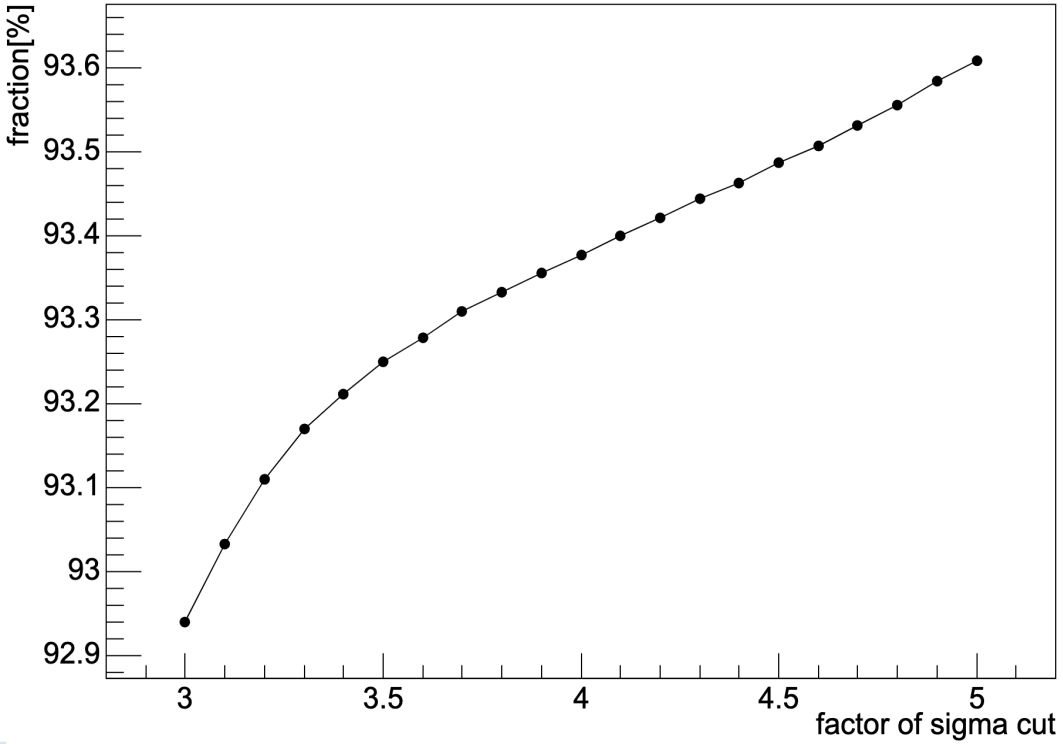
Investigation of cold channel Half entry chips

Jaein Hwang

Byungsik Hong

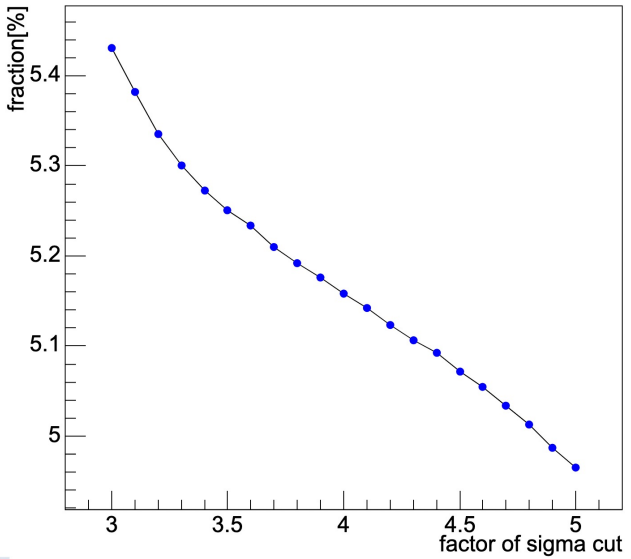
Fraction of channels vs sigma[3σ ~ 5σ]

Fraction of good channels : Run 20869



(3 sigma to 5 sigma 0.67% increasing)

