

# A $n^{\text{th}}$ look at the test beam data or do we see what we expect ?

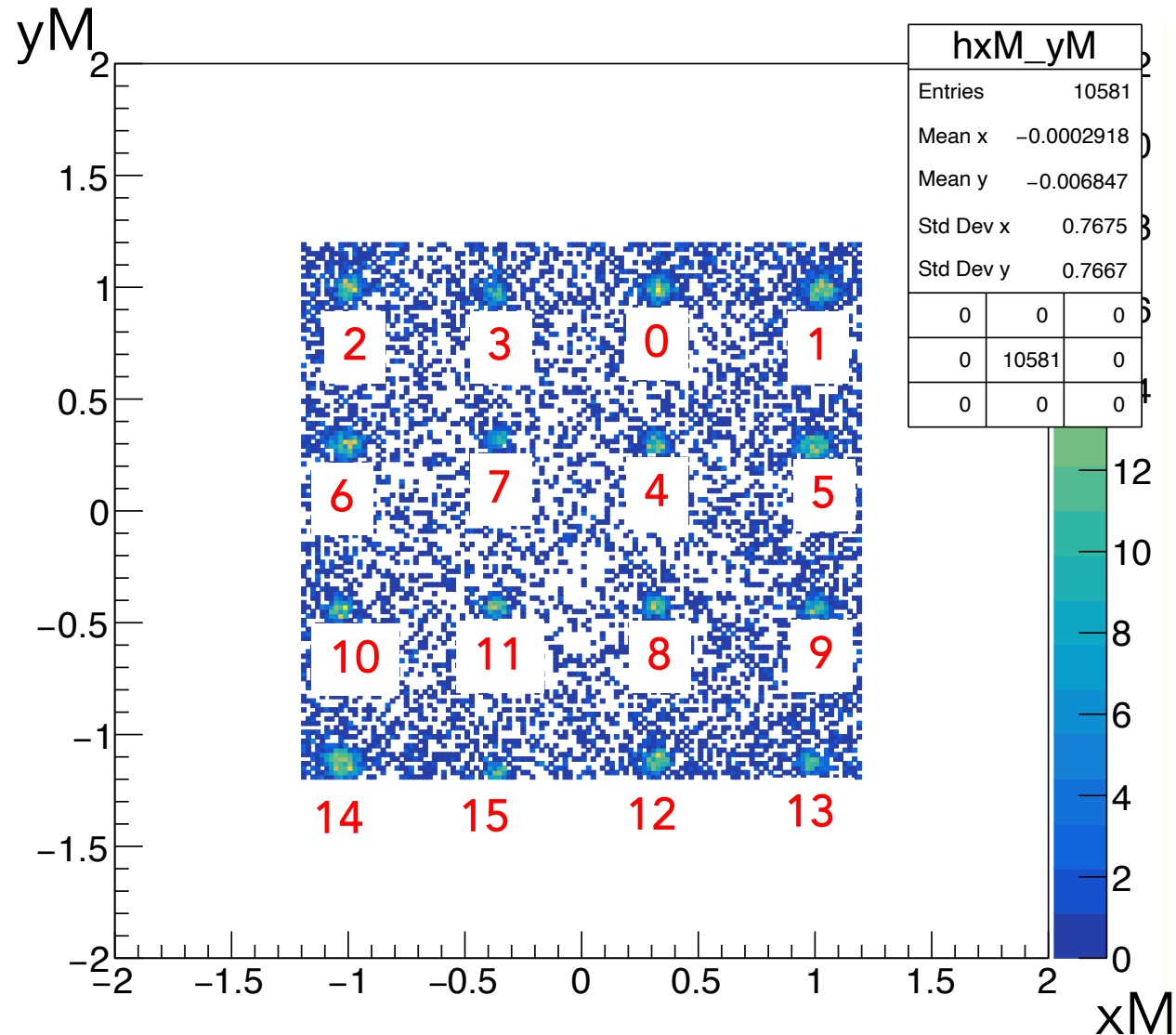
13/09/2024

General requirements :

- v3 processing
- general cuts : `("(muonType==20&&eventType==4)&&hitTotCor<1500 &&diffTrack2<1") ;`
- `muonType==20` (crosses all GRAINITA)

- Pion vs Muon : same shape ?
- SiBB setting impact

# Correct fibers numbering and positions ?



How does the signal  
evolve nearby a fiber ?

# How does the signal evolve in a disk centered around a fiber depending on the radius ?

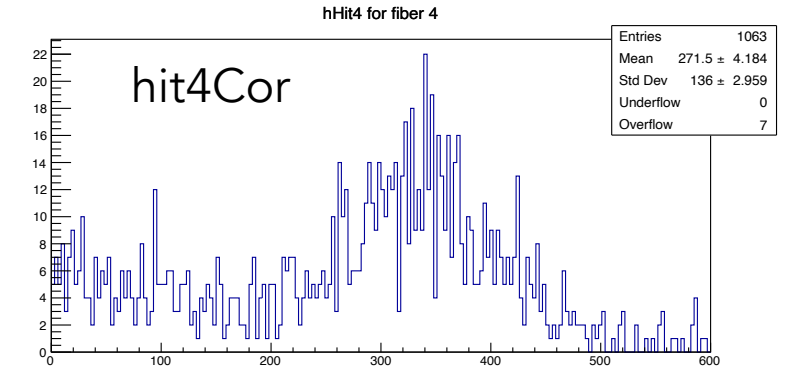
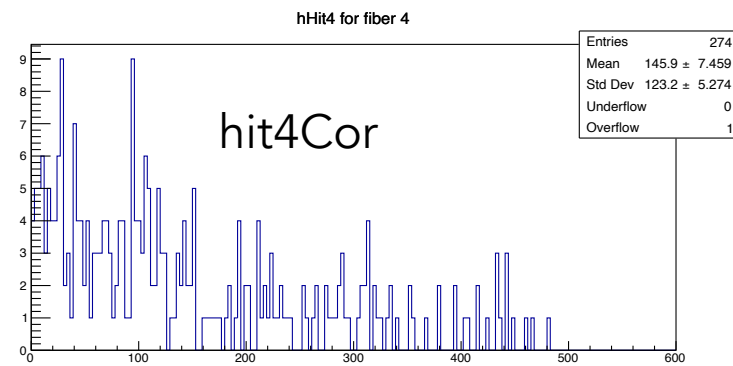
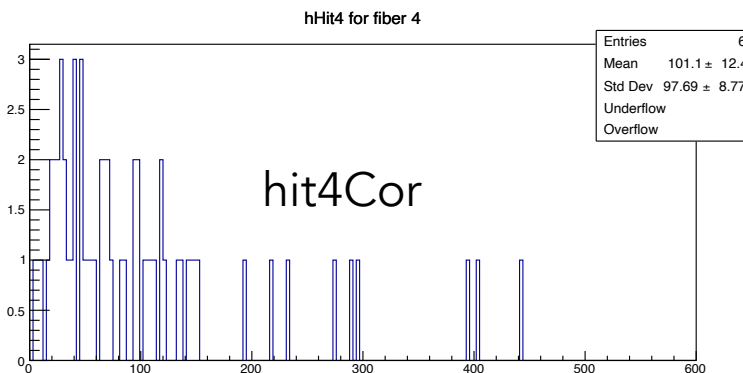
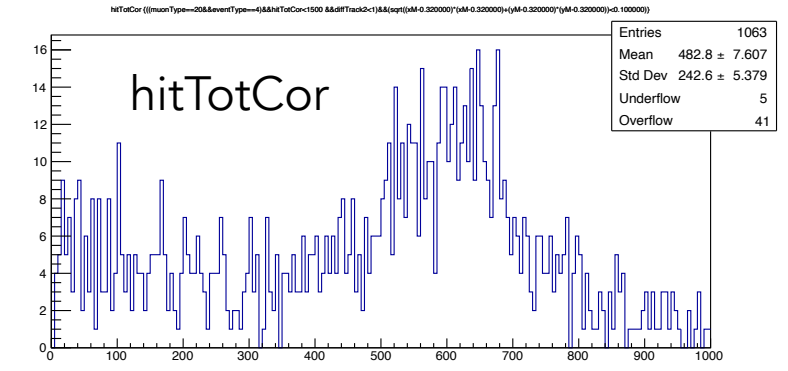
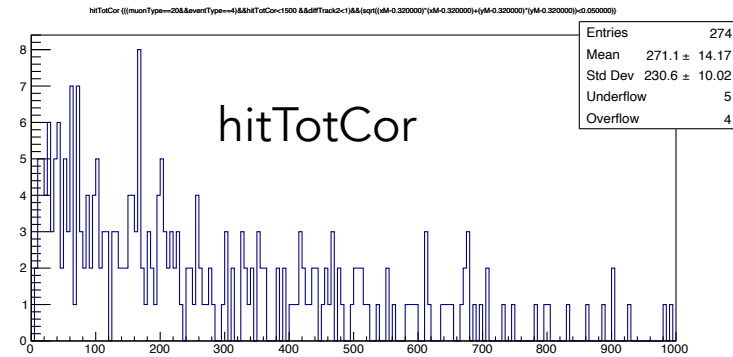
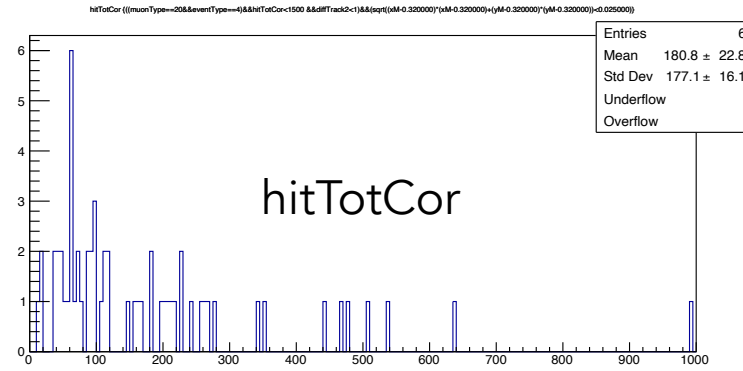
Muon runs 59 & 60

Fiber 4

R = 0.25 mm

R = 0.5 mm

R = 1mm

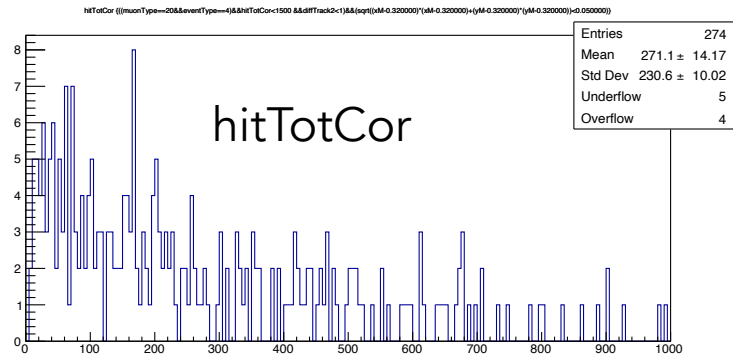




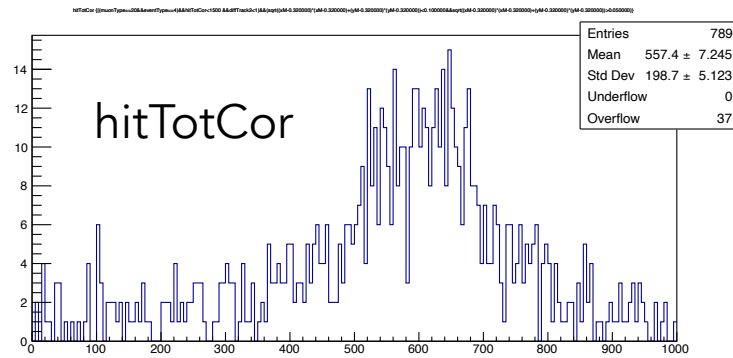
# How does the signal evolves in a corona centered around a fiber depending on the radius ?

Fiber 4

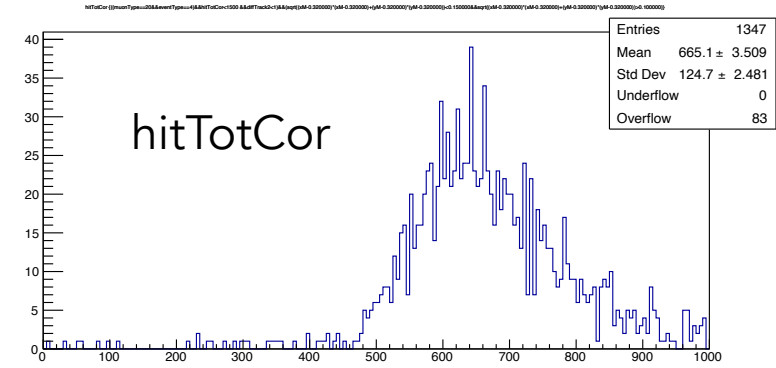
R < 0.5 mm



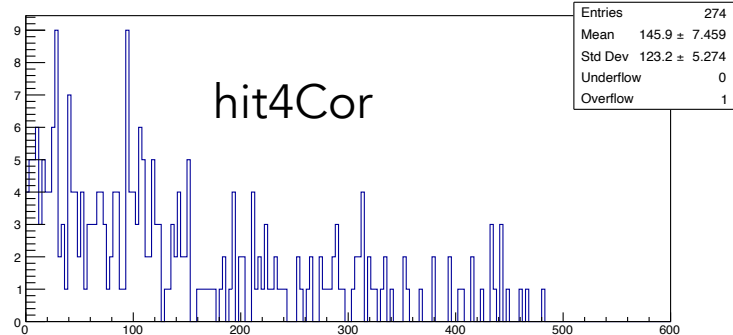
.5 mm < R < 1mm



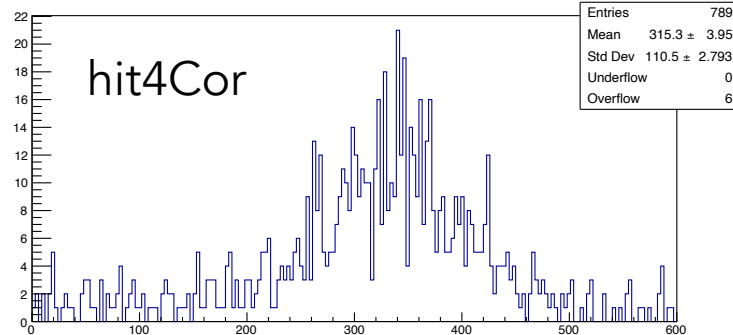
1 mm < R < 1.5 mm



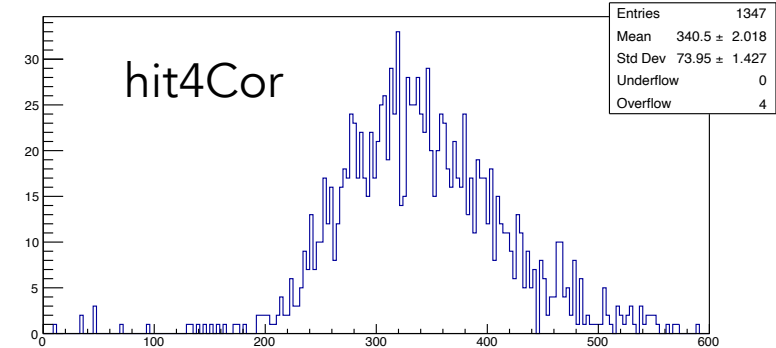
hHit4 for fiber 4



hHit4 for fiber 4



hHit4 for fiber 4

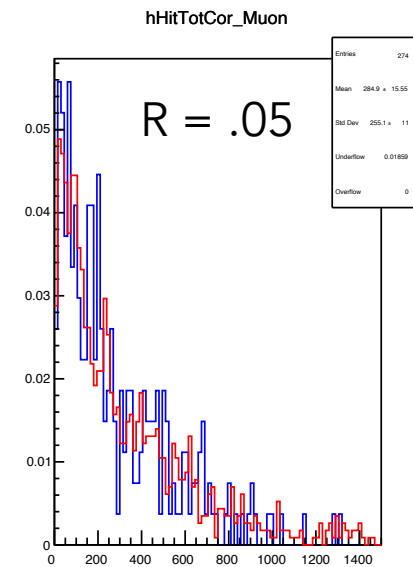
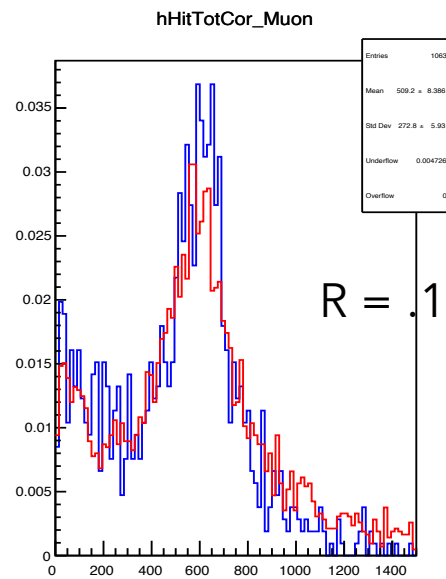
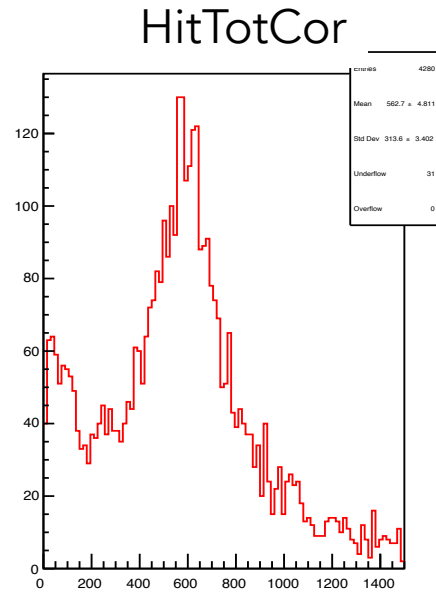
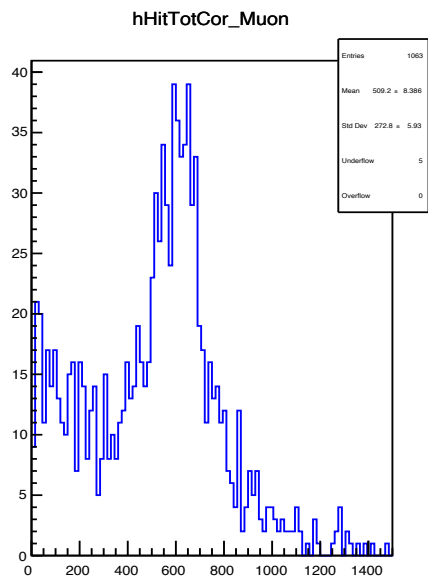
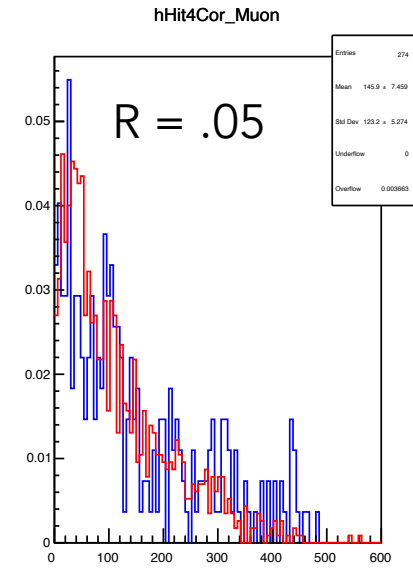
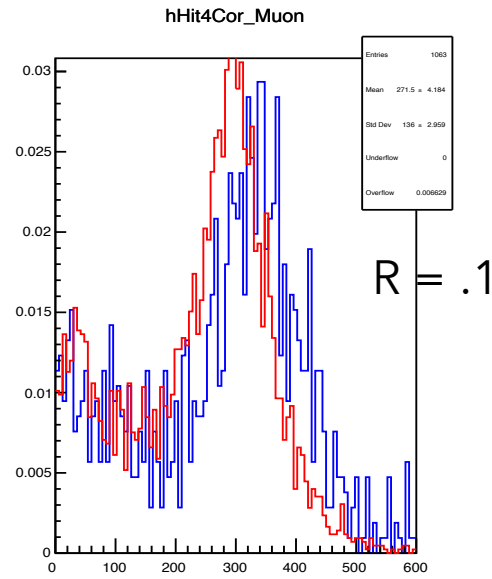
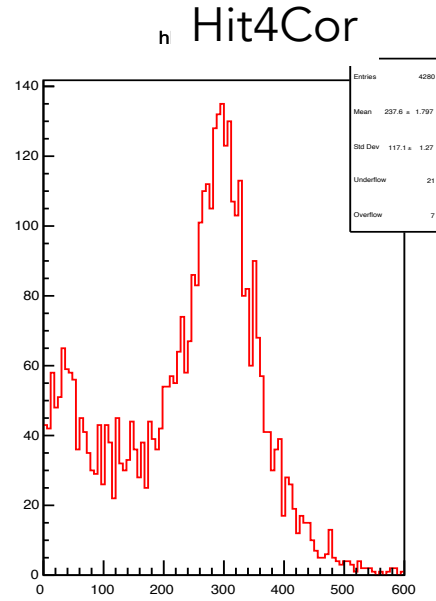
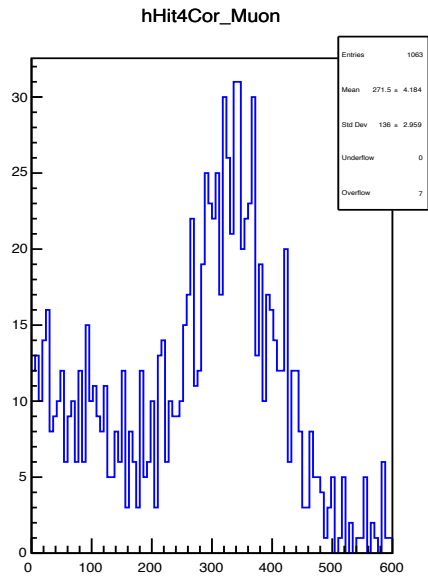


# Muon and Pion comparison

$\sqrt{(x_M - 0.32)^2 + (y_M - 0.32)^2} < 0.1$  centered on Fiber4

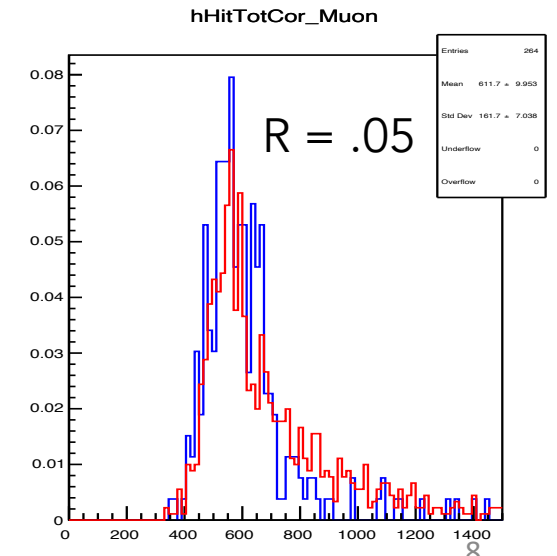
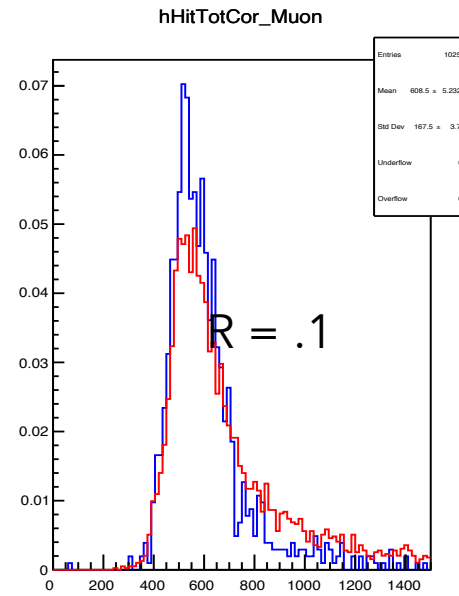
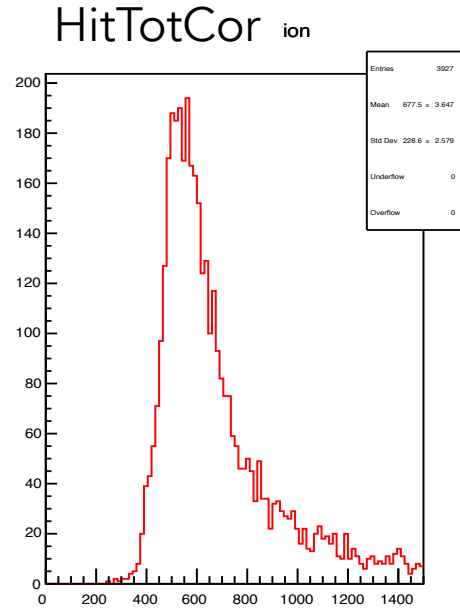
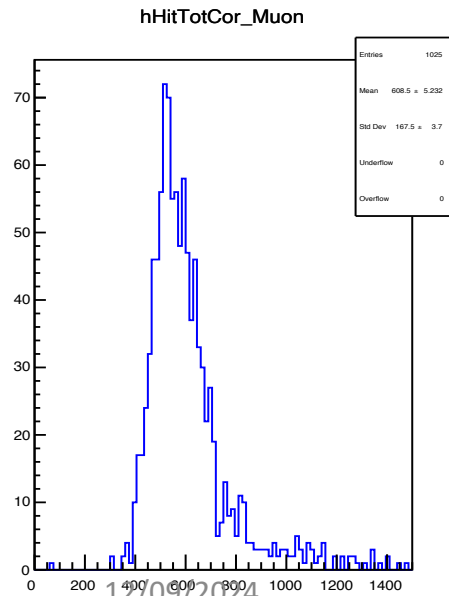
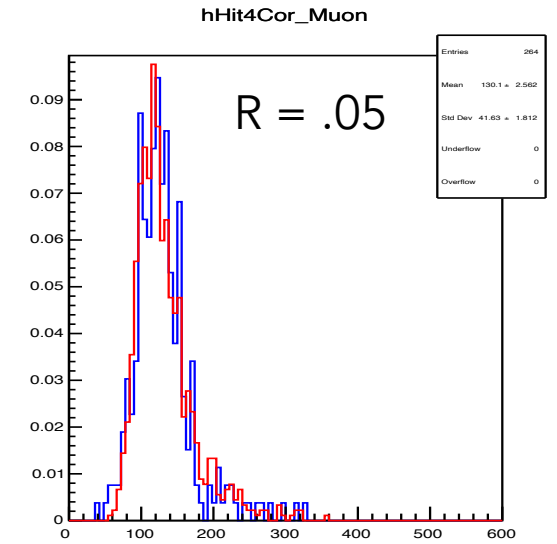
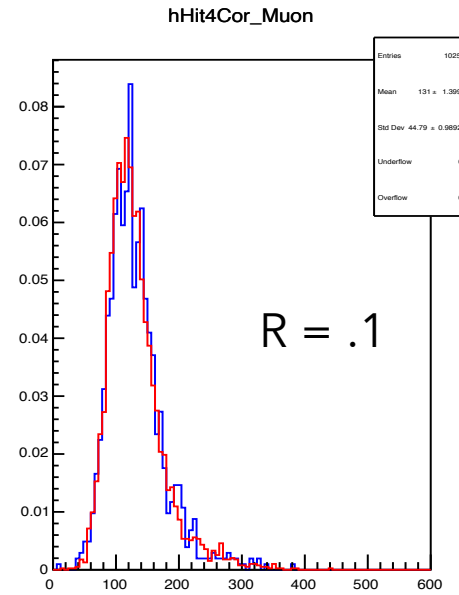
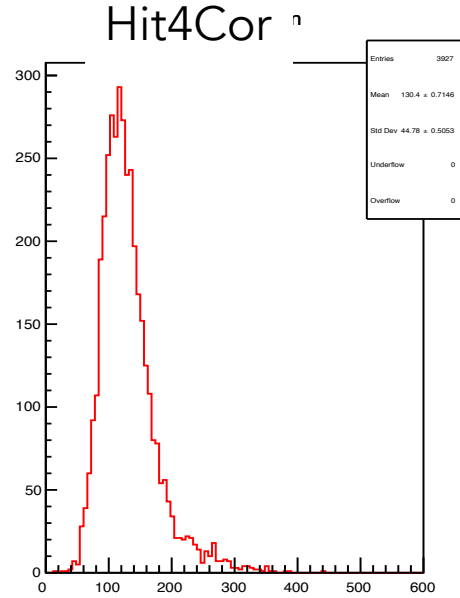
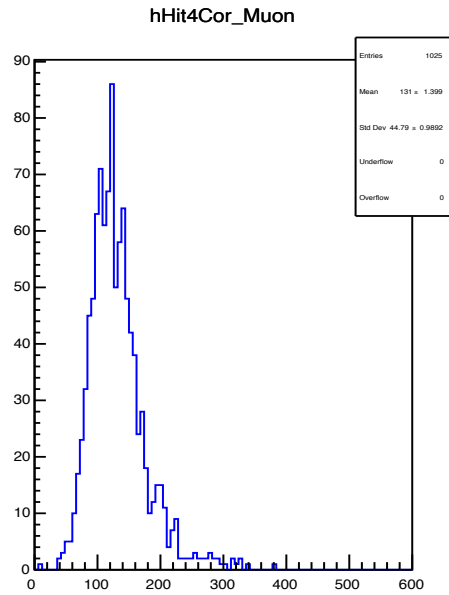
Pion runs 57 & 58

