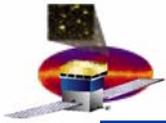


Study of the ToT for Triggering and Track Layers: 4 towers analysis

Francesco Loparco

Nicola Mazziotta

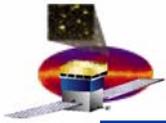
INFN - Bari



ToT in Triggering and Track Layers

Summary

- ✓ *Event Selection and Definitions*
- ✓ *Data samples: 4 towers runs*
- ✓ *Study of the **ToT** as a function of θ (\rightarrow track length in the SSD)*
- ✓ *Study of the **ToT** as a function of the ratio between **track length** and **projected track length***
 - ✓ *Comparison between **X-view** and **Y-view** Layers*
- ✓ *Conclusions*
- ✓ *Some questions...*



Event Selection and Definitions

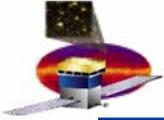
Event Selection:

- Trigger from 3 consecutive layers: ***GemConditionWord = 2***
- Single tower events: ***GemTkrVector[tower] ≠ 0 for only one tower***
- Single muon tracks in the TKR: ***TkrNumTracks=1***

Triggering Layers = Layers in both views from ***GltLayer*** (First Triggering Layer) to ***GltLayer+2*** (Last Triggering Layer)

Track Layers = Layers in both views from ***Tkr1FirstLayer*** (First layer in the track) to ***Tkr1LastLayer*** (Last layer in the track)

$$ToT = \begin{cases} 0 & \text{if both left and right ToT} = 0 \text{ or NA} \\ \text{left ToT} & \text{if right ToT} = 0 \text{ or NA} \\ \text{right ToT} & \text{if left ToT} = 0 \text{ or NA} \\ \text{left and right ToTs} & \text{if both left and right ToTs} > 0 \end{cases}$$



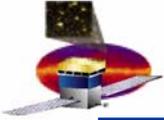
Data samples

Runs analyzed:

