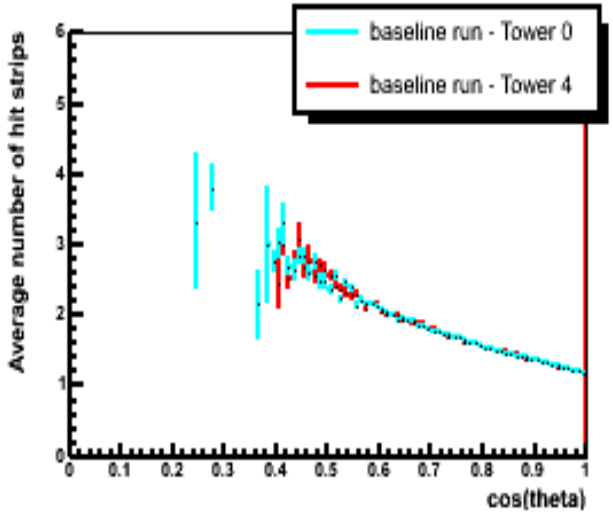


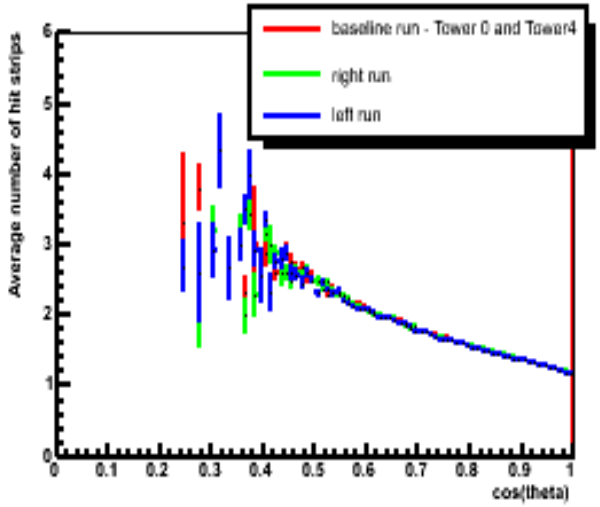
No significant differences between baseline, left and right cables readout

Hit strip multiplicity vs cos(θ)



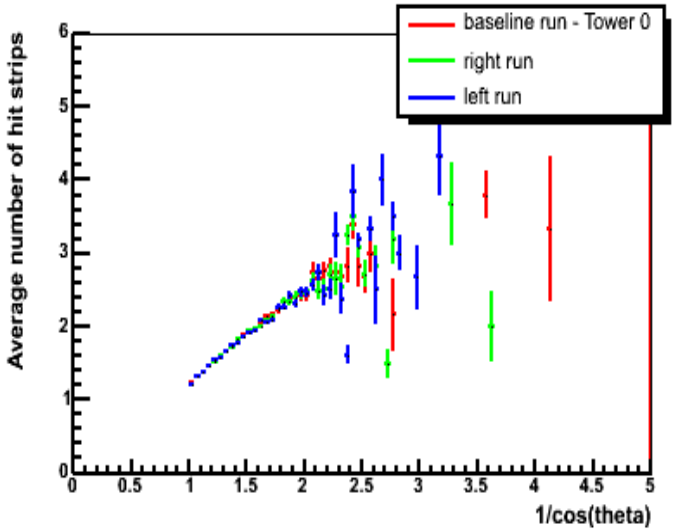


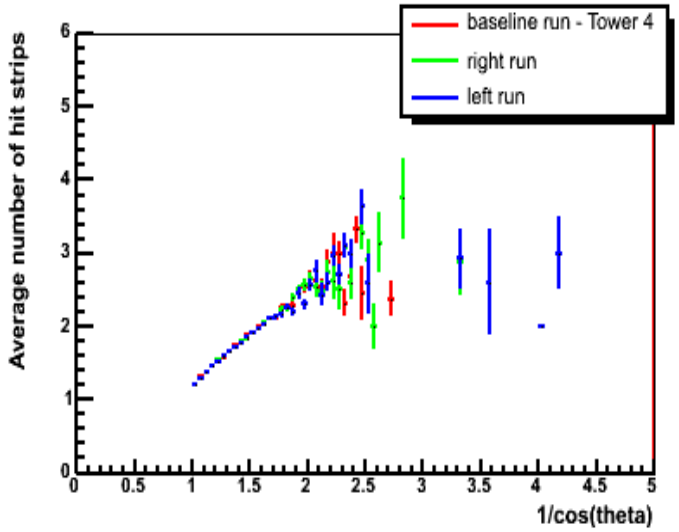




The strip multiplicity is minimum for vertical tracks and increases with track length

Hit strips multipliciy vs 1/cos(θ)