Muon runs 59 & 60



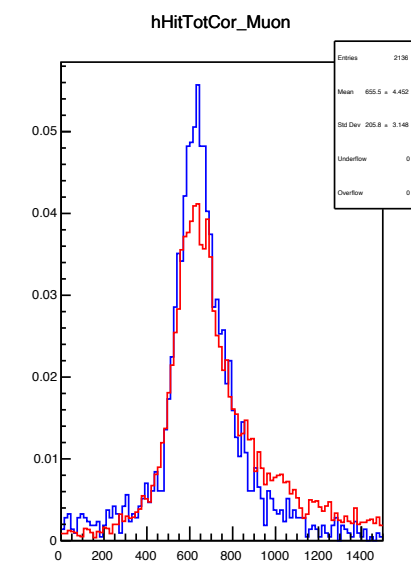
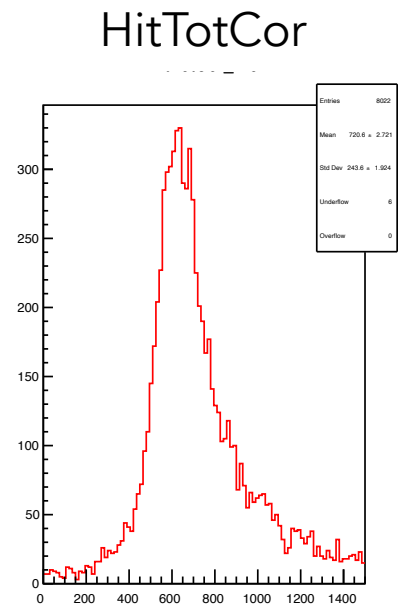
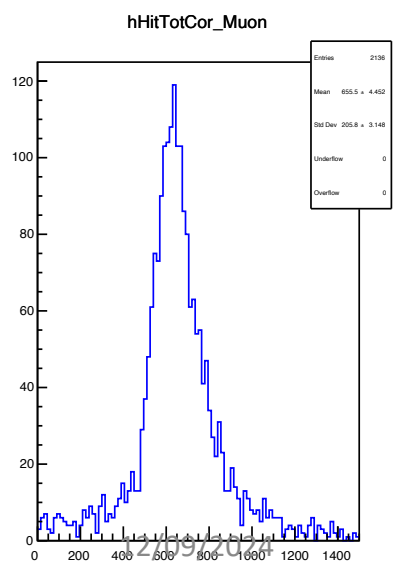
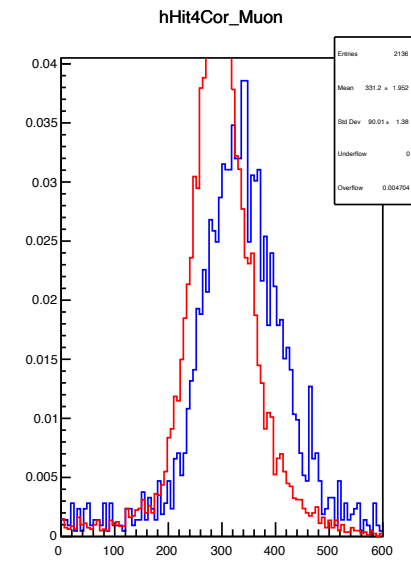
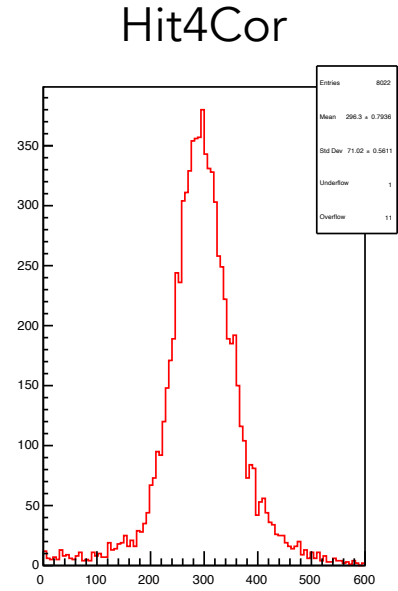
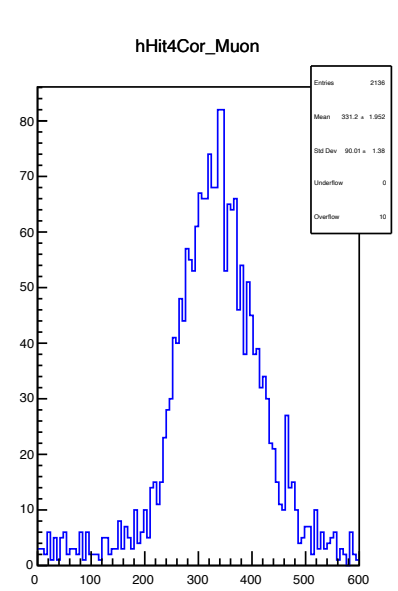
$\sqrt{(x_M - 0.32)^2 + (y_M - 0.82)^2} < 0.1$  off Fiber4

Pion runs 57 & 58  
Muon runs 59 & 60



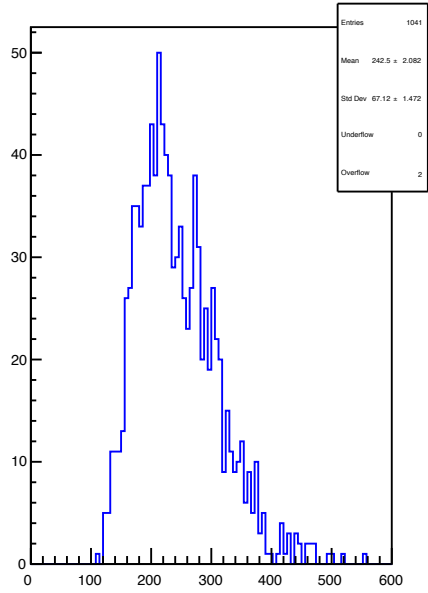
$\sqrt{(x_M - 0.32)^2 + (y_M - 0.32)^2} < 0.15$  &&  $\sqrt{(x_M - 0.32)^2 + (y_M - 0.32)^2} > 0.05$   
coronna around Fiber4

Pion runs 57 & 58  
Muon runs 59 & 60

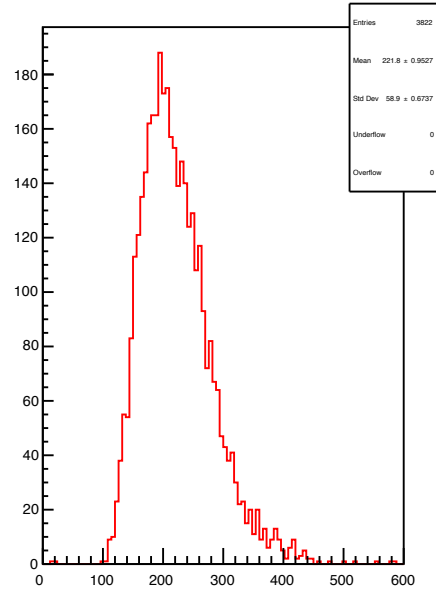


$$\sqrt{(x_M - 0.5)^2 + (y_M - 0.5)^2} < 0.1$$

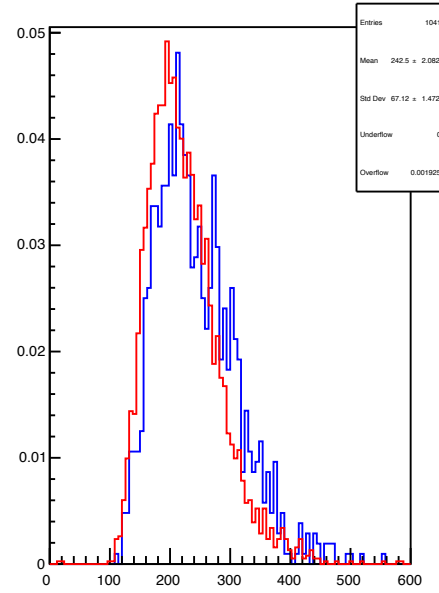
hHit4Cor\_Muon



hHit4Cor\_Pion



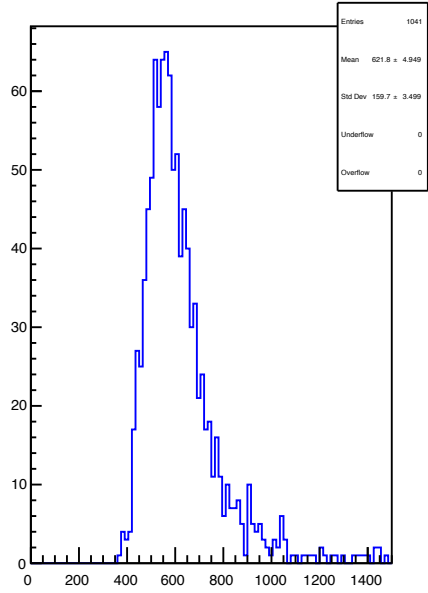
hHit4Cor\_Muon



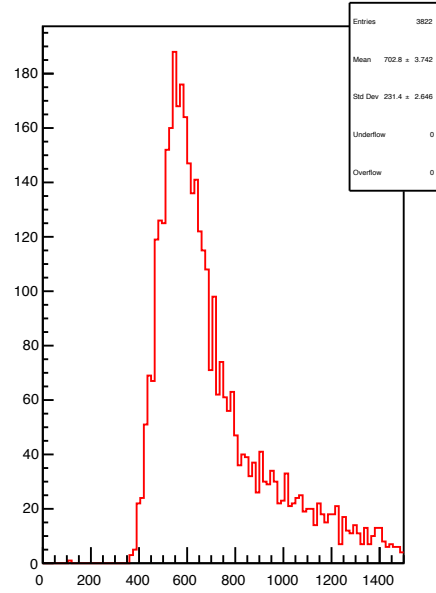
?

Pion runs 57 & 58  
Muon runs 59 & 60

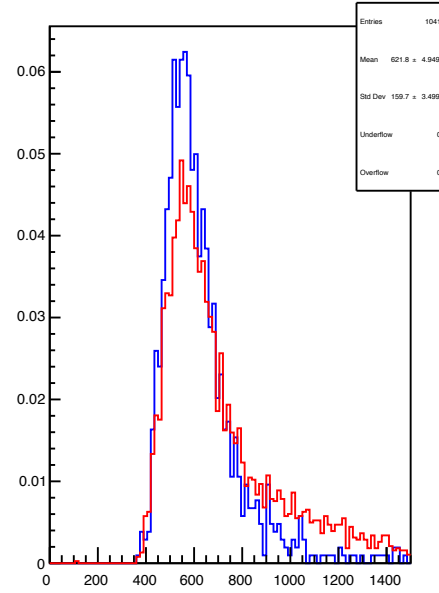
hHitTotCor\_Muon



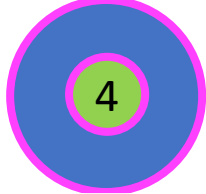
hHitTotCor\_Pion



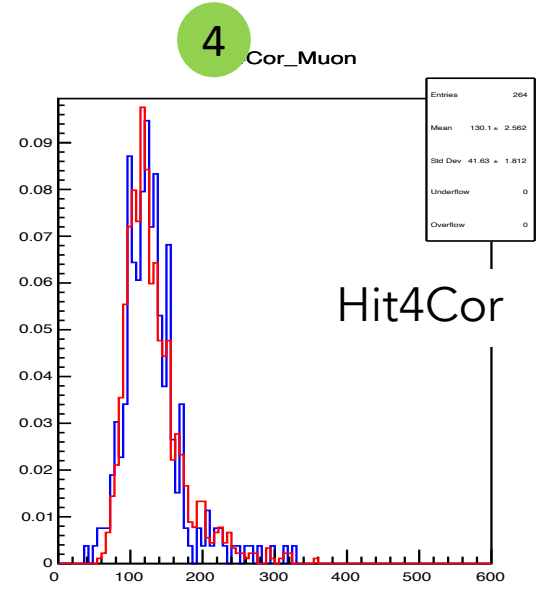
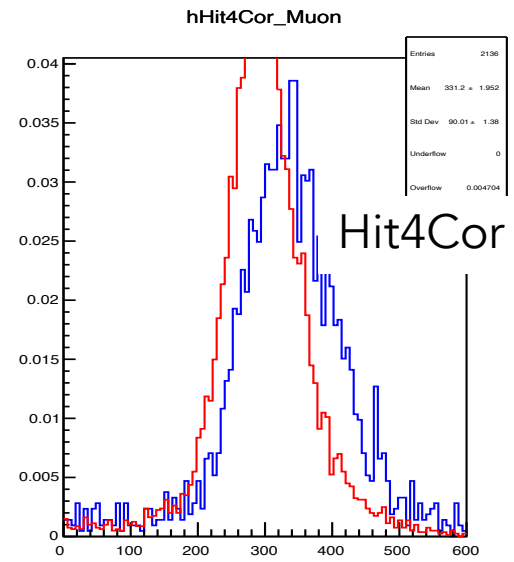
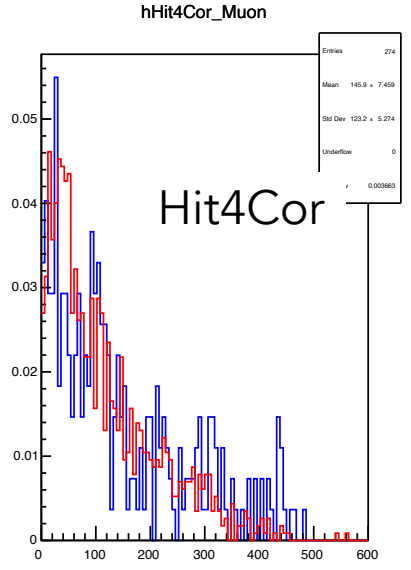
hHitTotCor\_Muon



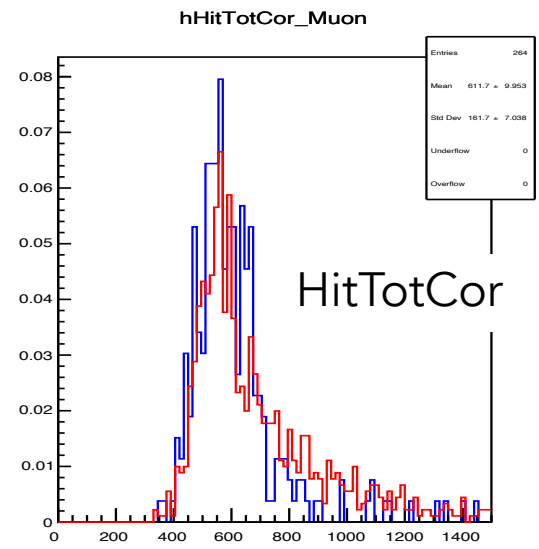
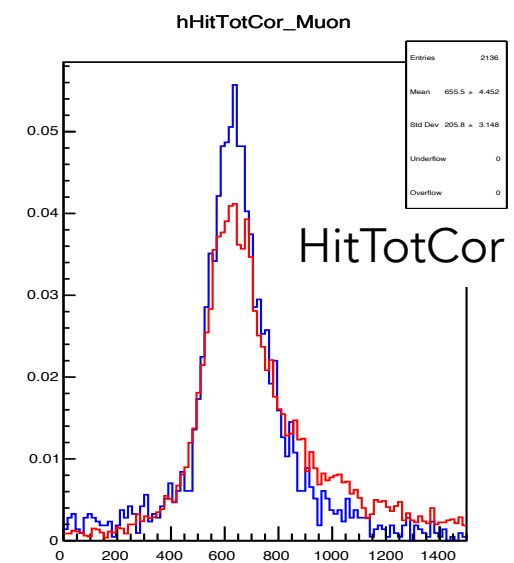
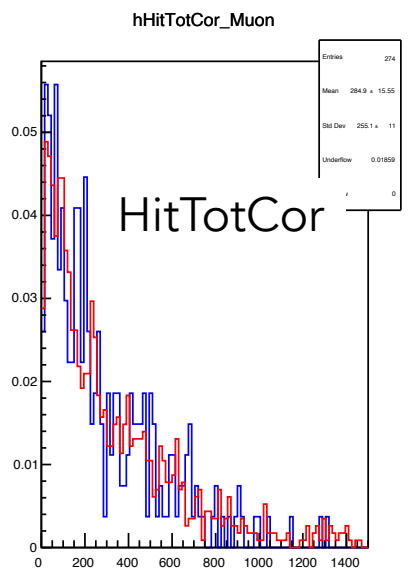
4



4



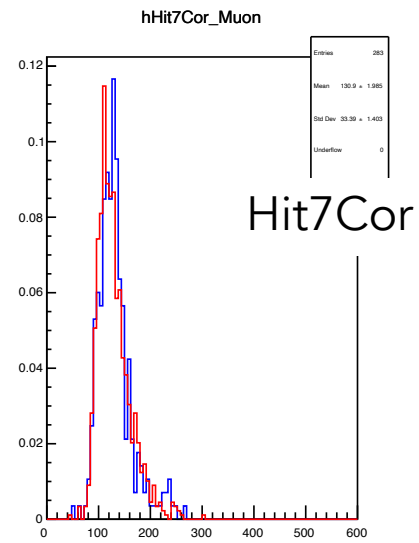
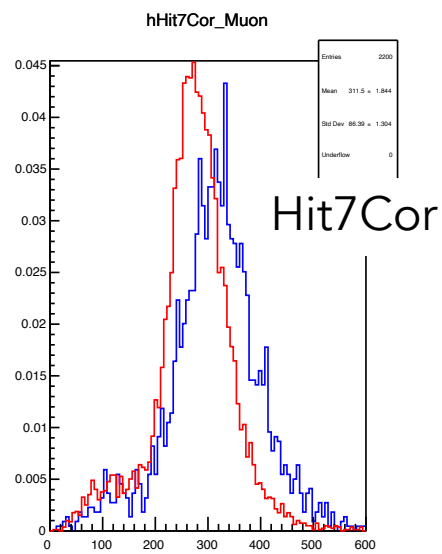
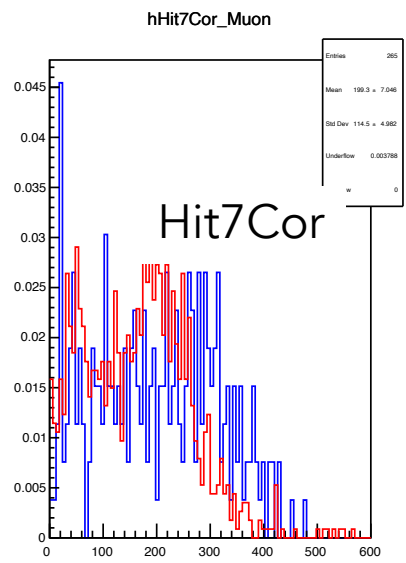
?



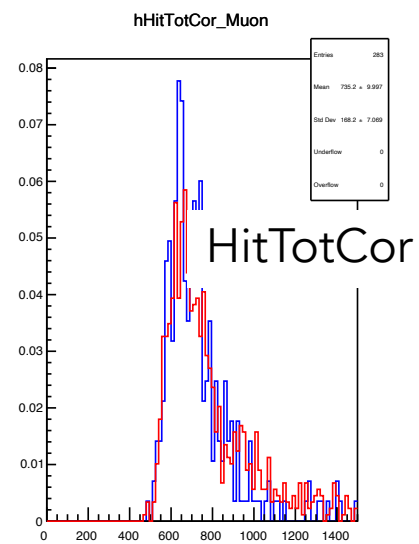
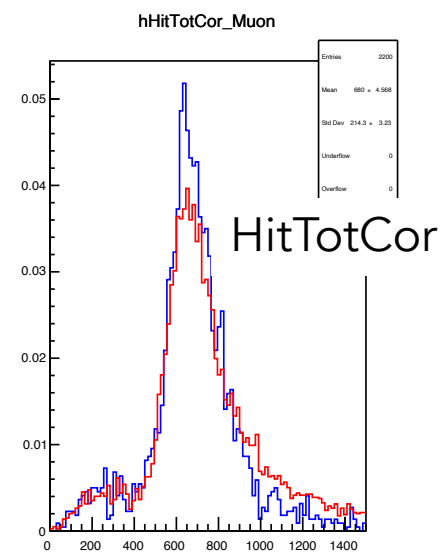
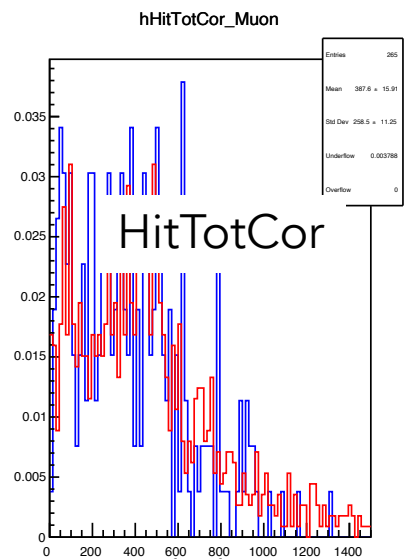
7



7



Same pattern as for Fiber4

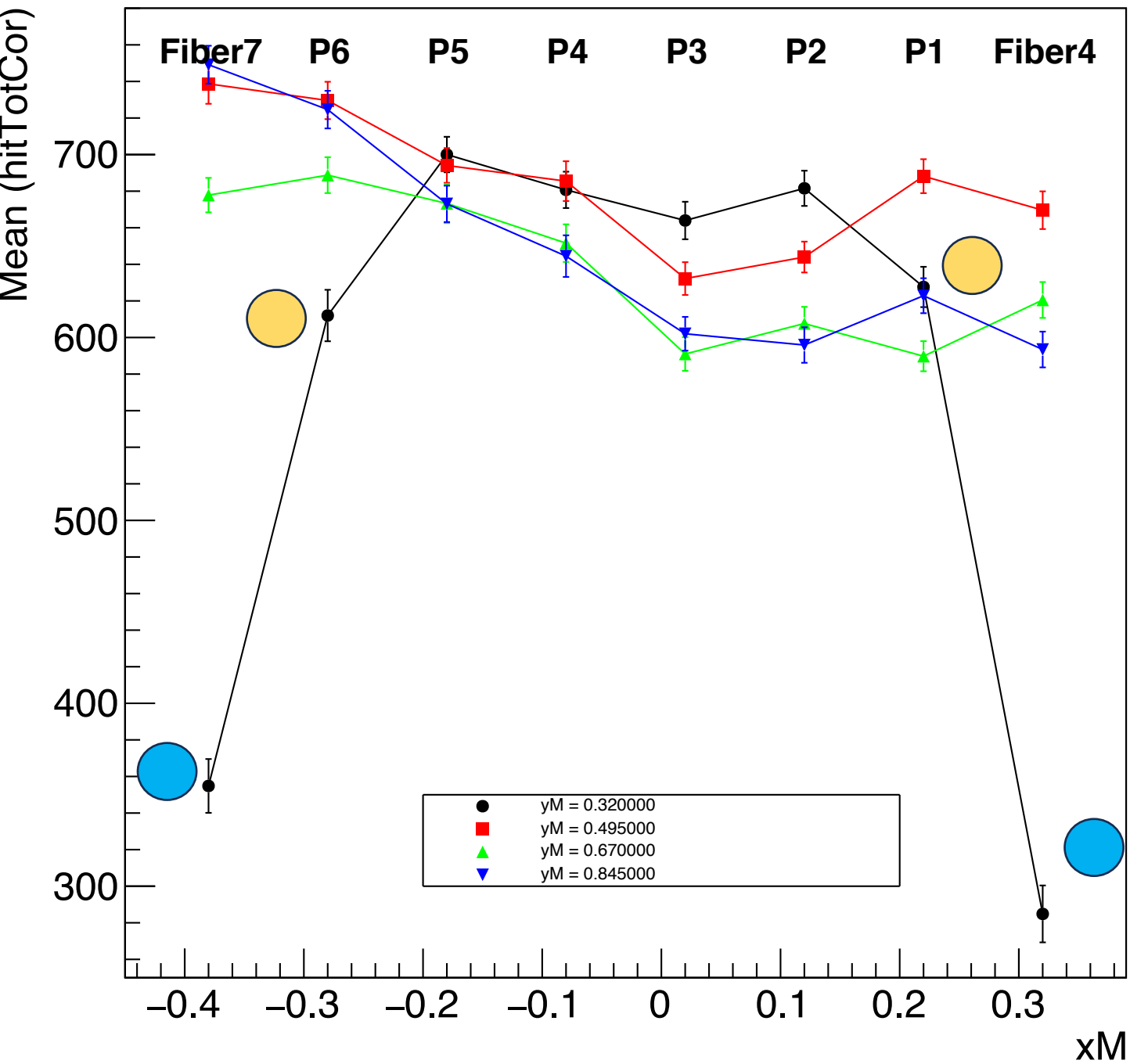


Nearby the fiber the Muon and Pion signal seems different ... ?