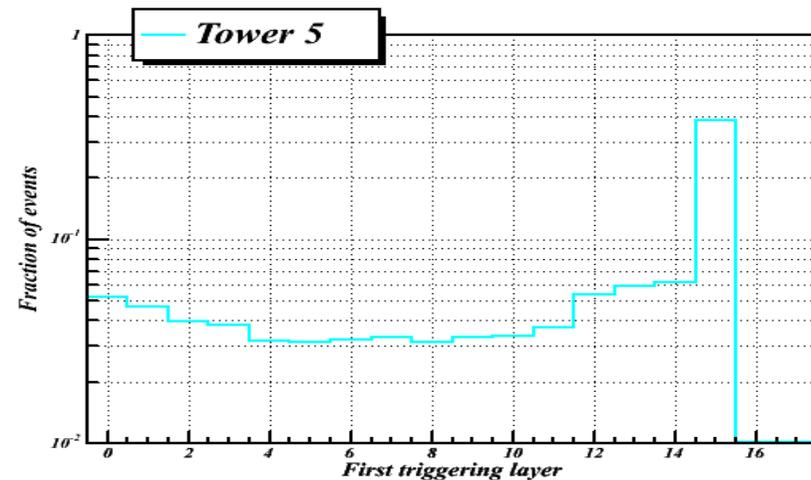
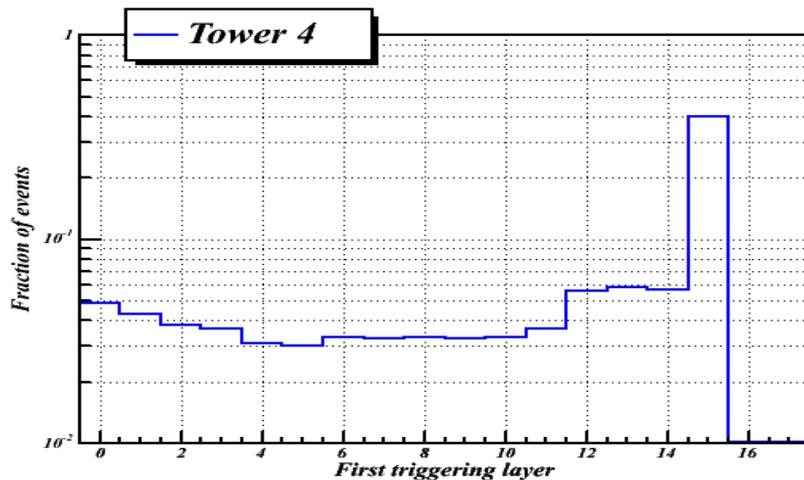
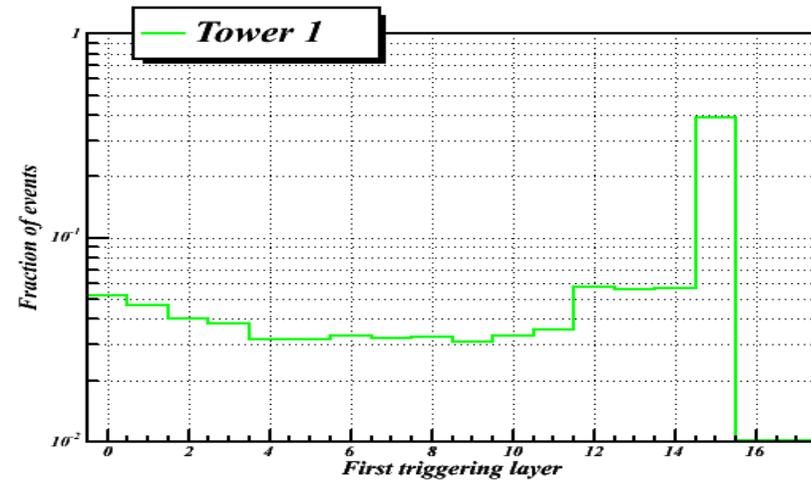
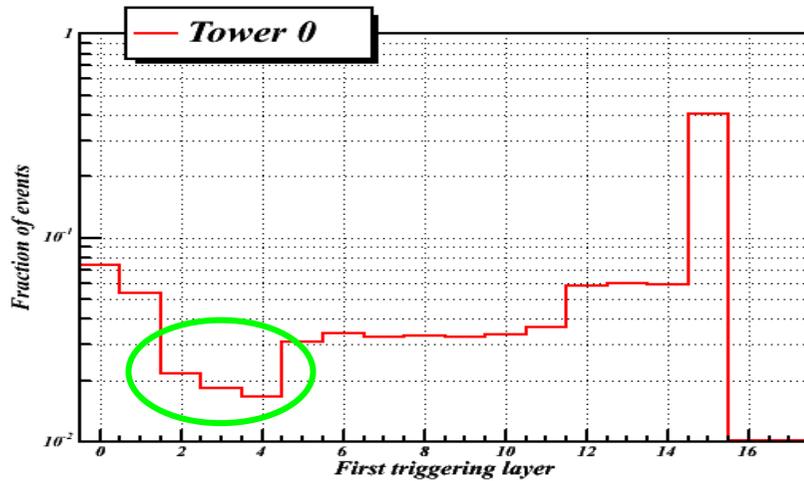
- *135002498; 135002499; 135002500; 135002501*

Events:

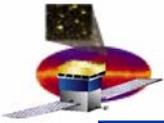
- *TWR0: 91076 tracks*
- *TWR1: 86827 tracks*
- *TWR4: 94814 tracks*
- *TWR5: 85635 tracks*