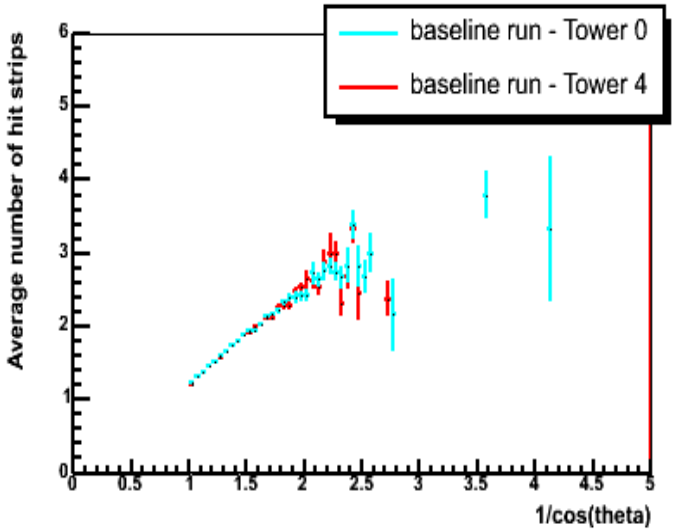


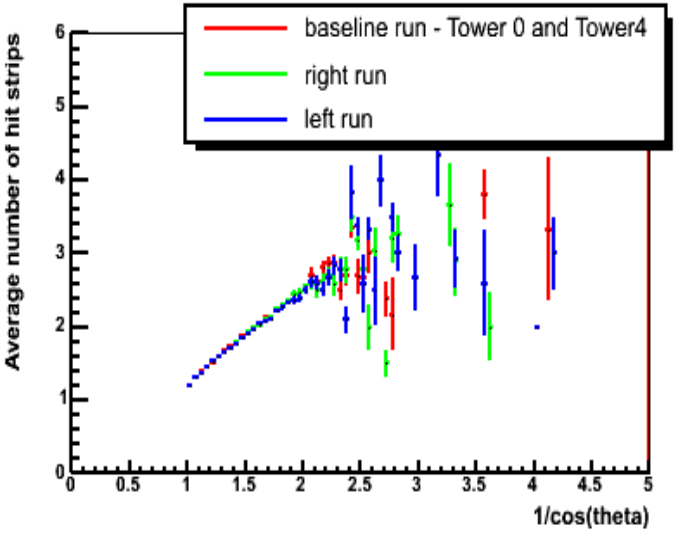


The hit strips multiplicity

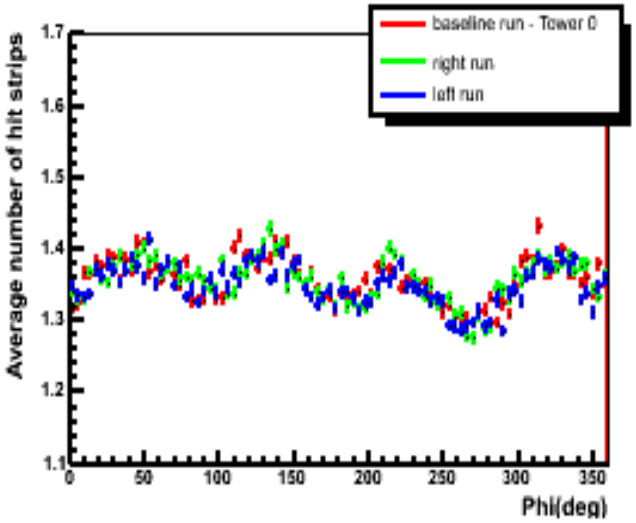
increases

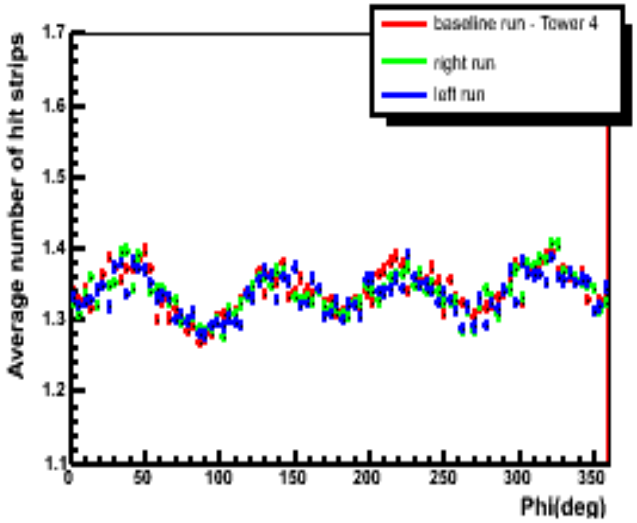
linearly with 1/cosθ



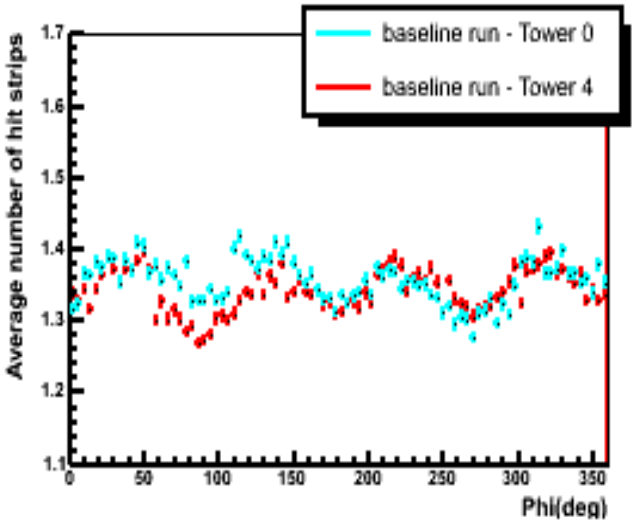


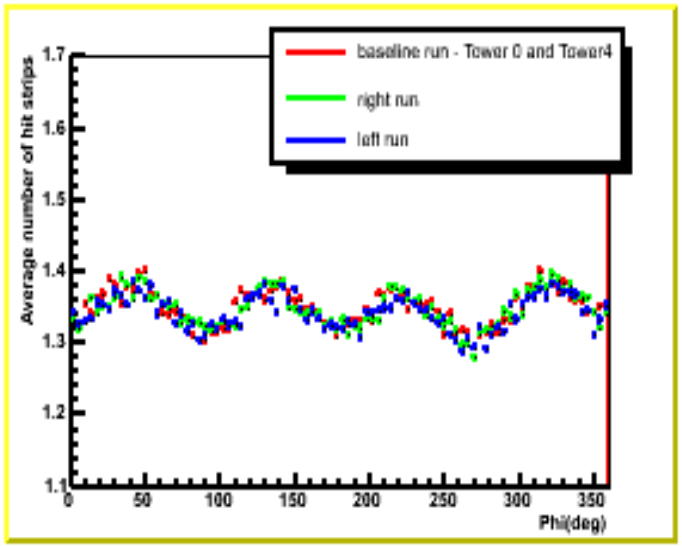