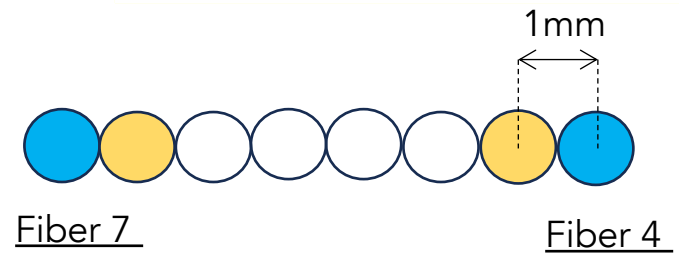
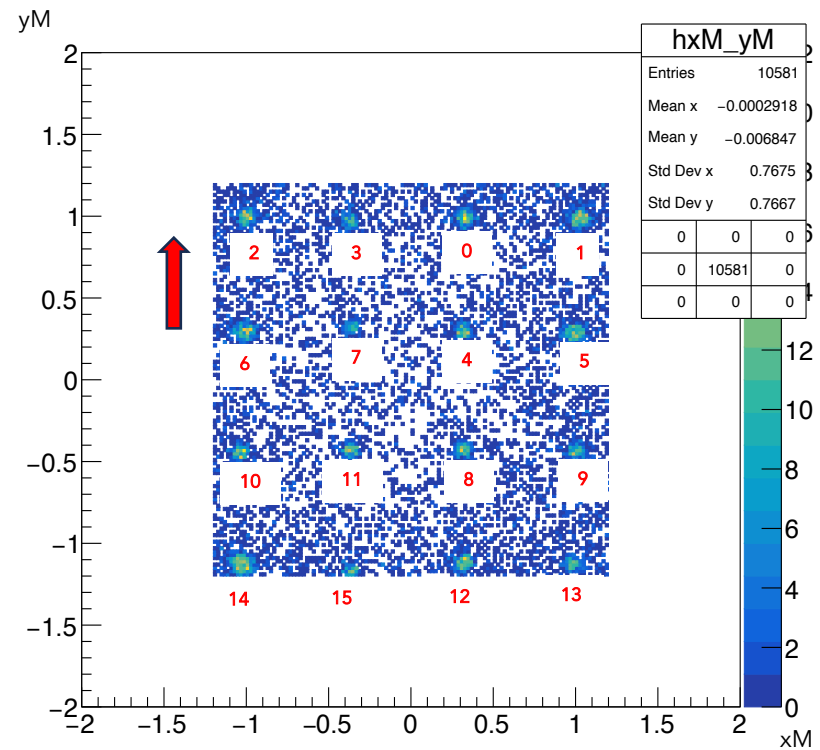
12/09/2024



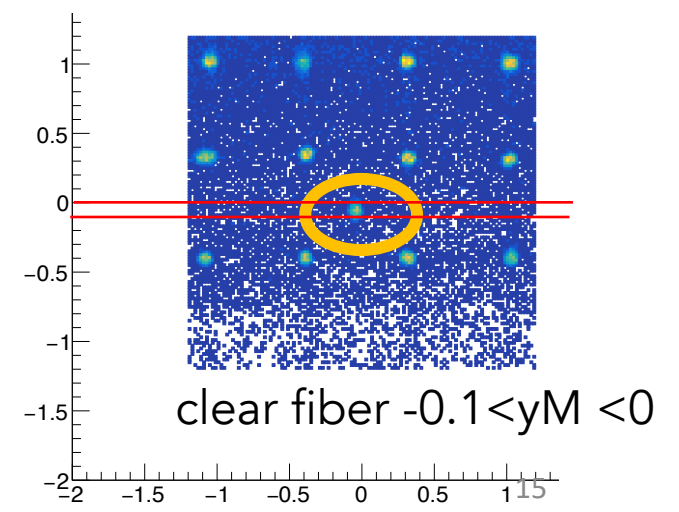
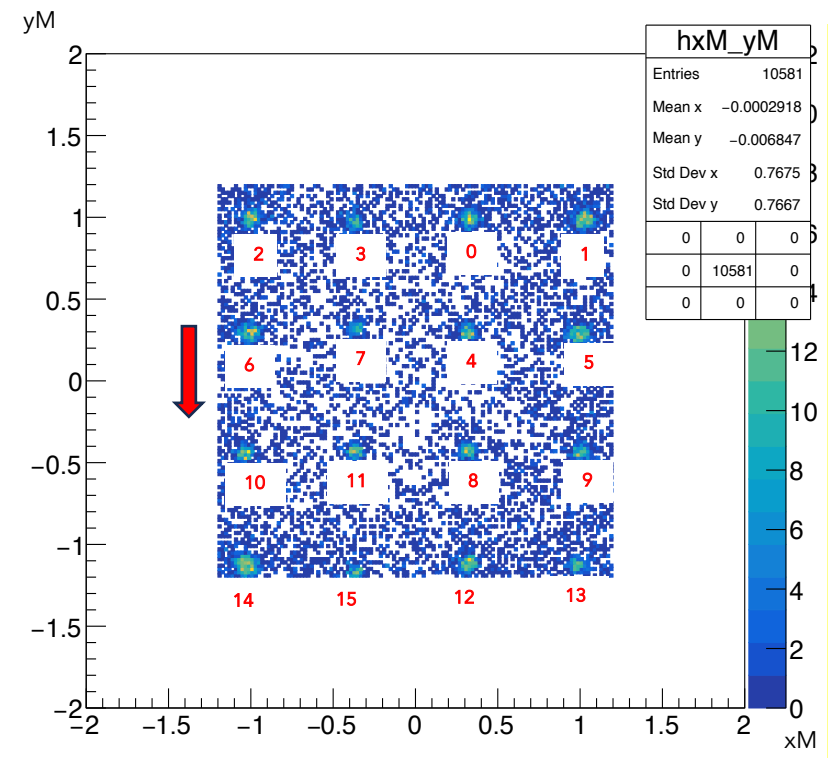
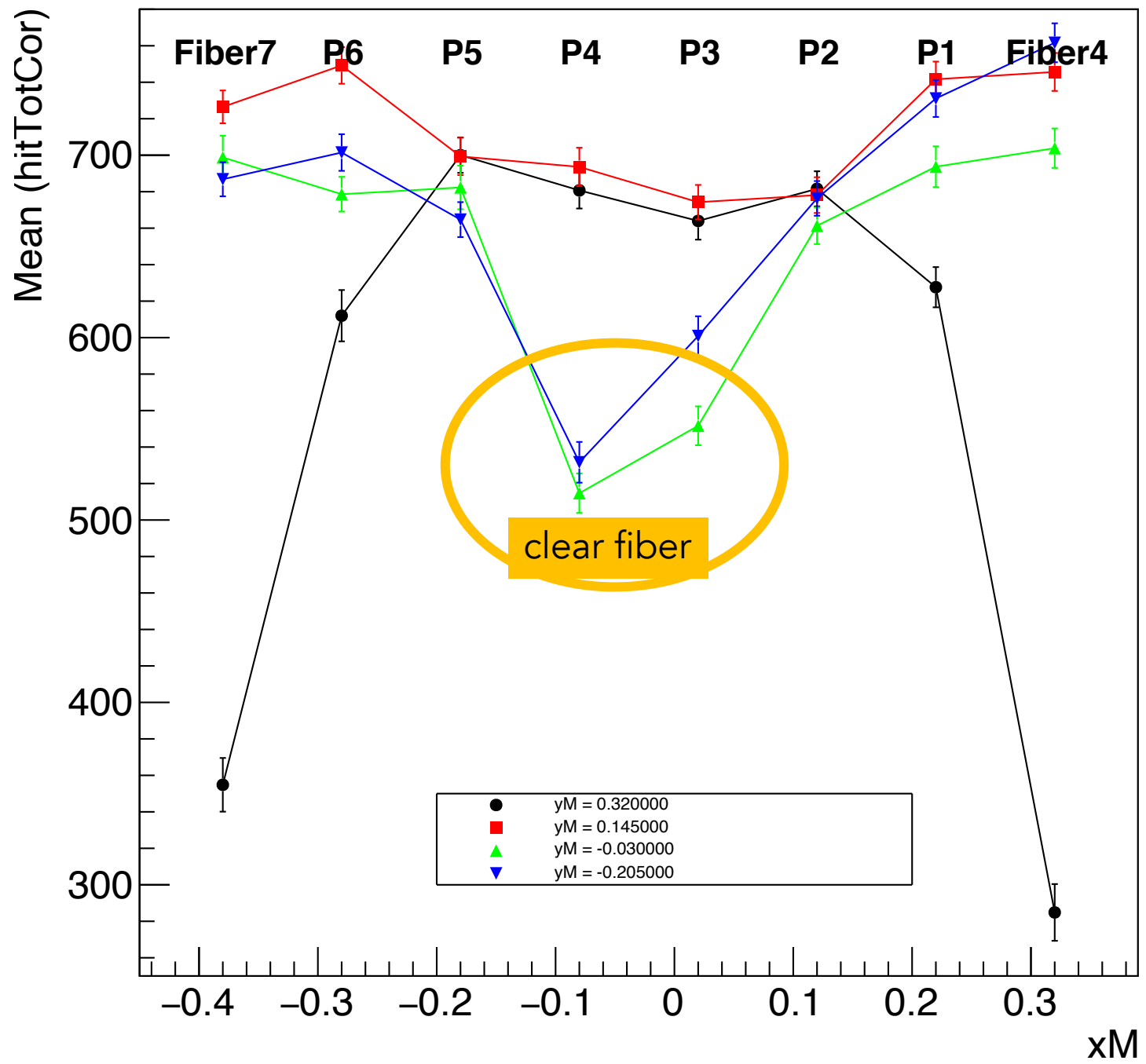
# Towards uniformity scan



### Muon runs 59 & 60



- In the fiber
- Mixed zone (mostly OK)
- Zone OK

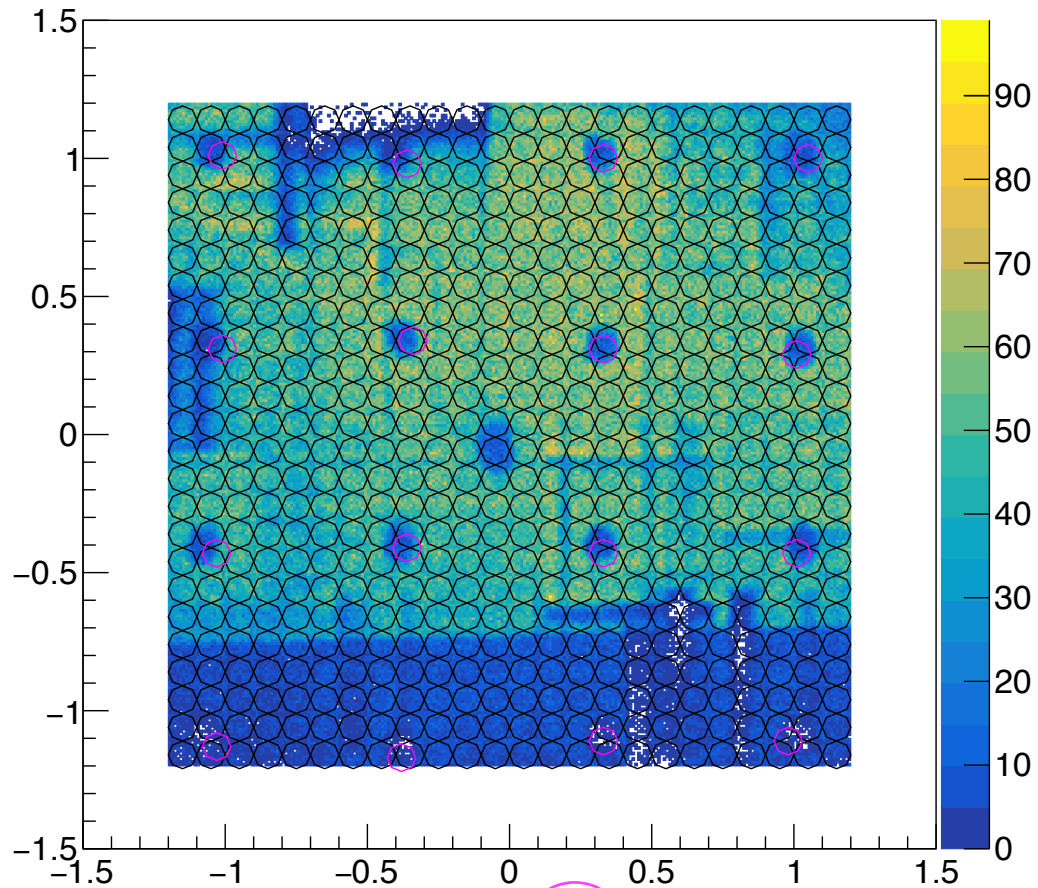


# Let's have a look at Pion high-stat sample paving the whole plane ...

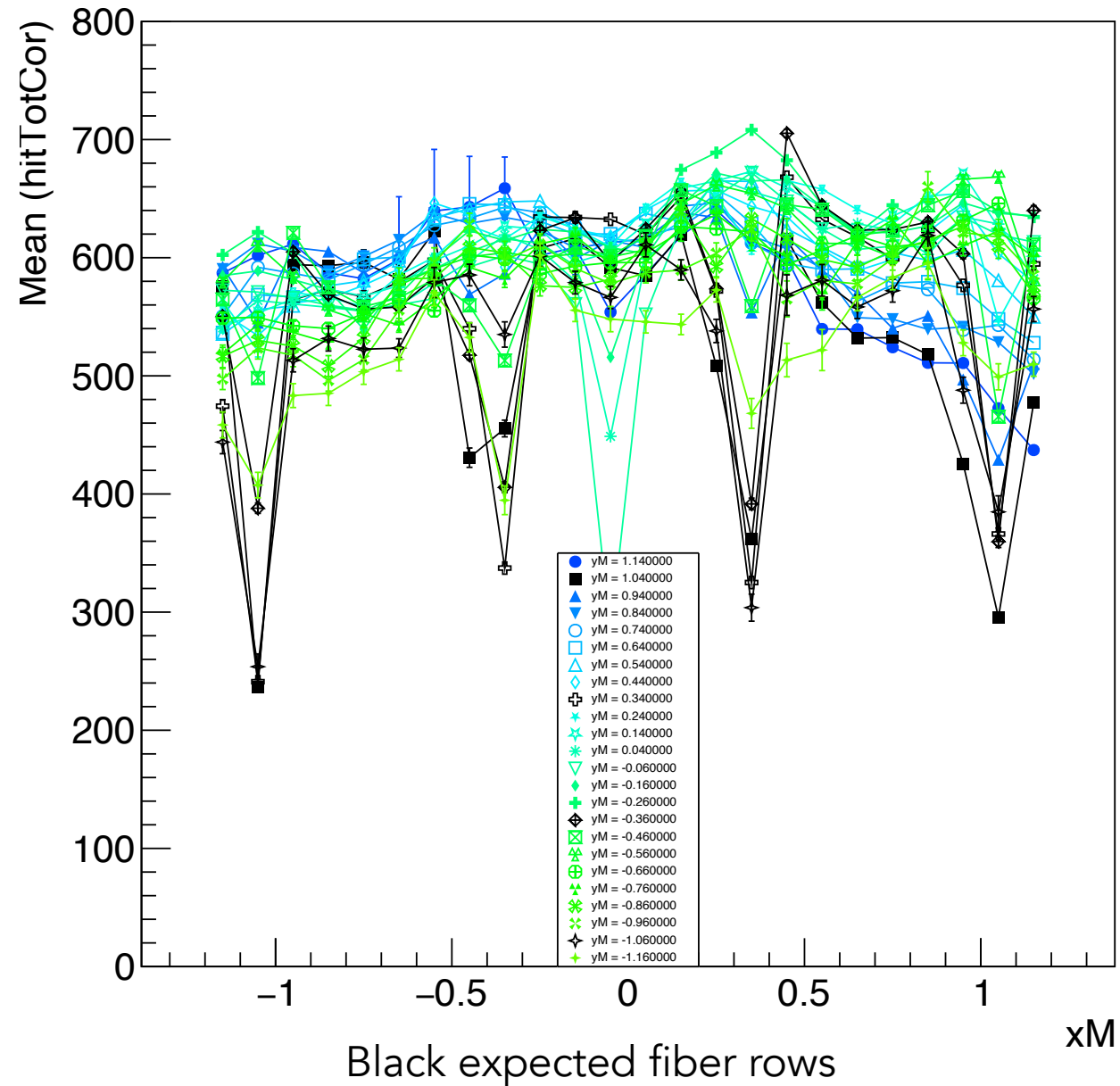
Runs 41 – 45 + 50 & 51  
Troll1 good SIBB

R = .5 mm

### xM vs yM (hitTotCor>400)



 Herve positions

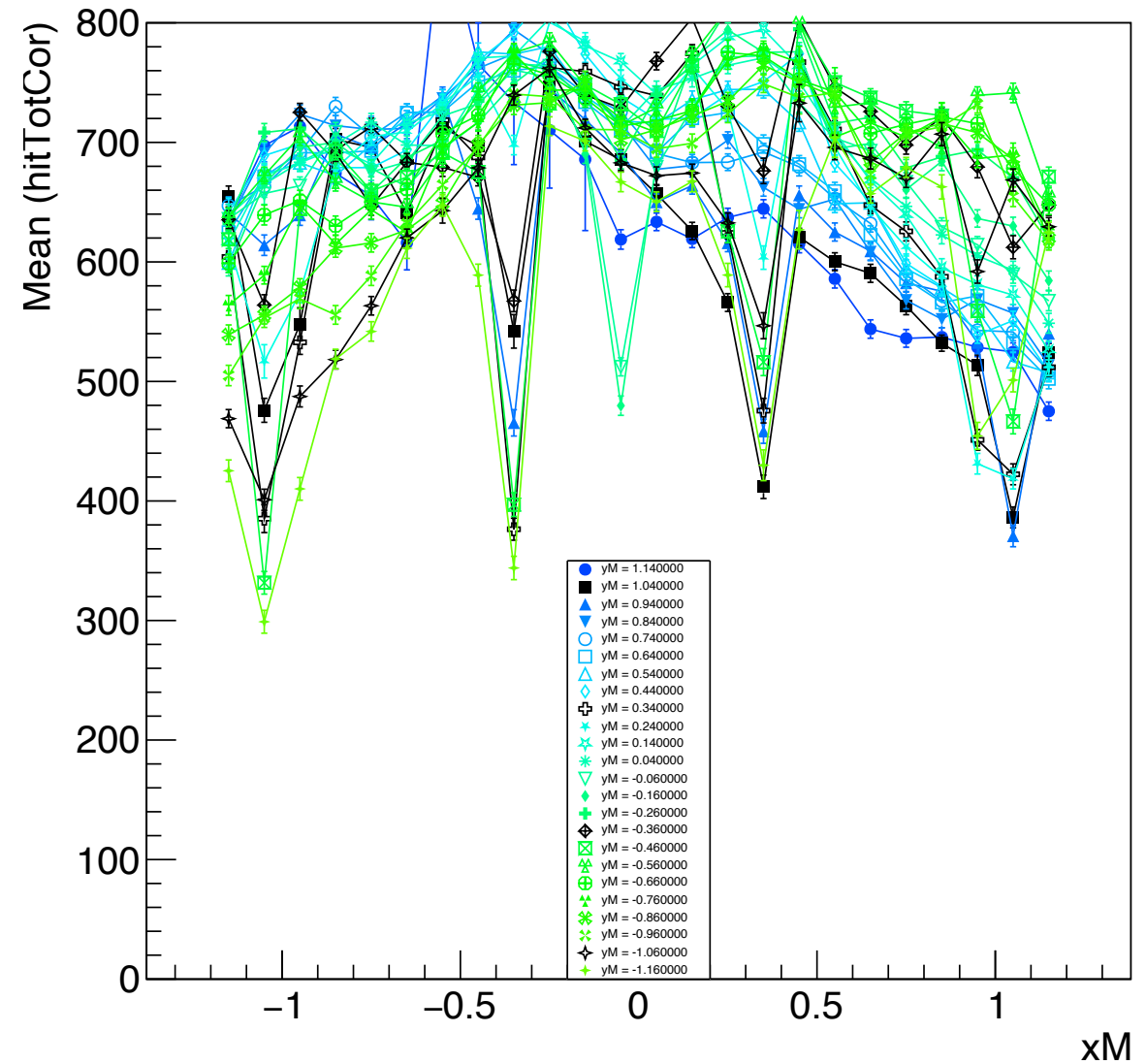
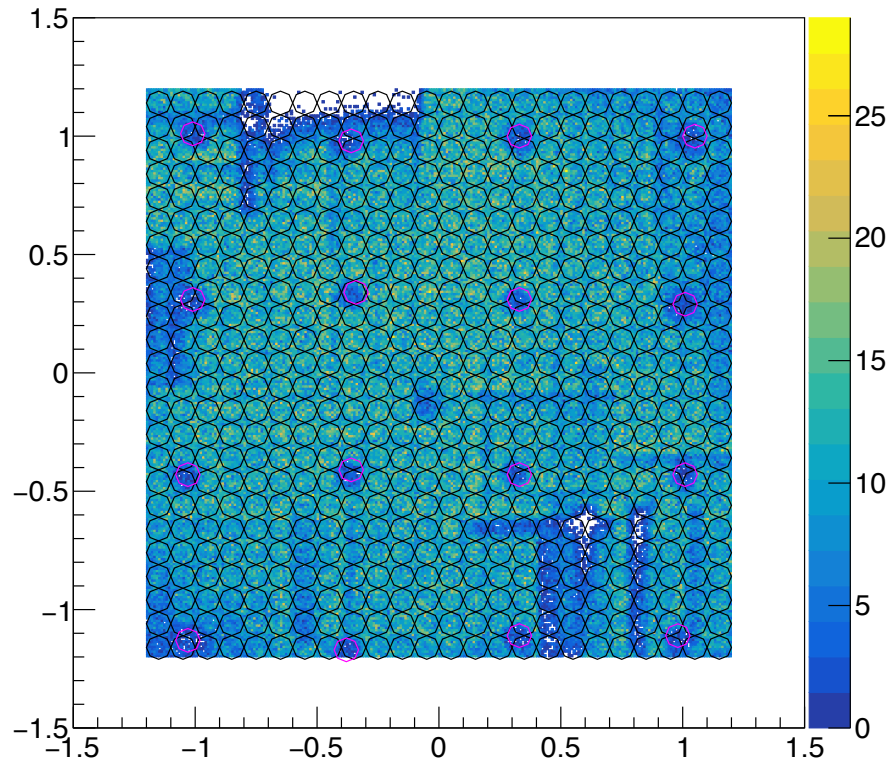


# What about Troll1 with bad SiBB settings ?

Run 57 – 58

Troll1 **HL**

xM vs yM (hitTotCor>400)





# Impact of the SiBB settings

Dominique & Jihane: expect a scaling factor which depends on the fiber

→ use Runs 61 (degraded SiBB settings) and 62 (correct SiBB settings) from V1 processing

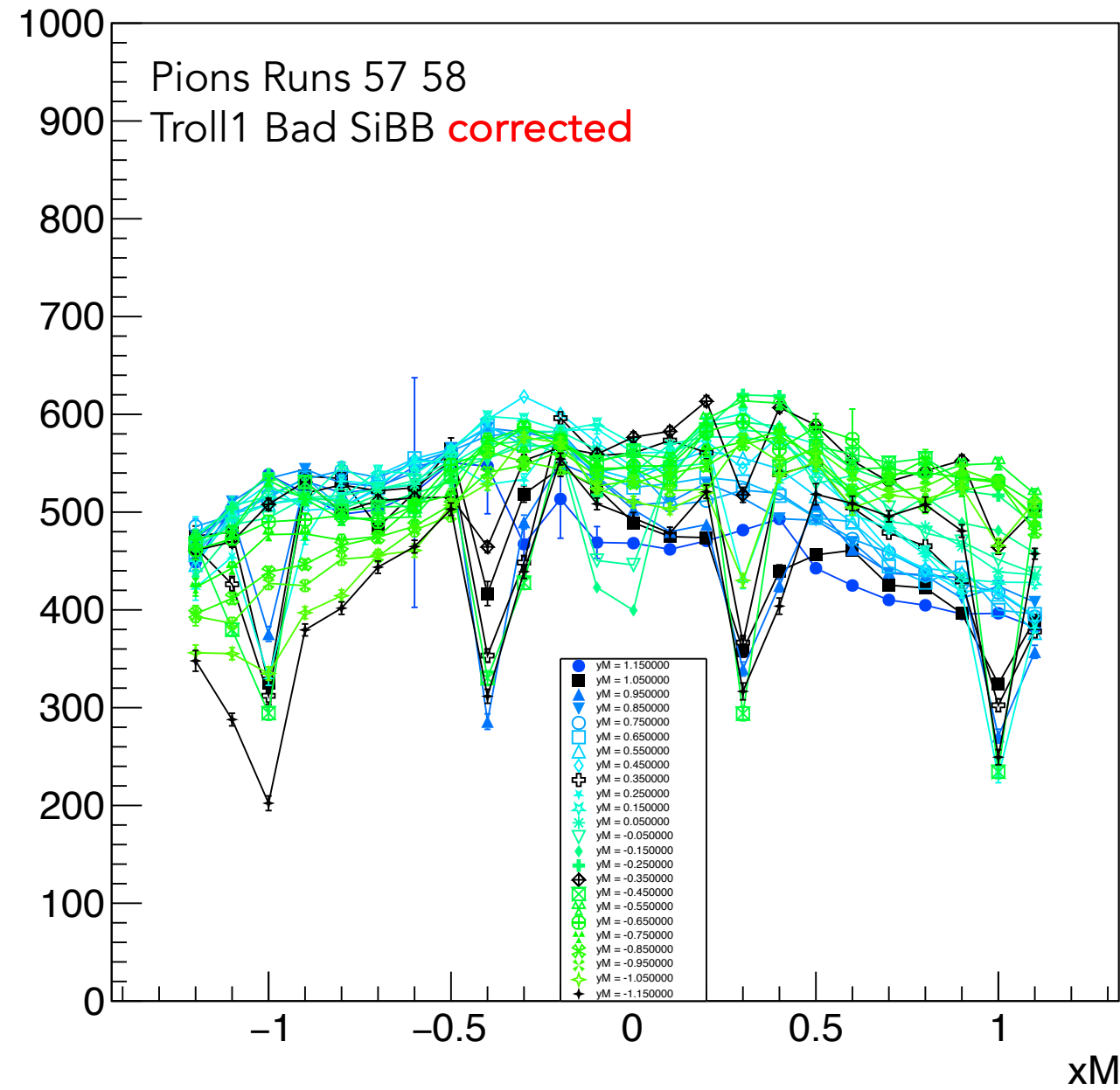
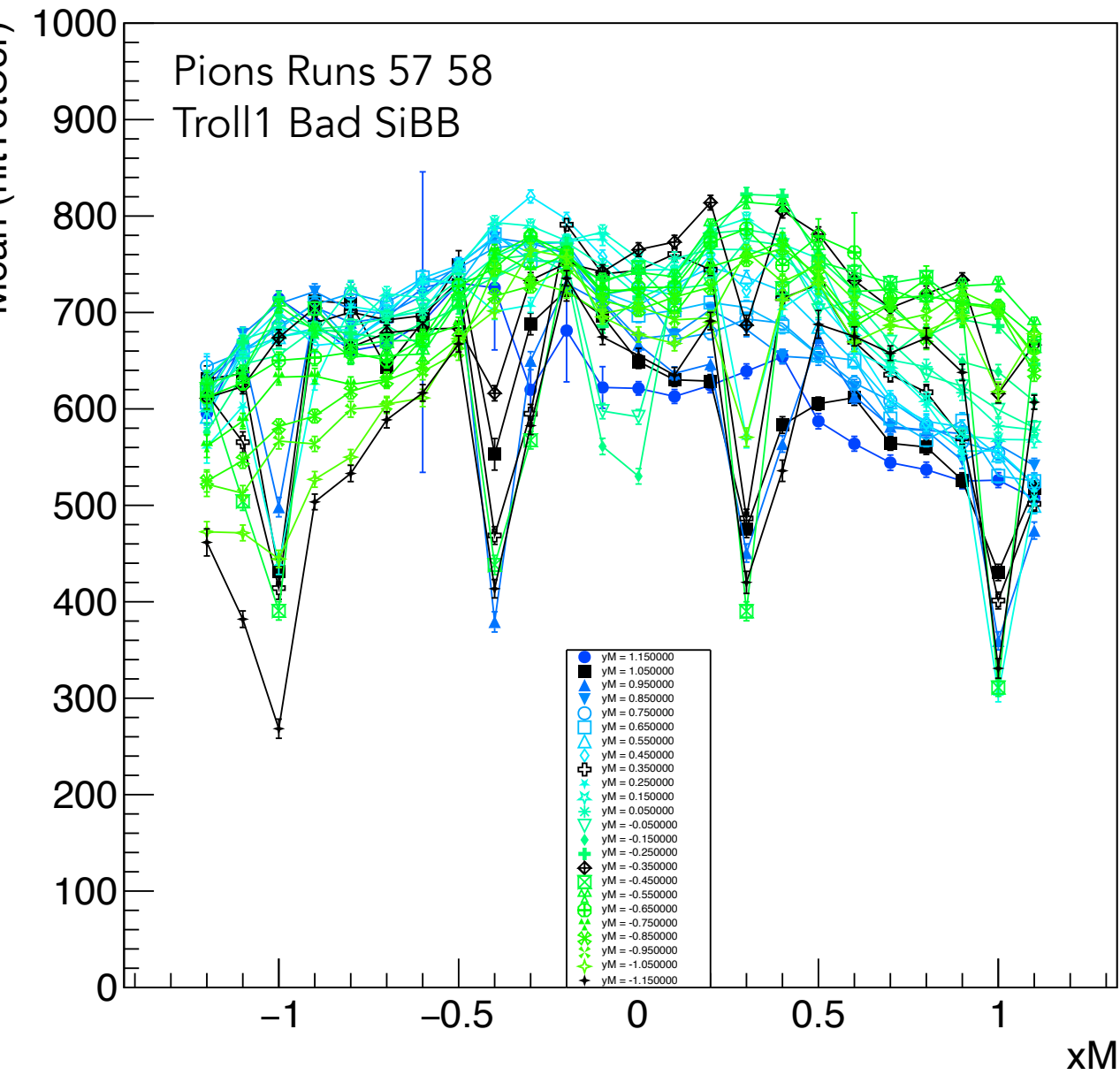
→ Correct for the noise and compute the ratio = Mean Run62 / MeanRun61