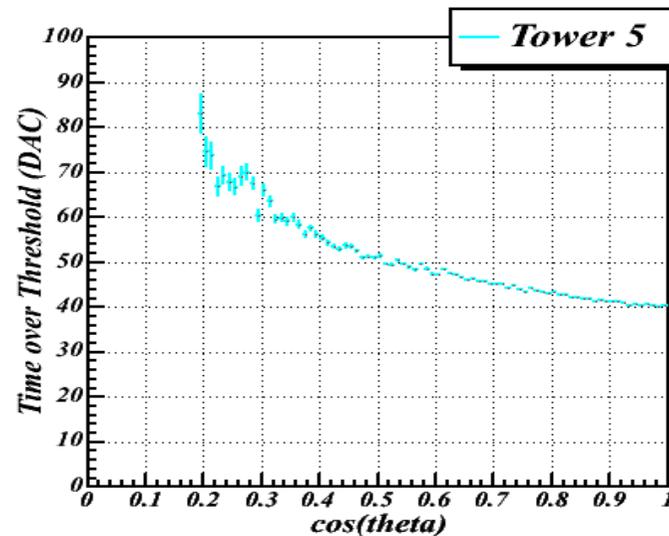
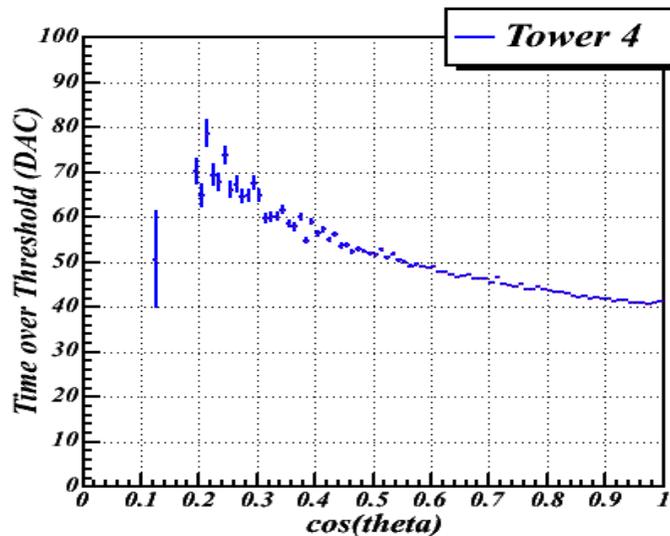
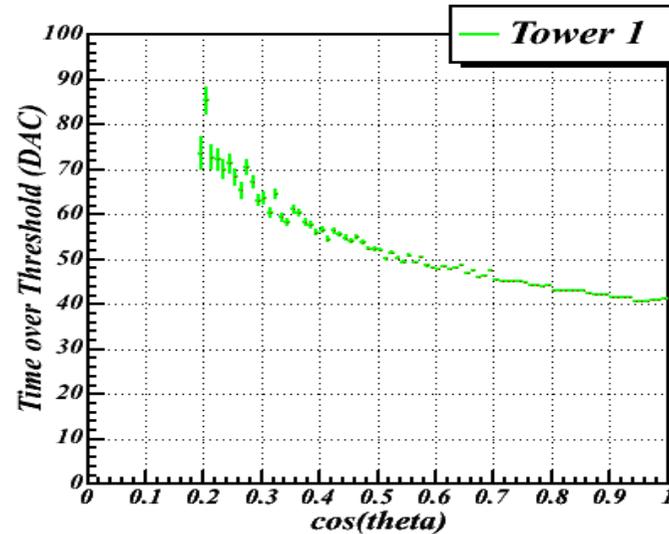
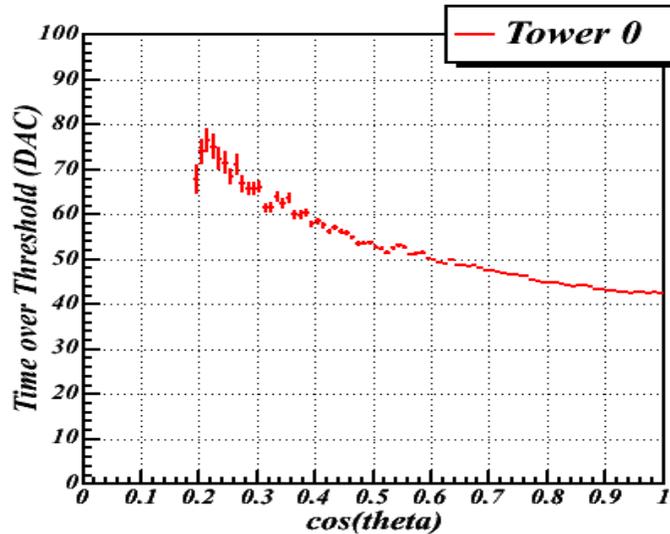
Triggering Layers



- 40% of events are triggering the 3 top layers (17,16,15)
- In TWR0 there is a deficit of events in layers 4,3,2 → **problems in layer 4**