Hit strip multiplicity vs φ



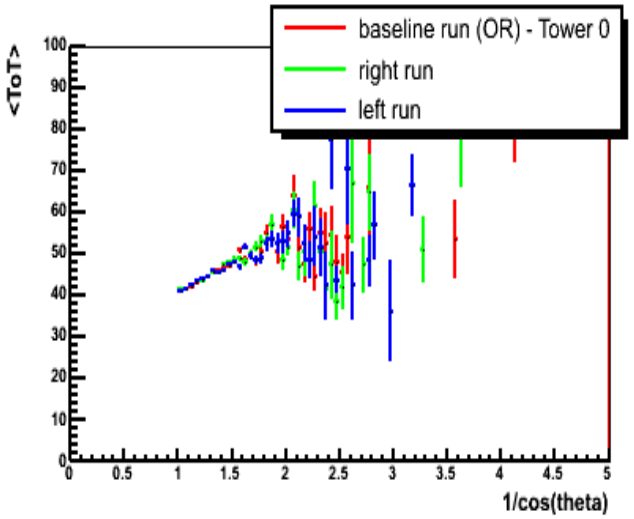


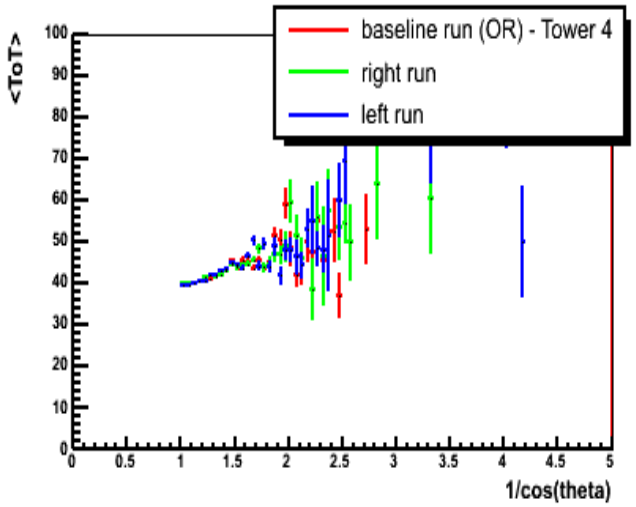
There is a difference between the hit multiplicity in Tower 0 and Tower 4, but the behavior is the same

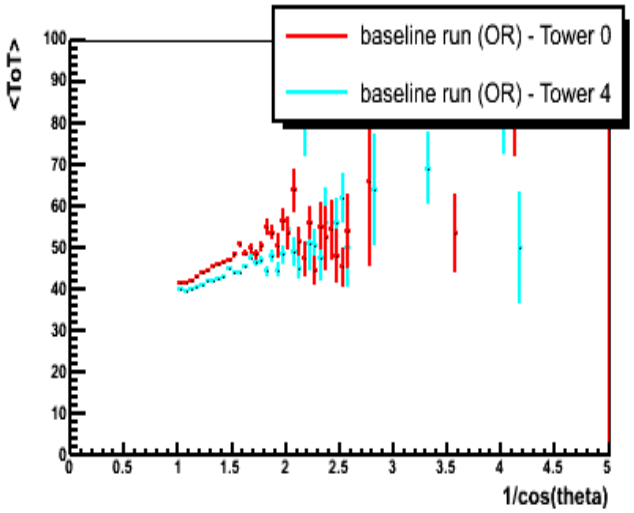


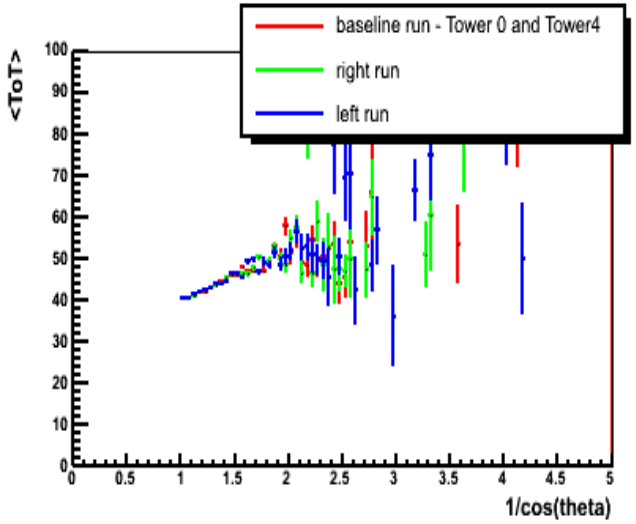


Average ToTs vs 1/cos(θ)