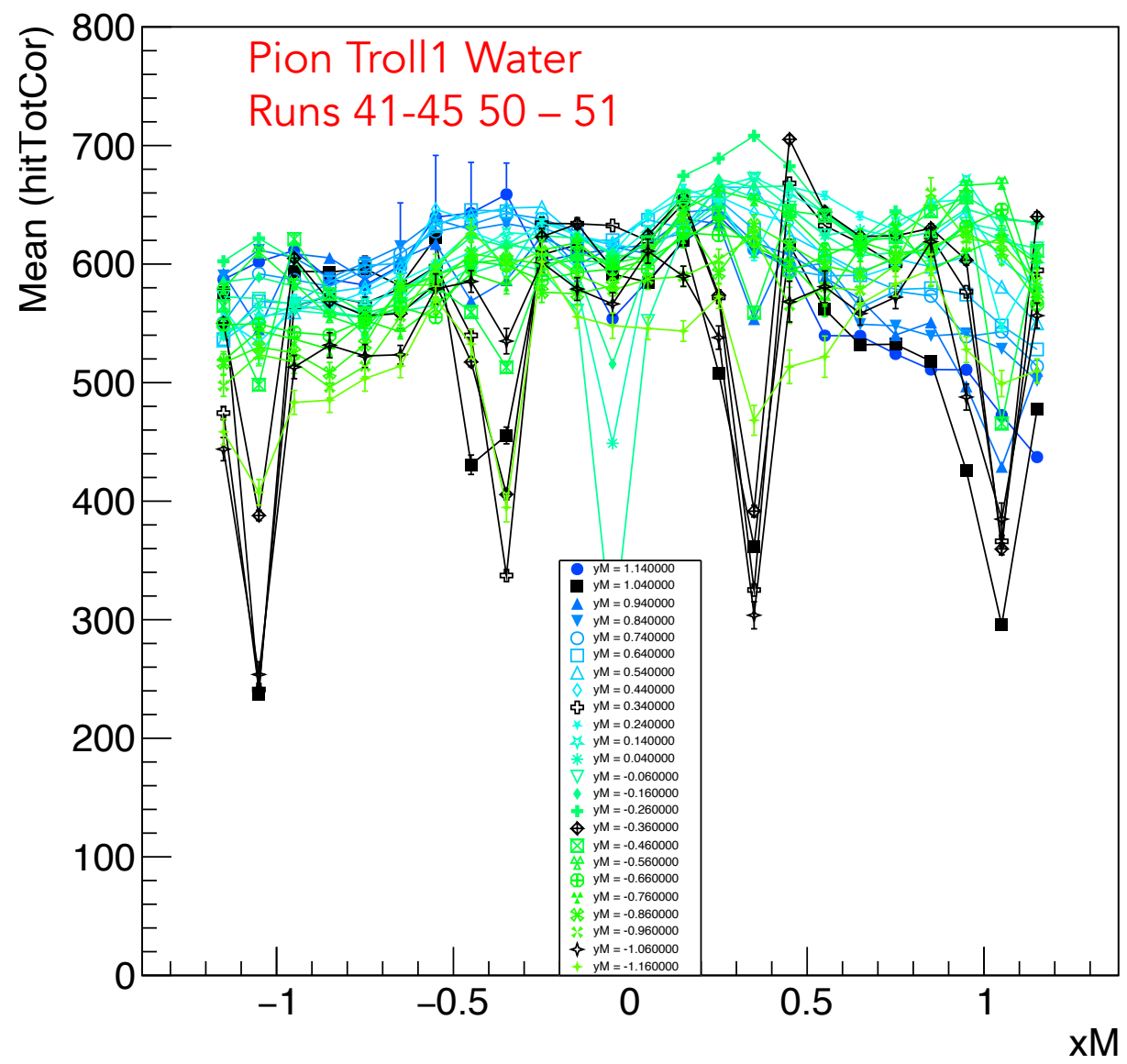
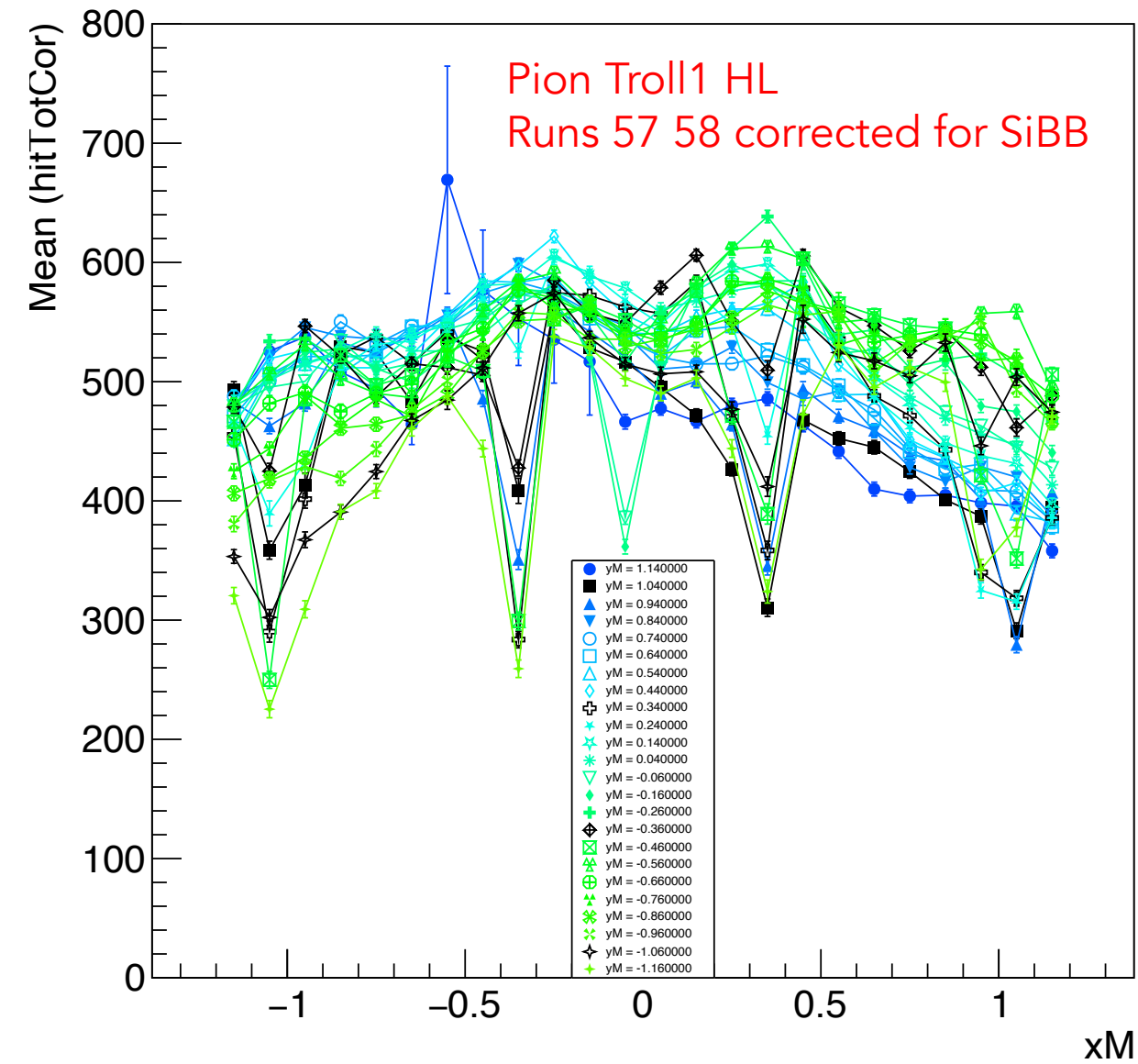
```
Fibre 0 mean61 = 63.0178 mean62= 45.8001 ----ratio = 0.726781 +/- 0.00125086
Fibre 1 mean61 = 27.1321 mean62= 20.2277 ----ratio = 0.745528 +/- 0.00245448
Fibre 2 mean61 = 41.1687 mean62= 30.7588 ----ratio = 0.747141 +/- 0.001726
Fibre 3 mean61 = 95.2357 mean62= 69.0664 ----ratio = 0.725216 +/- 0.000973765
Fibre 4 mean61 = 290.949 mean62= 225.668 ----ratio = 0.775626 +/- 0.000543847
Fibre 5 mean61 = 17.3315 mean62= 12.6886 ----ratio = 0.732112 +/- 0.00287214
Fibre 6 mean61 = 42.0114 mean62= 32.2555 ----ratio = 0.767781 +/- 0.0016736
Fibre 7 mean61 = 293.249 mean62= 224.502 ----ratio = 0.765568 +/- 0.00052338
Fibre 8 mean61 = 418.995 mean62= 327.541 ----ratio = 0.78173 +/- 0.000431691
Fibre 9 mean61 = 57.7626 mean62= 44.1612 ----ratio = 0.76453 +/- 0.00138608
Fibre 10 mean61 = 75.2196 mean62= 56.2561 ----ratio = 0.747891 +/- 0.00118119
Fibre 11 mean61 = 350.275 mean62= 268.866 ----ratio = 0.767584 +/- 0.000471817
Fibre 12 mean61 = 102.342 mean62= 76.8151 ----ratio = 0.750574 +/- 0.000970873
Fibre 13 mean61 = 47.1371 mean62= 34.9435 ----ratio = 0.741316 +/- 0.00154348
Fibre 14 mean61 = 21.1255 mean62= 15.9812 ----ratio = 0.756489 +/- 0.00260736
Fibre 15 mean61 = 135.374 mean62= 103.253 ----ratio = 0.762727 +/- 0.000843298
```



Correct (average factor)

**0.753662**



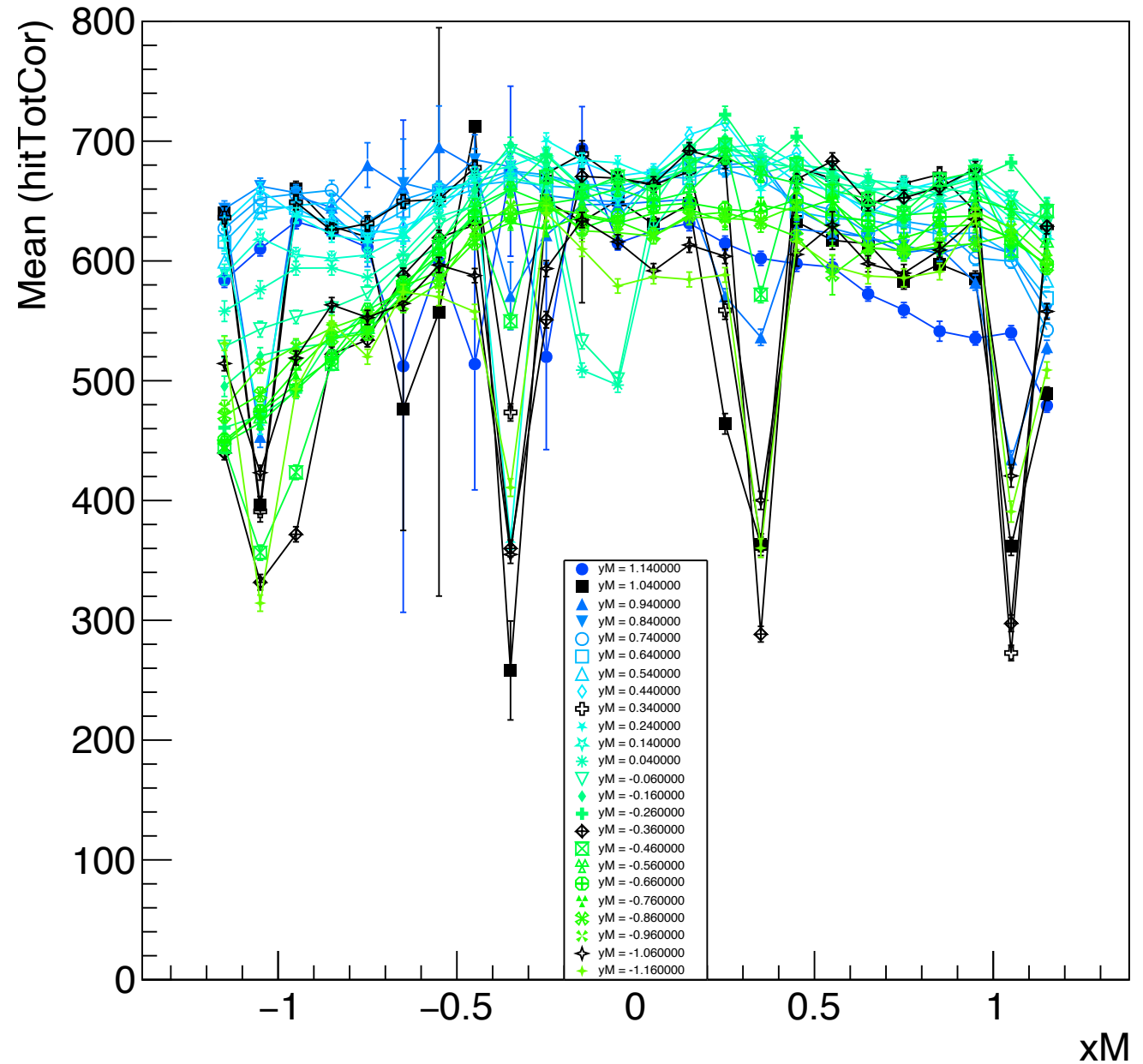
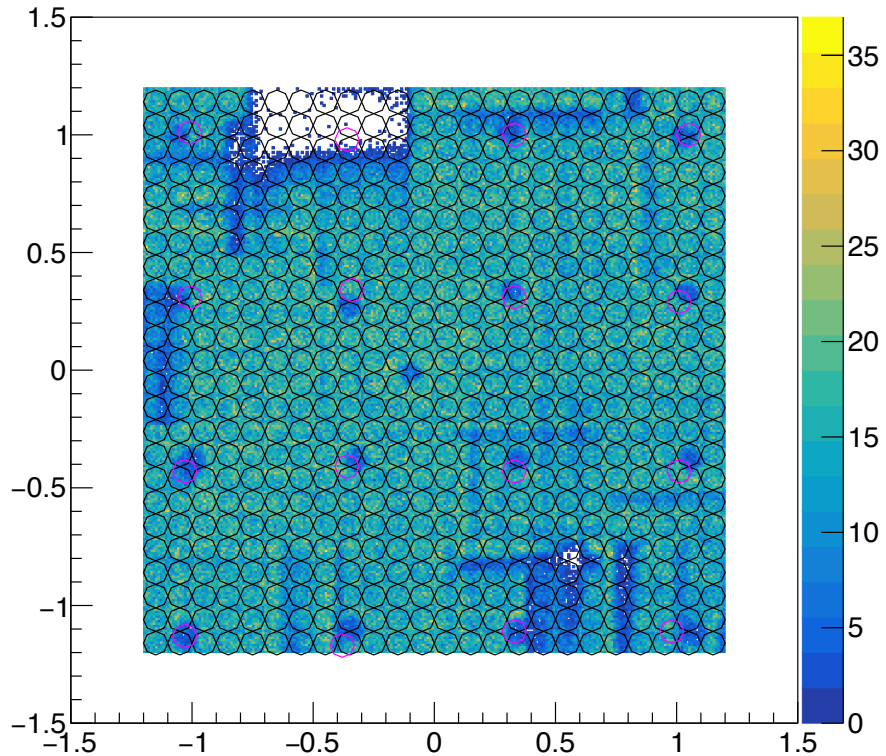




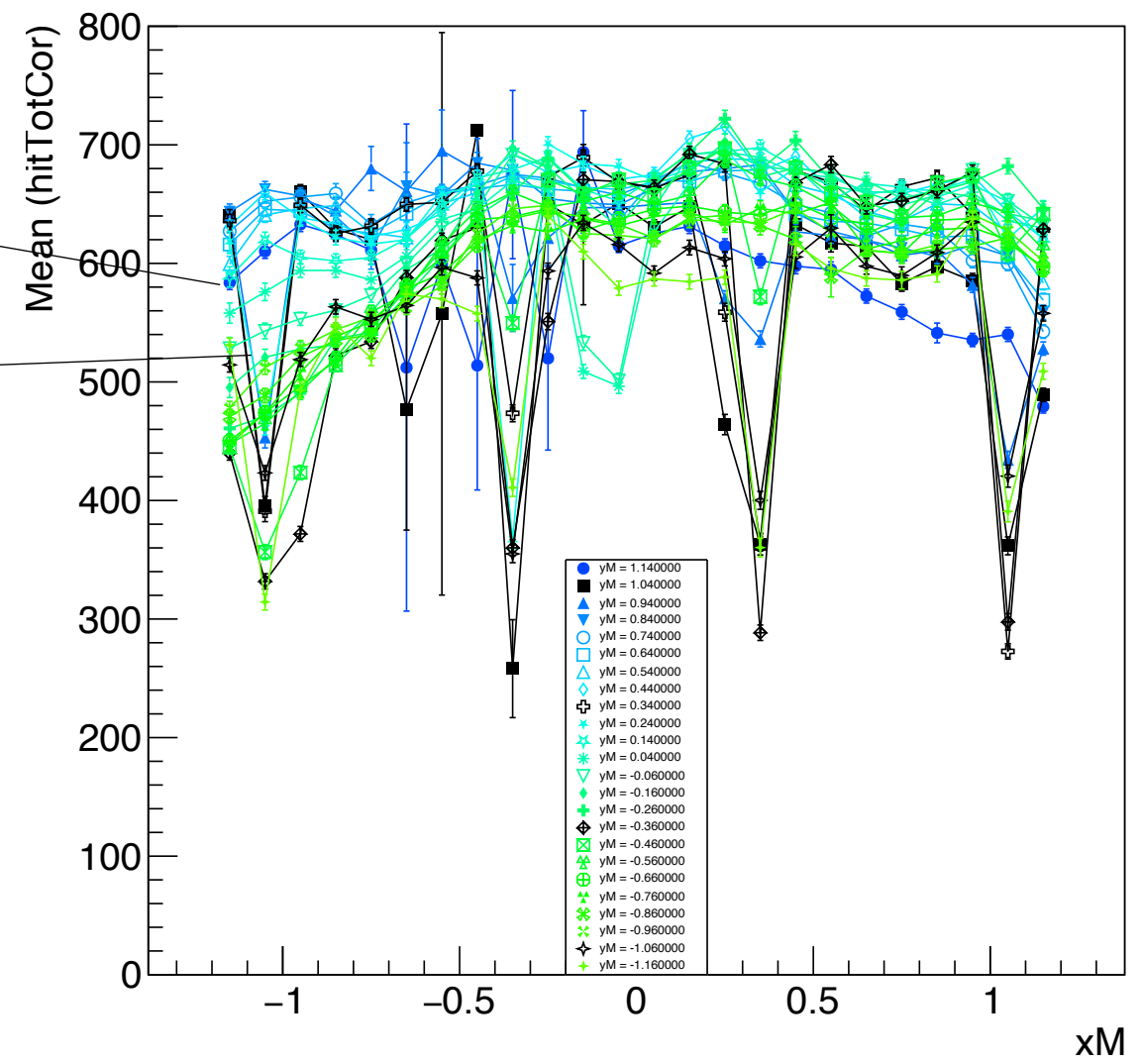
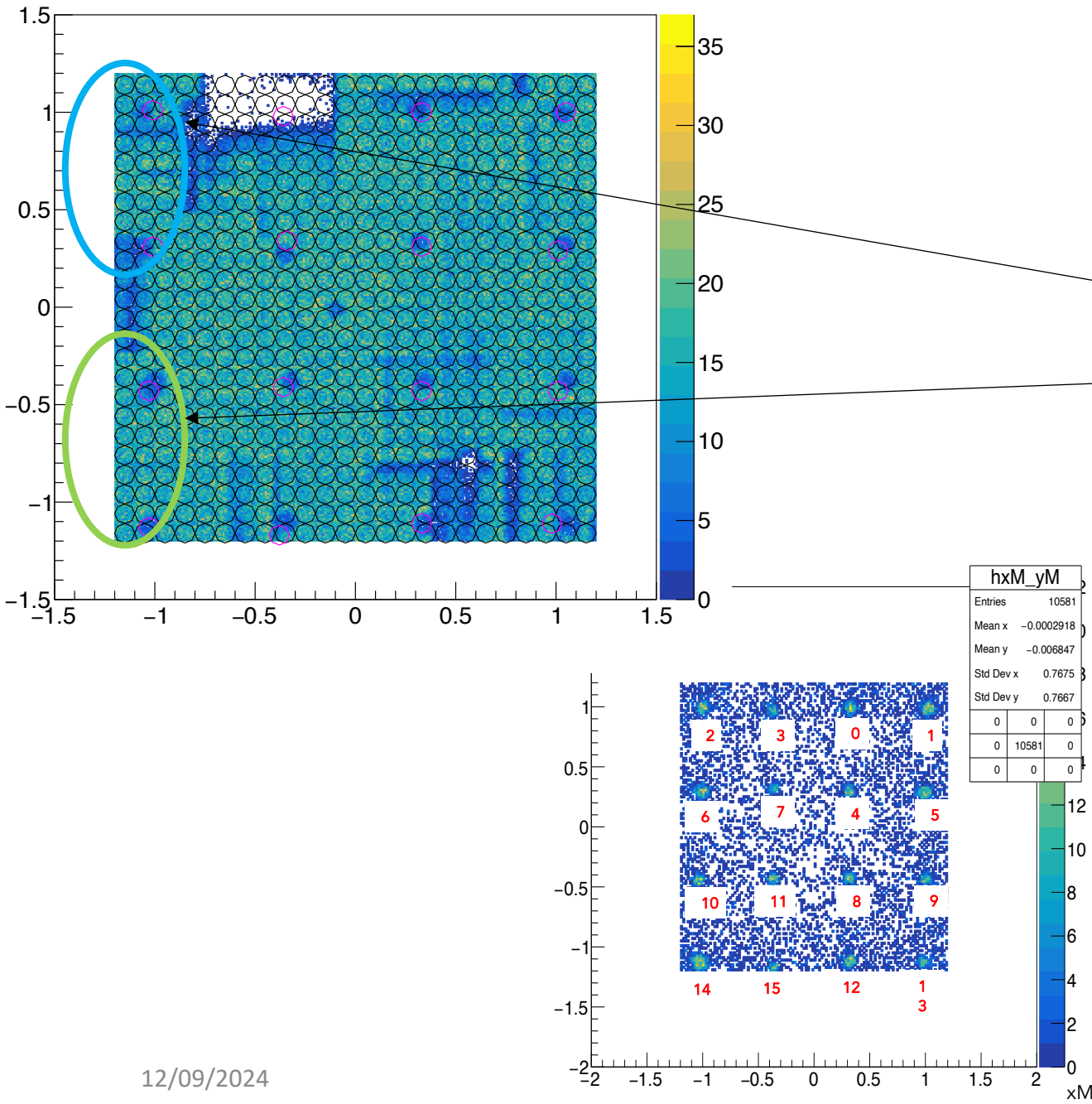
# What about Troll2-HL with bad SiBB settings (corrected) ?

(no other change)

xM vs yM (hitTotCor>400)



# xM vs yM (hitTotCor>400)



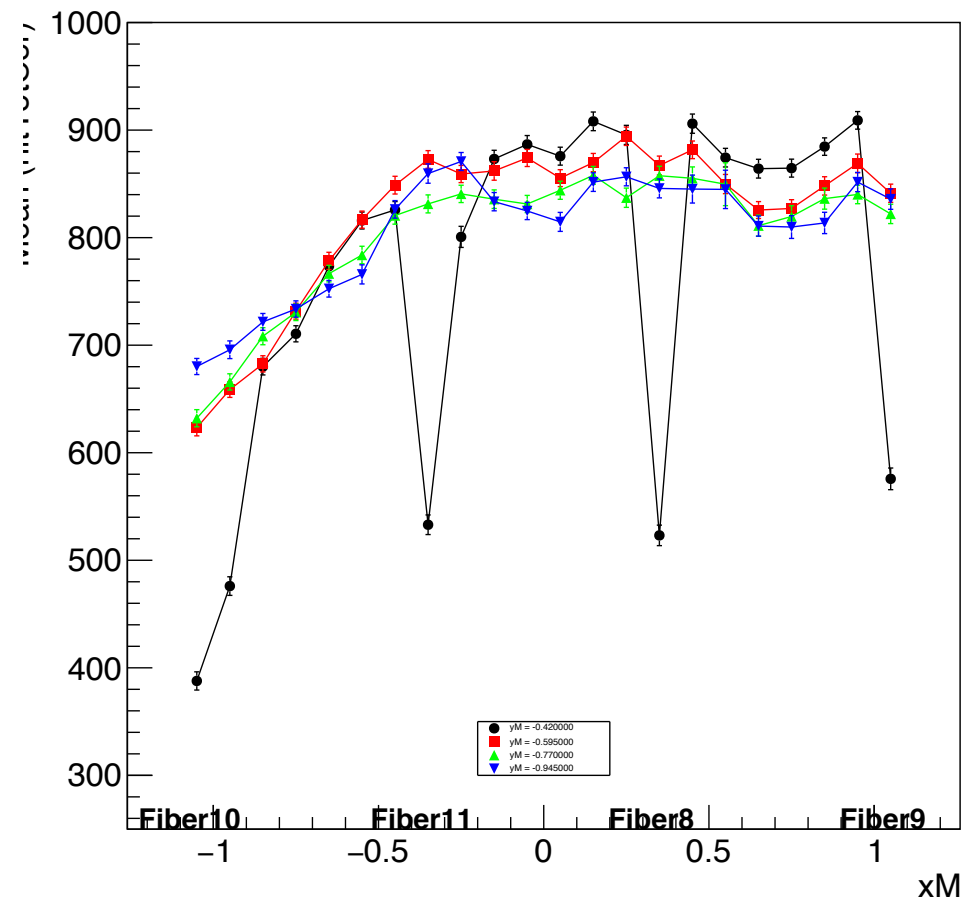
look at row of Fiber6 + few rows above  
look at row of Fiber10 + few above