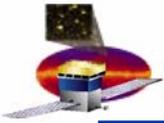


ToT vs $\cos\theta$ (Track Layers)

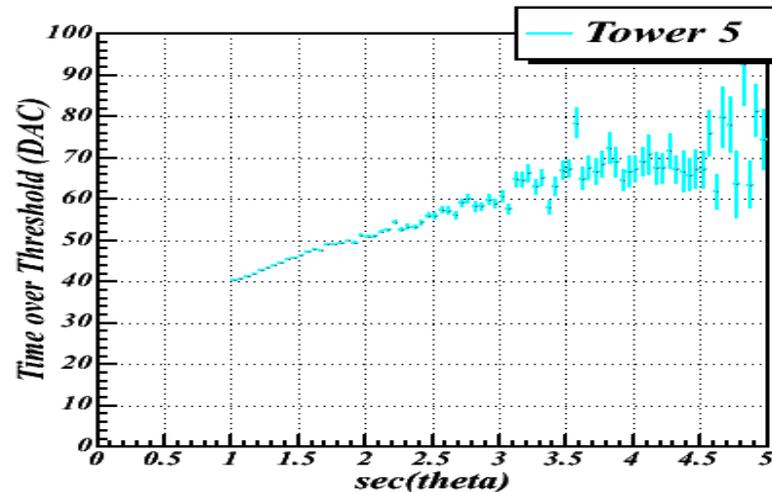
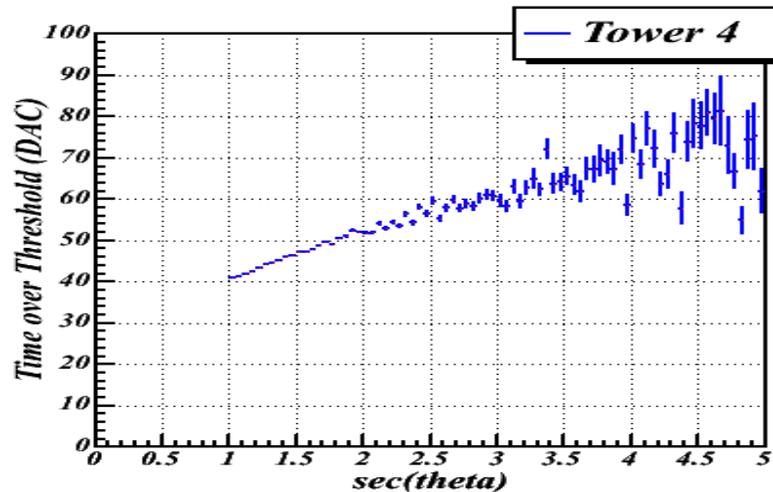
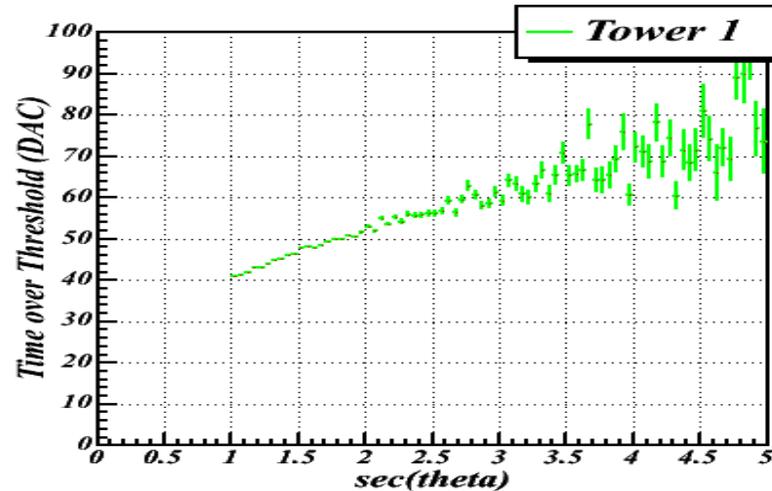
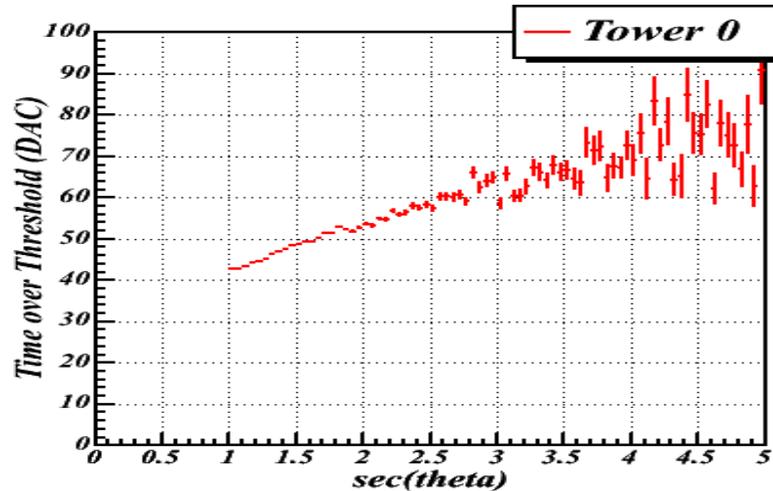


