

# Comparison Data – MC

Data reconstruction

Acceptance comparison with MC simulation

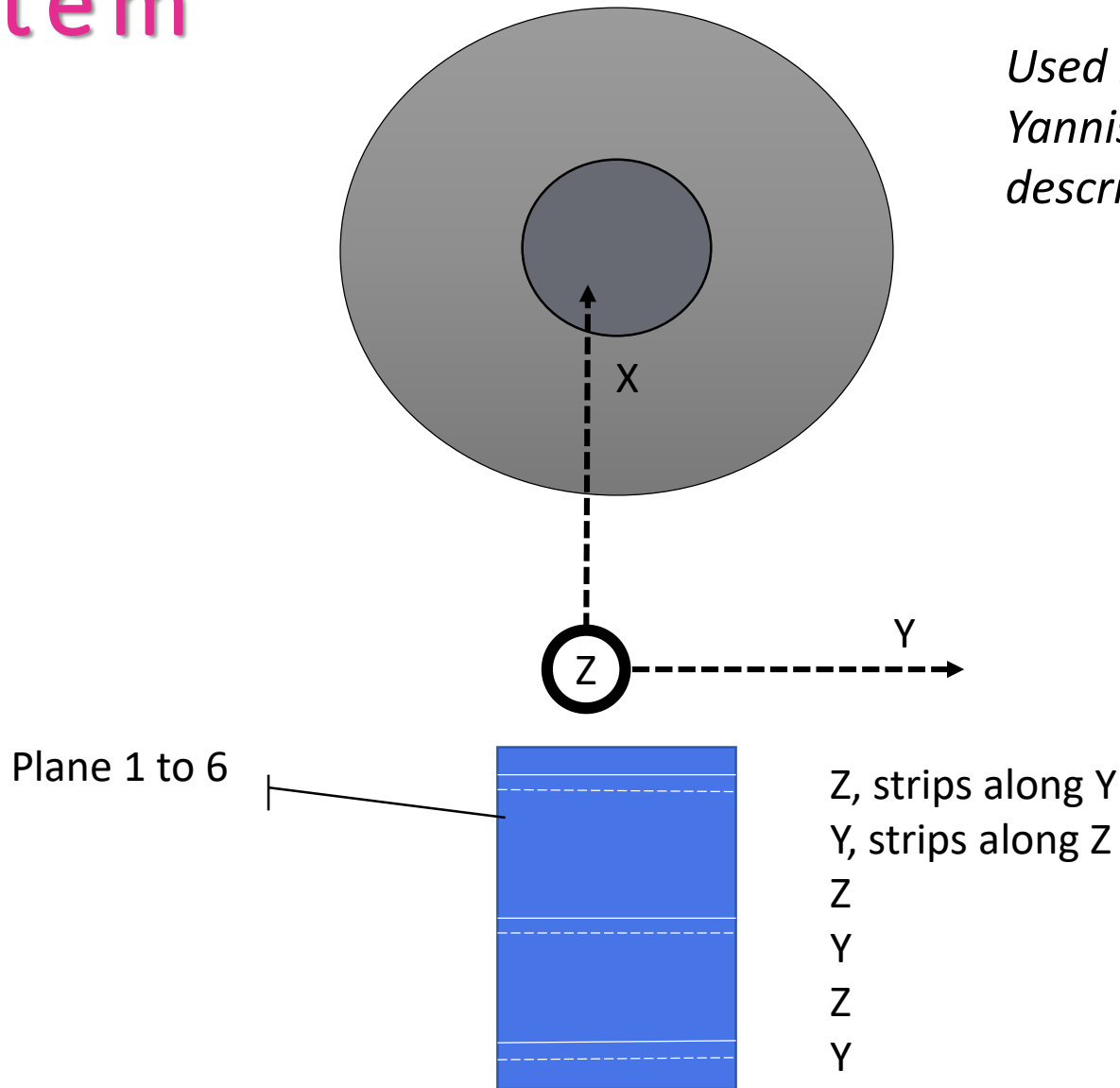
*Corinne, Yannis, Theodoros, Sabine*

# Data

- Preselection by Theodoros → Rootfile
- Data Looking towards the tumulus
- *Evts with at least  $\sum ADC > 200$ , per plane*
  - No cut on the middle 2 planes

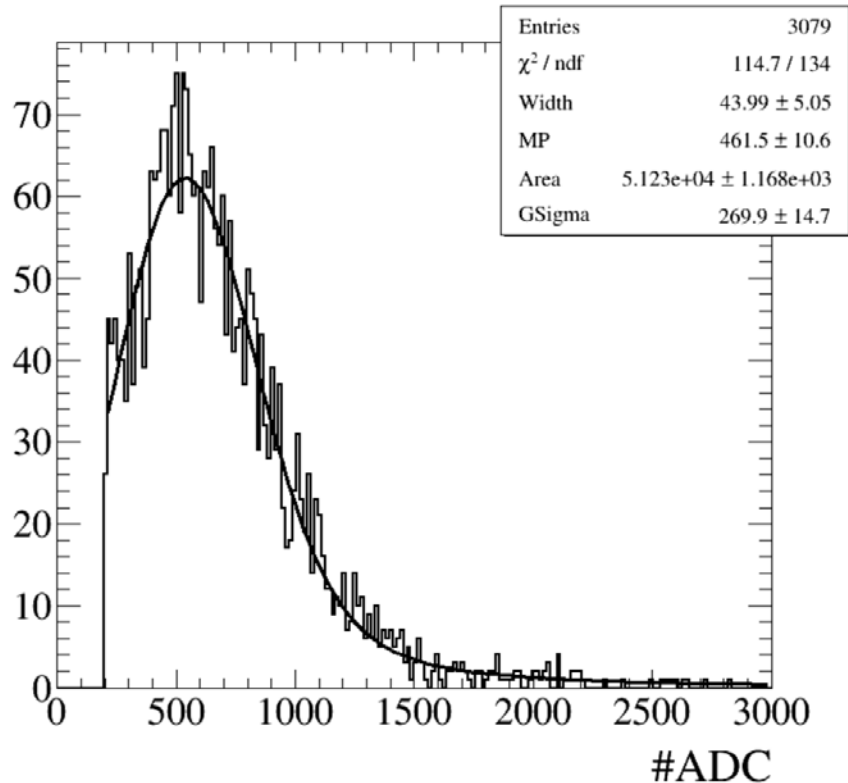
# Numbering & Coordinate System

*Used in this presentation  
Yannis uses a different  
description*

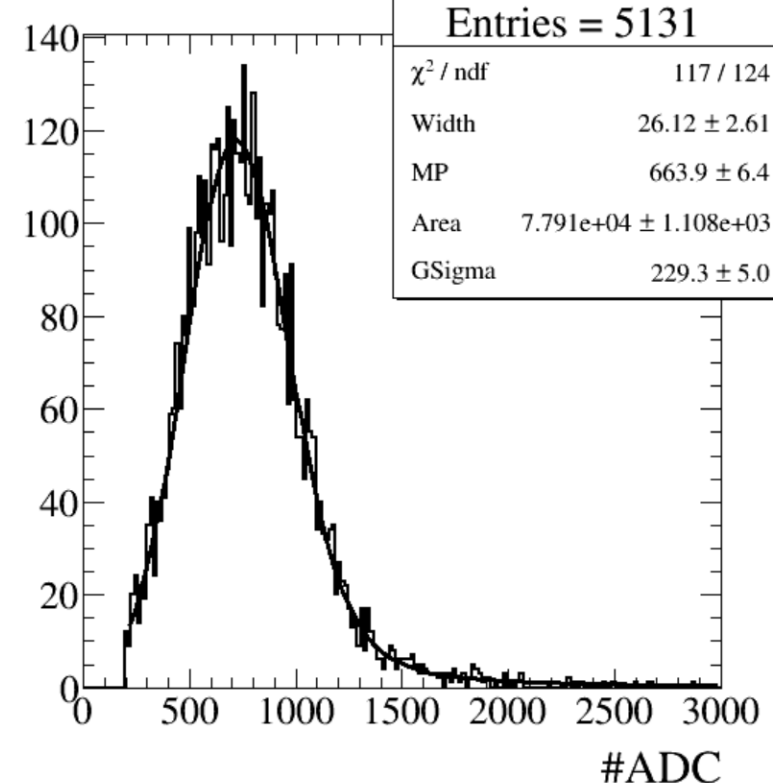


# Simulation: E (kev) to ADC

Data (Example)



MC (Example)

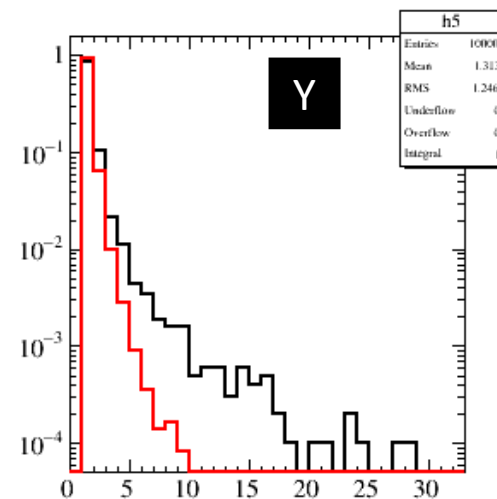
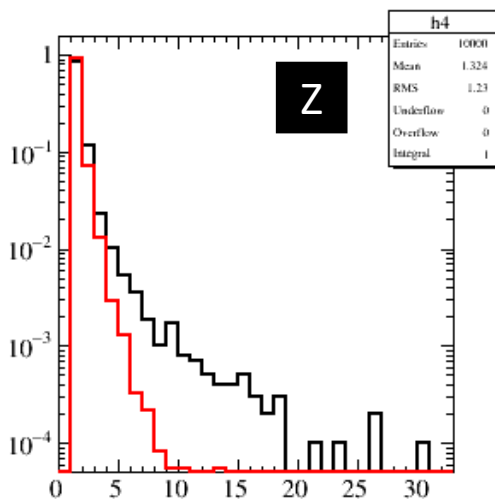
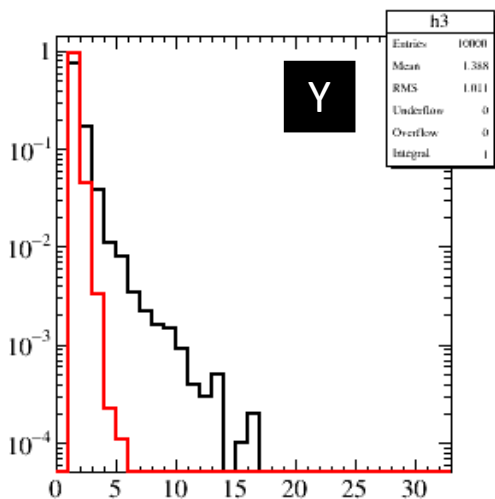
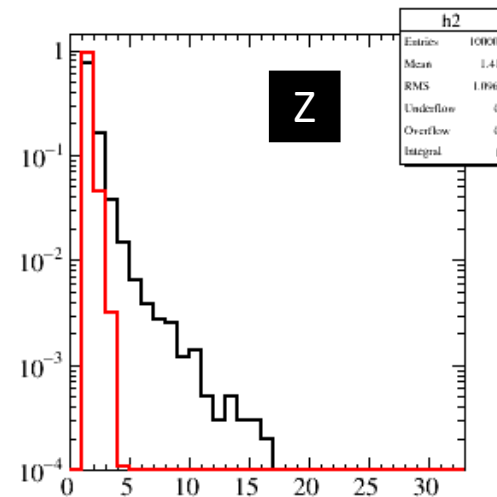
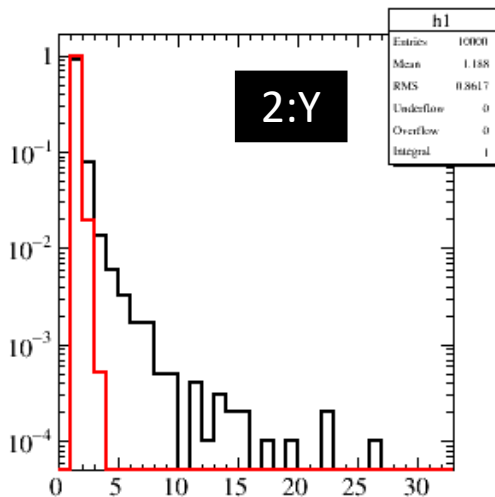
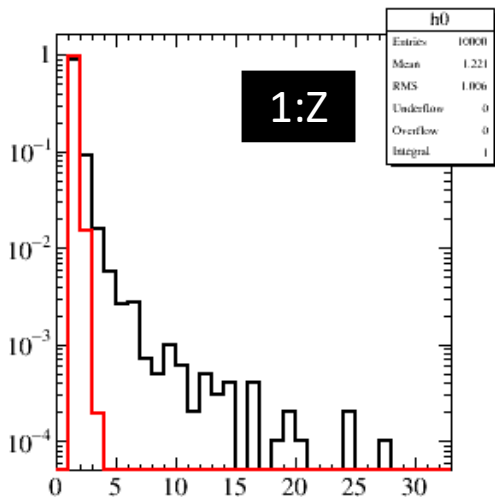


Simulation to be adjusted channel per channel, but qualitatively Ok for now

# Raw Multiplicity

Data  
Simulation

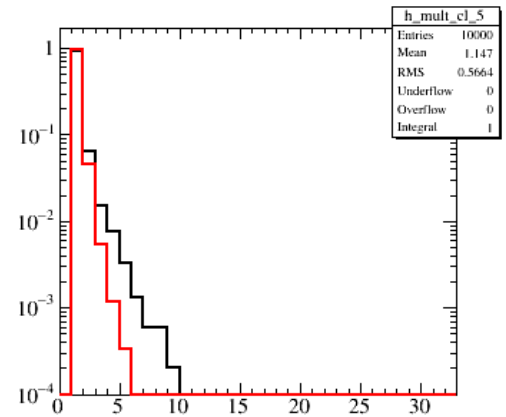
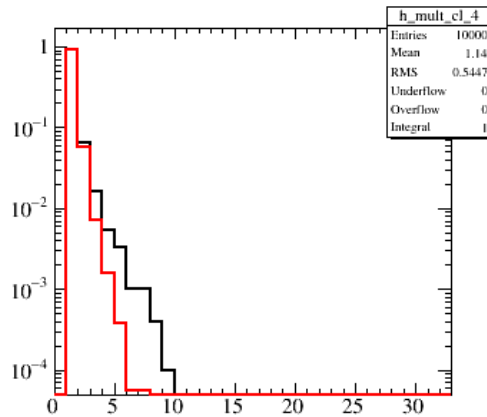
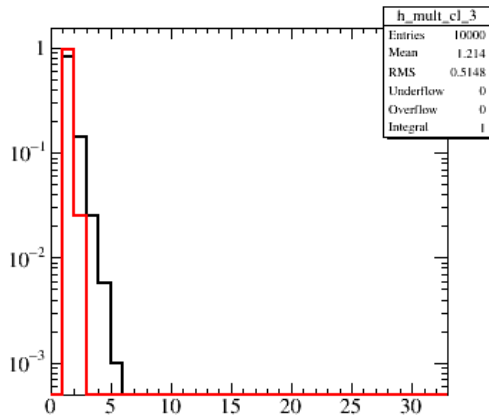
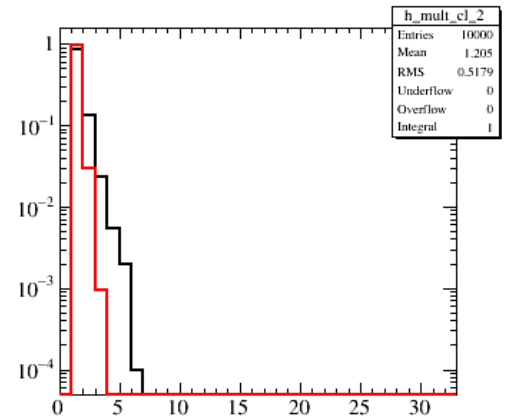
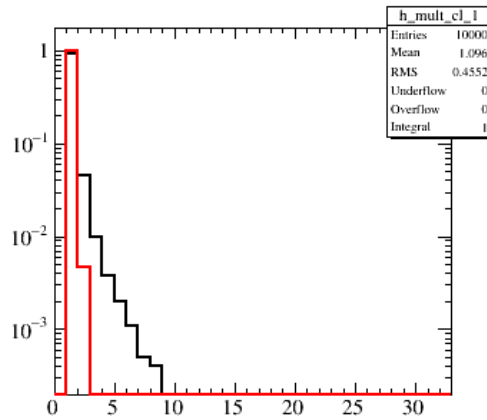
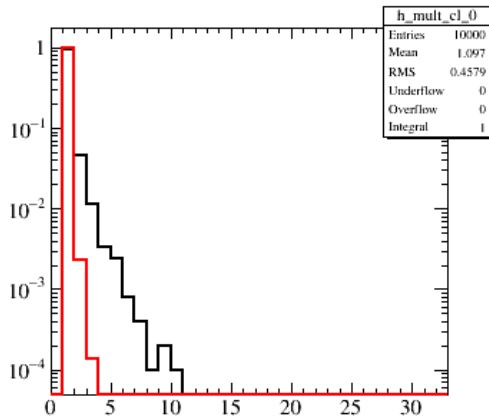
Events