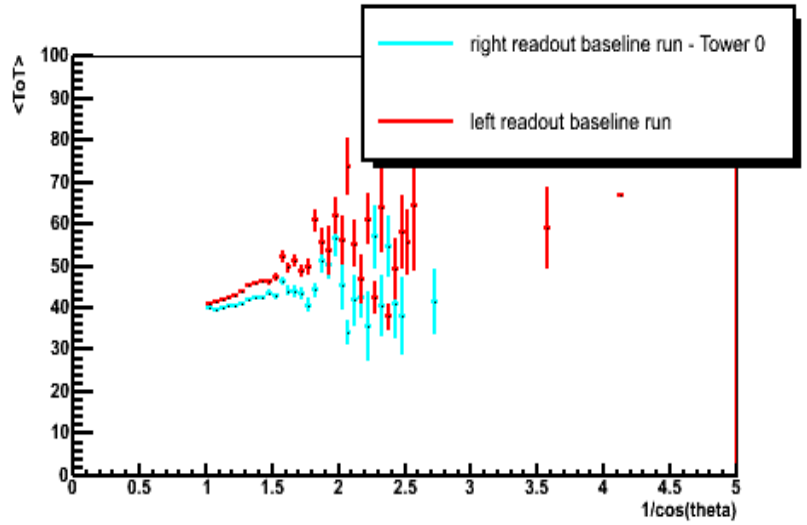


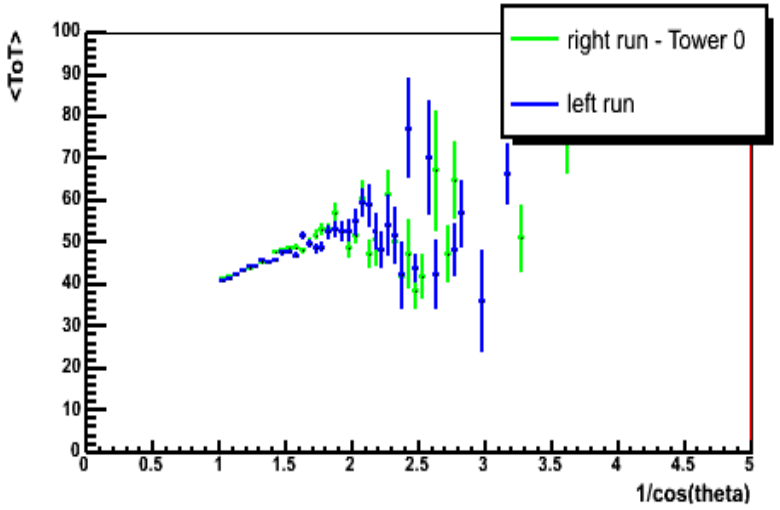


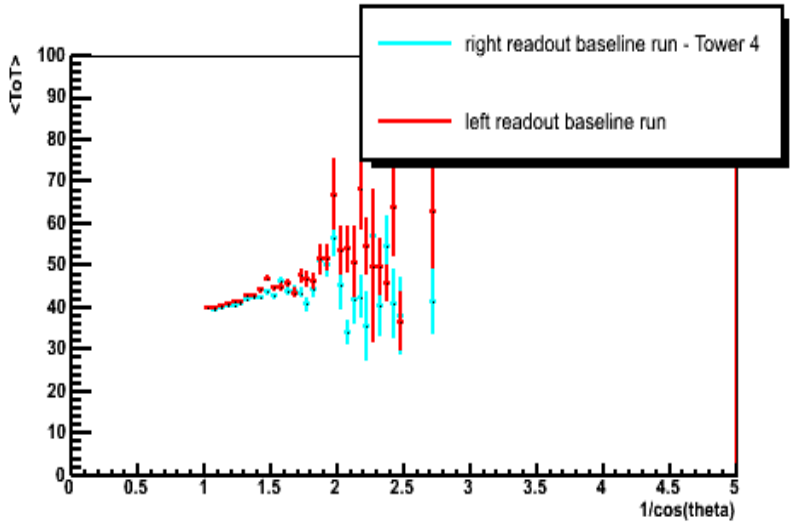
There is a difference between the ToT in Tower 0 and Tower 4, but the behavior is the same of hit strip multiplicity

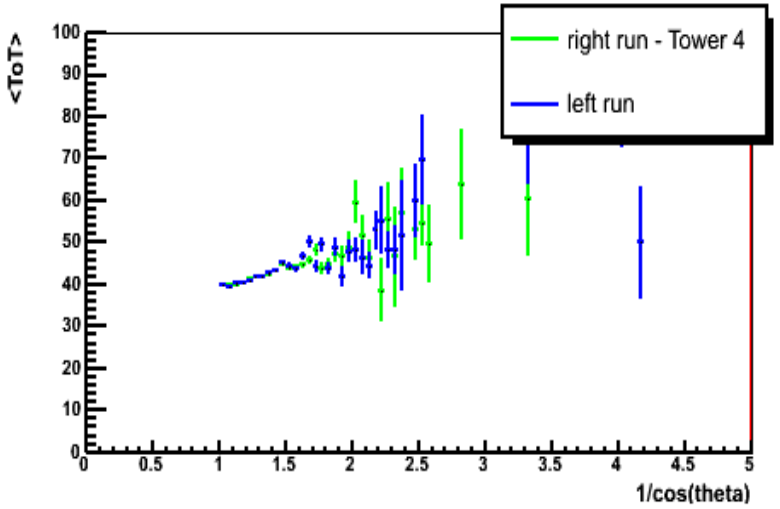
The ToT increases linearly with 1/cosθ as hit strip multiplicity

Average ToTs vs 1/cos(θ)