➤ The ToT is **minimum** for vertical tracks and **increases** with track length

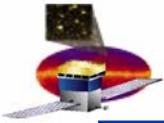
➤ The dependence on $\cos\theta$ is the **same** for all towers



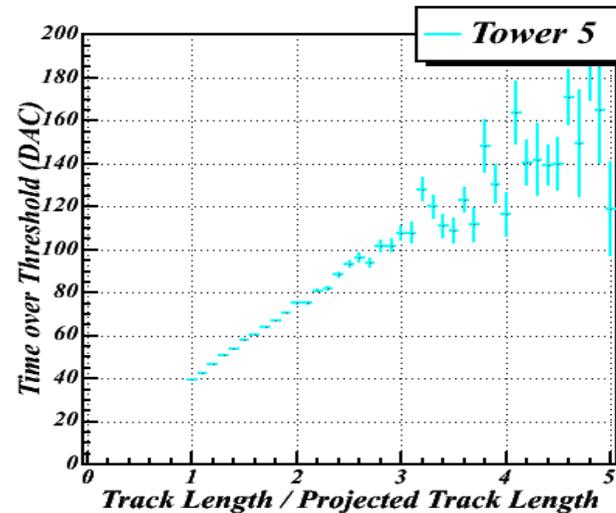
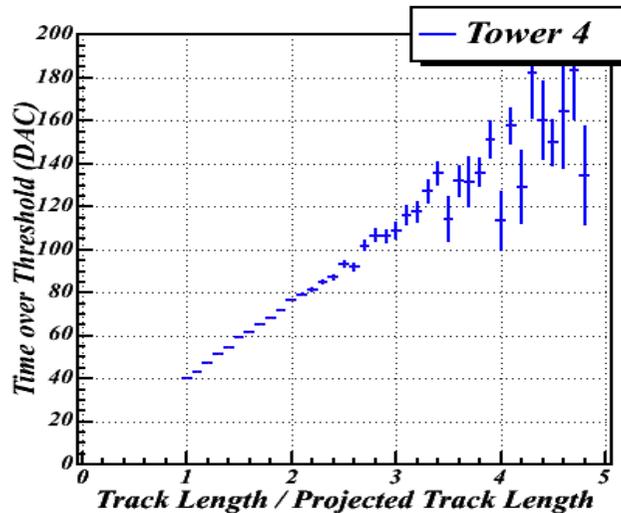
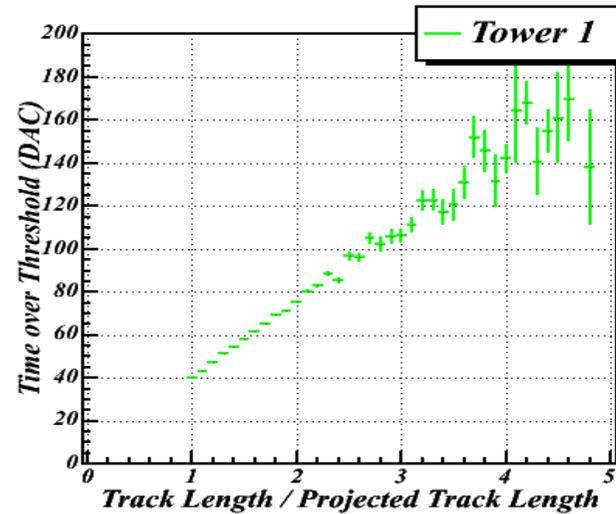
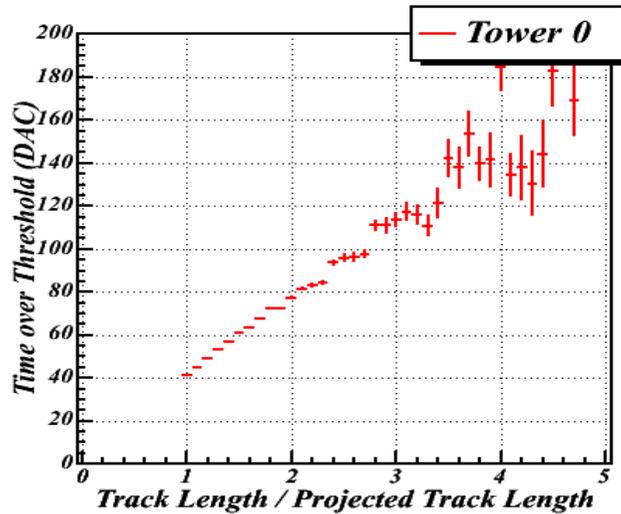
ToT vs $1/\cos\theta$ (Track Layers)