Fraction of cold/hot channels



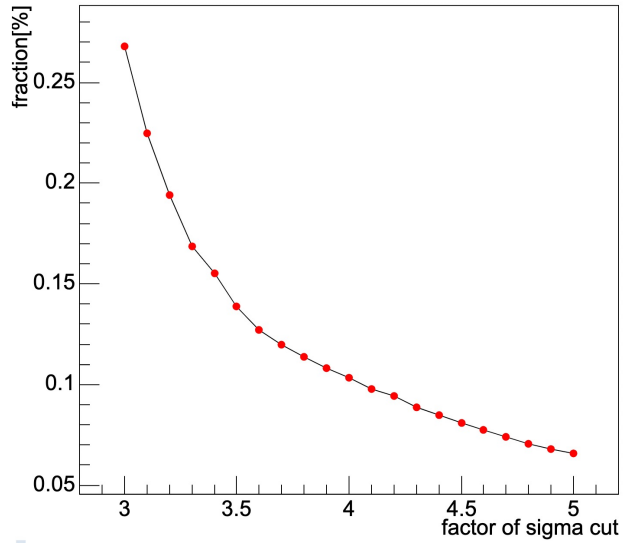


Table 1. fraction of classified channels

tag	3σ	3.5σ	4σ	4.5σ	5σ
GOOD	92.94%	93.25%	93.38%	93.49%	93.61%
COLD	5.43%	5.25%	5.16%	5.07%	4.96%
HOT	0.27%	0.14%	0.10%	0.08%	0.07%
DEAD	1.36%	1.36%	1.36%	1.36%	1.36%

Cause of high fraction of cold channels

1)Half entry chips/ladders

Half entry chips

Felix 0; Module 7; chip 15 (from Run 24767)

Felix 2; Module 9; chip 16 (from Run 24767)

Felix 3; Module 13; chip 21,23,25 (from Run 22)

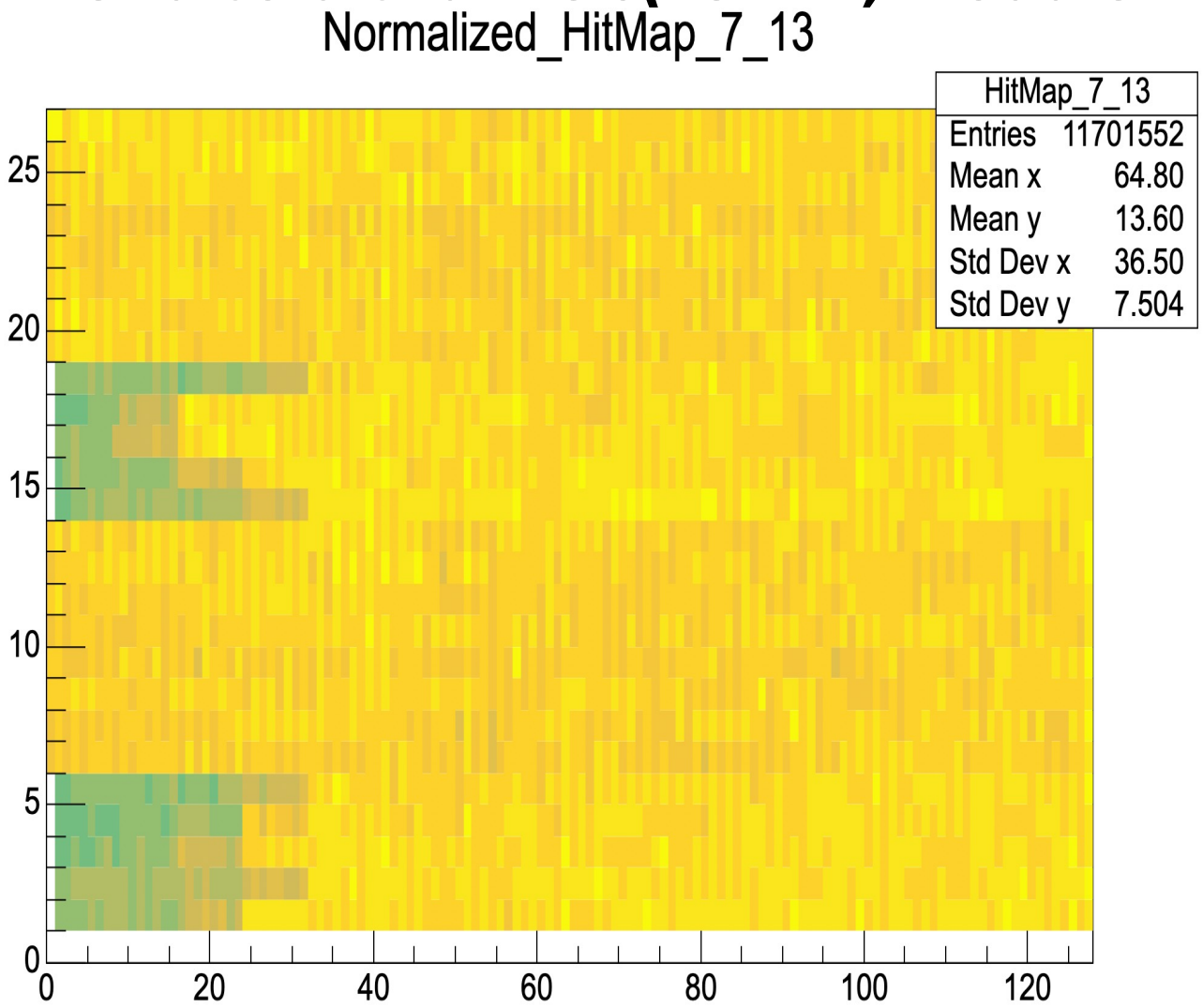
Felix 7; Module 0; Type B (from Run 24767)