Number of strips

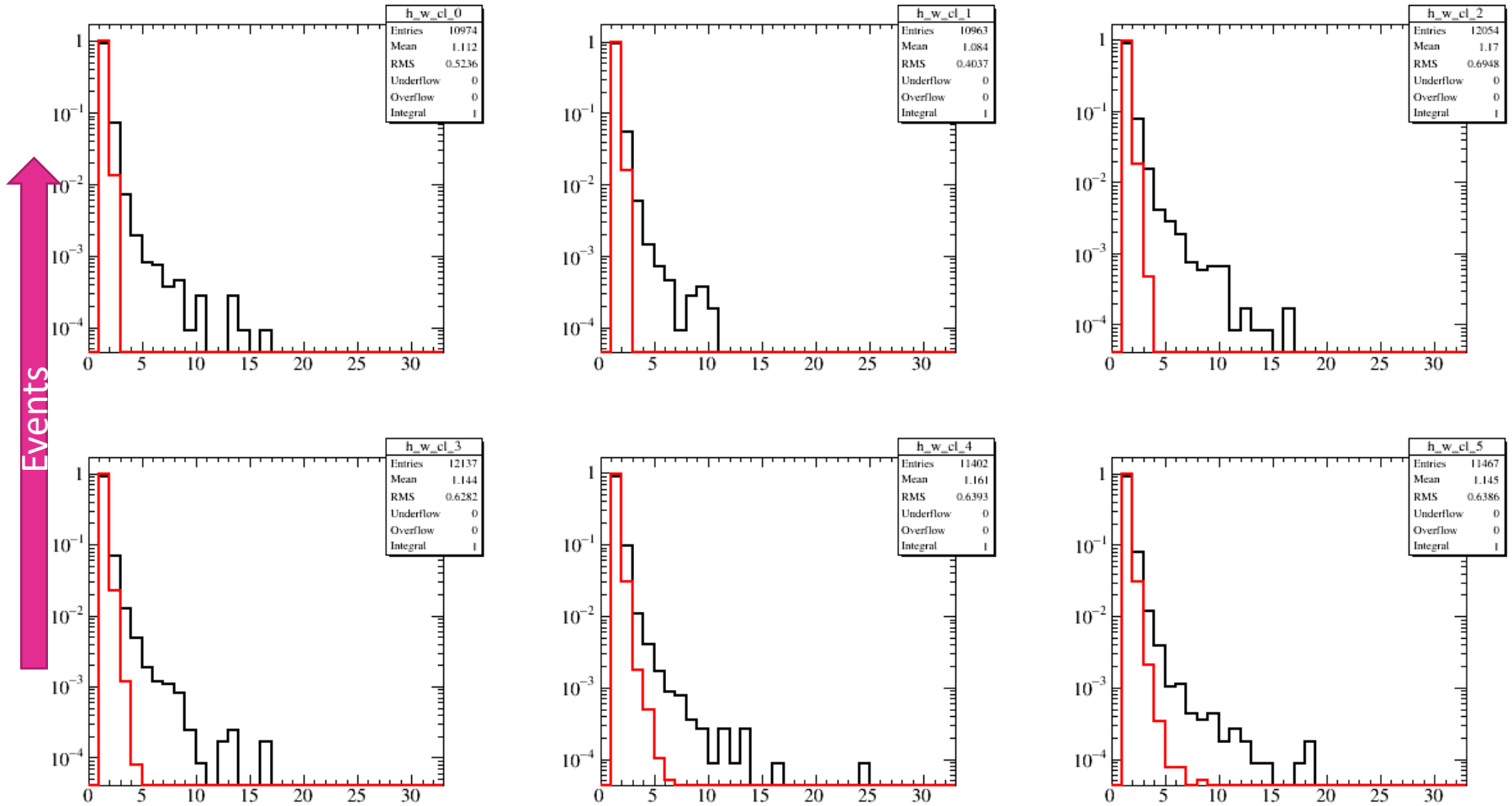
# Clustering

- Simple clustering associating neighbors



Number of clusters →

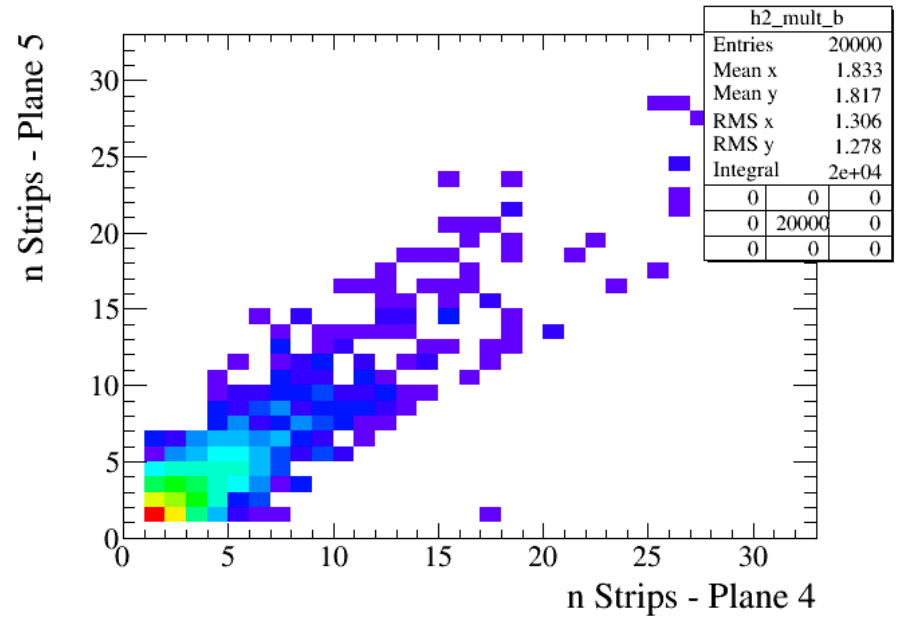
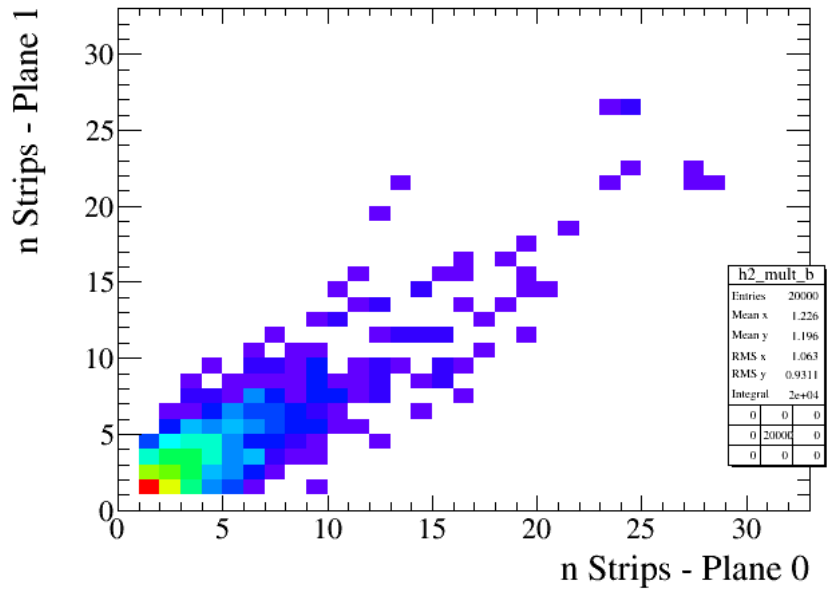
# Cluster's width



Investigating whether the  
larger multiplicity could  
be due to electrons

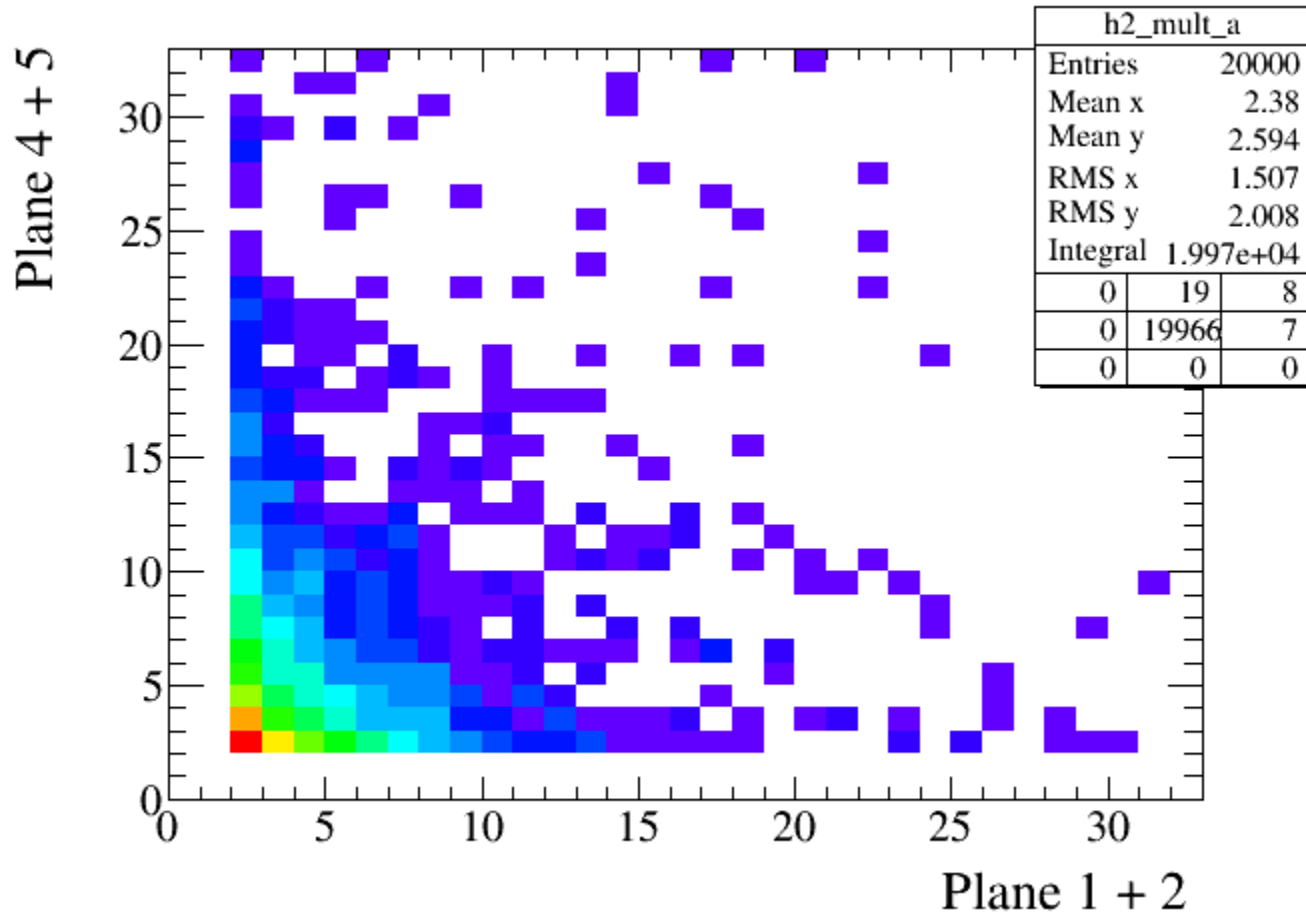


# Electrons ?



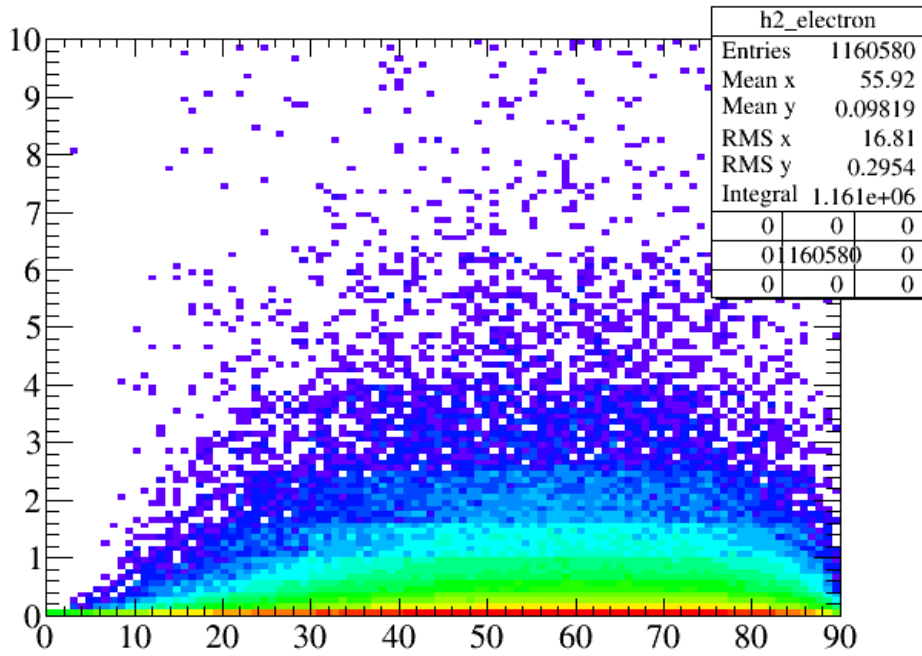
Seems to be of physical origin

# Electrons ? ~No correlation Front-Back



# Electrons/ Gamma (CRY)

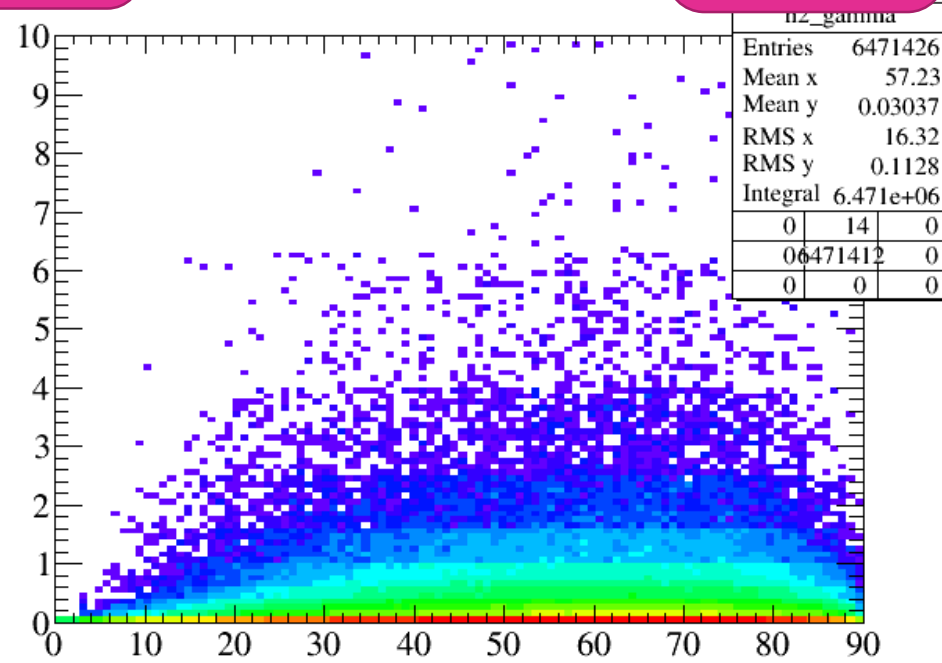
Energy (GeV)