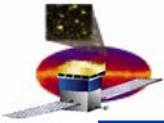
The ToT increases linearly with $1/\cos\theta$ (track length)



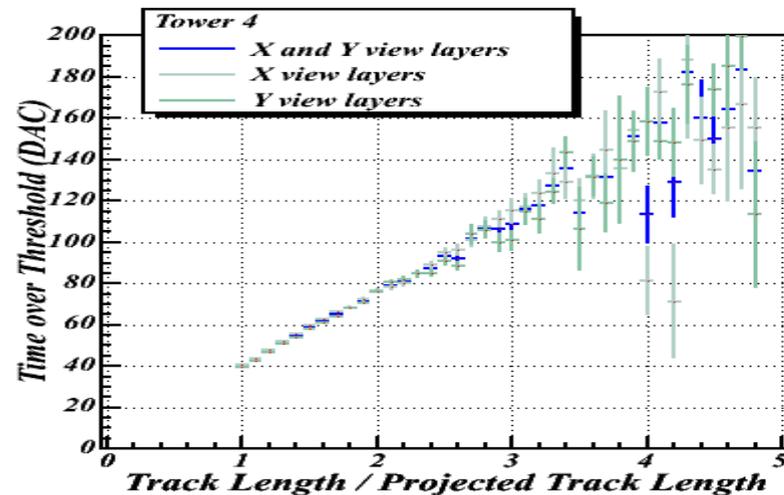
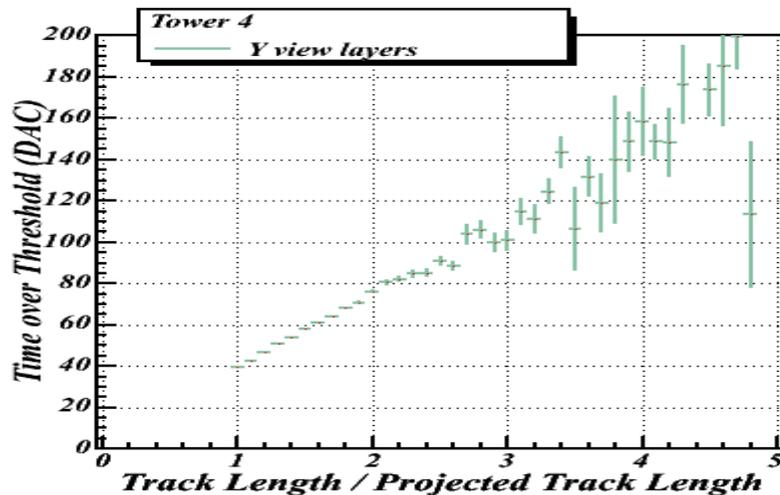
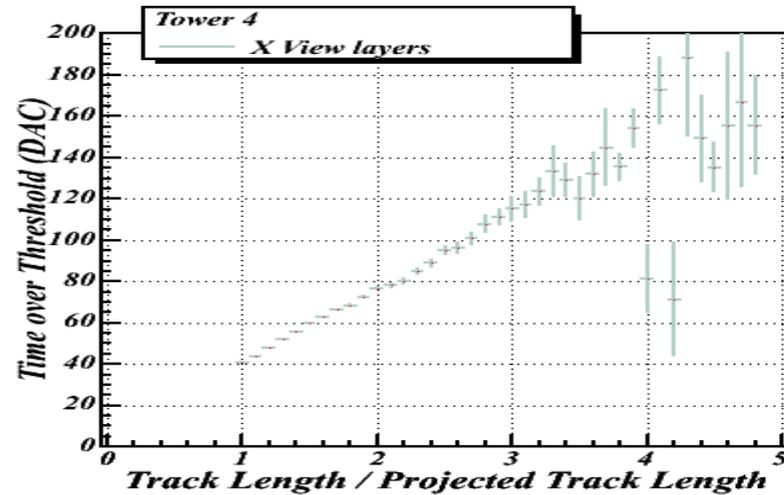
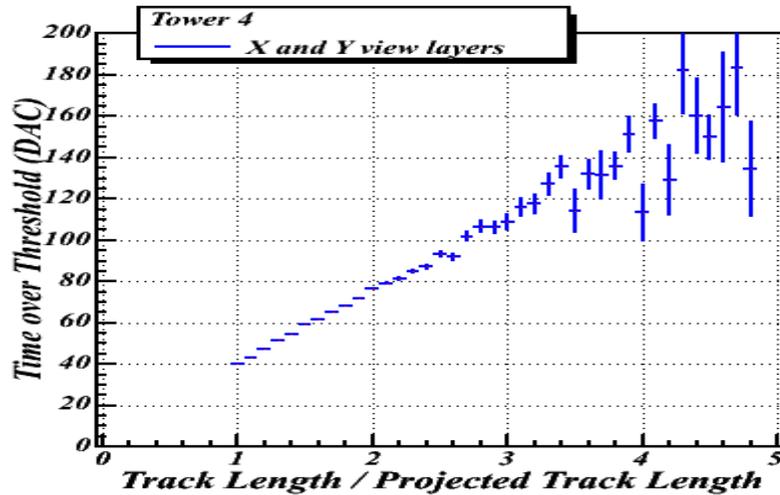
ToT vs l/l'