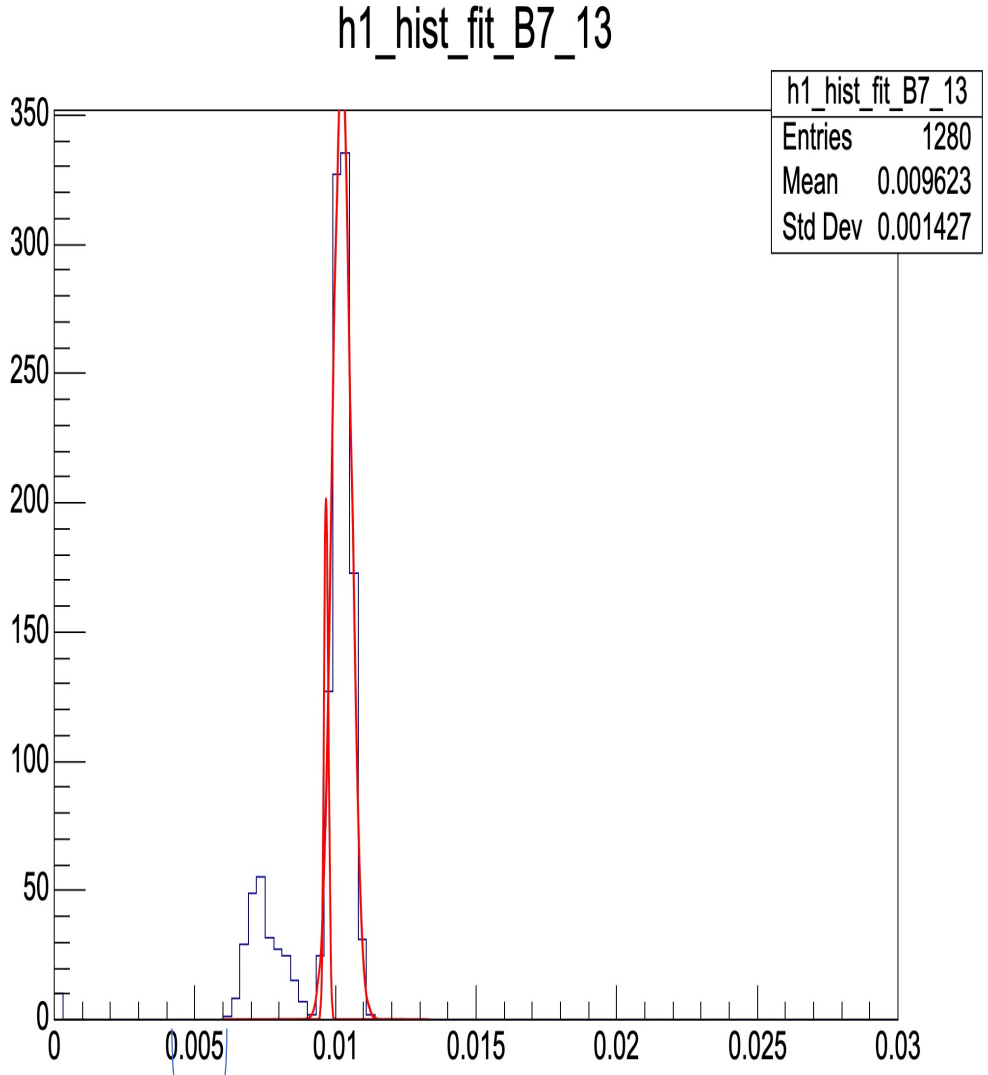
Felix 7; Module 0;Chip 6,8,10,12, 19,21,23,25 (from Run 24767)