Horizontal

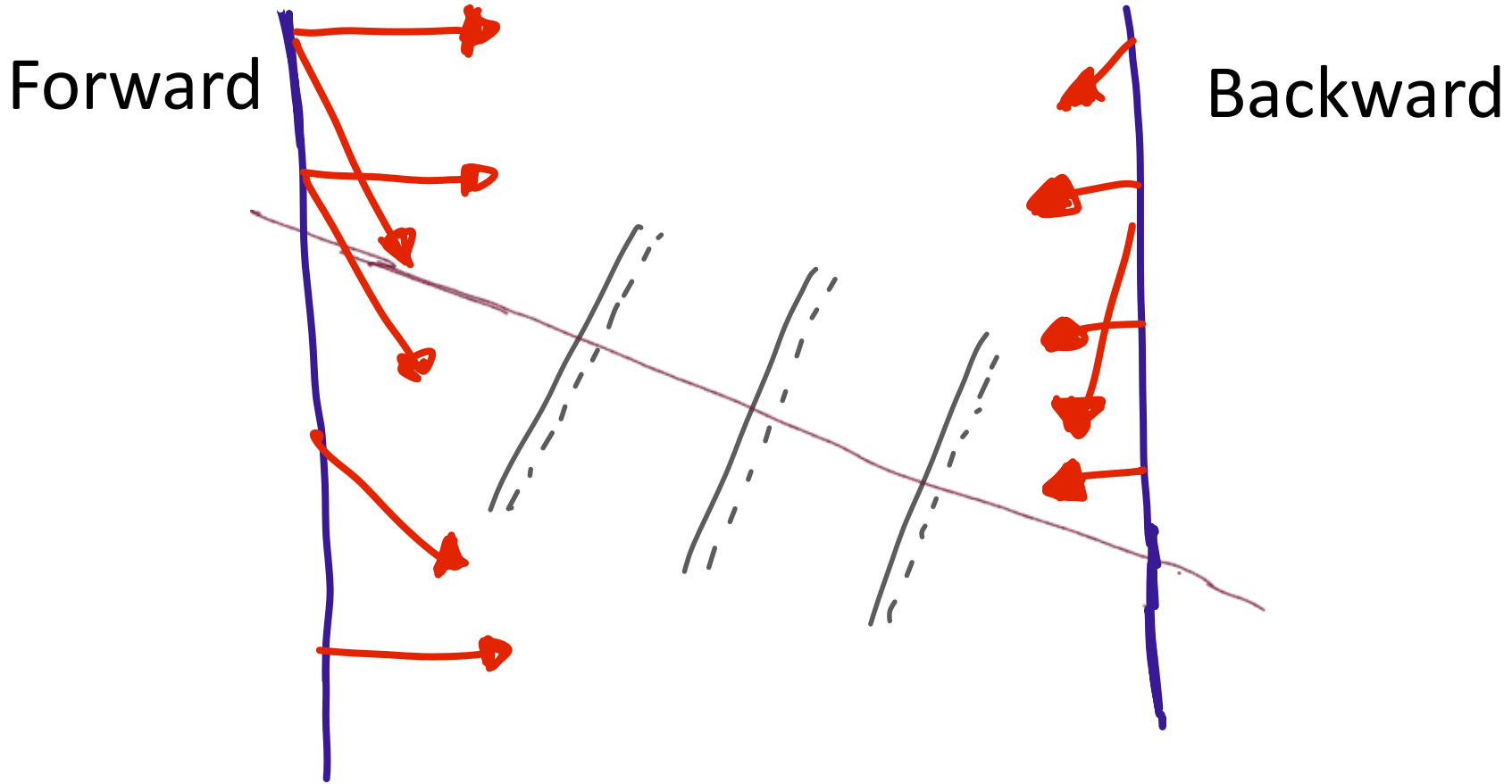
Vertical

Energy (GeV)

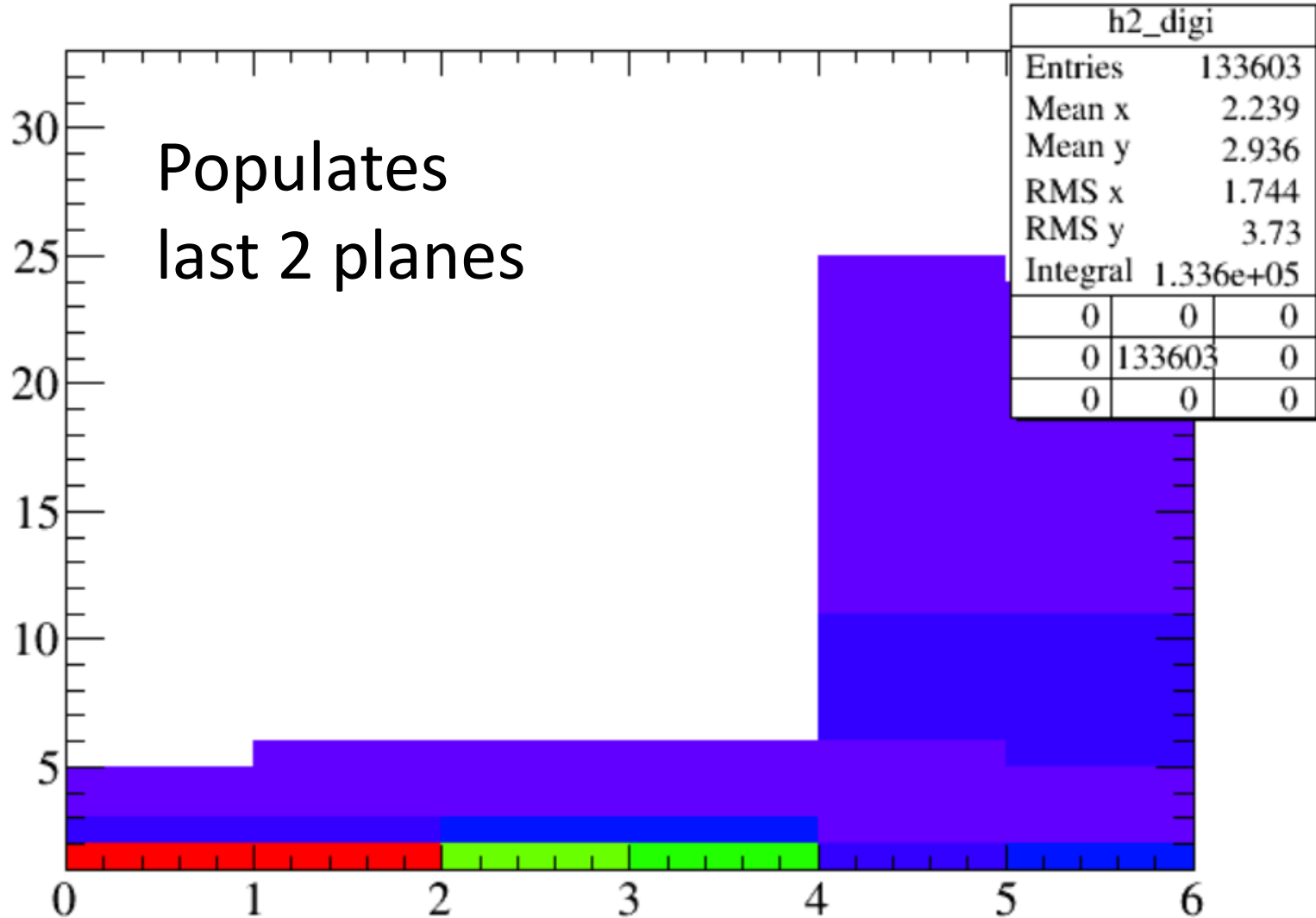


Fast simulation

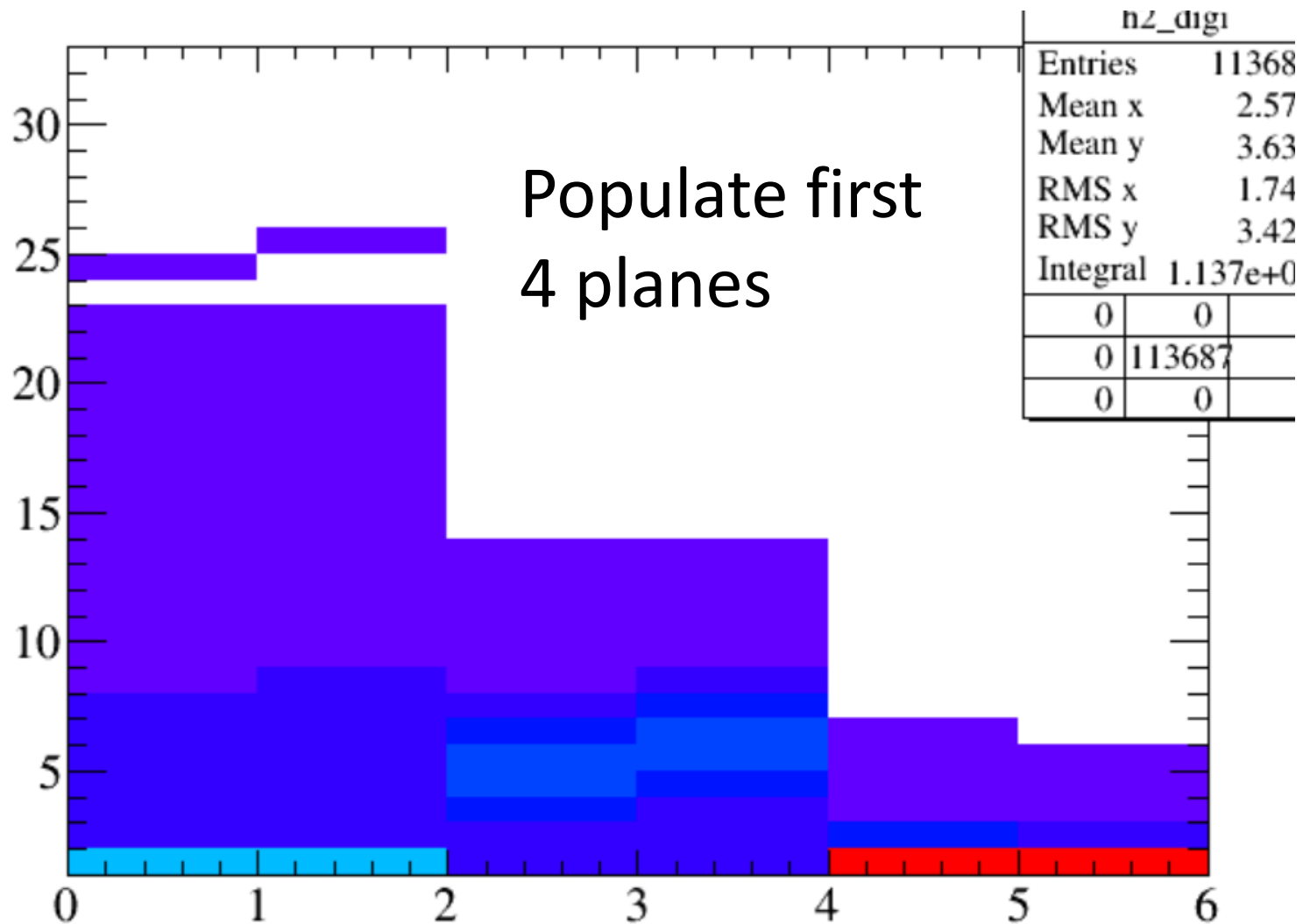
$$\left\{ \begin{array}{ll} \cos^2 \theta & \mu^- \quad 10 \text{ GeV} \\ \text{isotropic} & e^- \quad 5 \text{ GeV} \end{array} \right.$$



# 5 GeV forward electrons



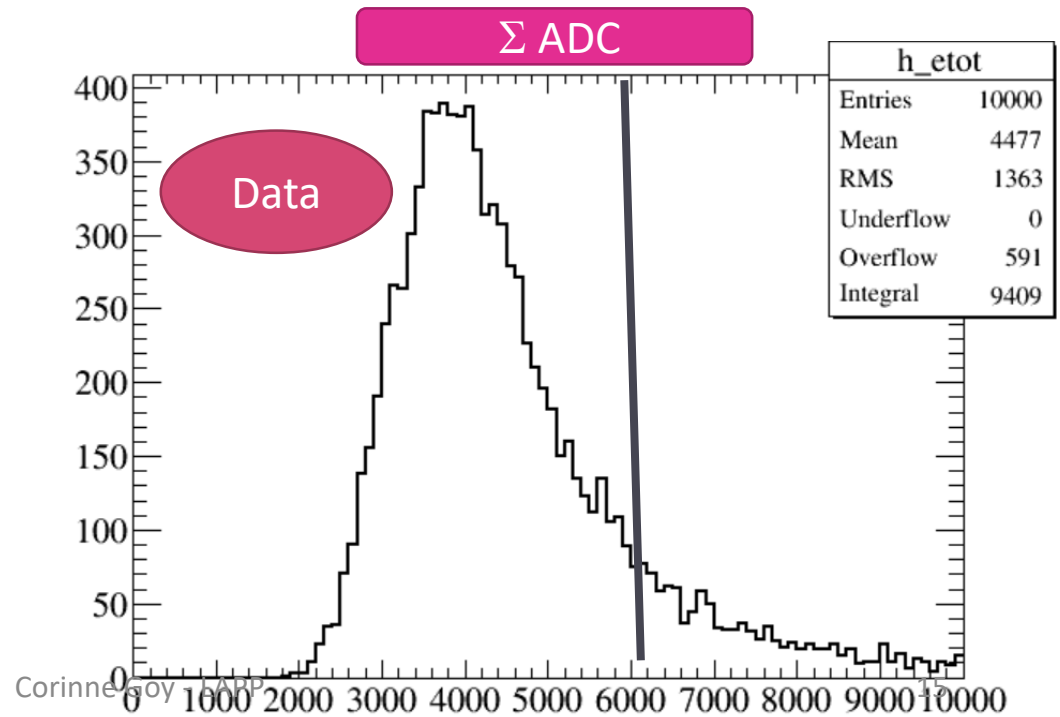
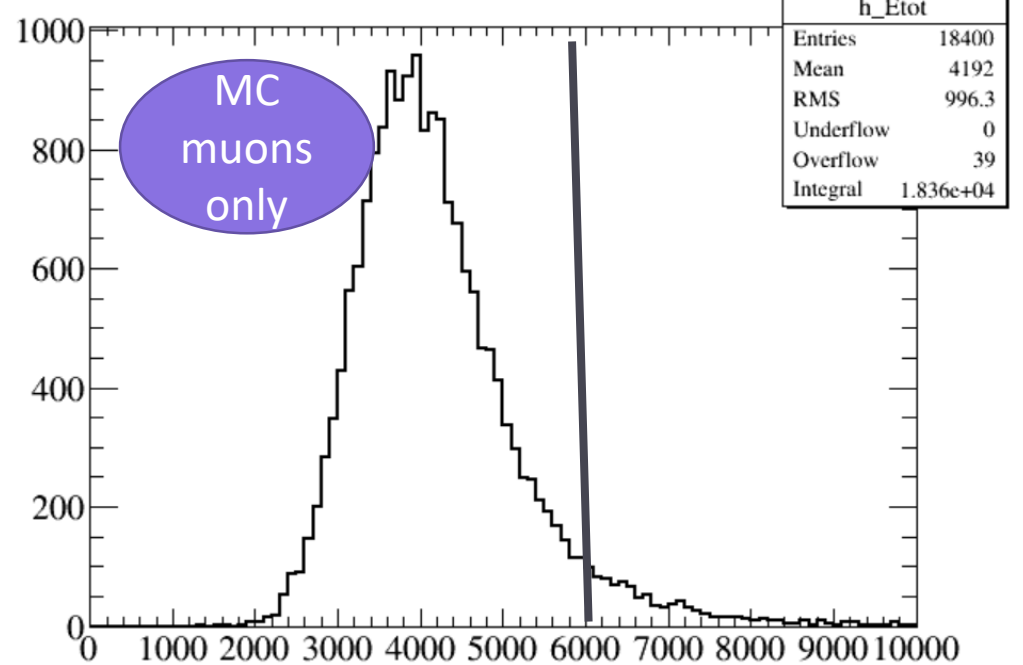
# 5 GeV backward electrons