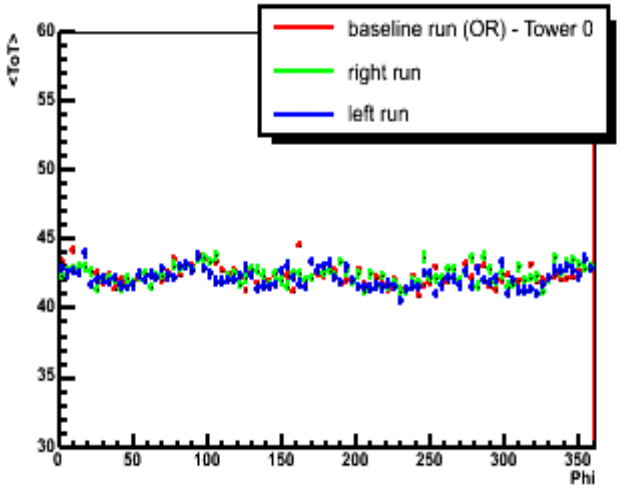


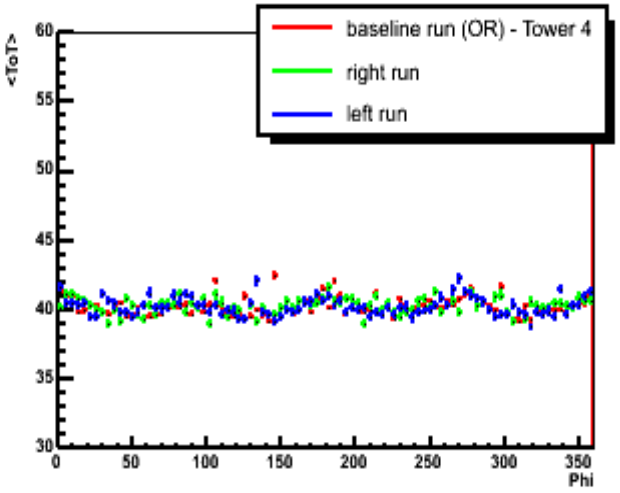


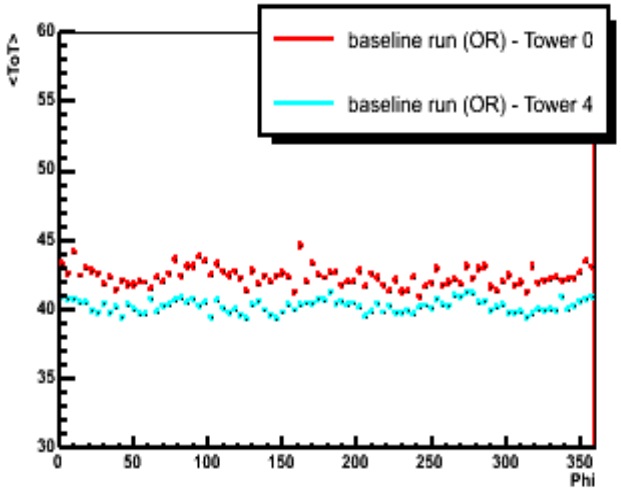


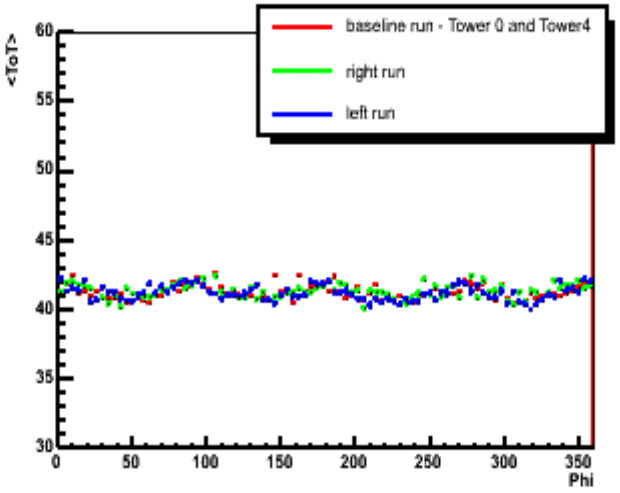


ToT vs φ



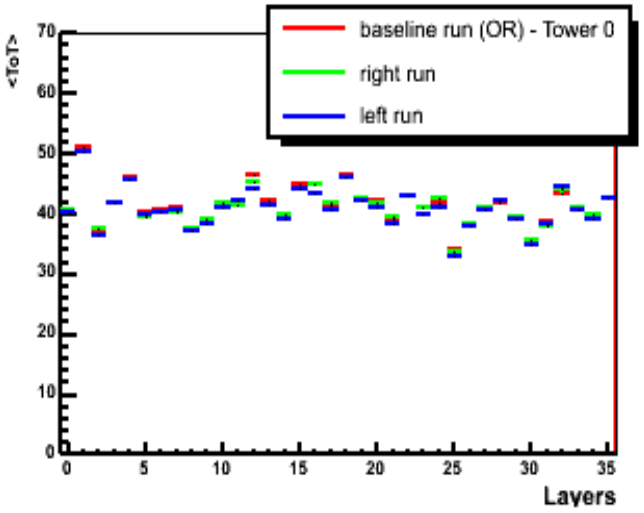


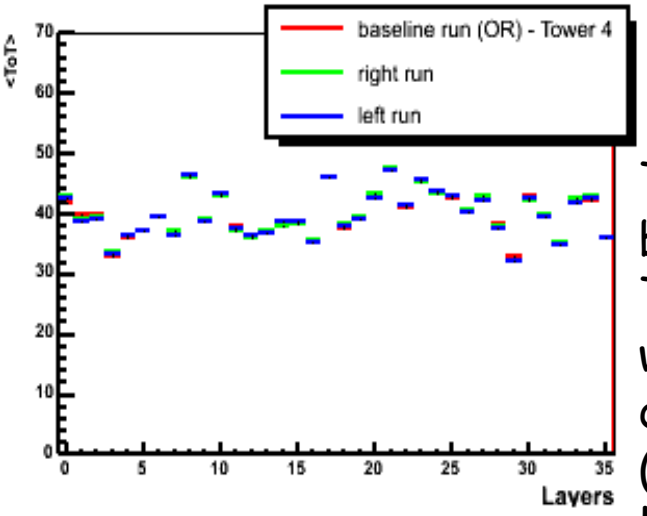




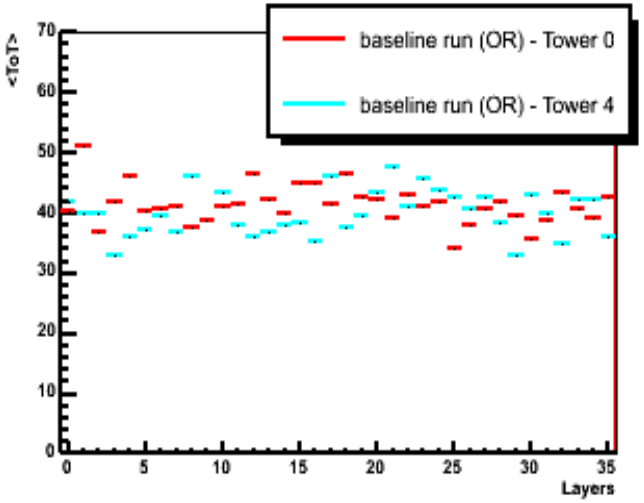
There is a difference between the <ToT> in Tower 0 and Tower 4 (baseline run)

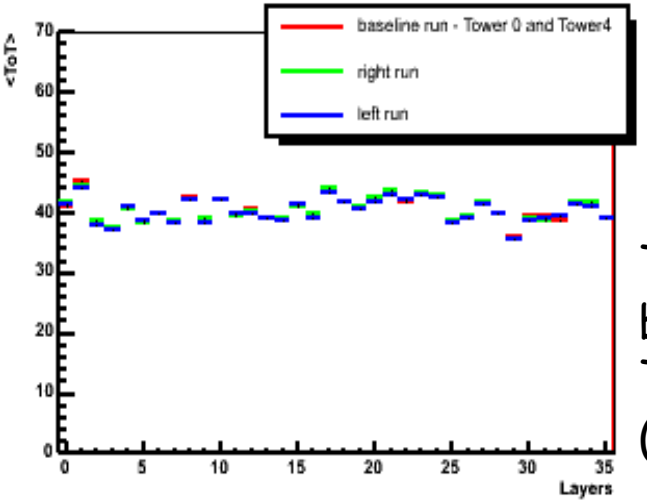
Average ToTs vs layers (1)