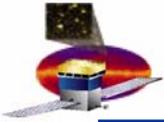
- The **ToT** depends almost linearly on the ratio l/l'
- The **ToT** increases with the same rate as the ratio l/l'



ToT vs l/l' : X and Y view layers

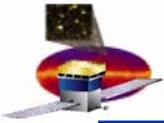


➤ The *ToT* dependence on l/l' is the same for X-view and Y-view layers



Conclusions

- *The dependence of the **ToT** on the **track parameters** has been investigated in the **4 towers configuration***
- *The proper **n-tuple variables** have been taken into account*
- *The same results as in the 2 tower configuration have been obtained*
 - *The ToT depends **linearly** on $1/\cos\theta$*
 - *The ToT depends **linearly** on the ratio l/l'*
- *The **dependence** of the **ToT** on the ratio l/l' is the **same** for **X-view** and **Y-view** layers*



Some questions...

➤ Question 1:

- Which are the **IDs** of the **three layers in a row** issuing the trigger?
- ❖ Actually we are assuming that these layers are the ones from **GltLayer** to **GltLayer+2**. Is this assumption correct?

➤ Question 2:

- To which tower do **Tkr1FirstLayer** and **Tkr1LastLayer** belong?
- ❖ This information is necessary to select data samples of **single tracks fully contained in a single tower**.
- ❖ For instance, is it possible an event with **GemTkrVector** $\neq 0$ only for **Tower 0**, **TkrNumTracks = 1**, but with **Tkr1FirstLayer** belonging to **Tower 1** ?

➤ Question 3:

- Is it possible to add in the **n-tuples** the information about the **x-y** (or **x-z**) coordinates of the **hit strips** ?
-