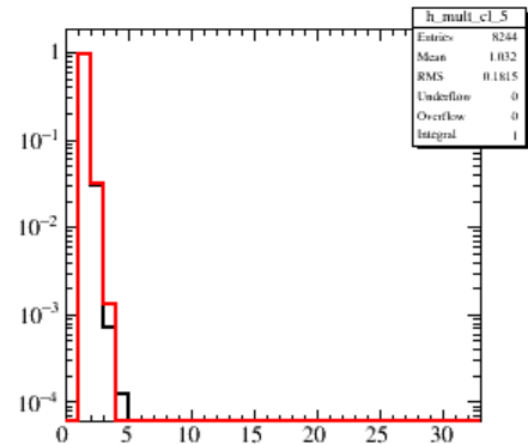
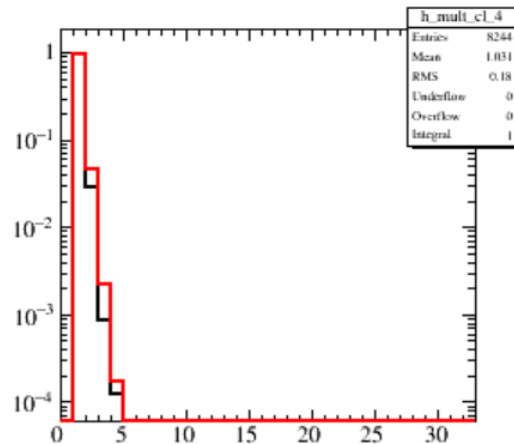
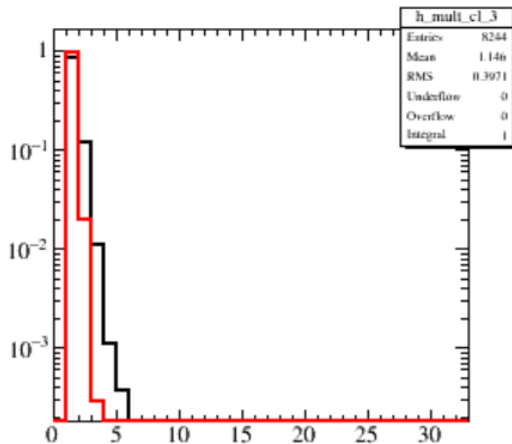
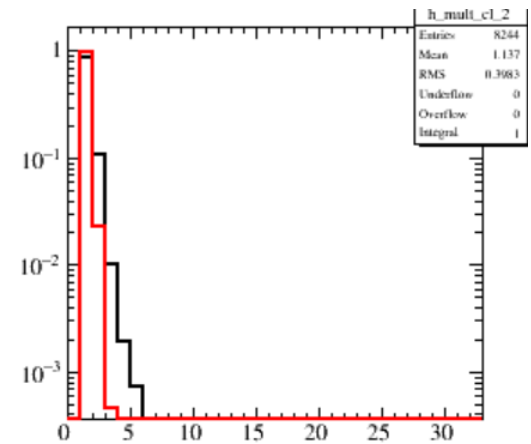
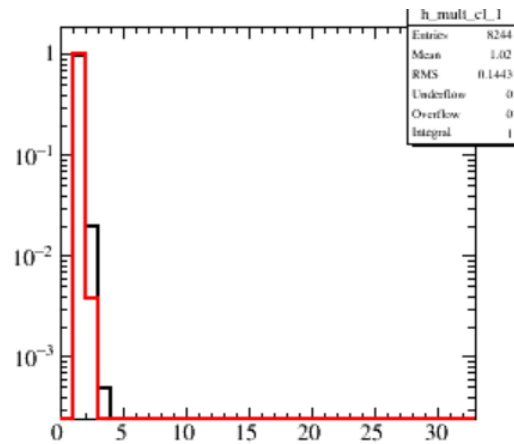
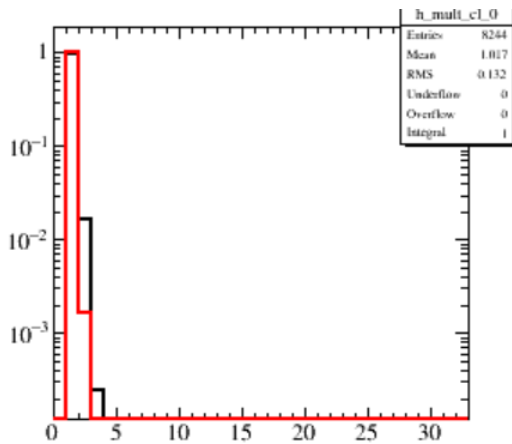
# Classical cut!

$\Sigma \text{ ADC} < 6000$  counts

To mitigate the background from electrons



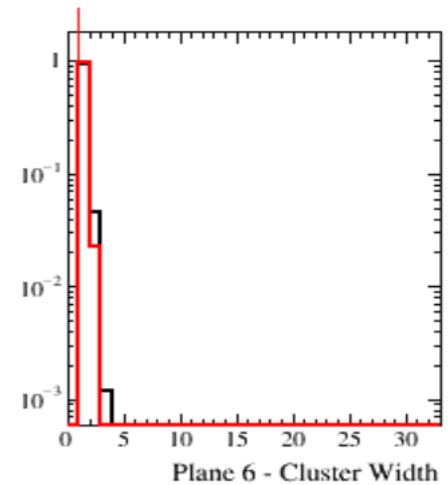
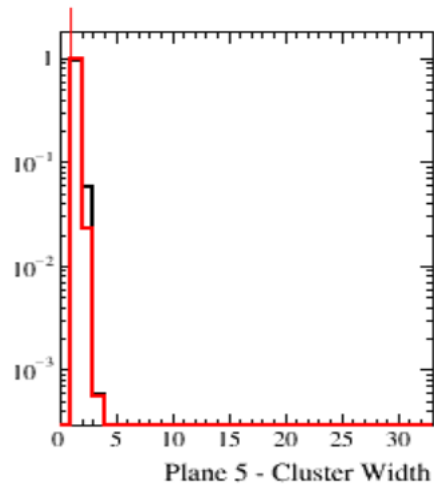
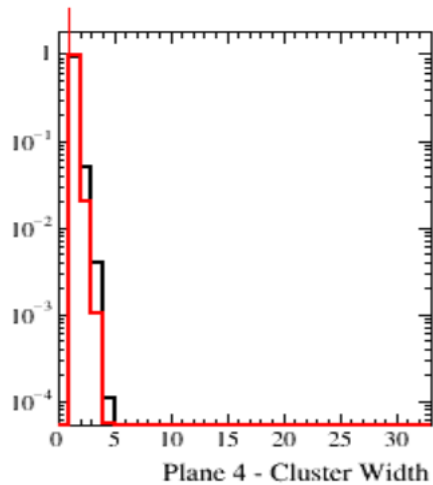
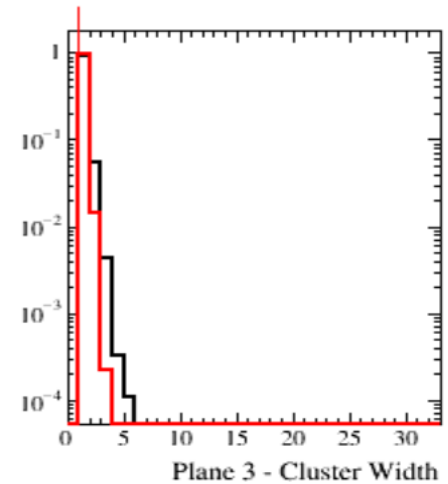
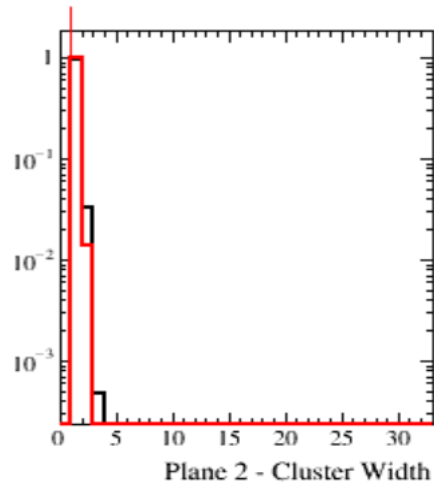
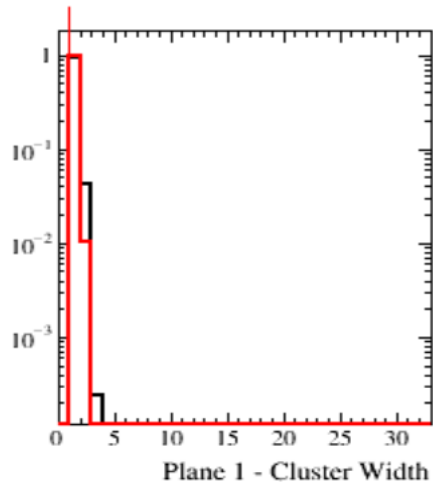
# Cluster multiplicity



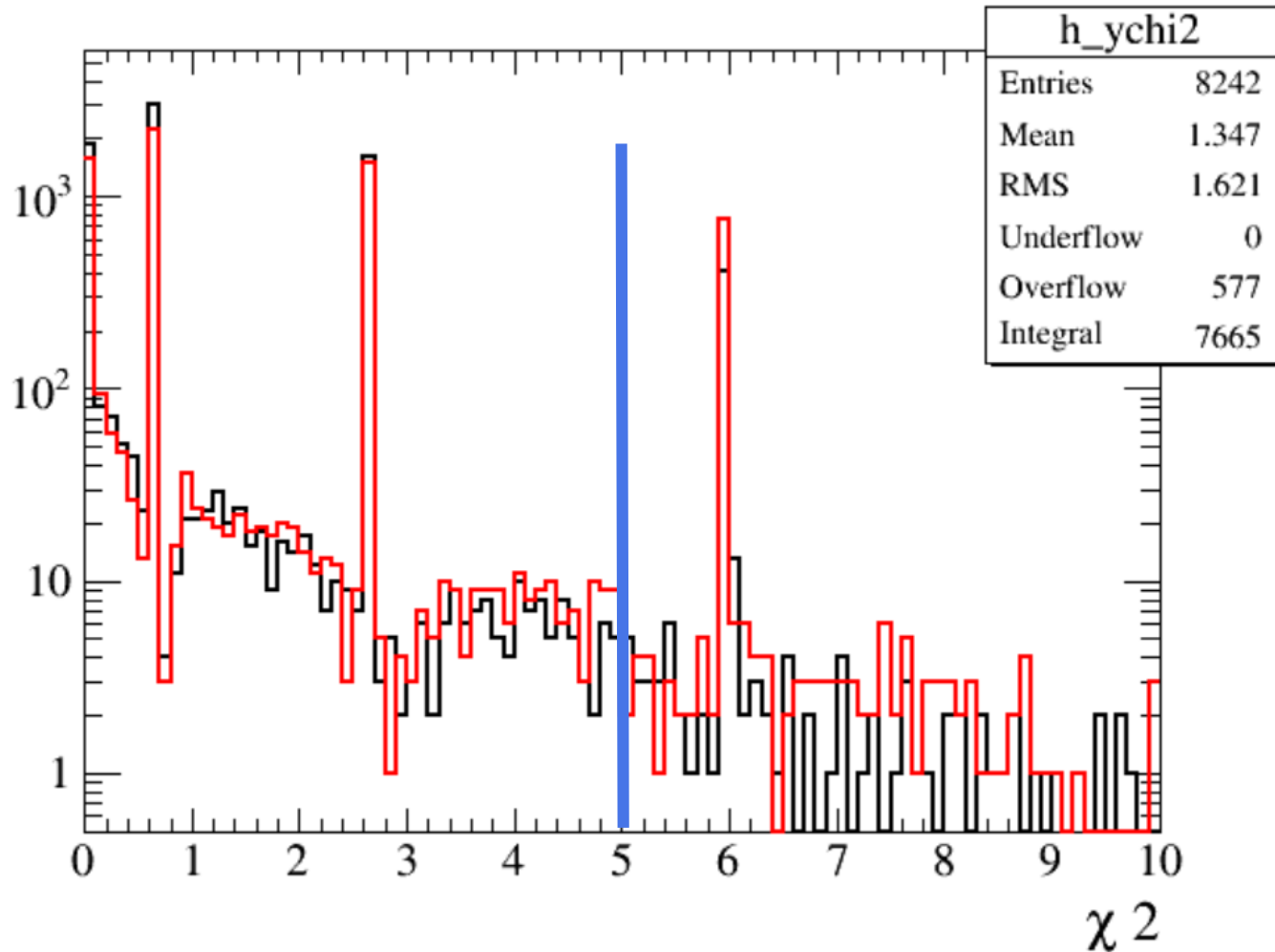
Nb of clusters



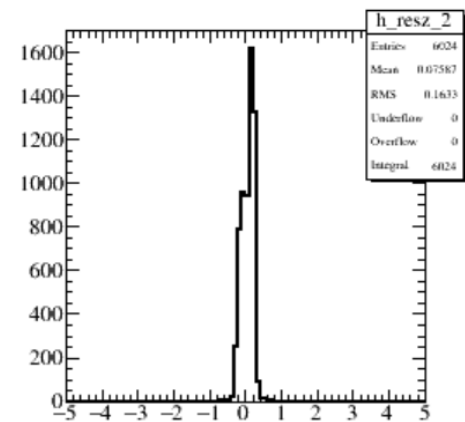
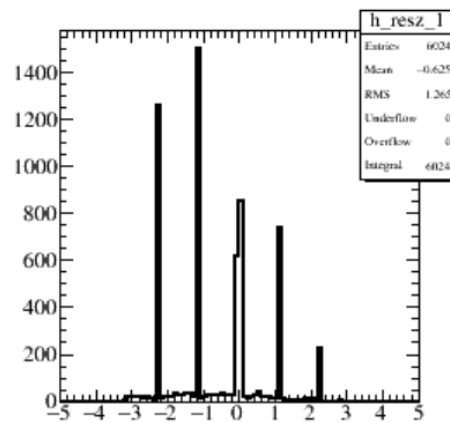
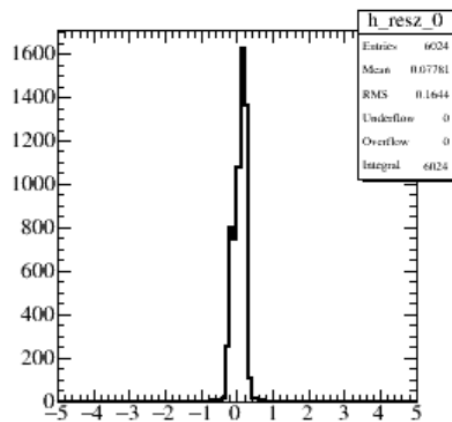
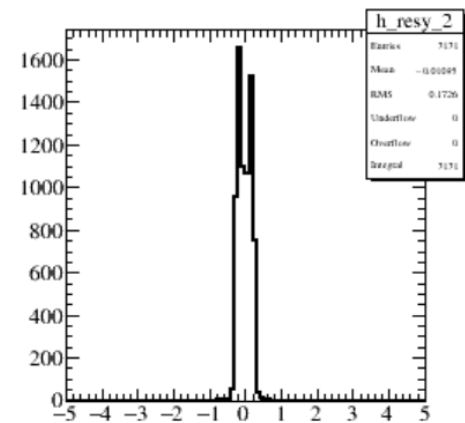
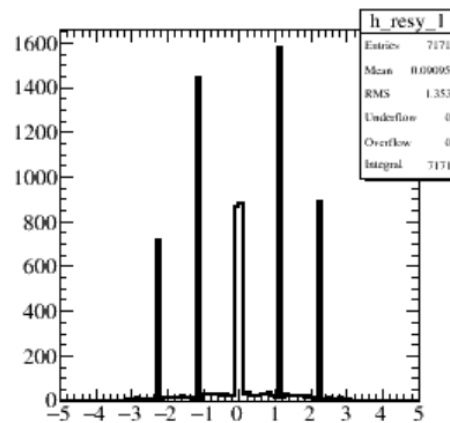
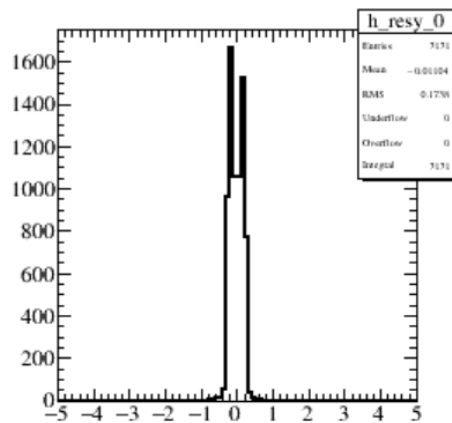
# Cluster Width $\rightarrow W \leq 3$