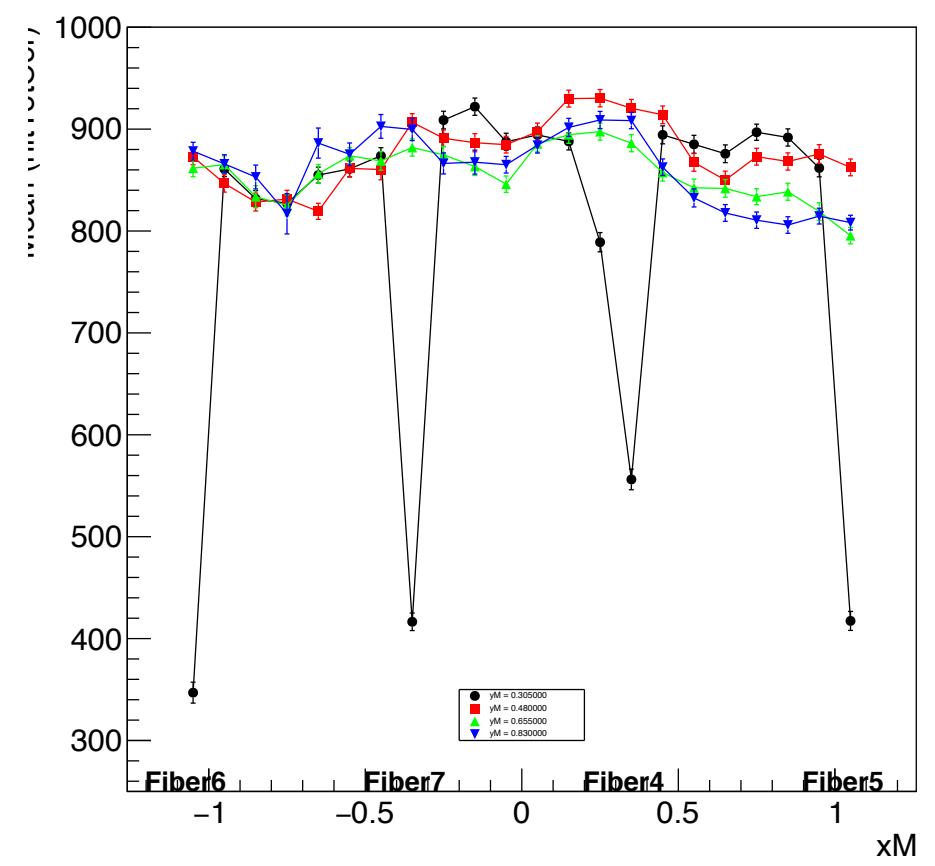
Not SiBB corrected

Troll2 HL

Mean as function of position

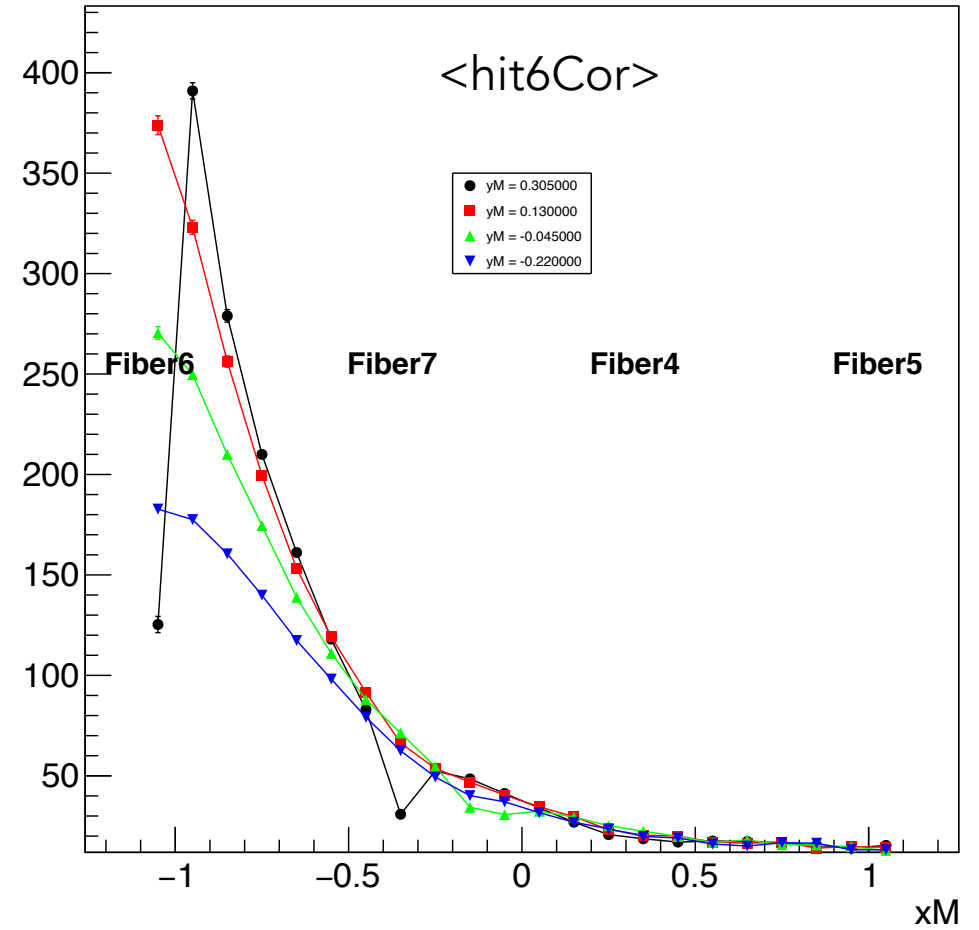
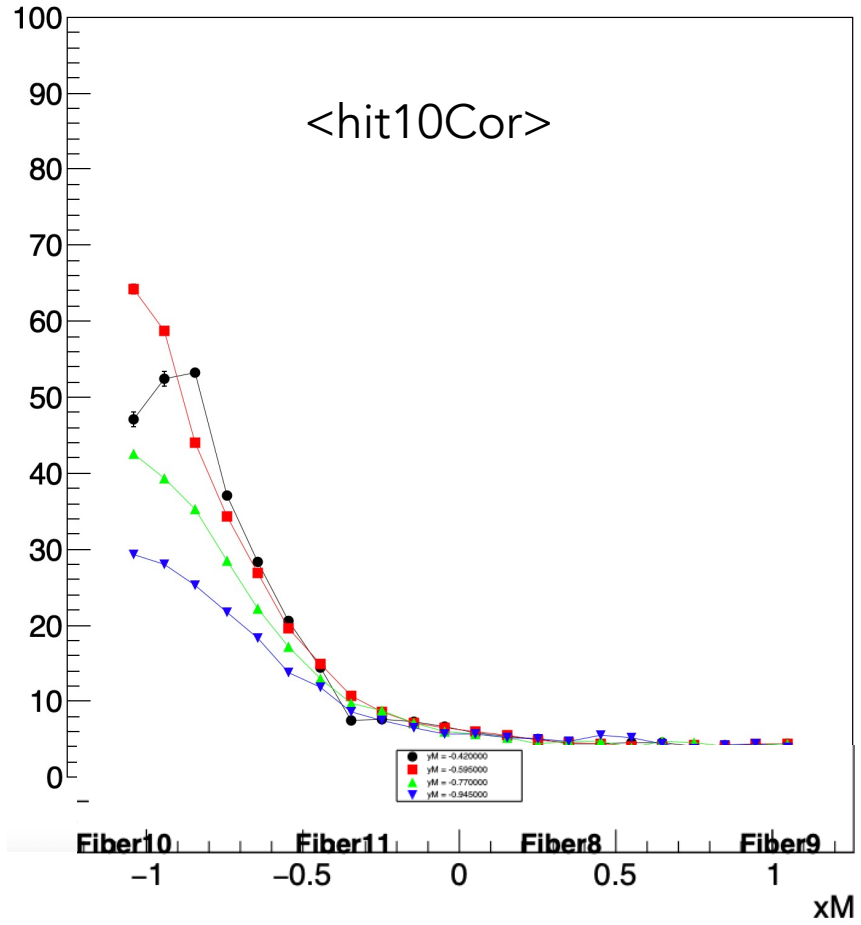


Mean as function of position



NB : slightly different positions for the center of the areas (not changing the conclusion)

Look at the mean variation of hit6Cor and hit10Cor

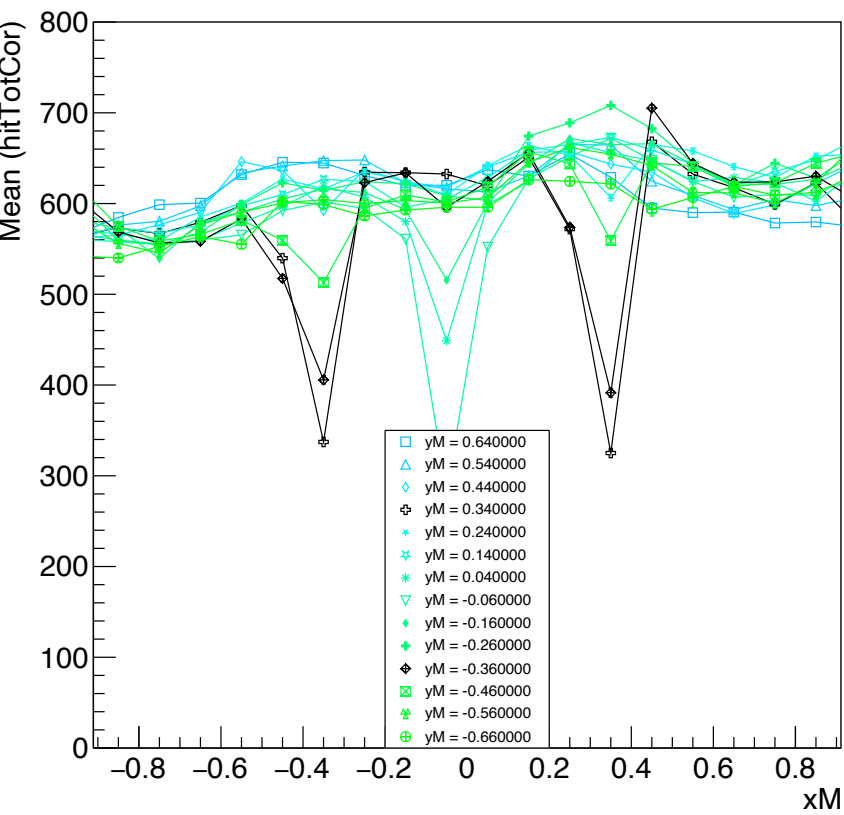


Fiber10 not well connected... ?

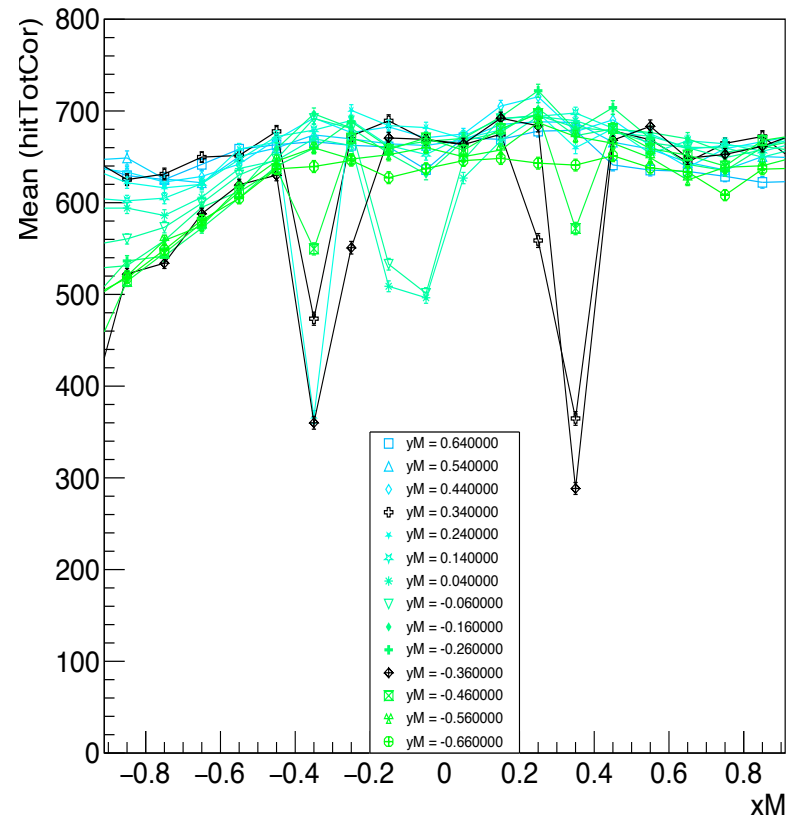
# Display only the central region !

*No change of position of the regions*

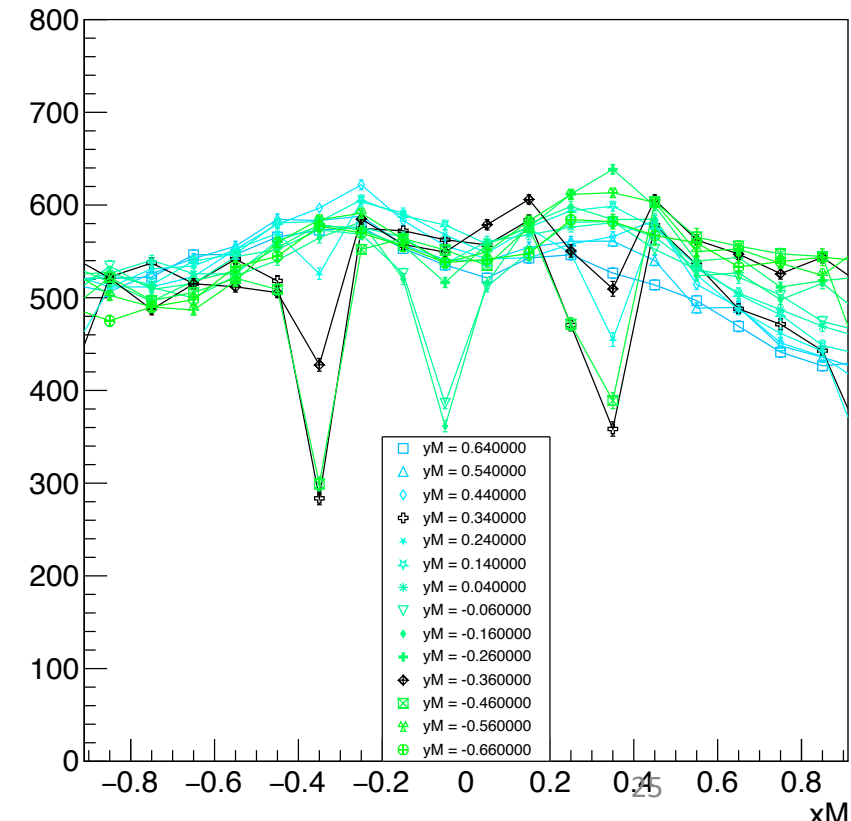
Run 41-45 + 50-51 Troll 1 water



Run 53 – 55 – Troll 2 HL



Run 57 – 58 – Troll 1 HL

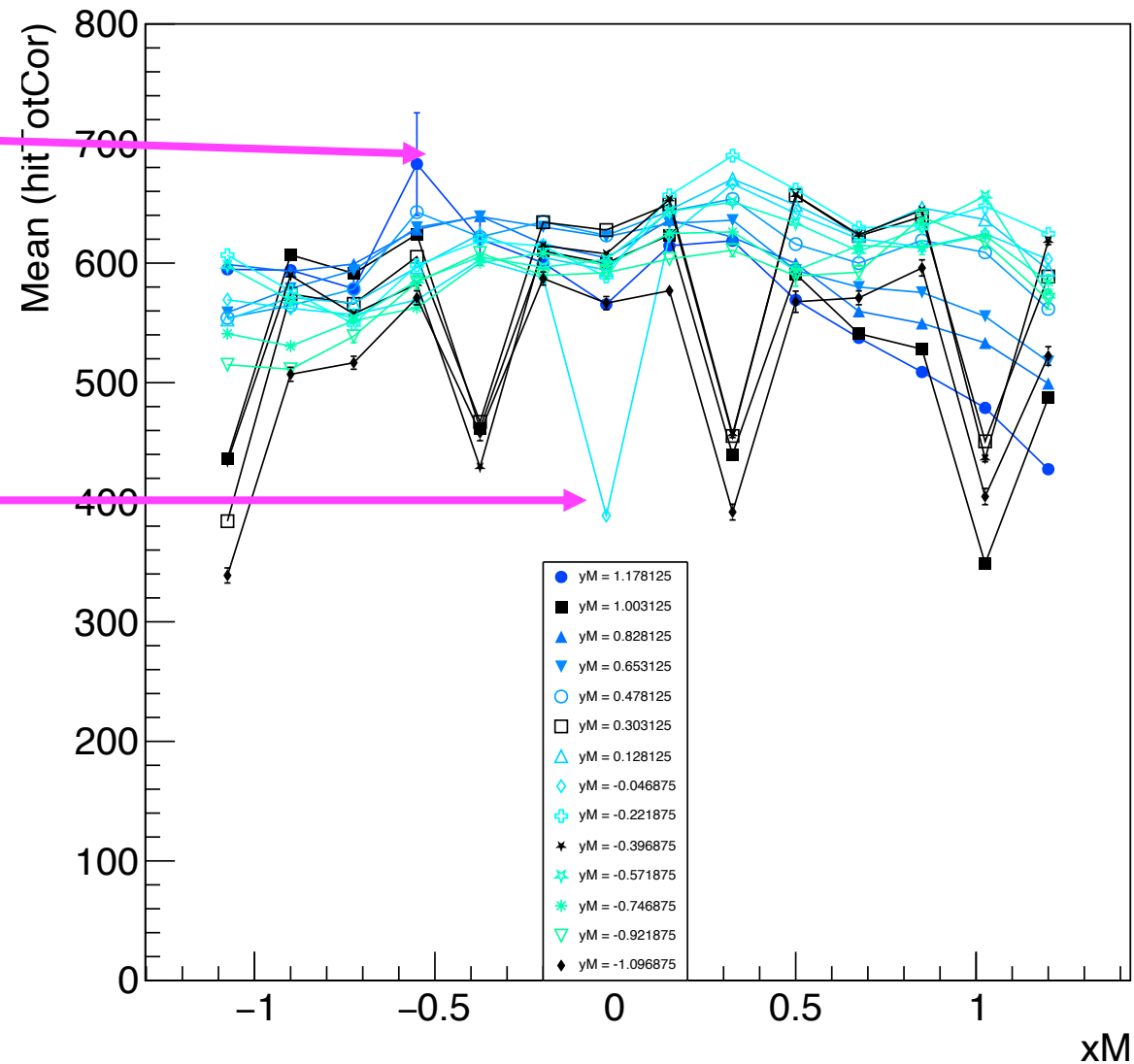
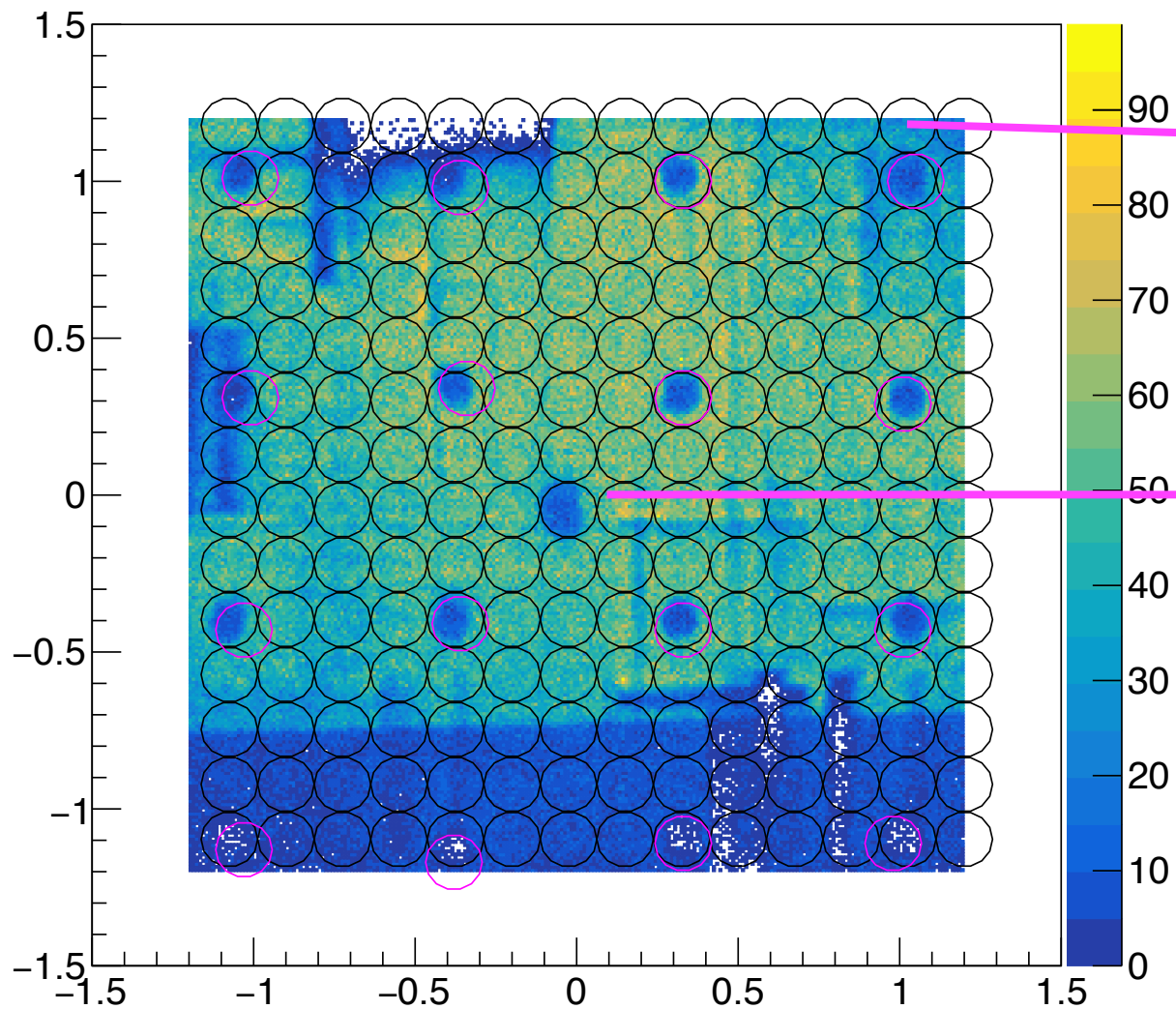




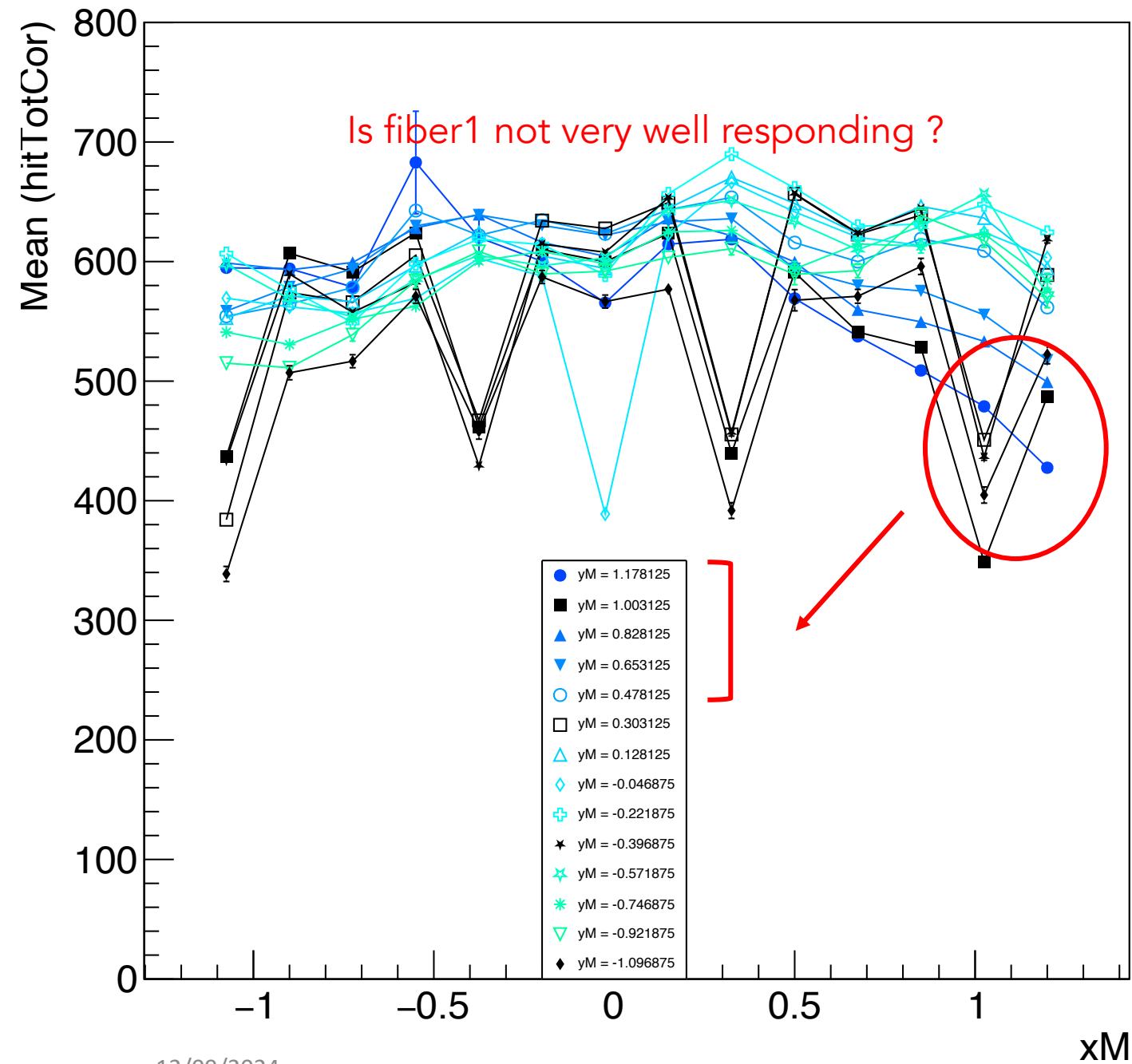
Try slightly wider areas Radius = 0.0875 cm

Runs 41 – 45 + 50 & 51  
Troll1 good SIBB

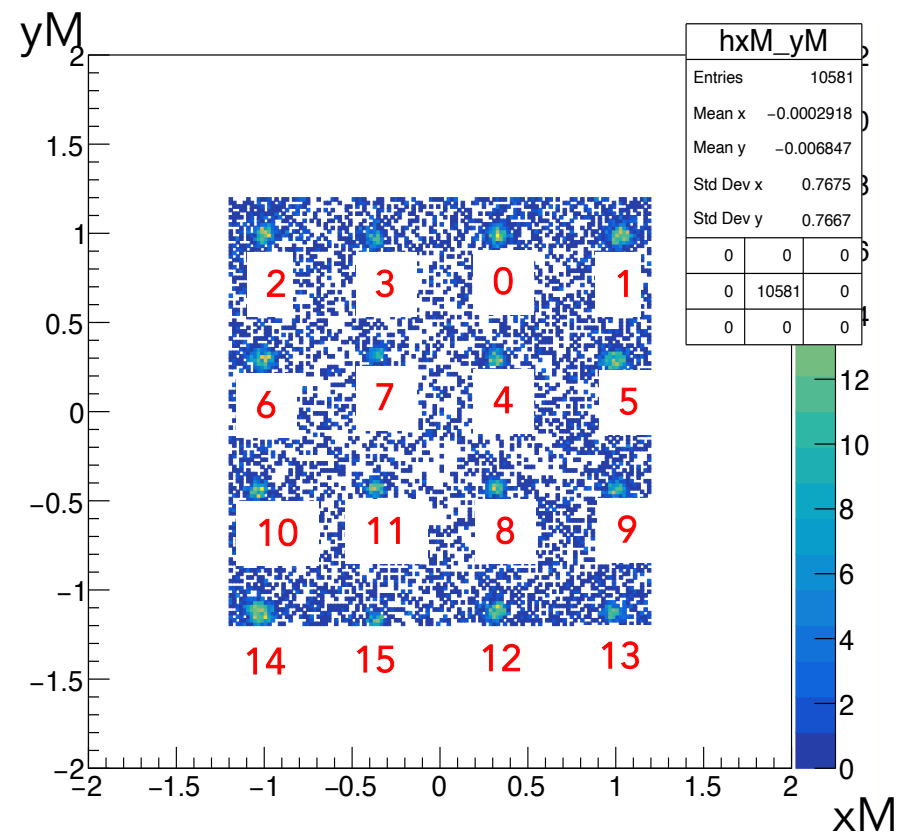
xM vs yM (hitTotCor>400)