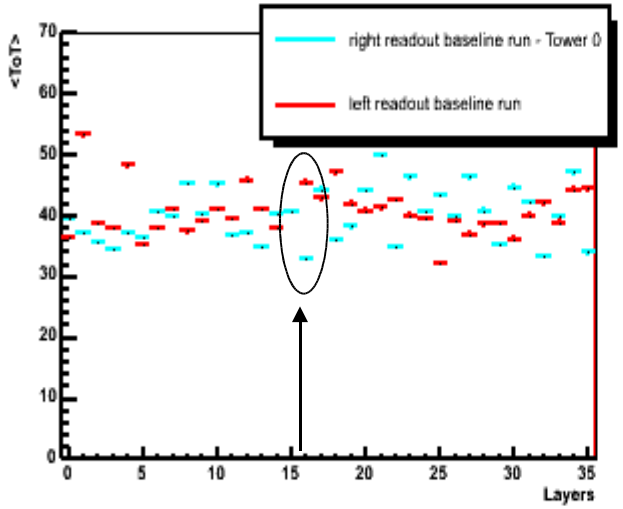
There is no difference between the <ToT> in Tower 0 and Tower 4 with TKR readout in different configuration (baseline run left-right run)

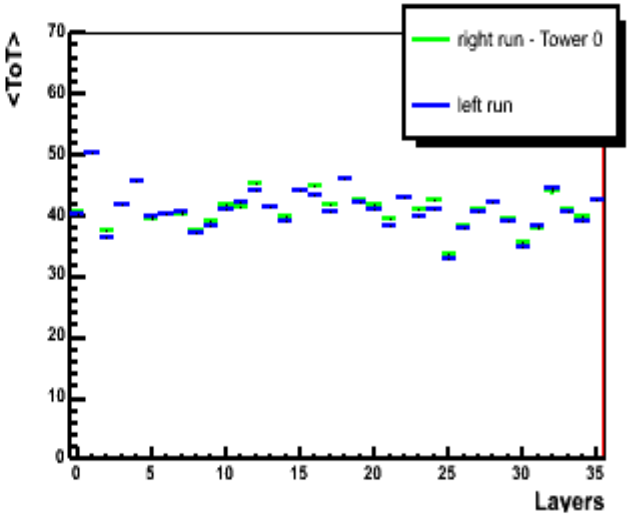




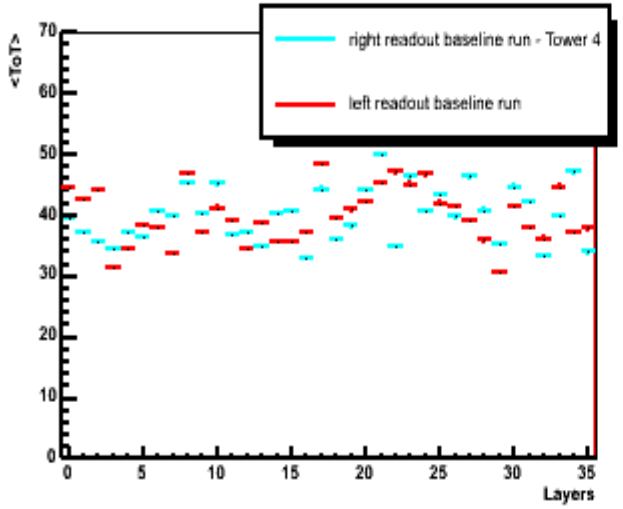
There is a difference between the <ToT> in Tower 0 and Tower 4 (baseline run)

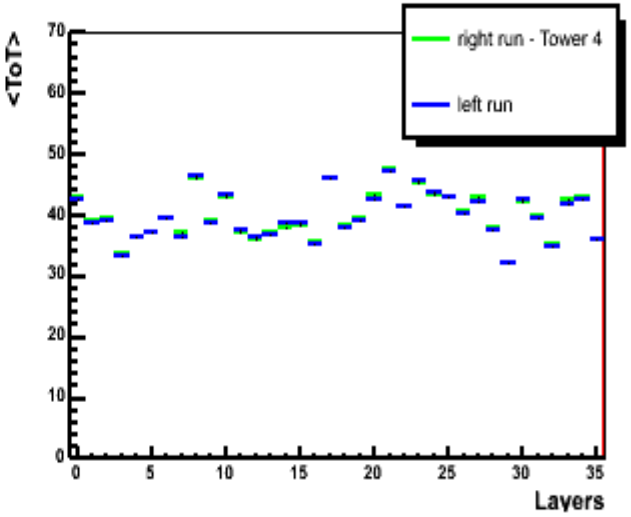
Average ToTs vs layers (2)





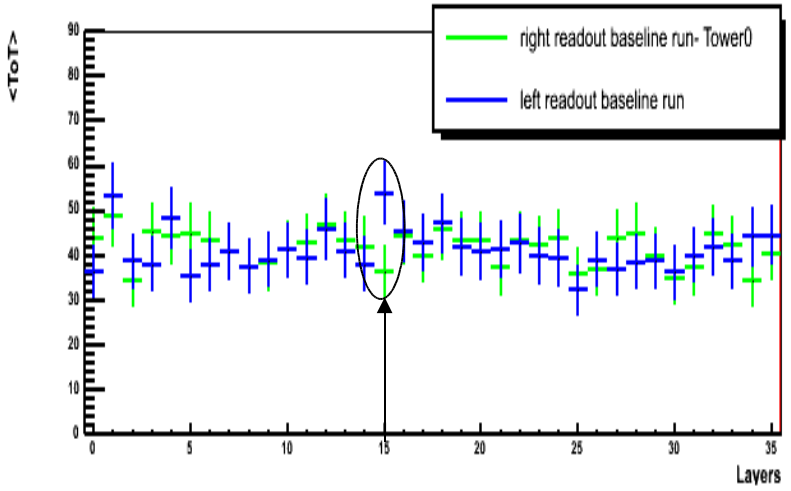
There is a difference between the <ToT> in Tower 0 Layer 15 when read out by left or right cables in baseline configuration.