# $\chi^2$ of the fitted track in y & z direction

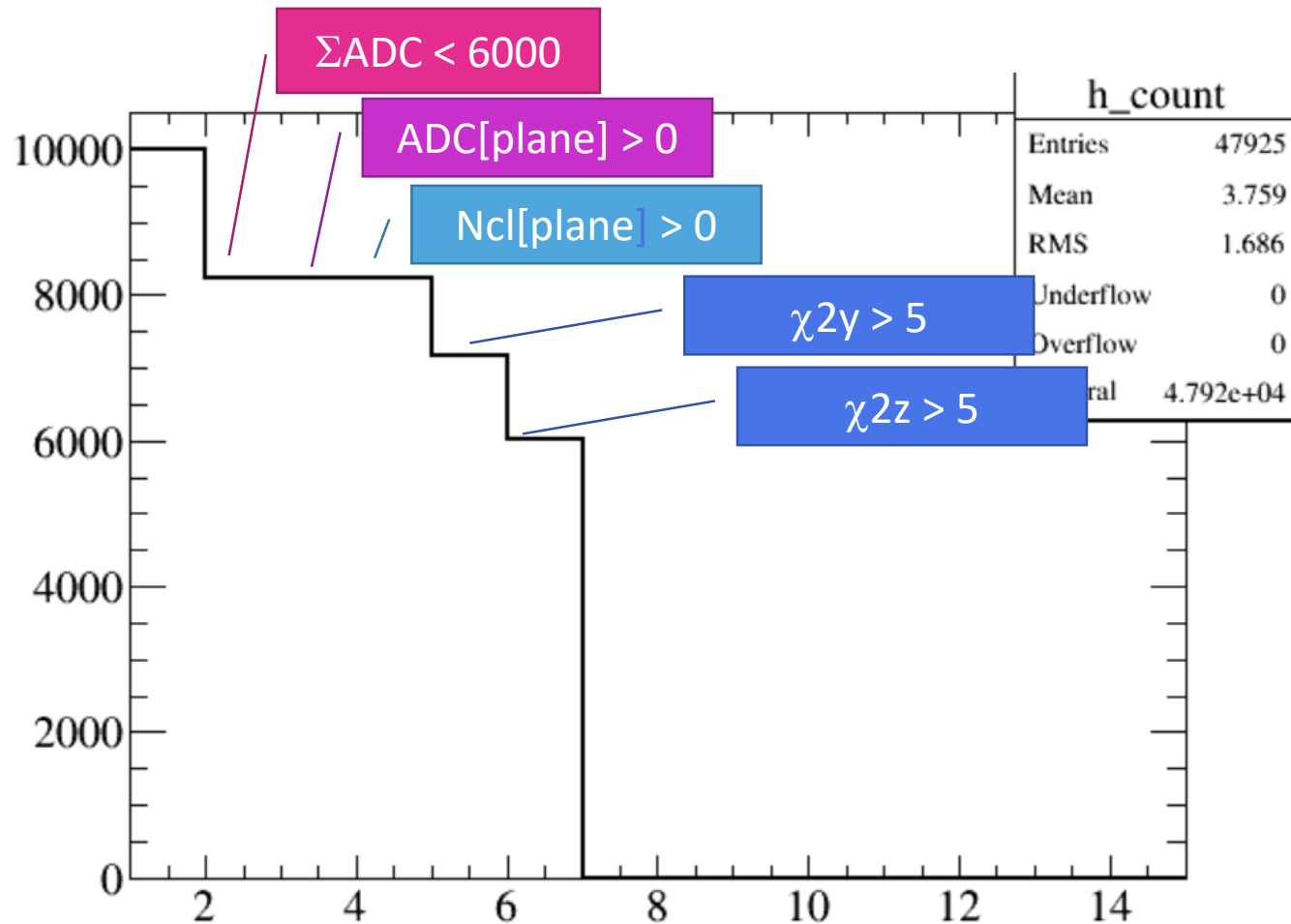


# Residuals after $\chi^2$ cut $< 5$



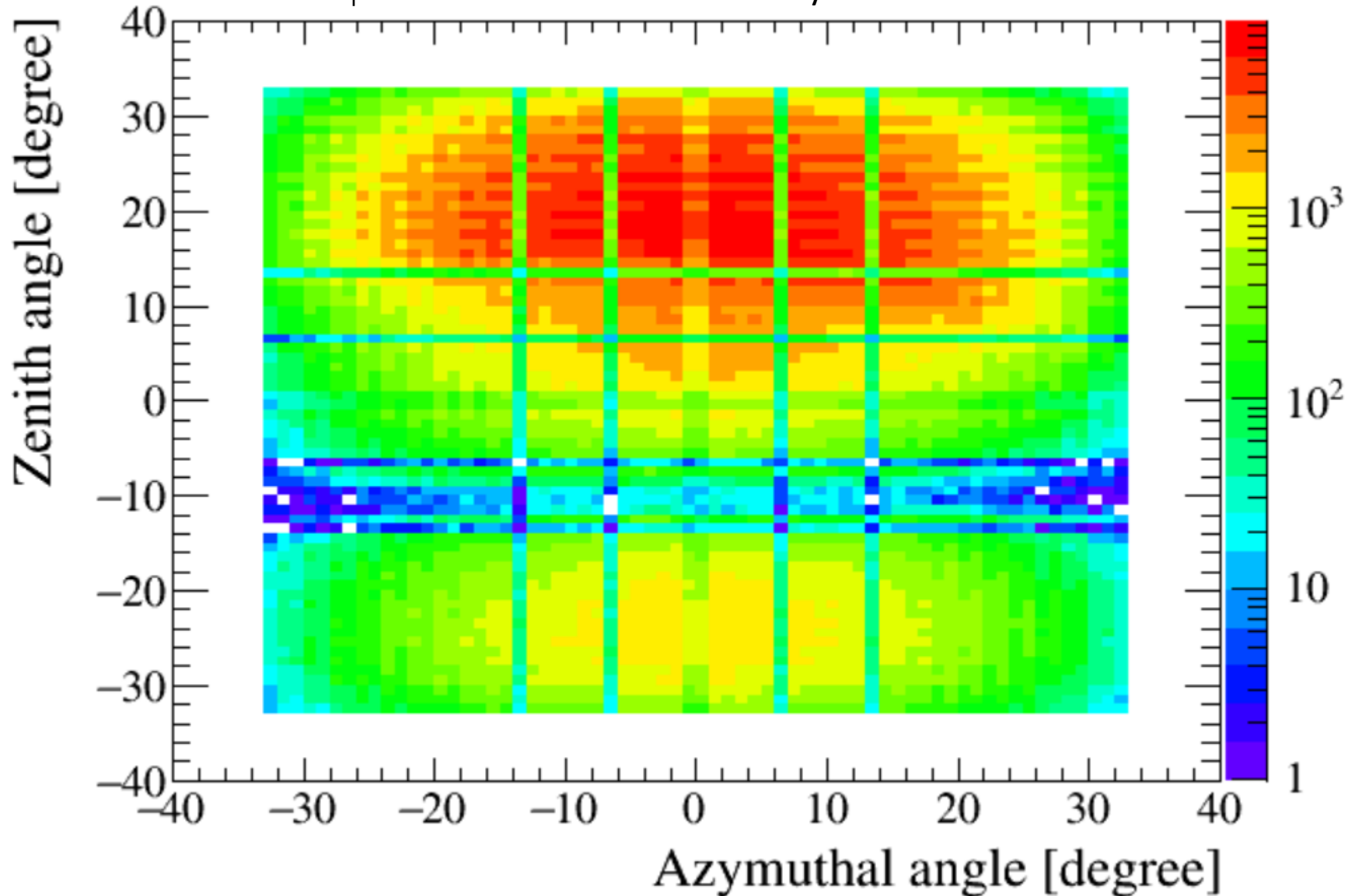
cm

# Cut flow (data)

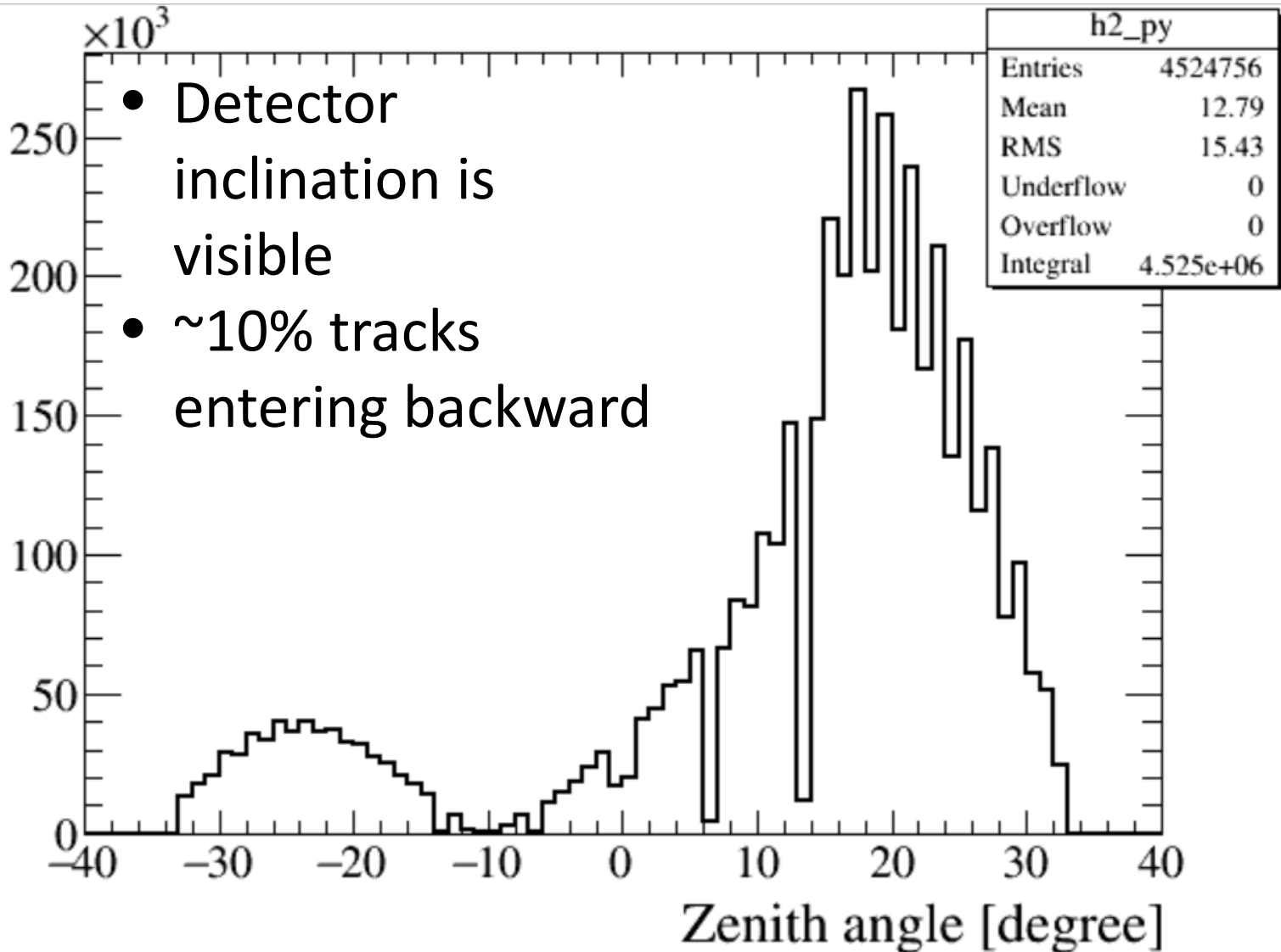


# All events : $\sim 5$ millions tracks

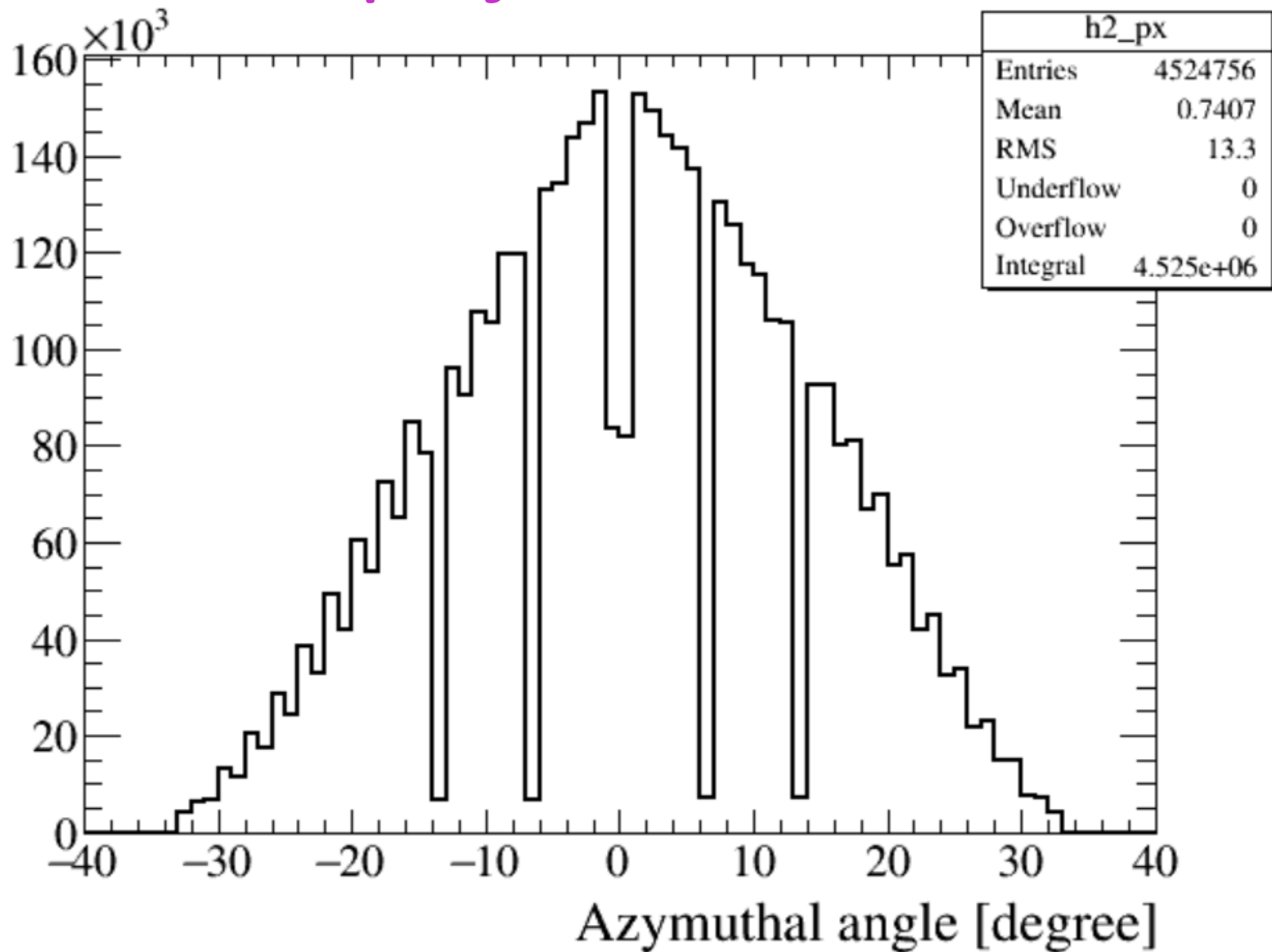
$\varphi$  and  $\theta$  are in the coordinate system of the detector