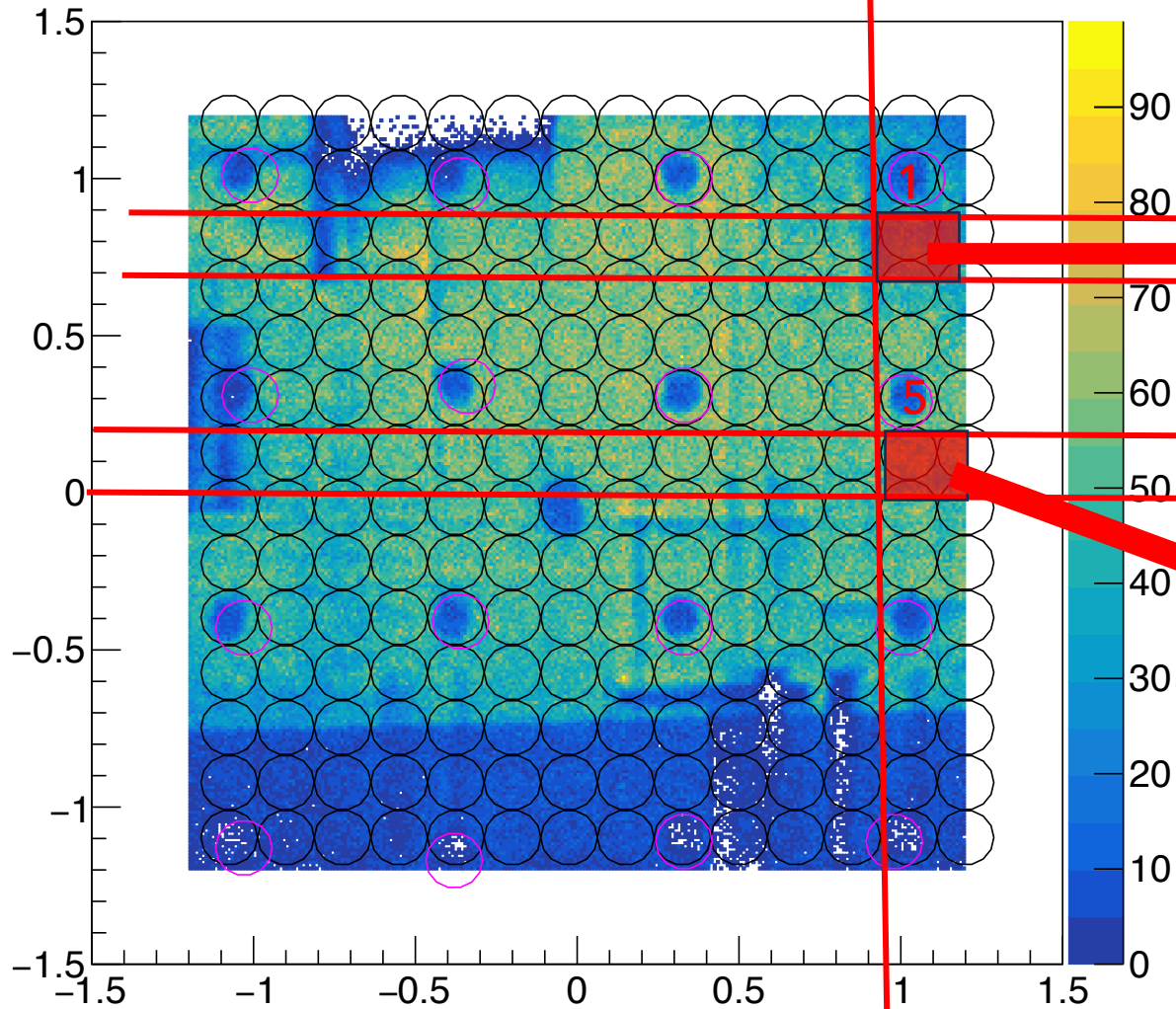
Black : fibers lines



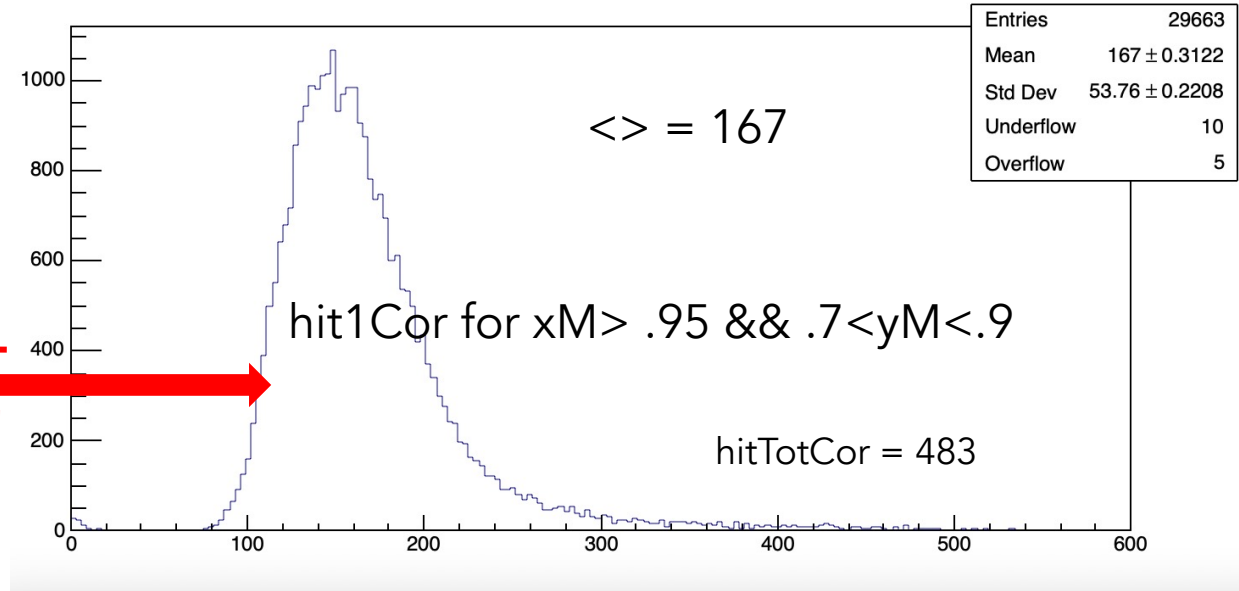
Runs 41 – 45 + 50 & 51  
Troll1 good SIBB



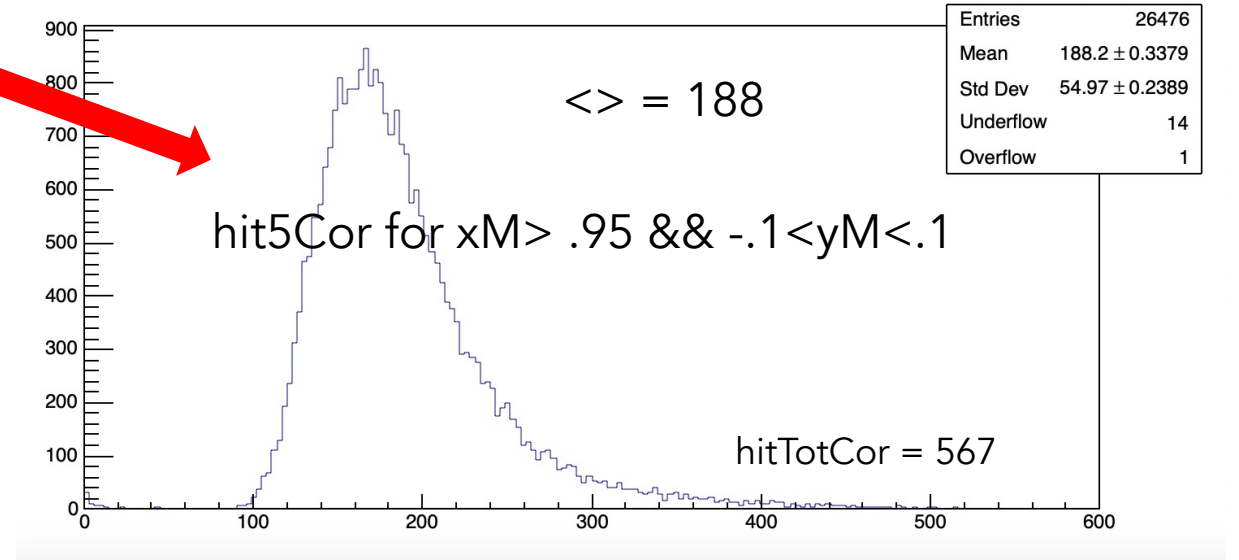
xM vs yM (hitTotCor>400)



hHit1 for fiber 1



hHit5 for fiber 5

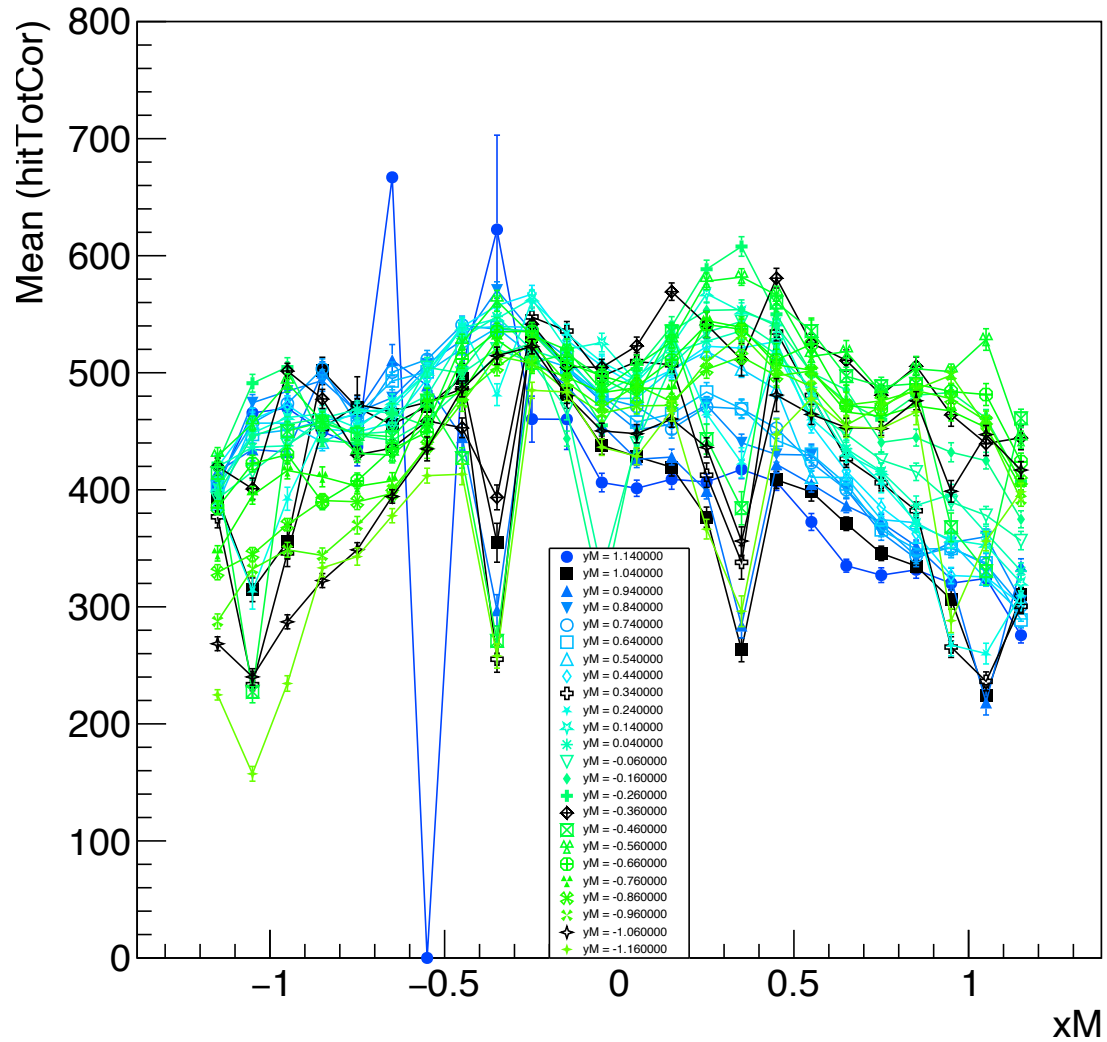




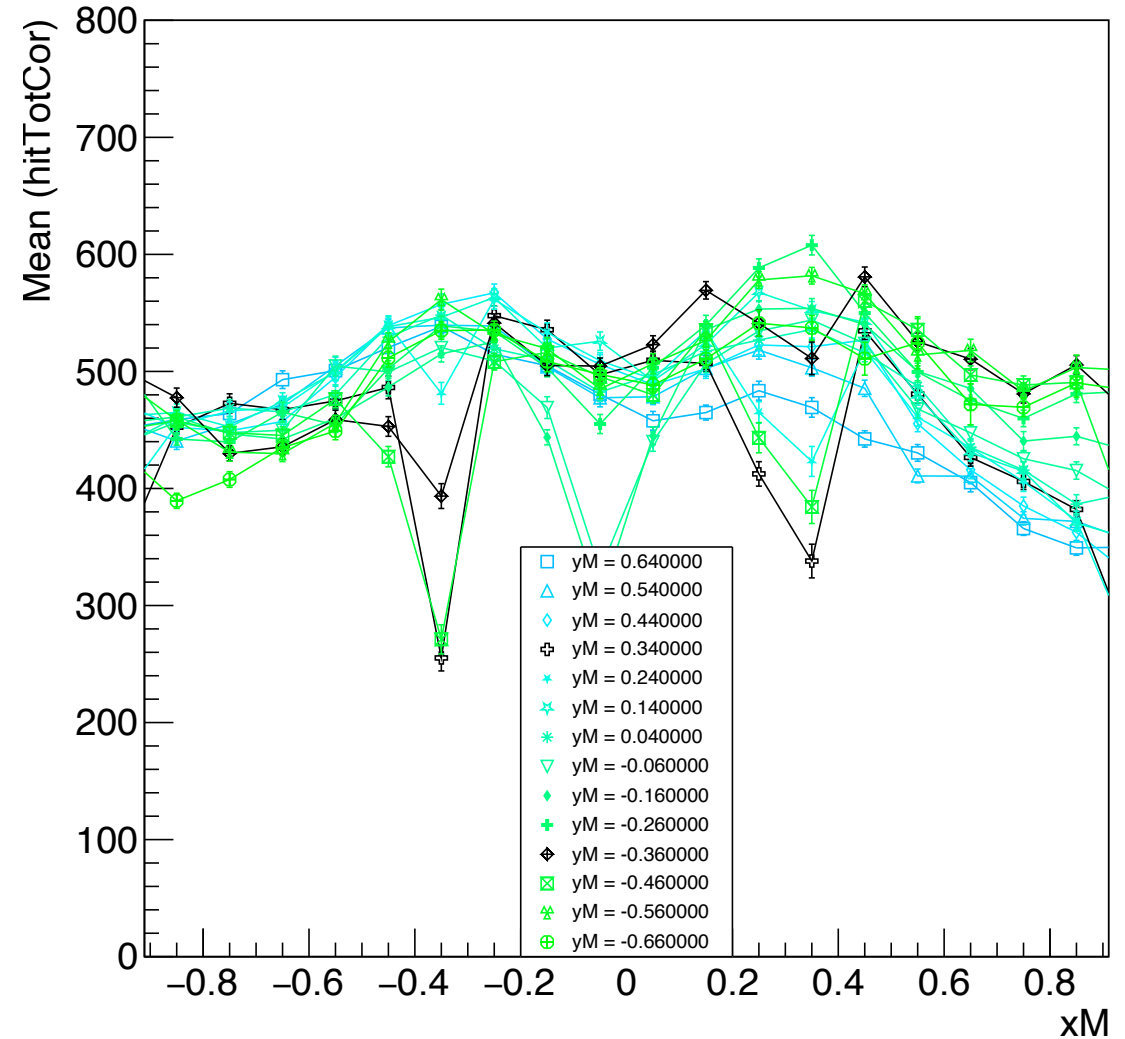
# Coming back to the muon data ?

Runs 59 – 60 , Troll1 HL  
corrected for SiBB settings

## Mean as function of position



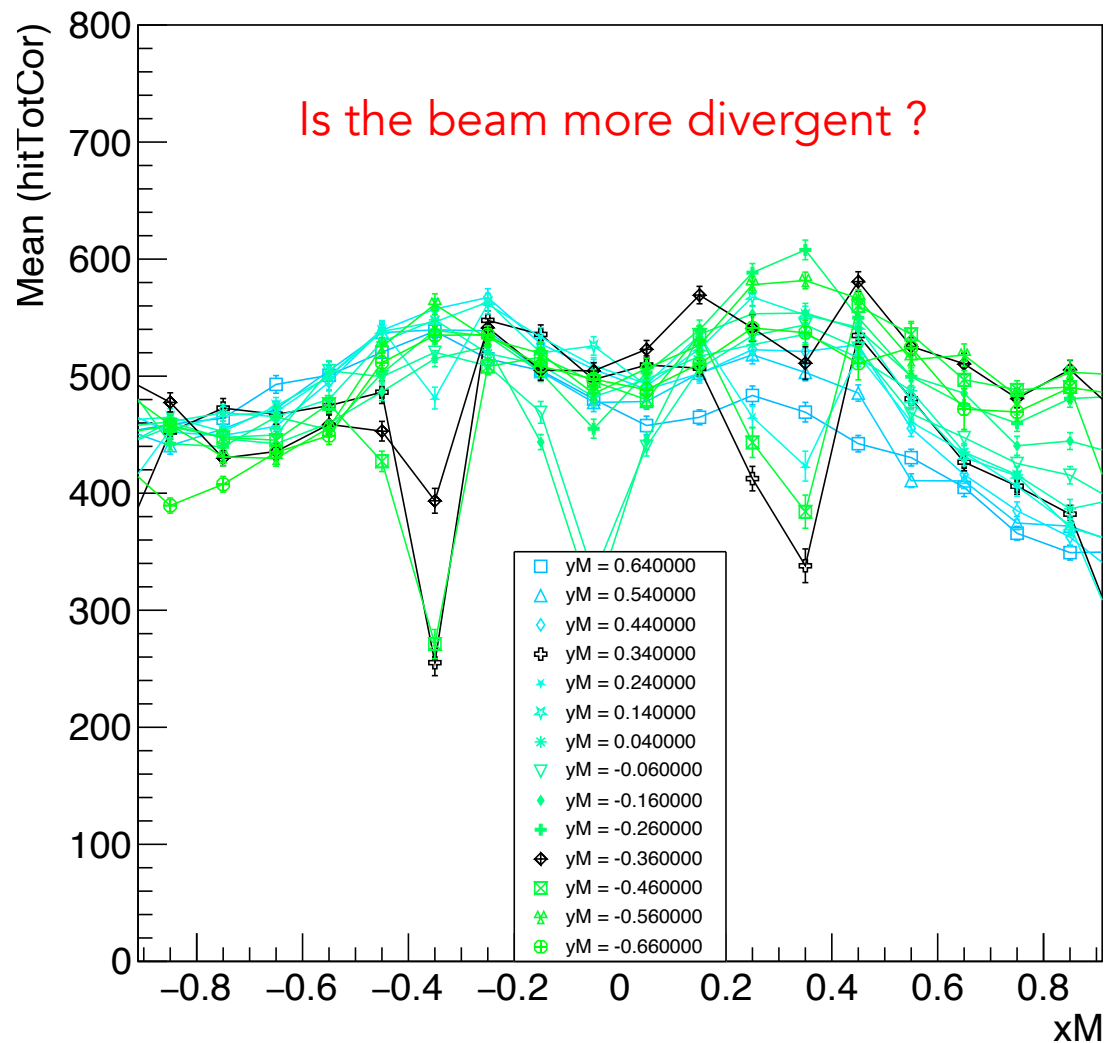
## Mean as function of position



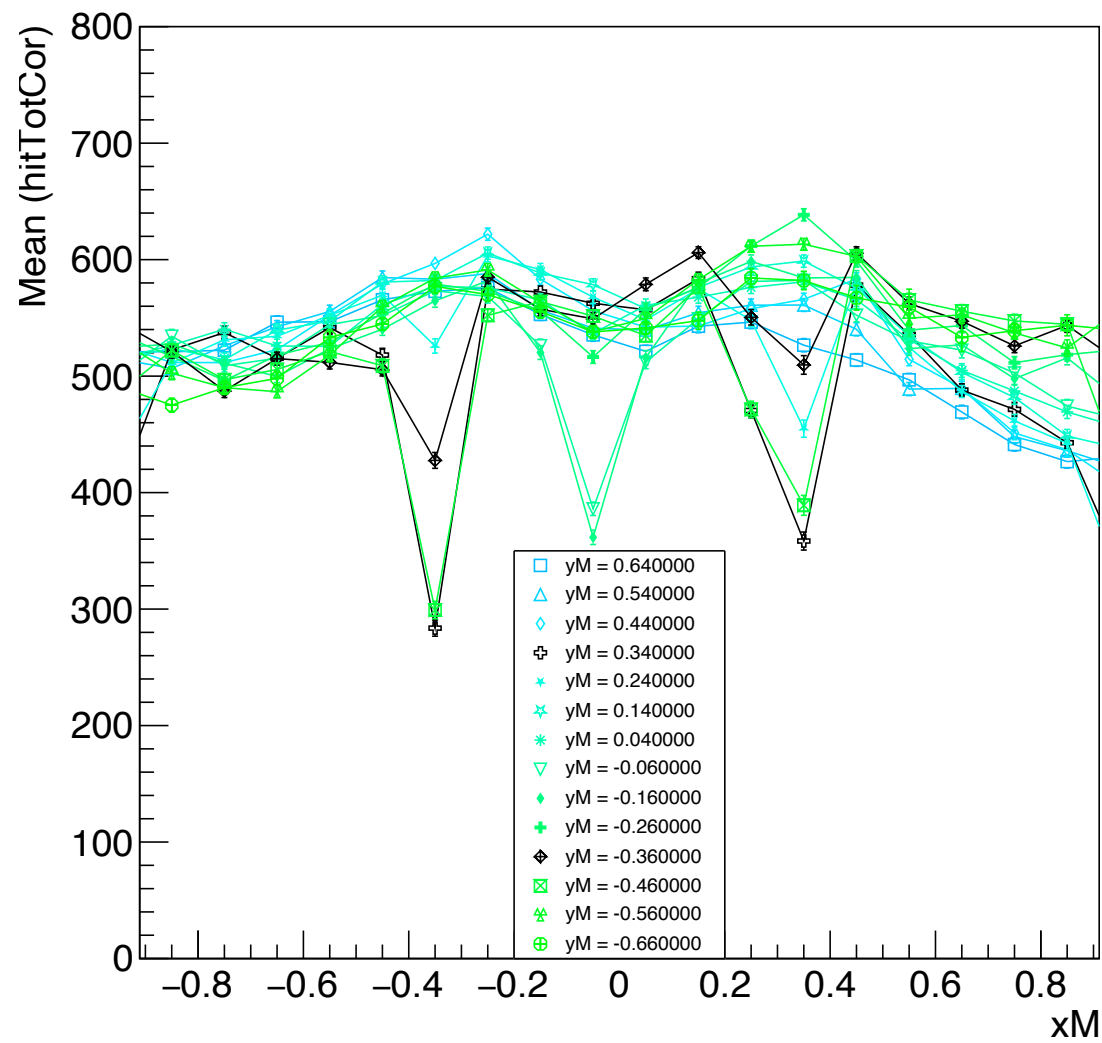
# Coming back to the muon data ?

Zoom from previous page

Runs 59 – 60 , Troll1 HL MUON

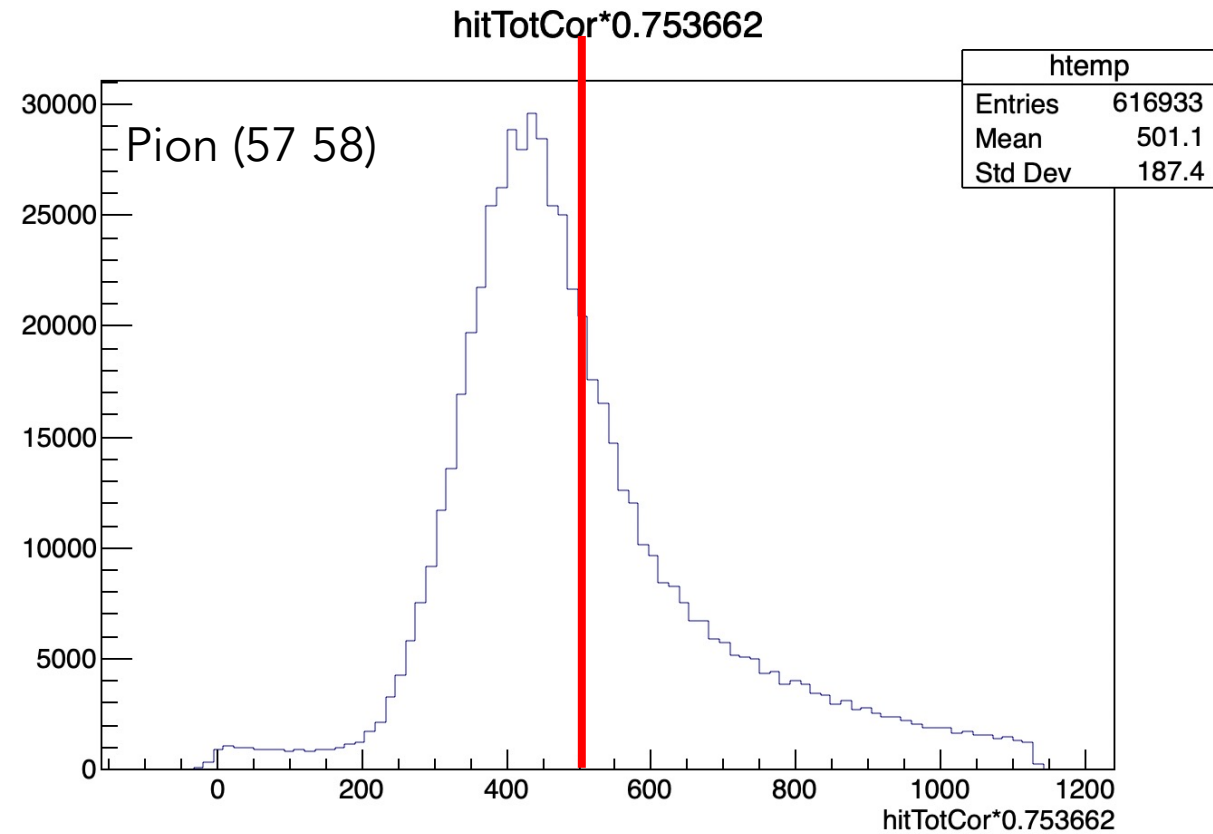
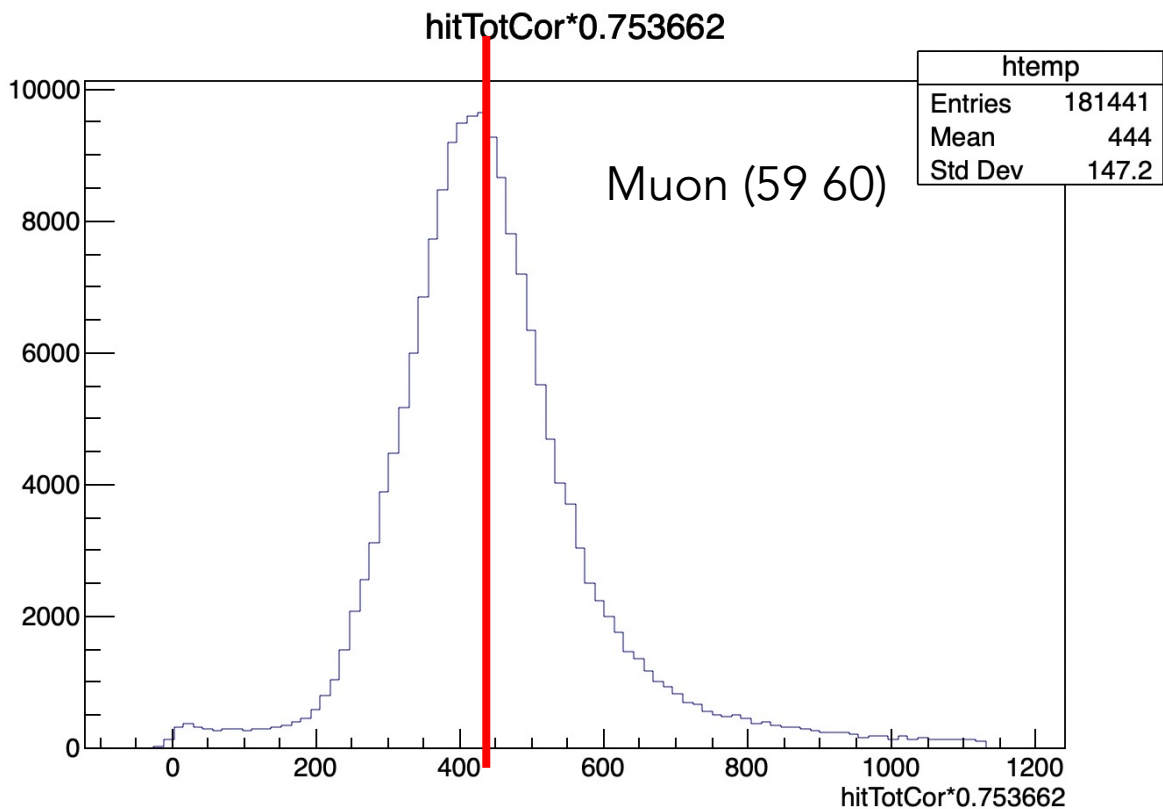


Runs 57 – 58 , Troll1 HL PION



# Currently using the mean of hitTotCor .. is it fine ?

we cut at hitTotCor<1500



mean value not that good for pion ?