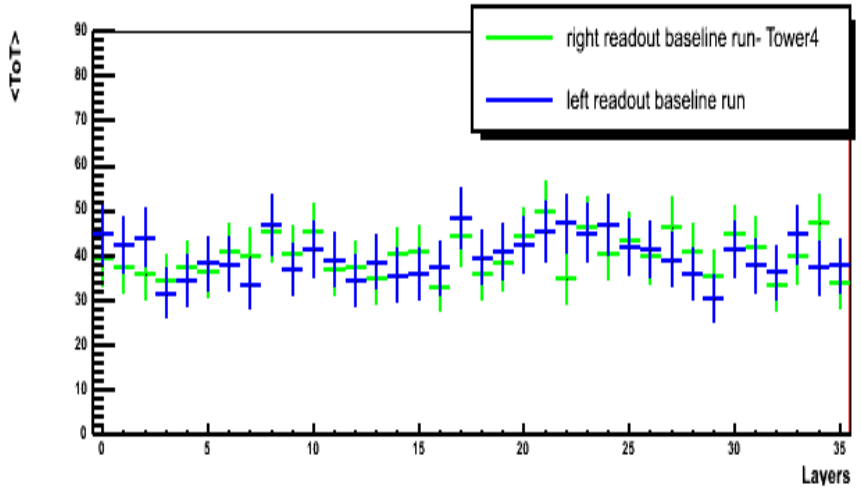


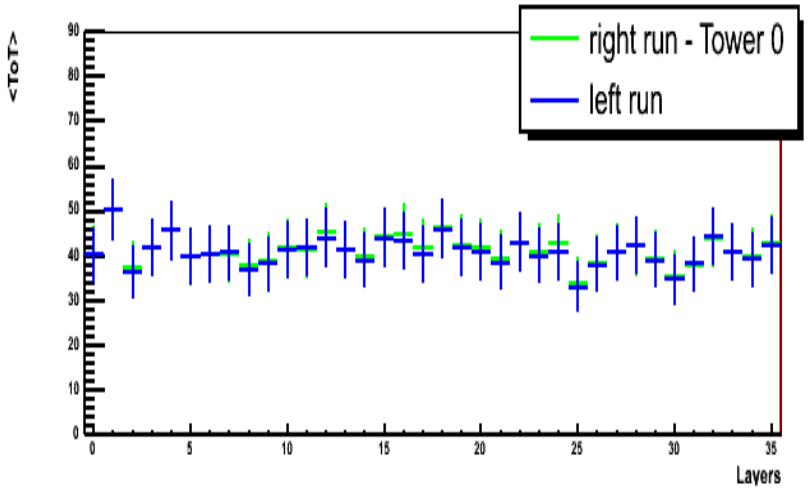


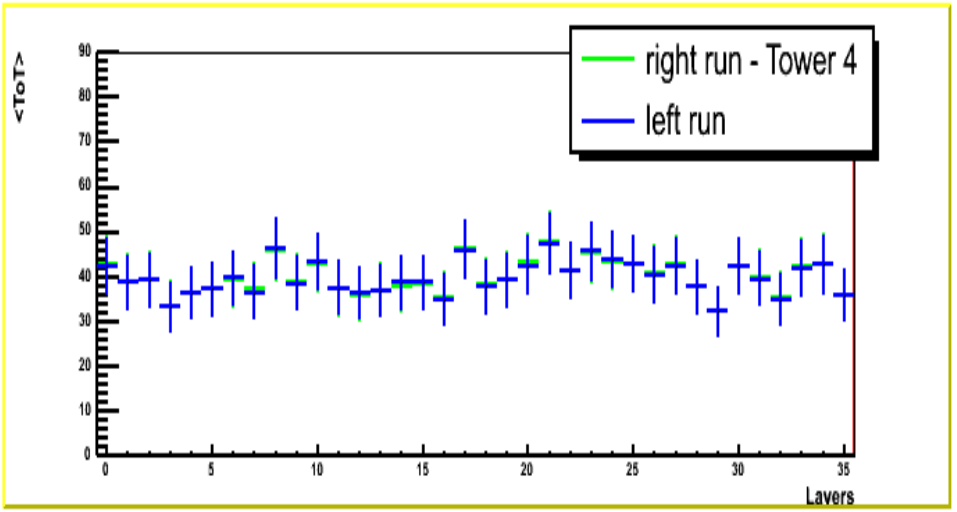
No difference when we use left or right readout, separately (left-right run)

Average ToTs vs layers (3)