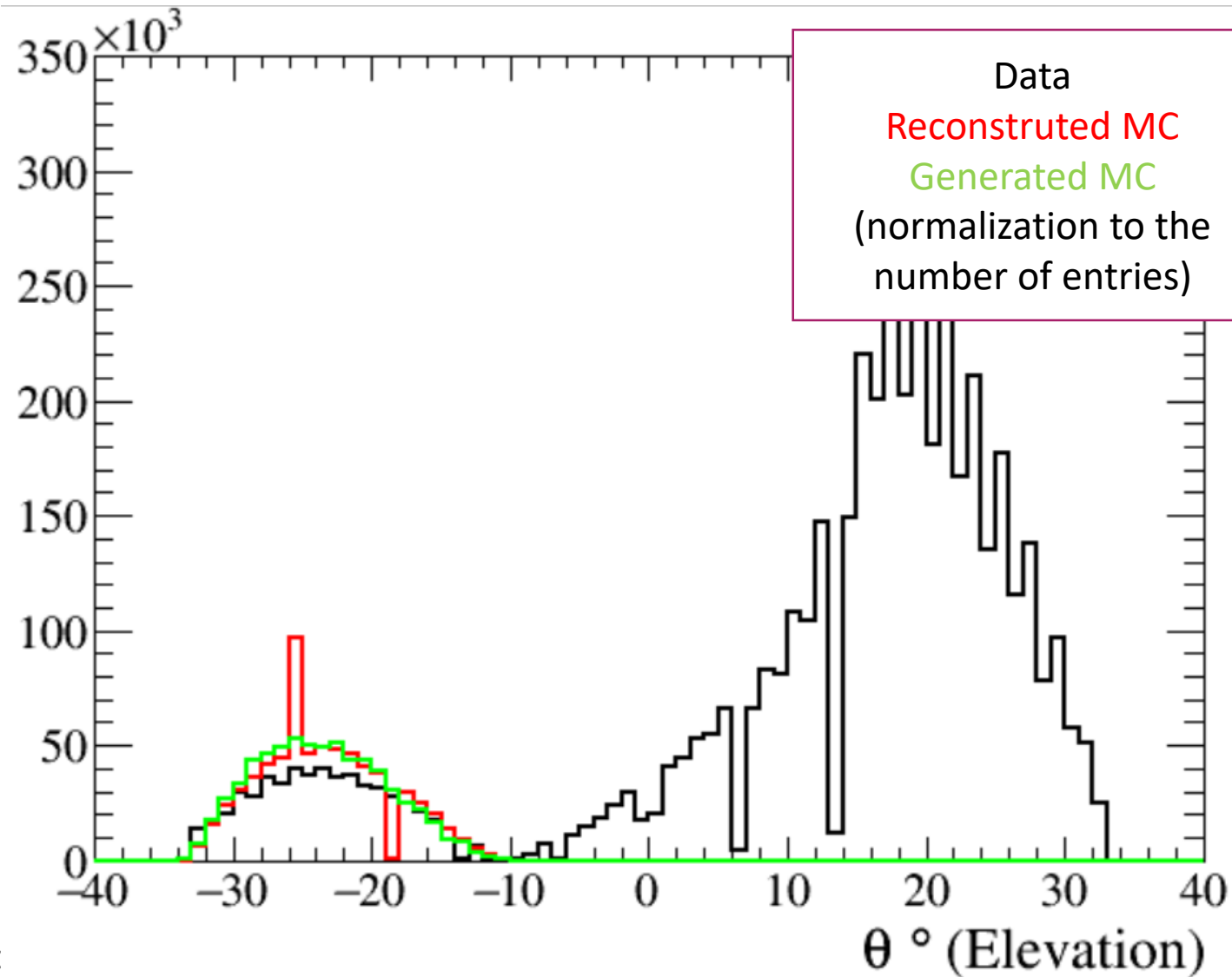
# Data :Theta projection



# Data : Phi projection

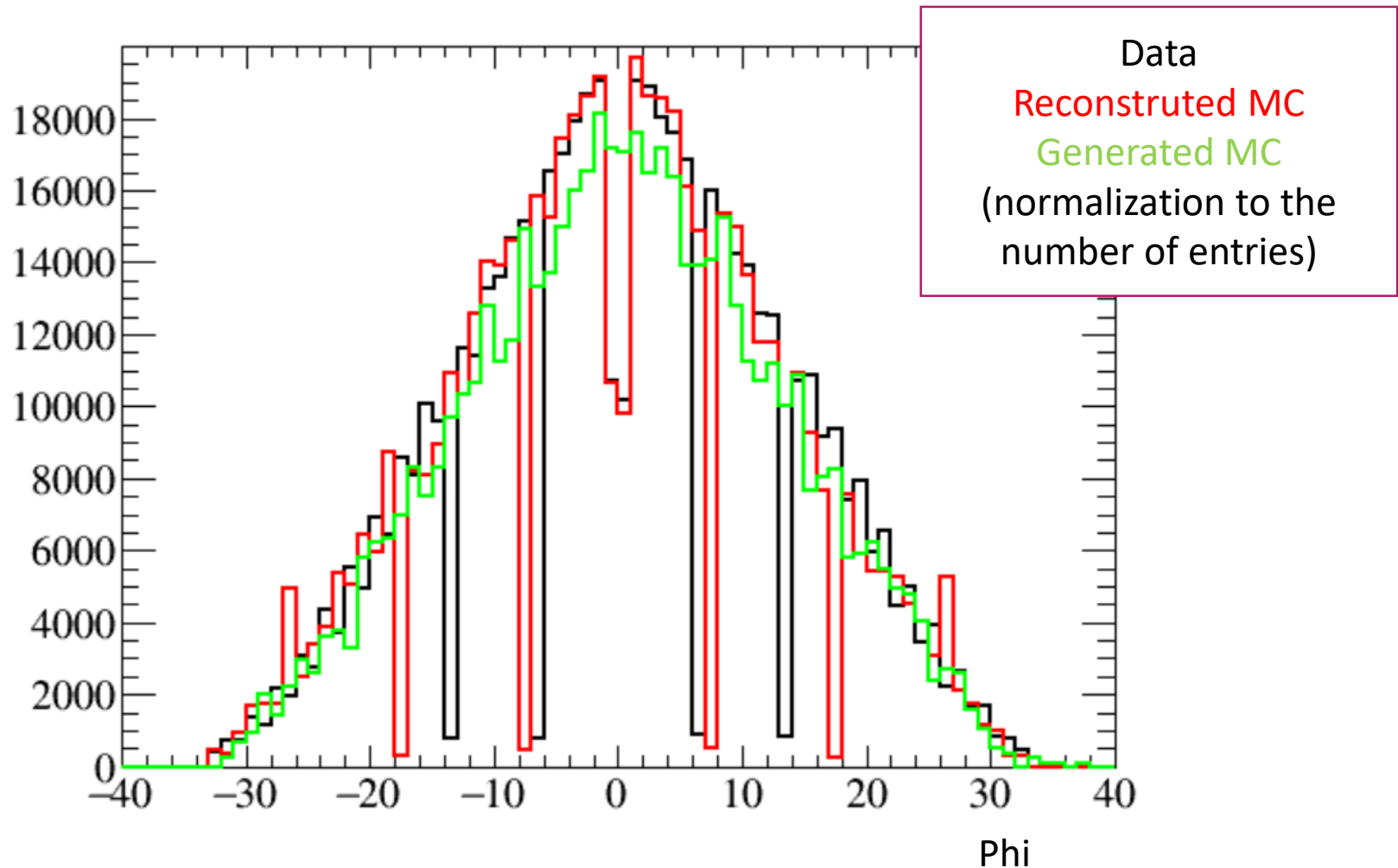


# Bwd gen. tracks : theta

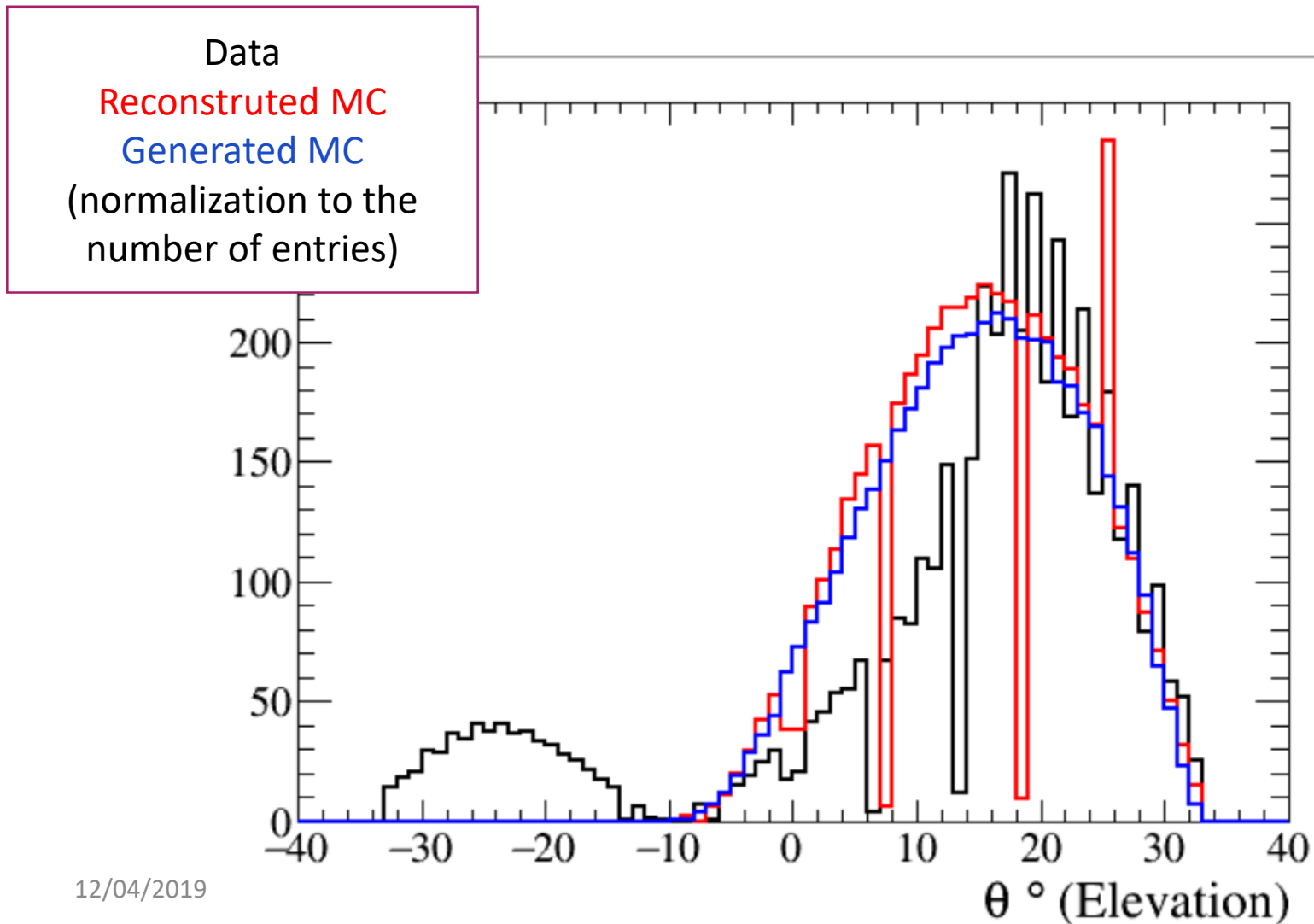




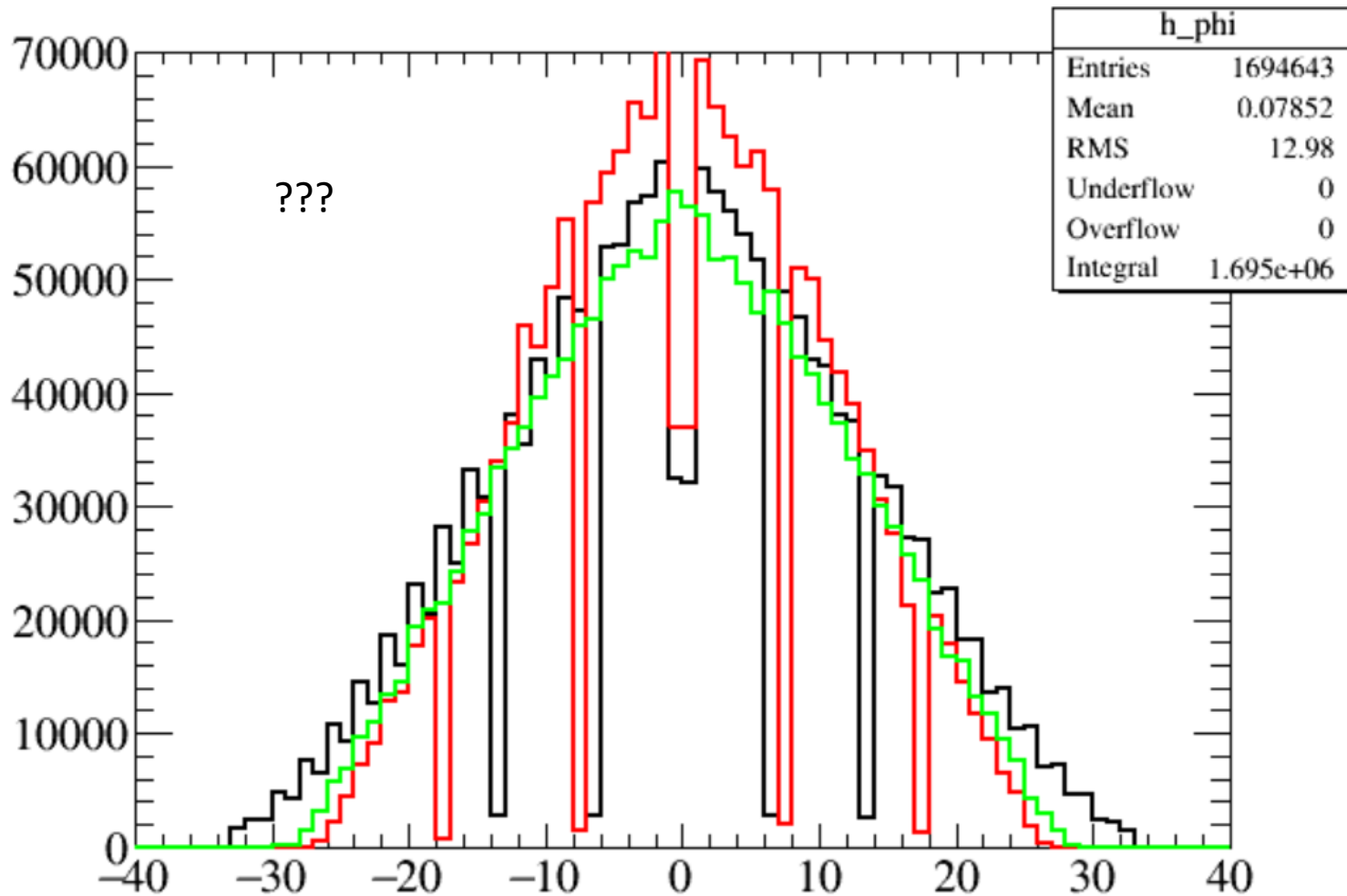
# Bwd tracks and comparison with fast simulation: $\varphi$