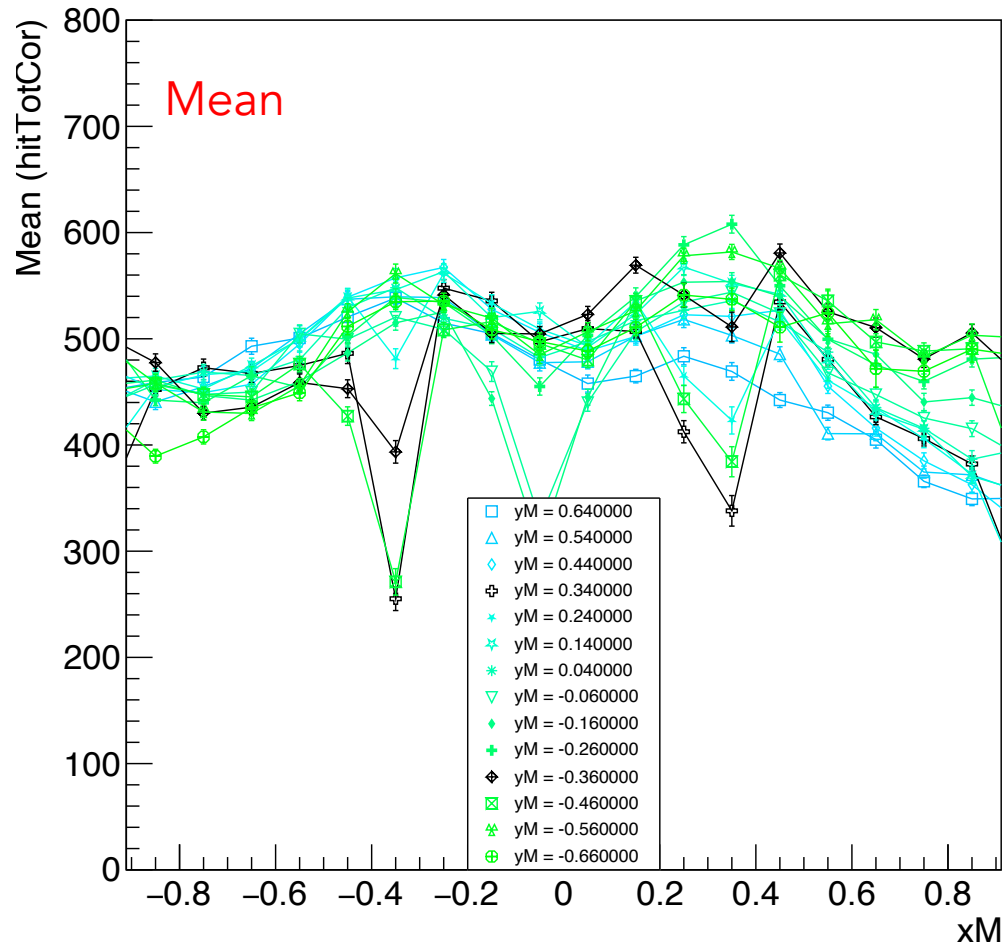
Use location of the most populated bin



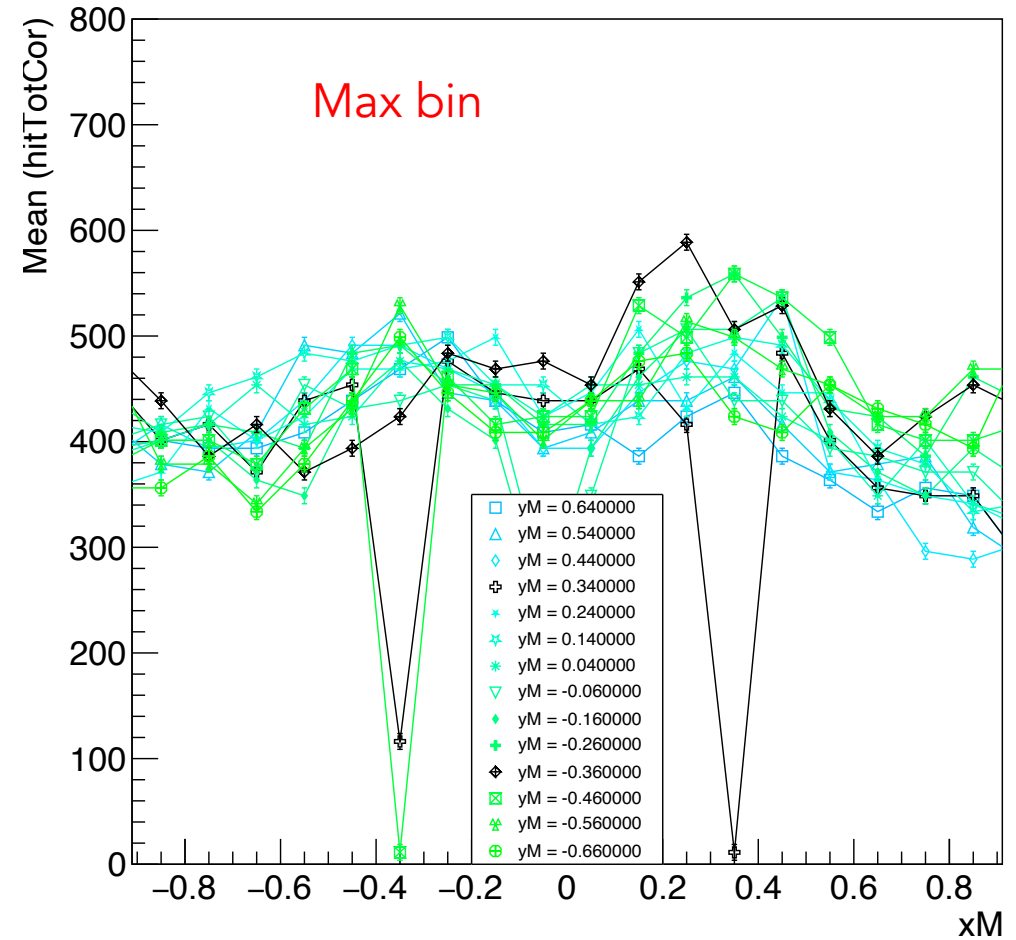
# Run 59 60 Troll 1 HL Muon

Use location of the most populated bin ("Max")

Mean as function of position



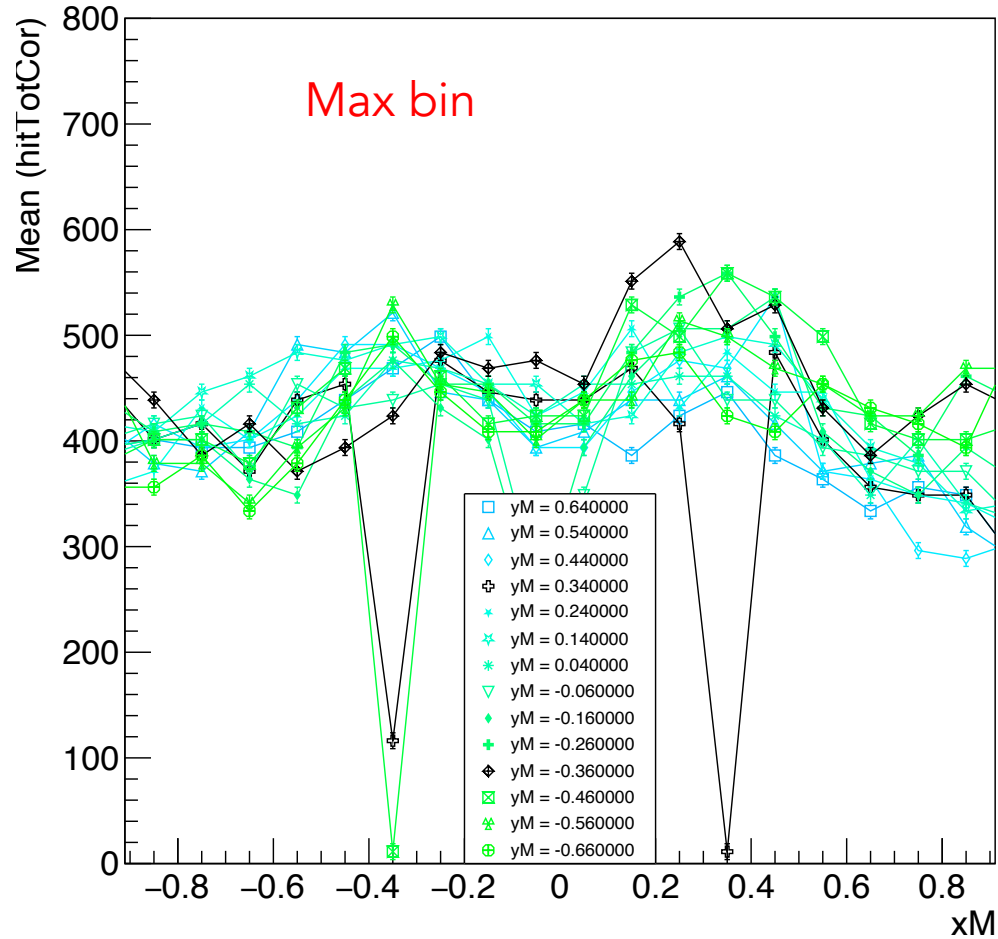
Muon (59 60)



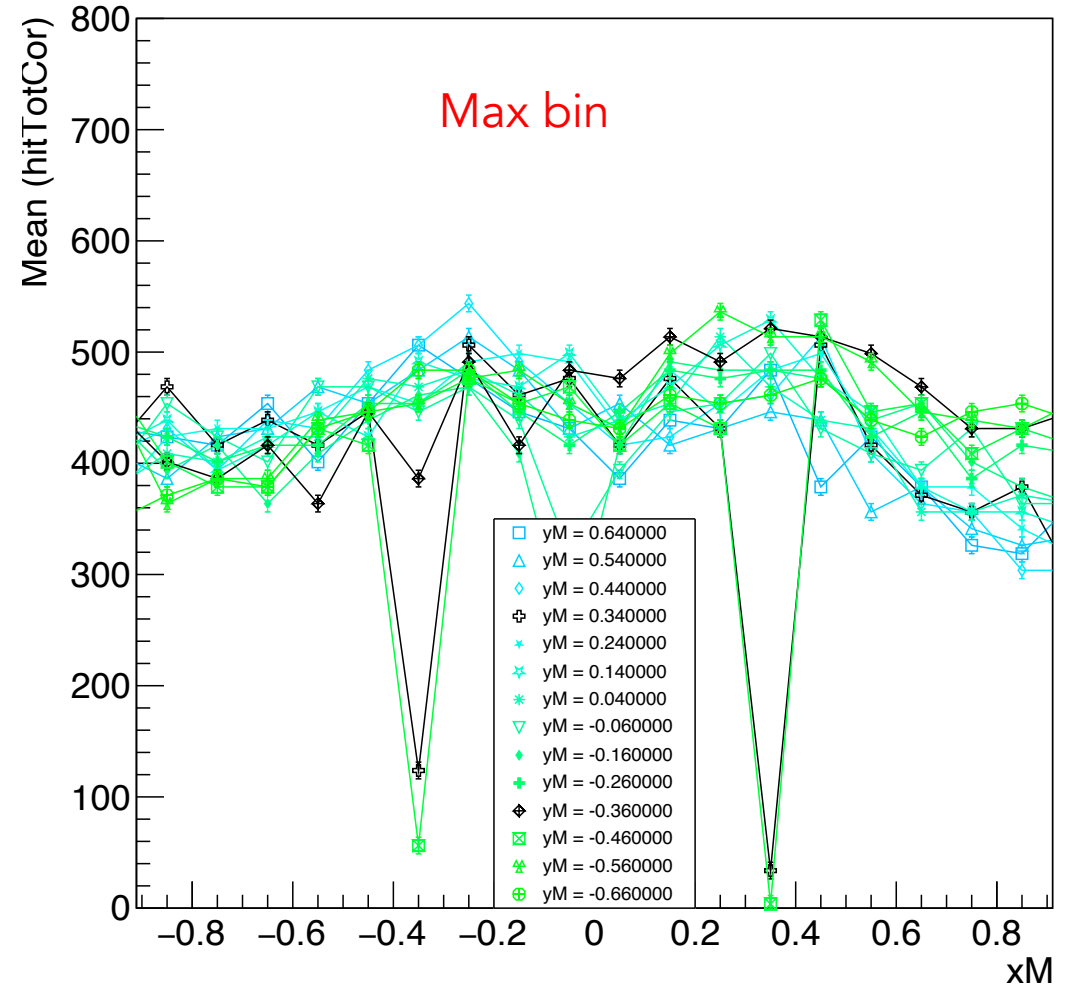
# Currently using the mean of hitTotCor .. is it fine ?

we cut at hitTotCor < 1500

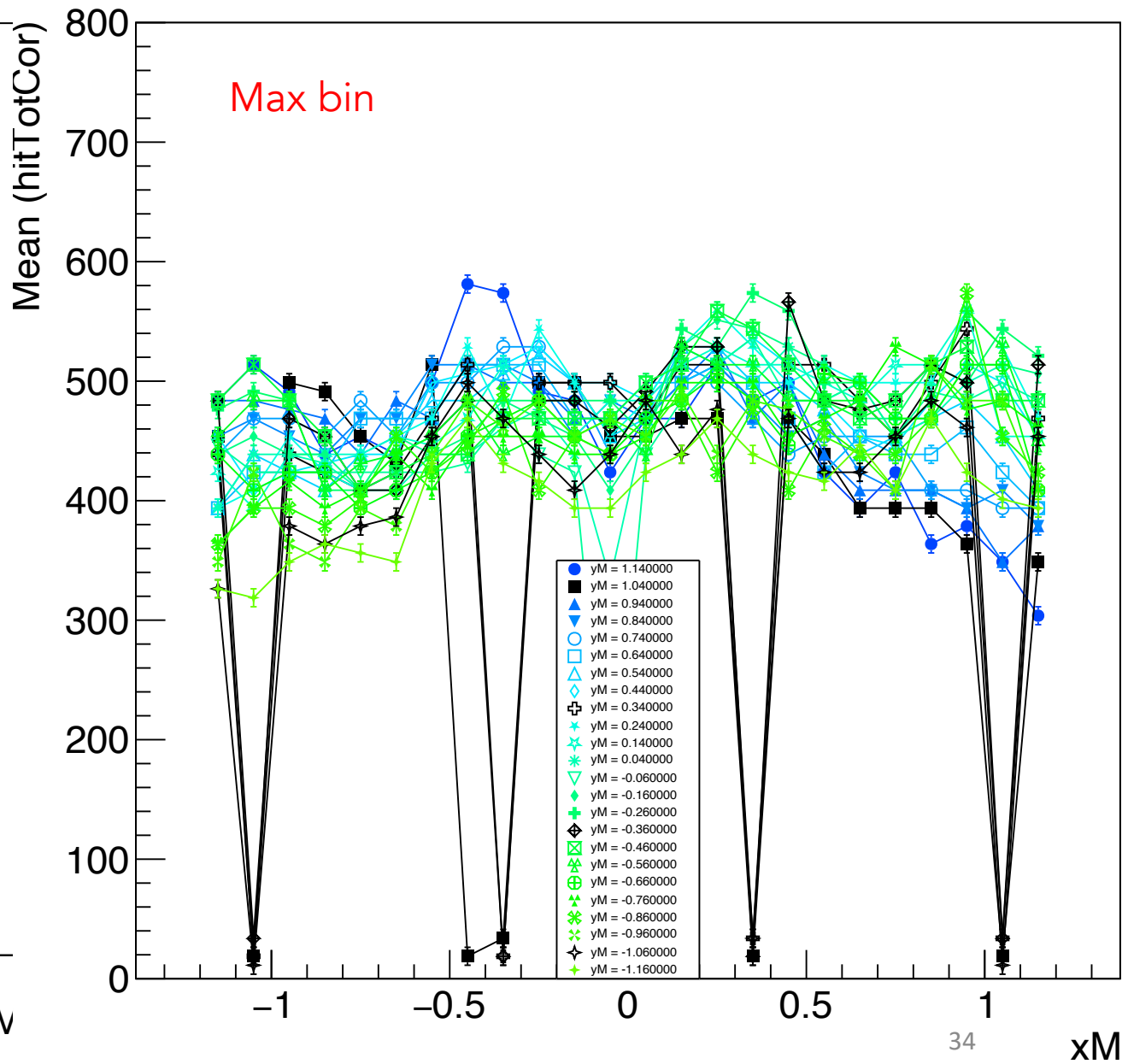
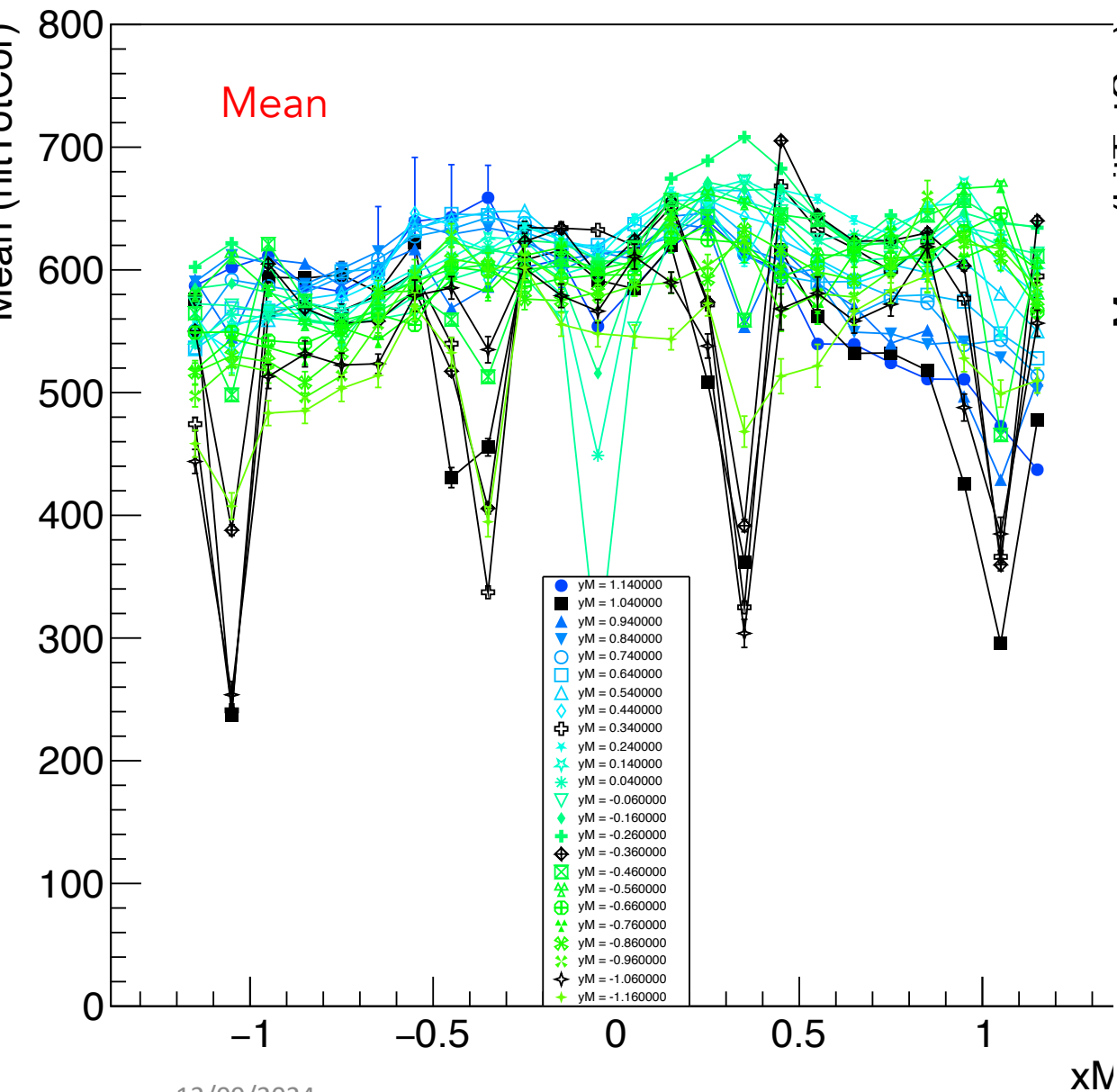
Muon (59 60)



Pion (57 58)



# Run 41-45 + 50-51 Troll 1 water

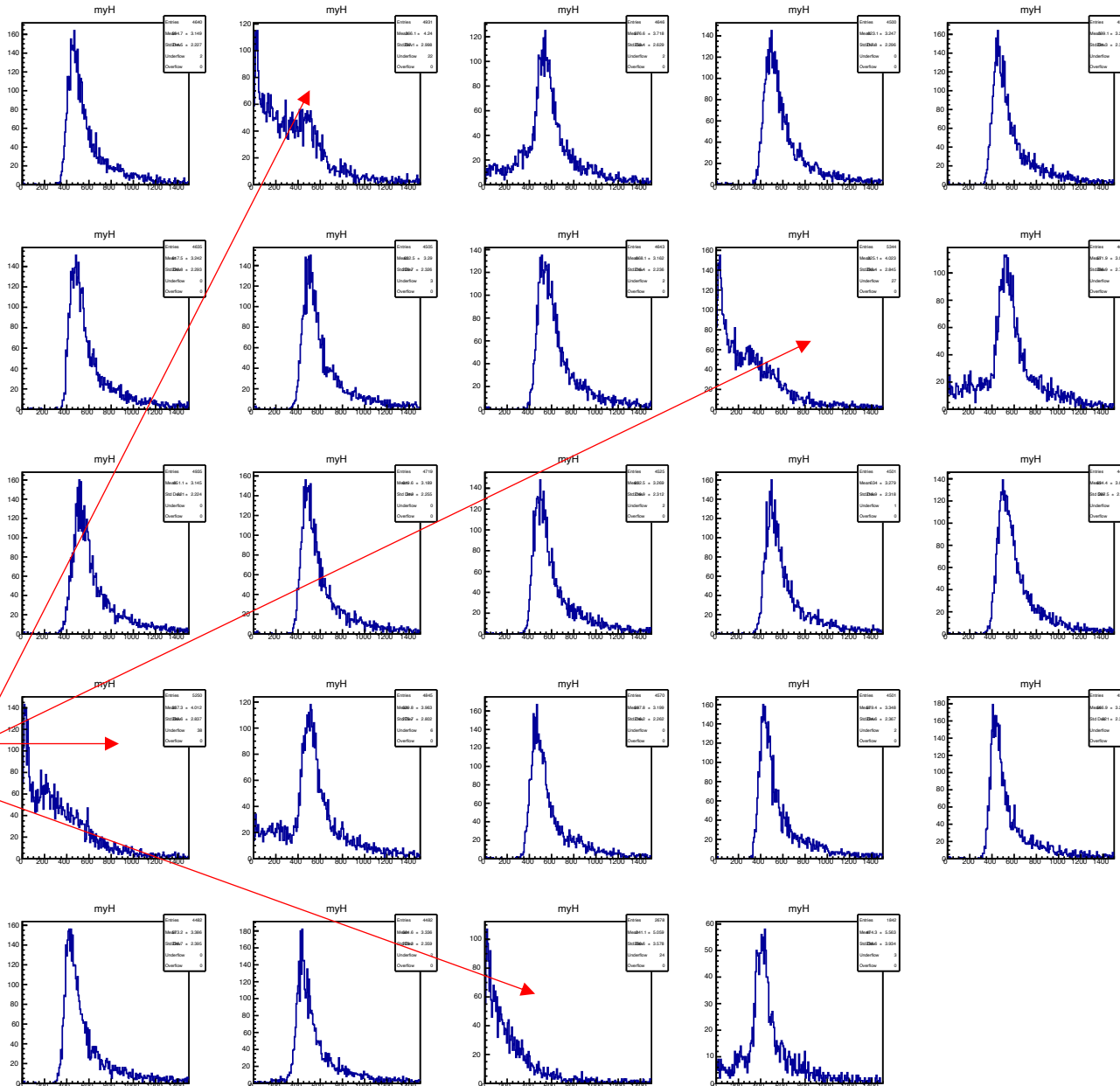






# Run 41-45 + 50-51 Troll 1 water

Look at  $yM = .34$

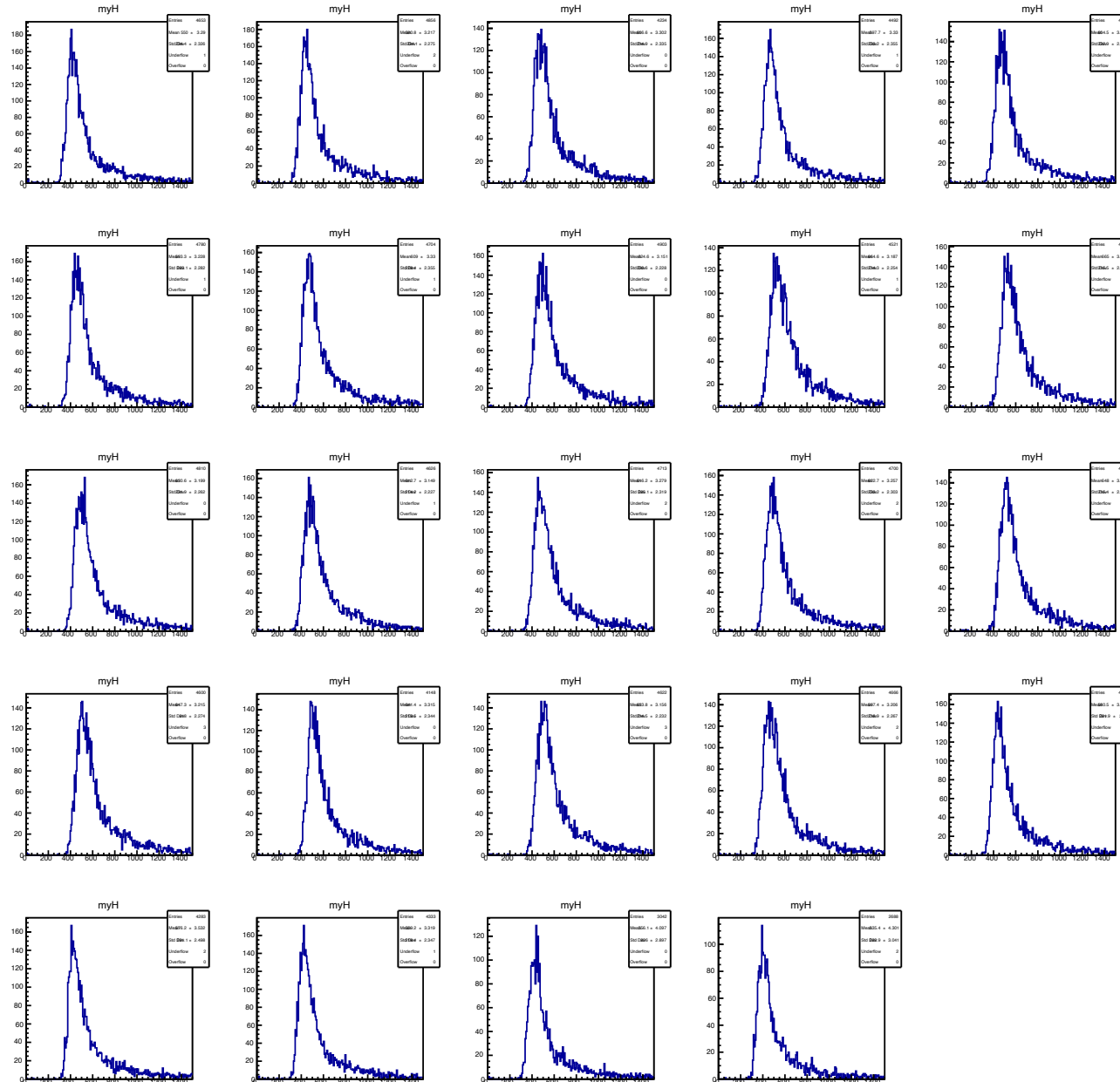


this explain the large change for the area located on the fiber



# Run 41-45 + 50-51 Troll 1 water

Look at  $y_M = .54$



# What is learnt (?)

Troll1 water :

- good SiBB settings
- no obvious sign of a badly behaving fiber
- significant amount of stat in pions.
- otherwise, looks promising

Troll1 HL :

- only with bad SiBB settings
- less signal nearby VM200 ?
- larger variations ?