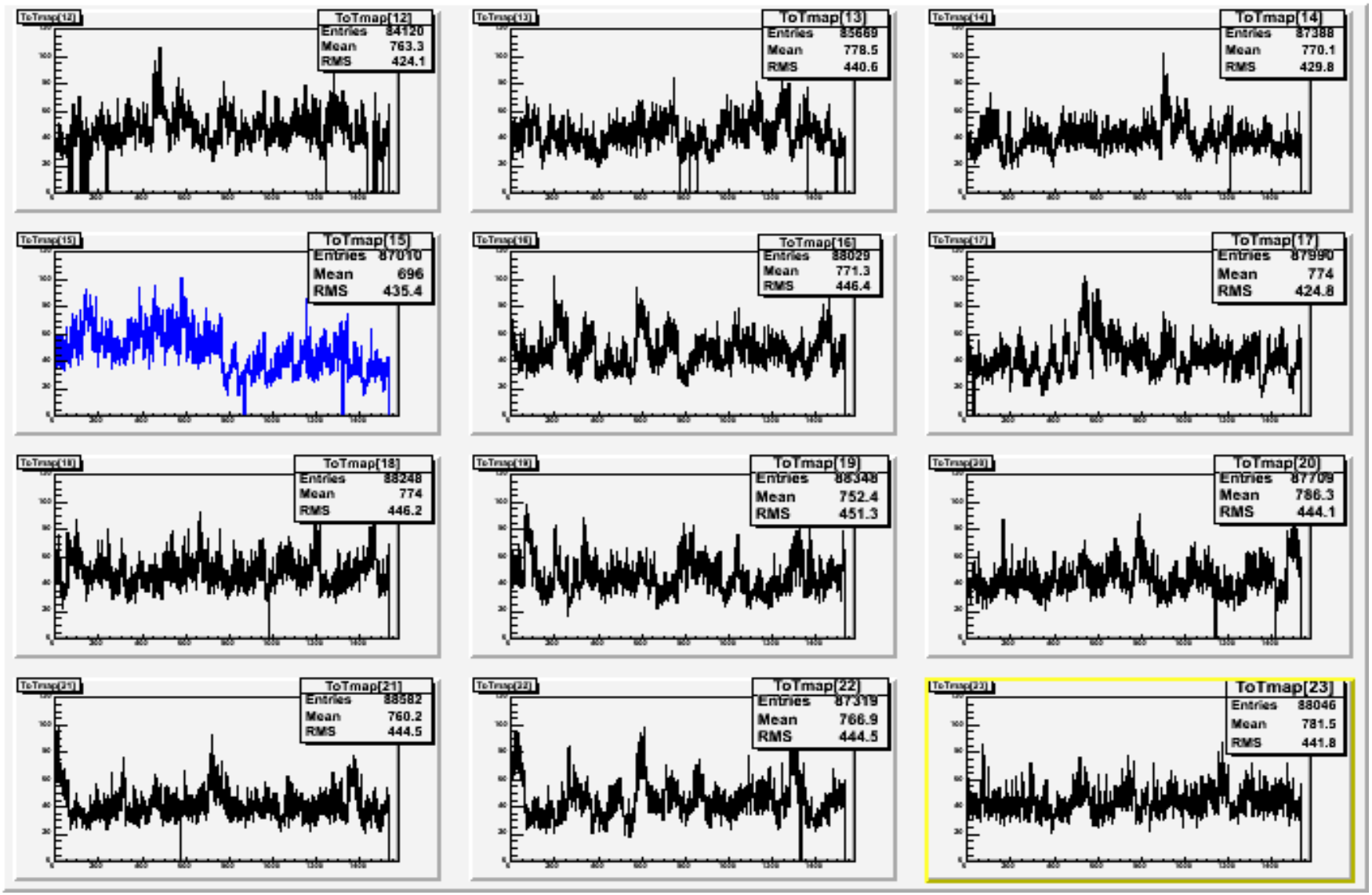
ToT selection

Single hit strips per layer

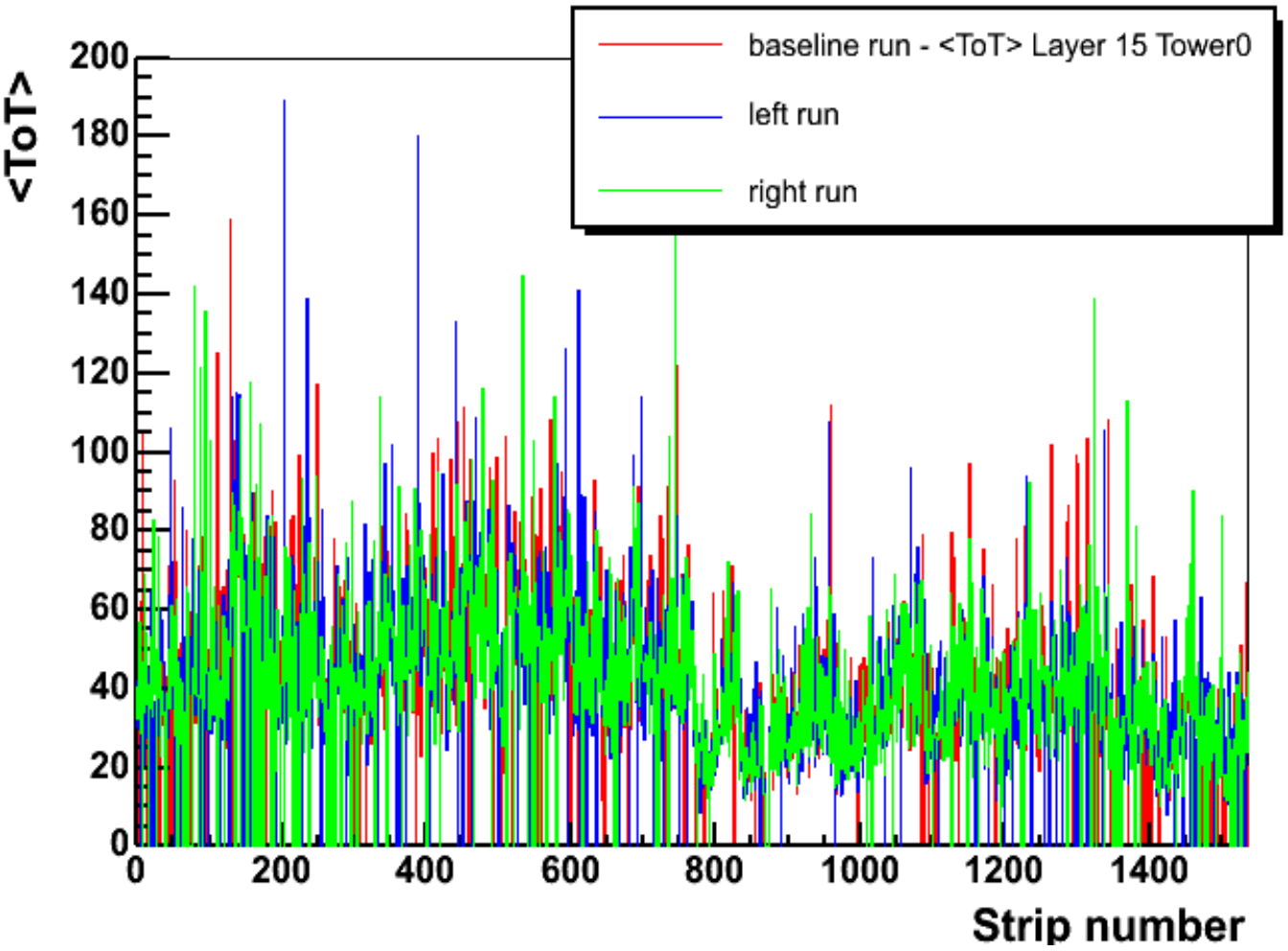
ToT value of the layer assigned to selected hit strips

We made an average ToT map (ToT vs strip) layer by layer

ToT map (central layers)



ToT map (Layer 15 Tower 0)



ToTs from the right side of the layer (strip 768-1535) seem to be lower than the left one

Conclusions

Angular distributions, hit multiplicity and ToT have been compared for different TKR readouts in the **2 towers configuration**

The results in the 2 tower configuration are the following:

- The Hit multiplicity and ToT depend **linearly** on **$1/\cos\theta$** (track length)
- ToT needs to be calibrated
- MC comparison: work in progress