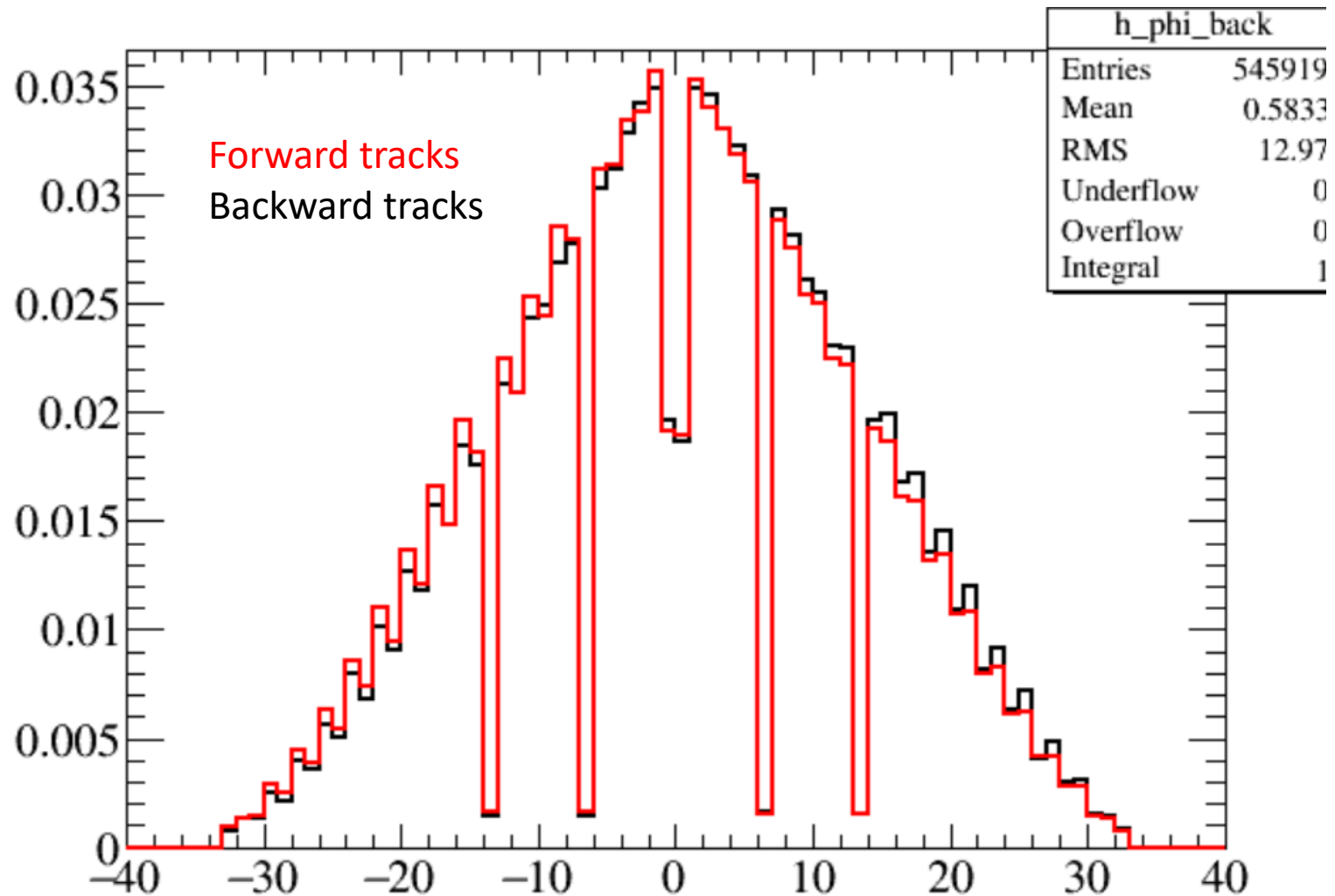
# Forward track: theta comparison



# Phi – Open sky (Theta > 20 deg)



# Comparison data phi fwd open sky/phi bwd

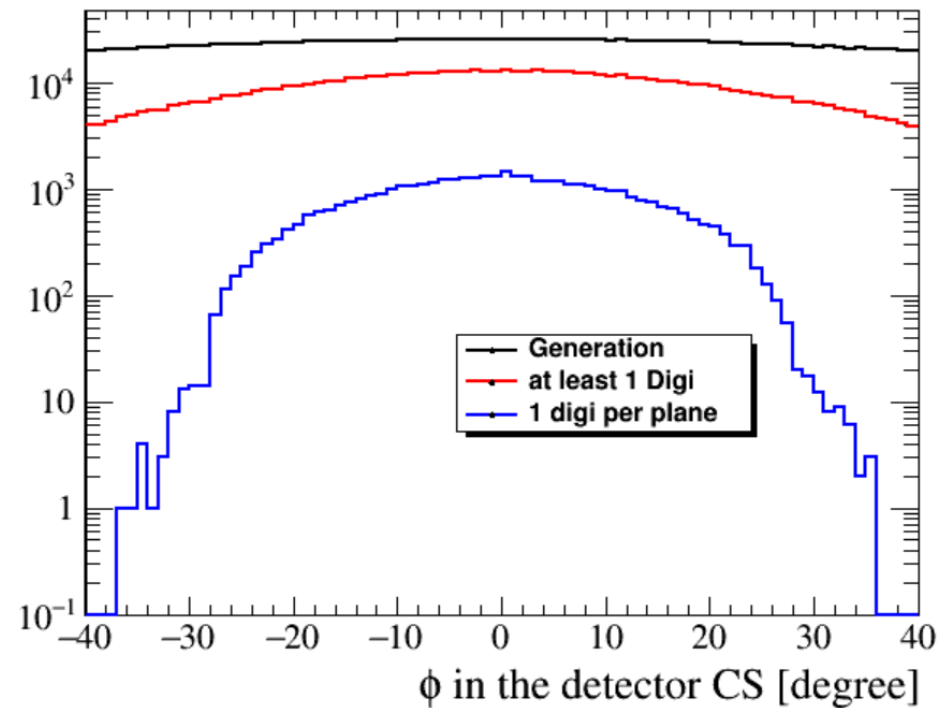
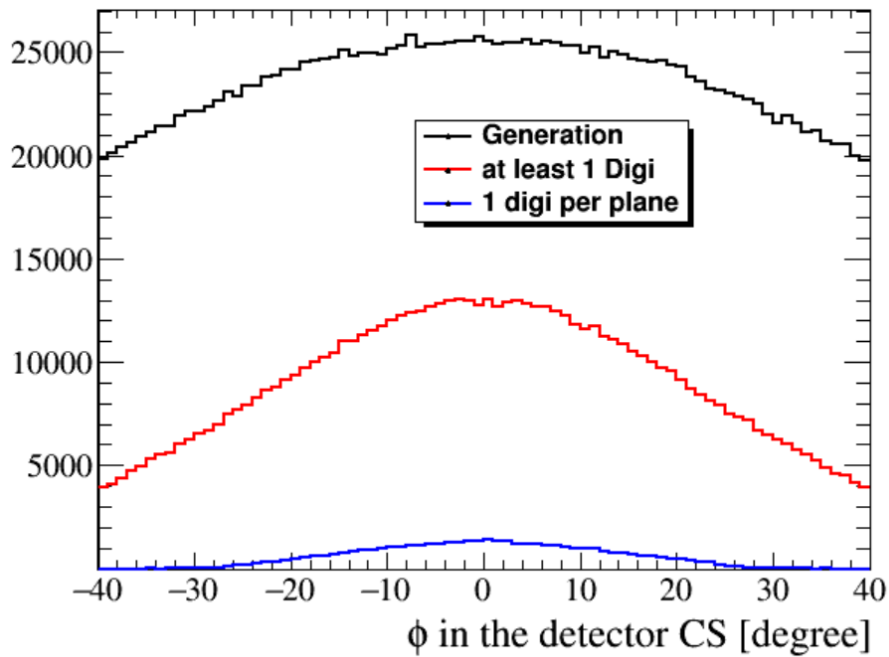


# Outlook

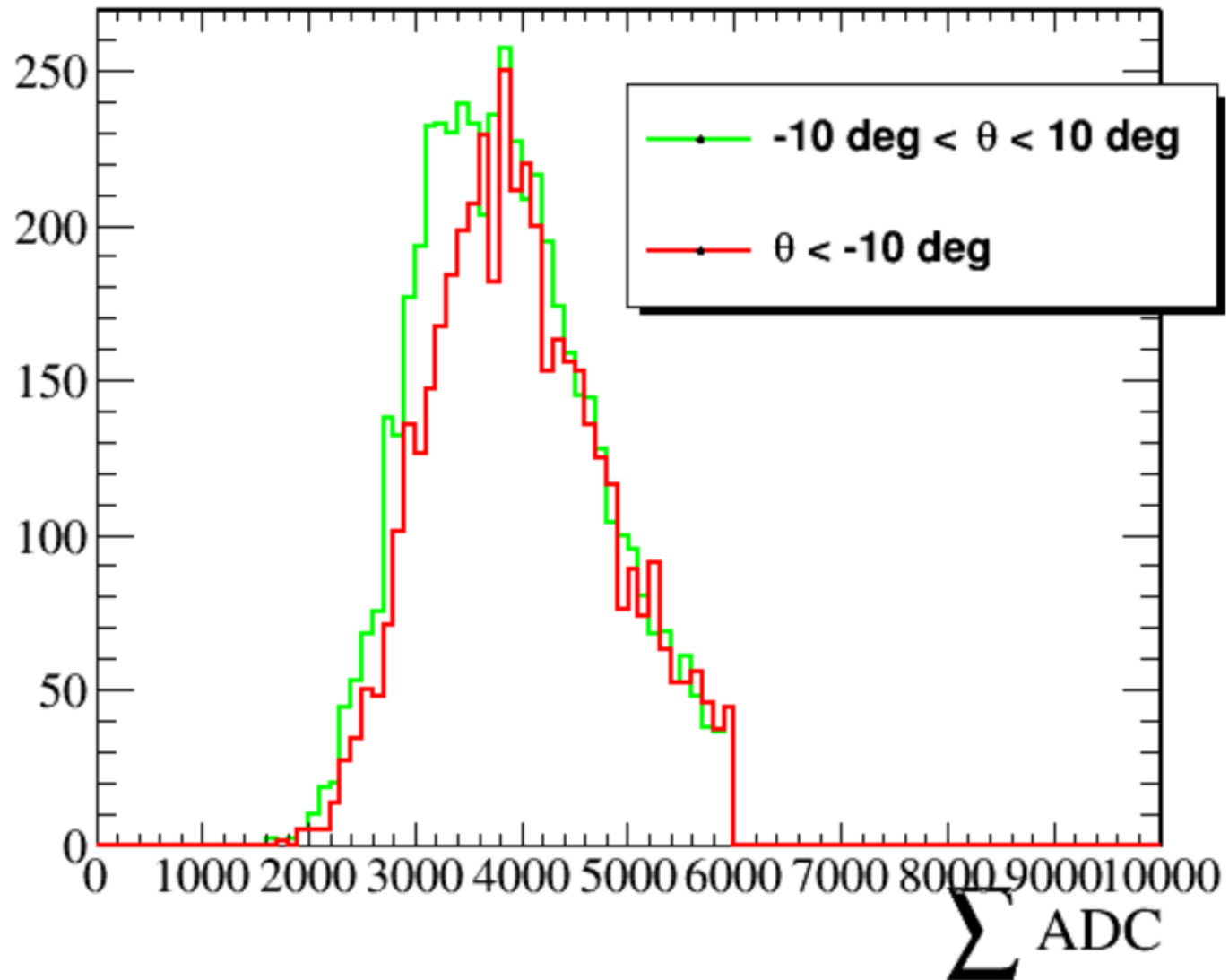
- Fast simulation useful to understand the basic principles
- Issue to be understood for the phi distribution
- Detailed simulation (see Yannis)

Generated phi :

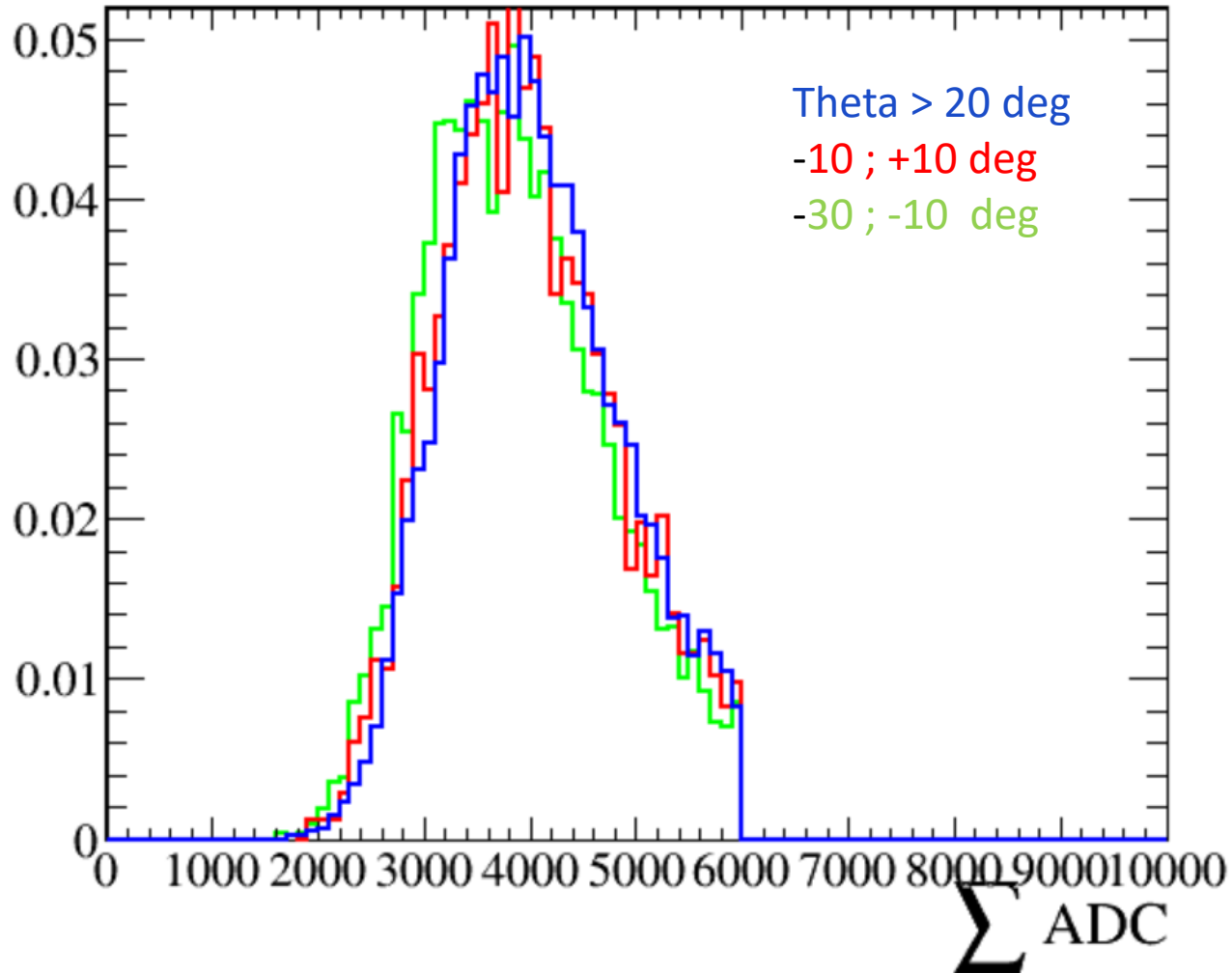
1 strip/plane seems to create the cut-off