Troll2 HL

- only with bad SiBB settings
- problem with Fiber10 ?
- otherwise more flat than Troll1 HL (makes no sense) a

Sensitivity to

- how well centered we are wrt to the fiber
- the fiber answer itself (cf the fiber10 impact on Troll2)

Is the bin more populated better than the mean for a fast estimate ?

- Pions and muons are more similar (for the region without fibers)
- Of course one should rather do an average of +/- 2 bins around the maximum ...
- When located on the fiber this is probably not very good ....

# Back-up slides

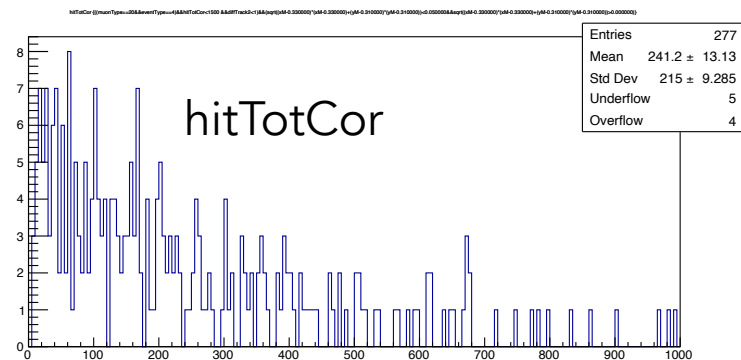
If instead of "my" fiber4 position (determined by eye as  $x_M = .32$ ,  $y_M = .32$ ) I use Herve's one ( $x_M = .33$ ,  $y_M = .31$ )

Muon runs 59 & 60

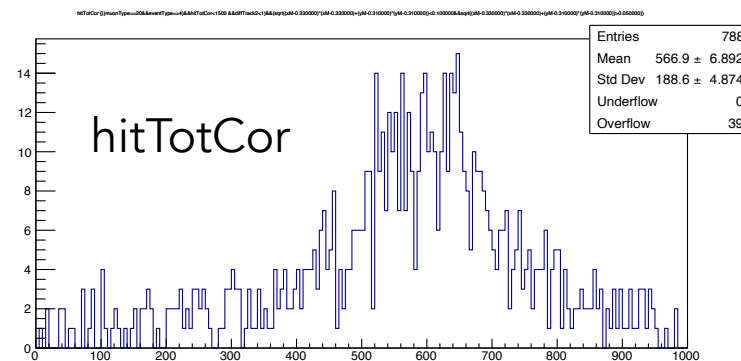
Fiber 4

~no difference as expected

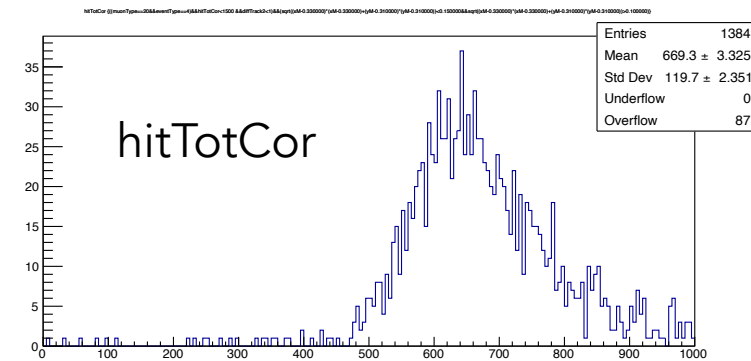
R < 0.5 mm



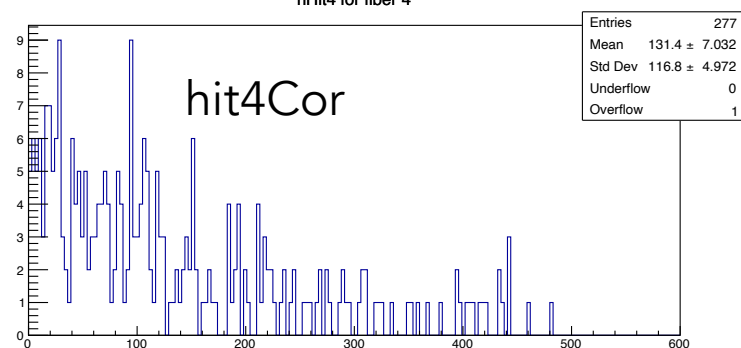
.5 mm < R < 1mm



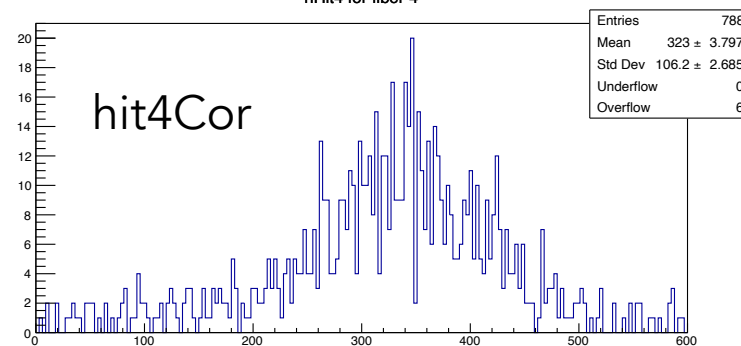
1 mm < R < 1.5 mm



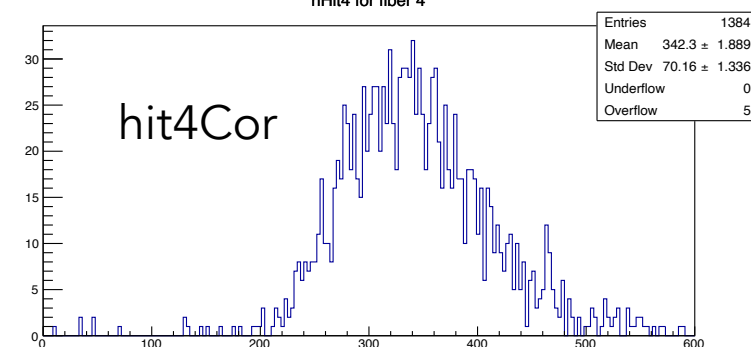
hHit4 for fiber 4



hHit4 for fiber 4

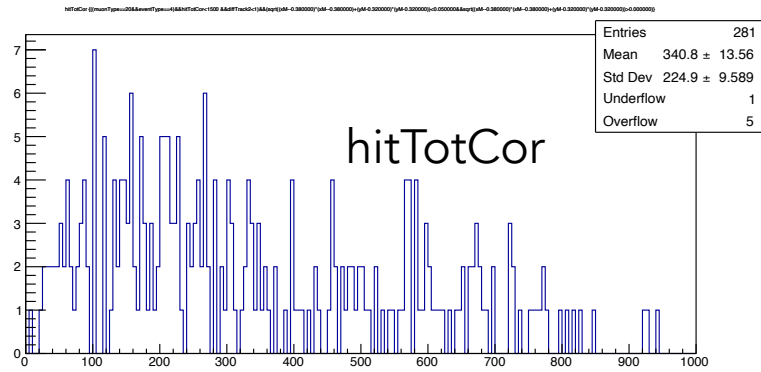


hHit4 for fiber 4

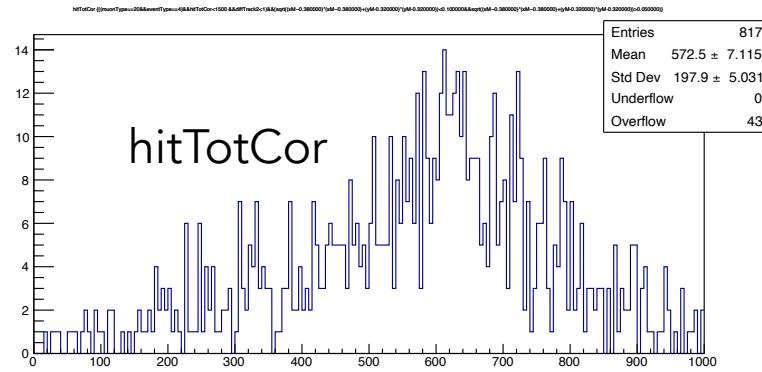


Fiber 7 (xM = -.38 yM = .32)

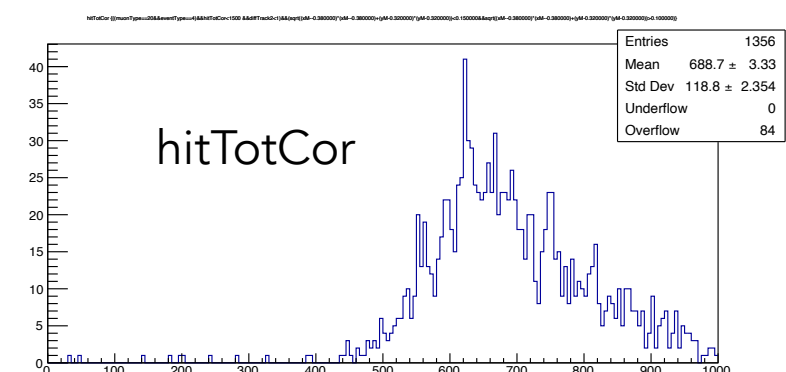
R < 0.5 mm



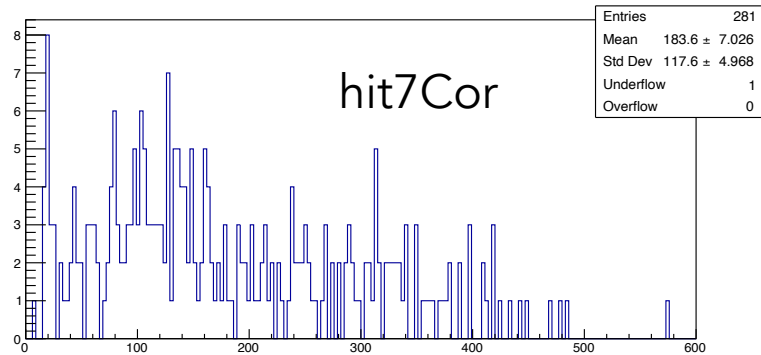
.5 mm < R < 1mm



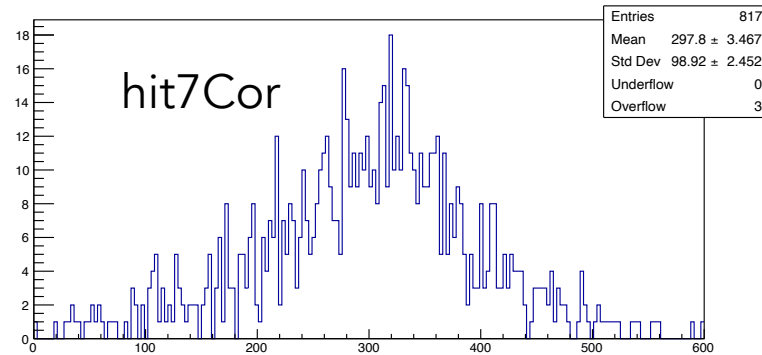
1 mm < R < 1.5 mm



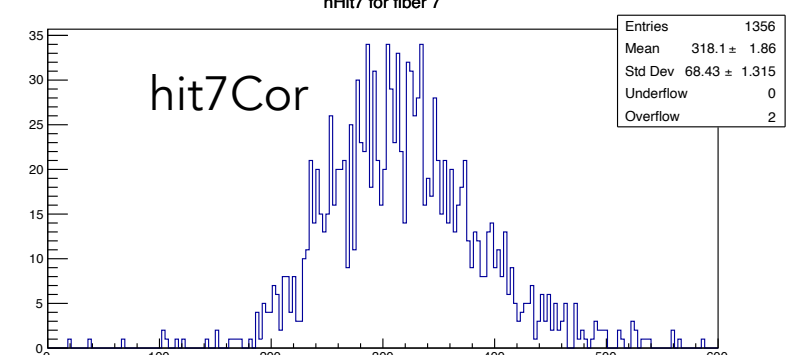
hHit7 for fiber 7



hHit7 for fiber 7



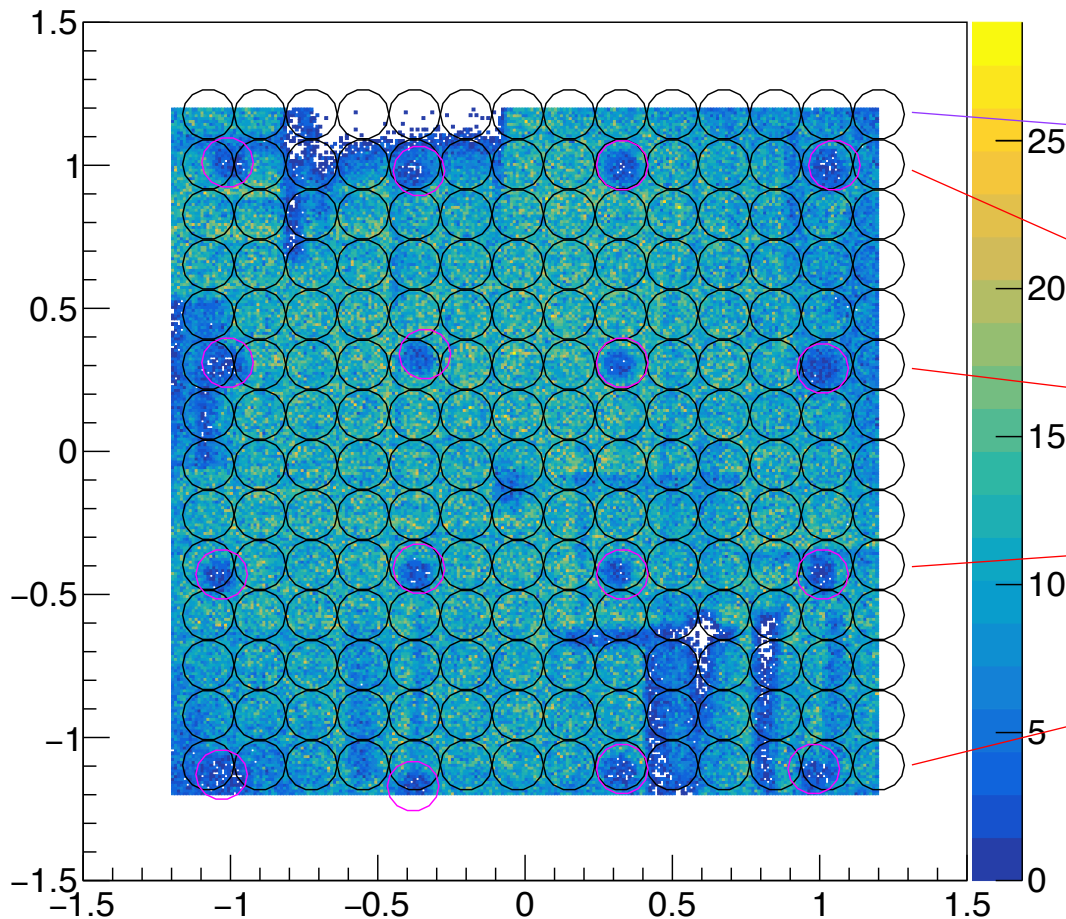
hHit7 for fiber 7



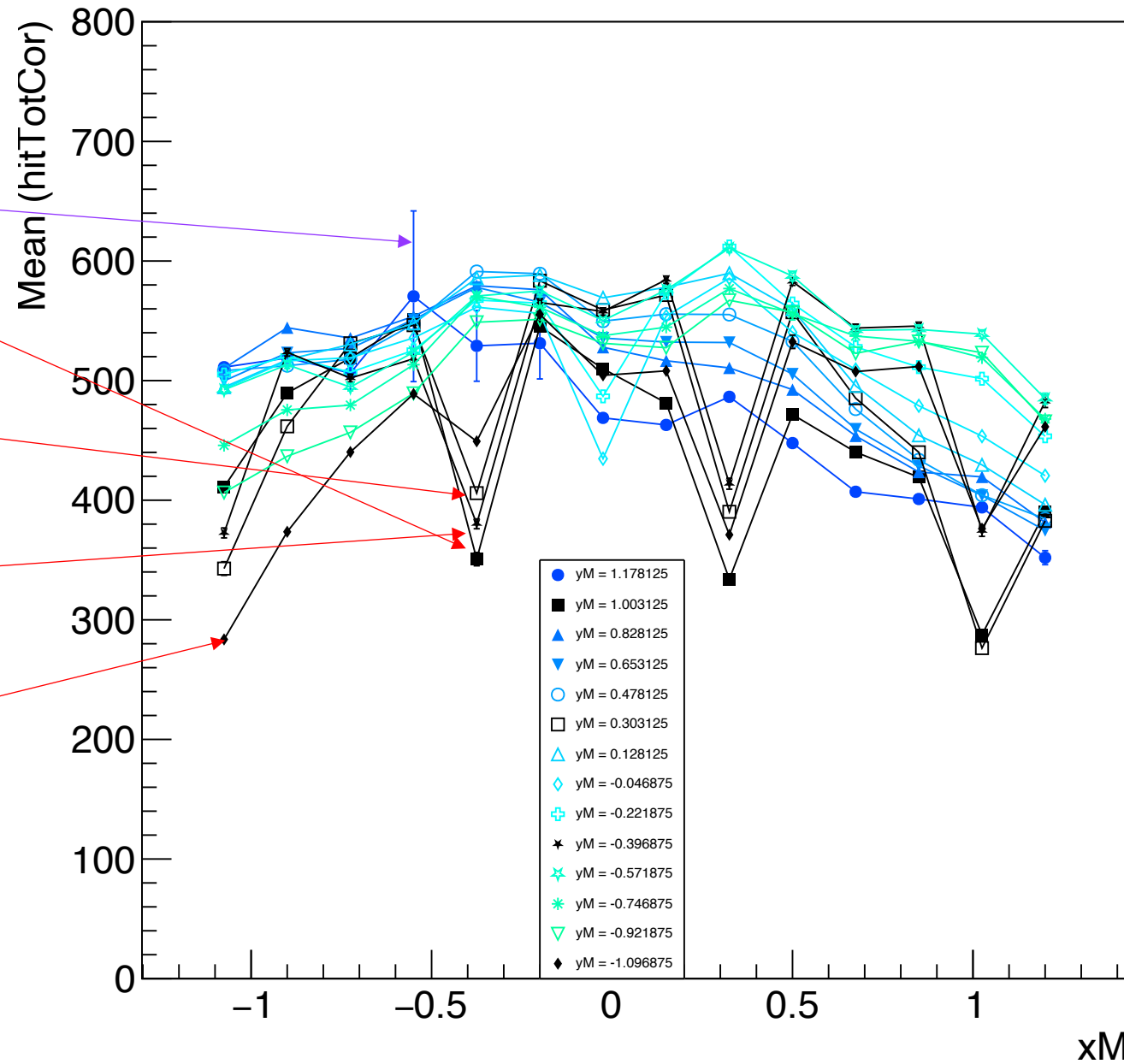
Radius = 0.0875 cm

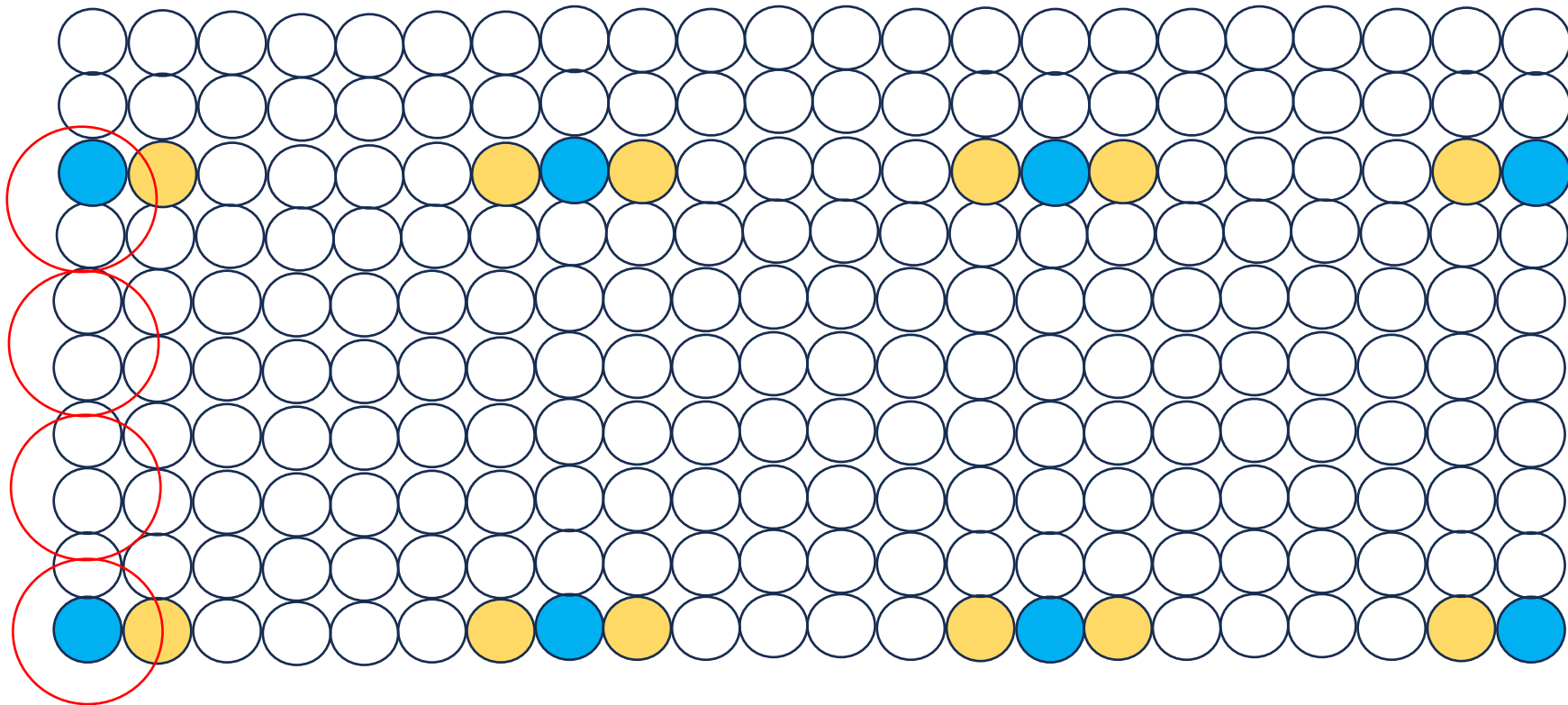
Pion SSiB corrected Runs 57 58

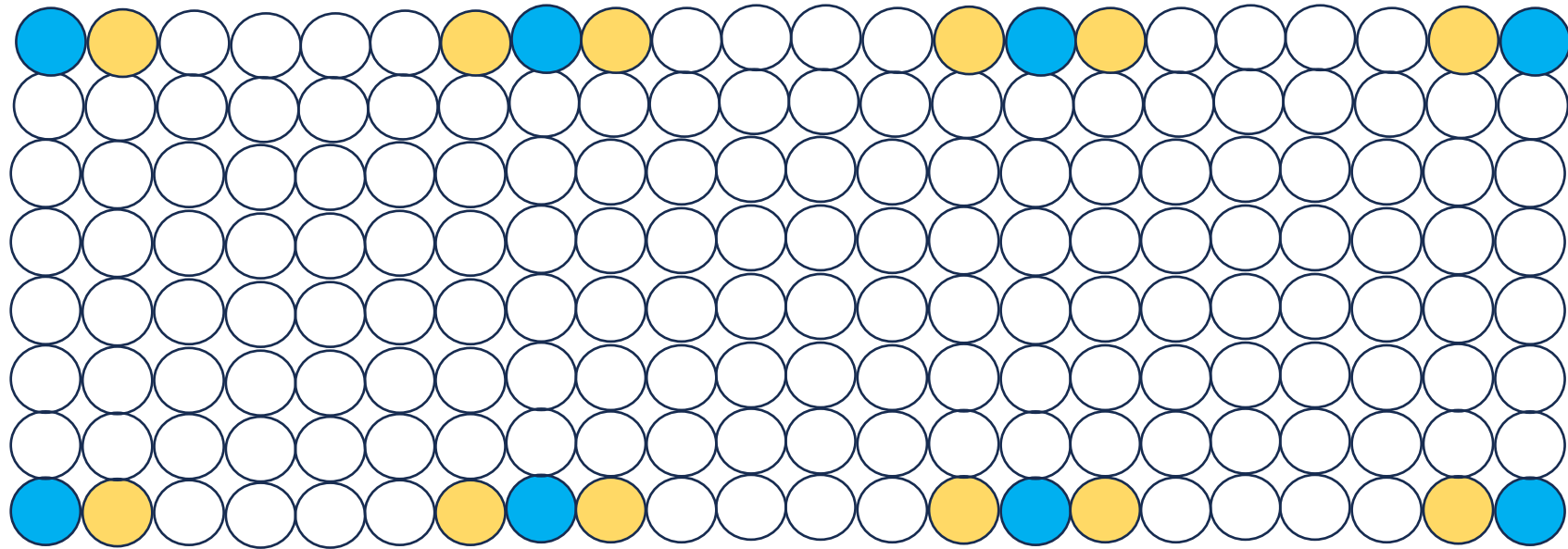
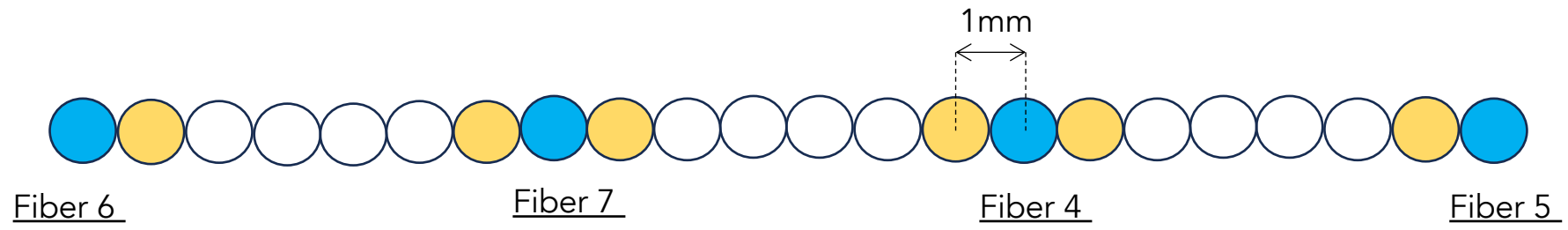
xM vs yM (hitTotCor>400)



 Herve positions









Run#	Troll Type	Data type	Comment	Dark
11	Troll1 Water	LED + pedestal ?		<b>118</b> – Event Type = 4 LED reste pedestal ?
24	Troll1 Water	LED-only		Event Type = 4 LED
25,30,31,32	Troll1 Water	Electron		~120 – 130
33,34	Troll1 Water	Muon		~130
35,36,37,38,39,40	Troll1 Water	Pion.	changes in position of GRAiNITA ... Beam changes	~130
41,42,43	Troll1 Water	Pion	With 3x3 in the trigger (Samedi soir S, MH)	~140
44,45	Troll1 Water	Pion	No 3x3 in trigger. Dimanche matin... (Giulia & co)	~130
47	Troll1 Water	Pedestal		~ <b>119</b>
48	Troll1 Water	LED		<b>118</b> .
50,51	Troll1 Water	Pion	Trigger 5x5	~130
52	Troll2 Heavy L	LED	Degraded SiBB	<b>203. SiBB pb from here</b>
53,54,55	Troll2 Heavy L	Pion	Trigger 5x5 Degraded SiBB	210
56	Troll1 Heavy L	LED+pedestal	Degraded SiBB	<b>Bizarre du beam ???</b>
57,58	Troll1 Heavy L	Pion	Trigger 5x5 Degraded SiBB	180 ?
59,60	Troll1 Heavy L	Muon	Degraded SiBB	211
61	Troll1 Heavy L	LED	Degraded SiBB	204 <b>eventType = 4 = LED</b>
62	12/09/2024 Troll1 Heavy L	LED	Normal SiBB	125 <b>eventType = 4 = LED</b> 45