# Etot distribution



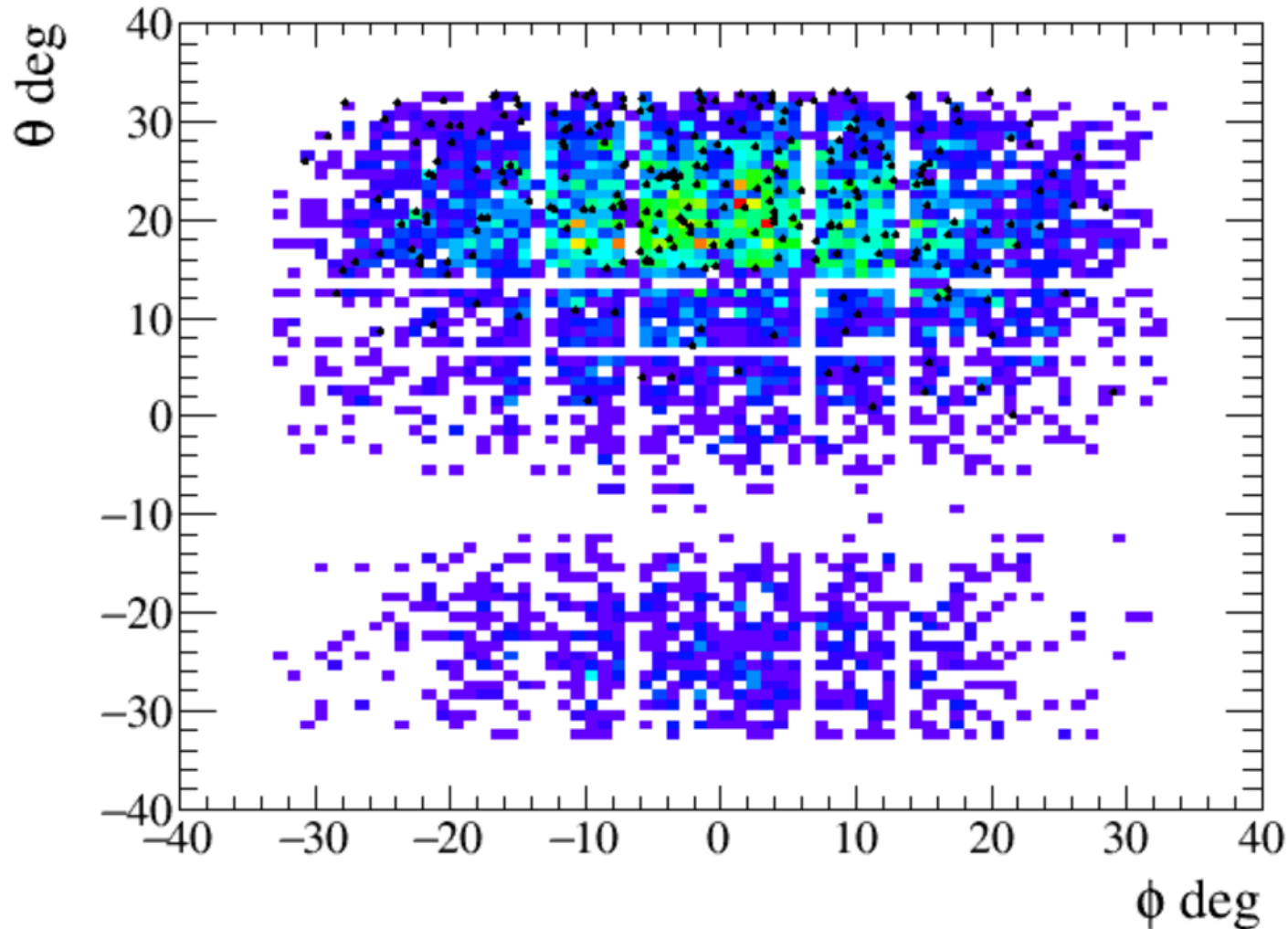
# Normalized

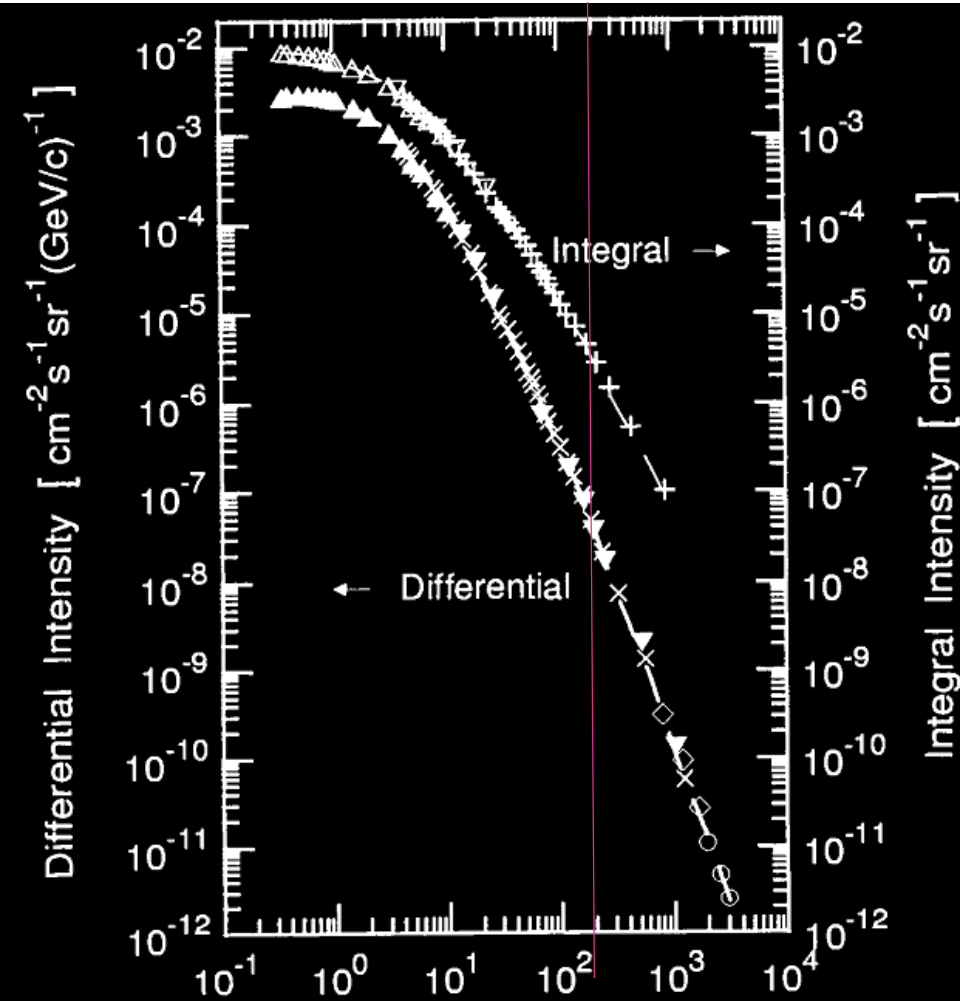




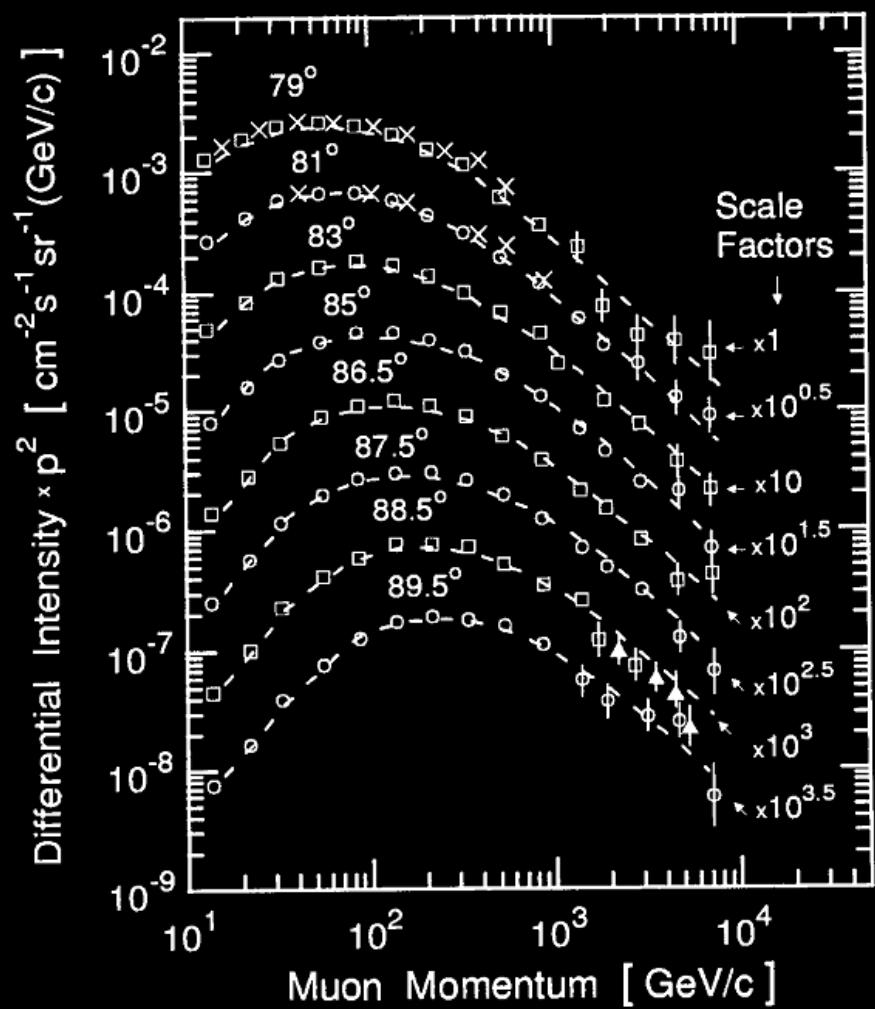
# Backup

# Phase space corresponding to the first strip in the first layer

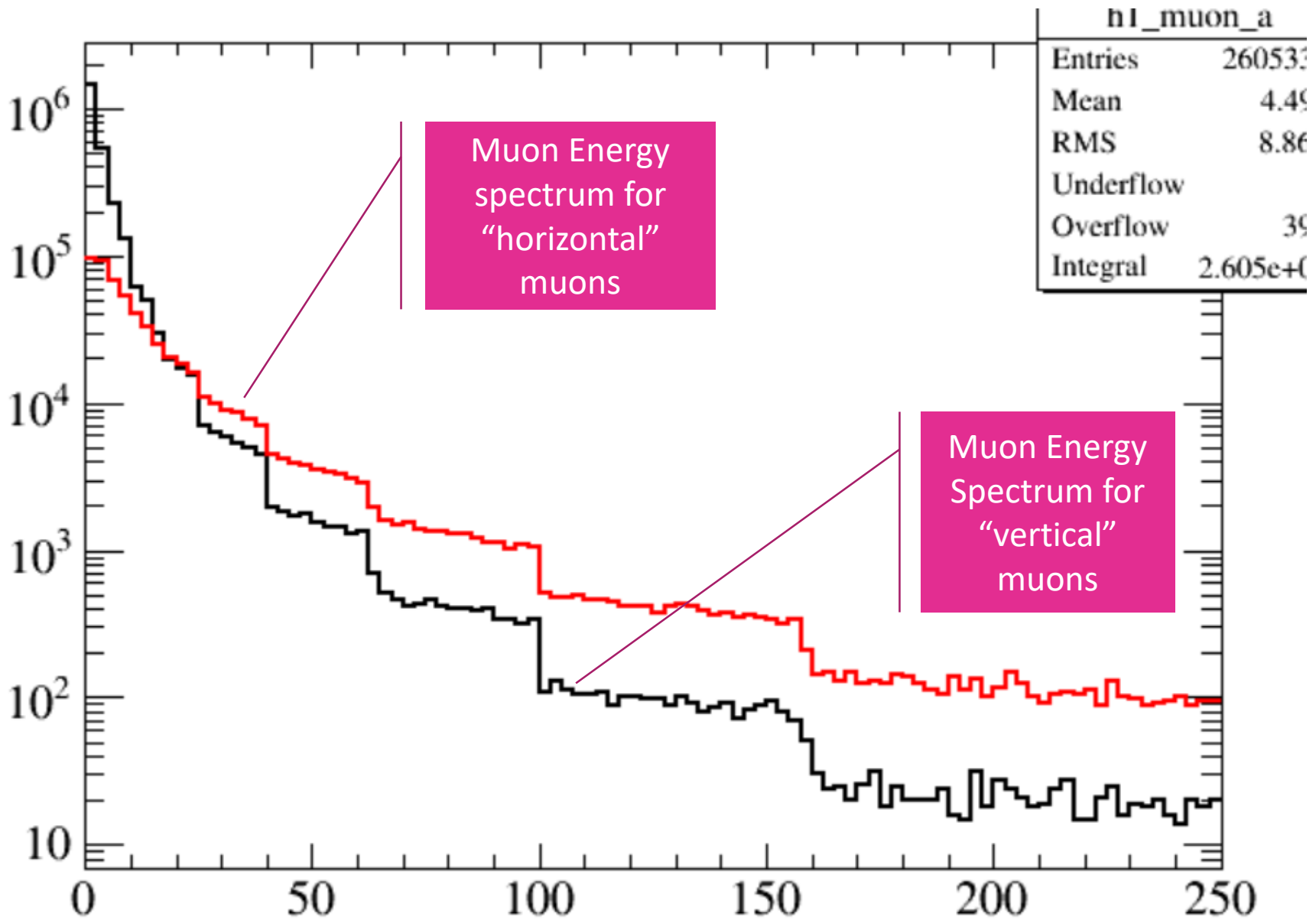




- |      |                          |      |   |
|------|--------------------------|------|---|
| ▼, ▽ | Appleton et al. (1971)   | ▲, △ | Barbouti and Rastin (1983)                    |
| ×, + | Rastin (1984a)           | ○    | Komori (1977) and<br>Komori and Mitsui (1979) |
| ◇    | Thompson et al. (1977b)  |      |   |
| - -  | best fit, Rastin (1984a) |      |   |



- |       |   |
|-------|---|
| □, ○  | DEIS 78° - 90°, Allkofer et al. (1979b, 1981) |
| ×     | Kiel-DESY, Allkofer et al. (1977b)            |
| ▲     | MUTRON, Muraki et al. (1979)                  |
| - - - | model calculation, Maeda (1970, 1973)         |



# Generator : CRY