In total, 23 chips

Detail plot can be found in backup slides

Cause of high fraction of cold channels
2) weird cold channels(Felix 7; module 13)

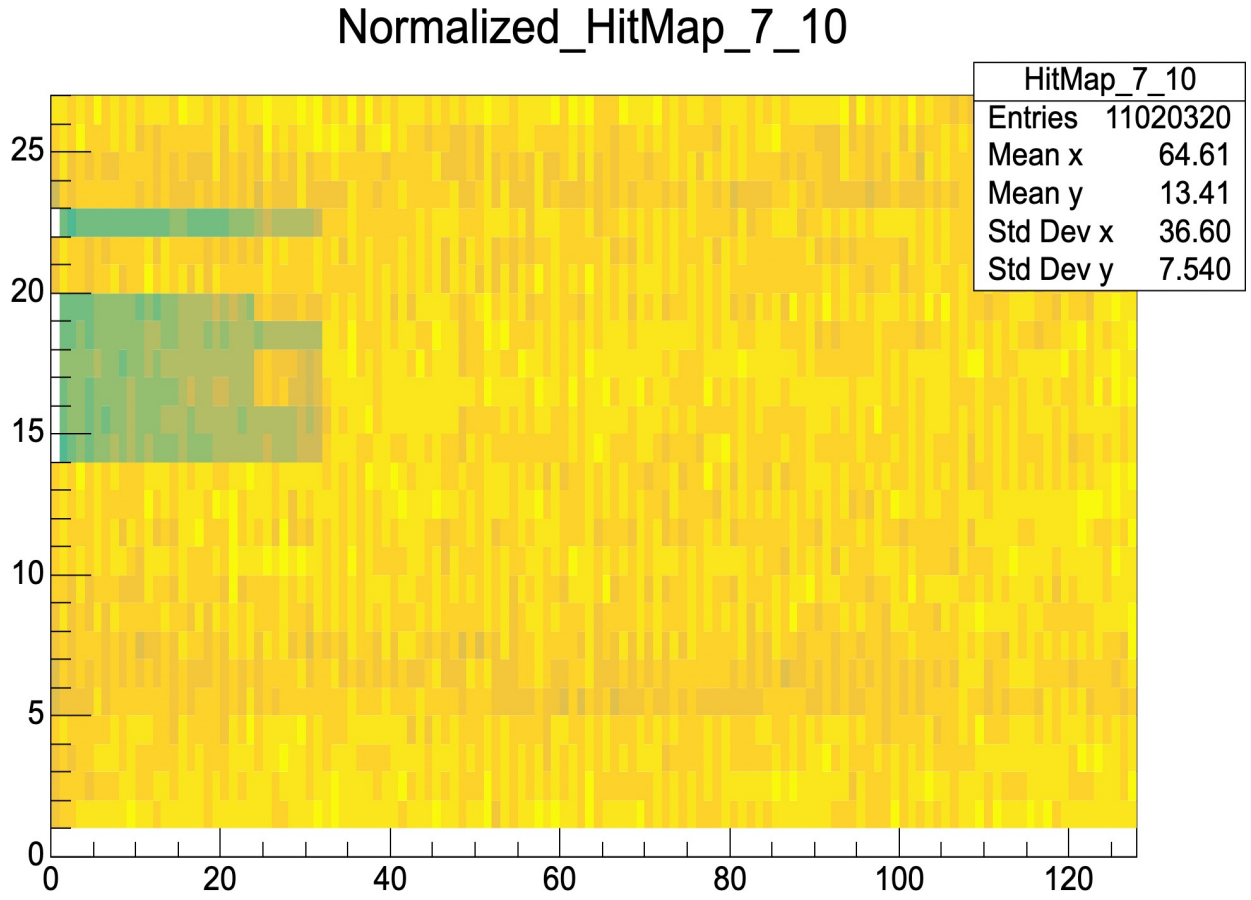


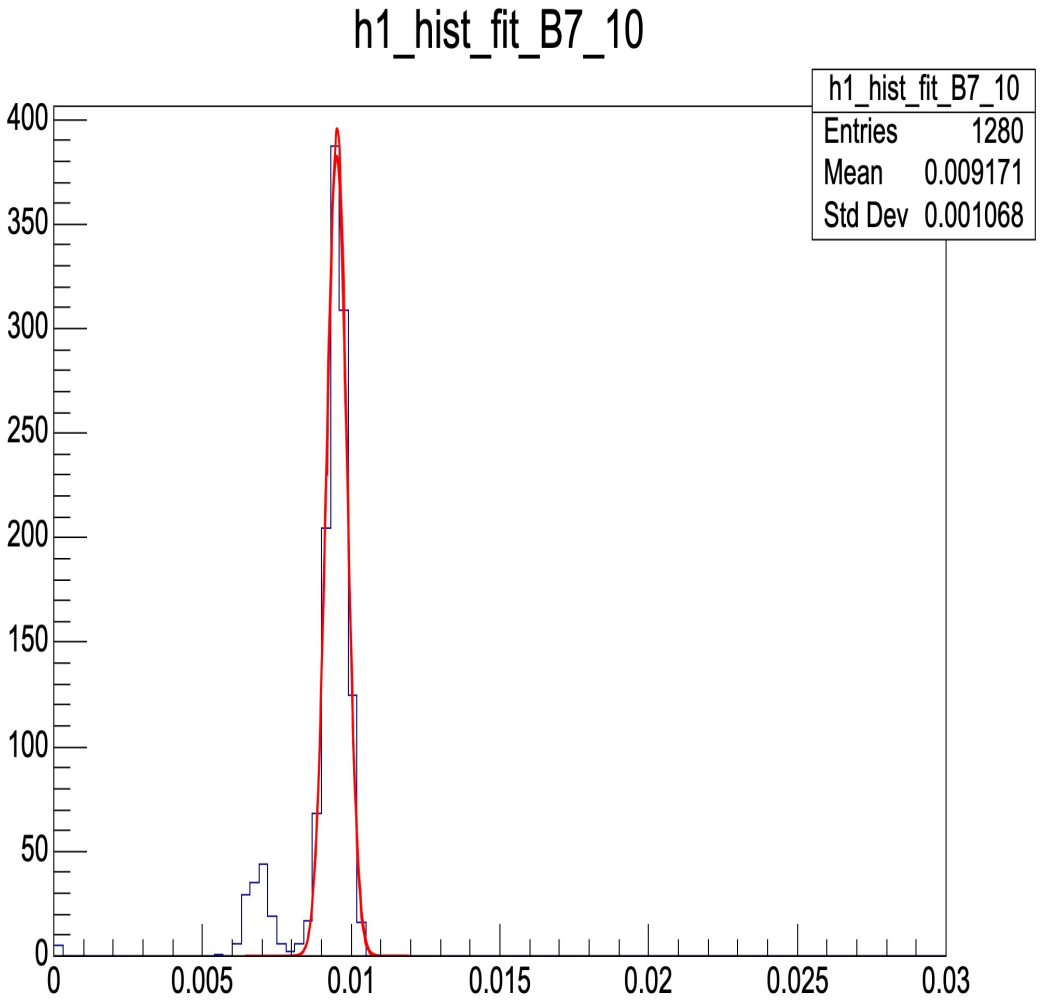


If we mask channel 0, some channels close to masked channel 0 will be cold

Half entry region

Cause of high fraction of cold channels
2) weird cold channels(Felix 7; module 10)





If we mask channel 0, some channels close to masked channel 0 will be cold

Summary

Fraction of cold channel is ~ 5% even with 5 sigma cut.

- Due to half entry chips

Felix 0; Module 7; chip 15 (from Run 24767)

Felix 2; Module 9; chip 16 (from Run 24767)

Felix 3; Module 13; chip 21,23,25 (from Run 22)

Felix 7; Module 0; Type B (from Run 24767)

Felix 7; Module 0;Chip 6,8,10,12, 19,21,23,25 (from Run 24767)

In total, 23 chips

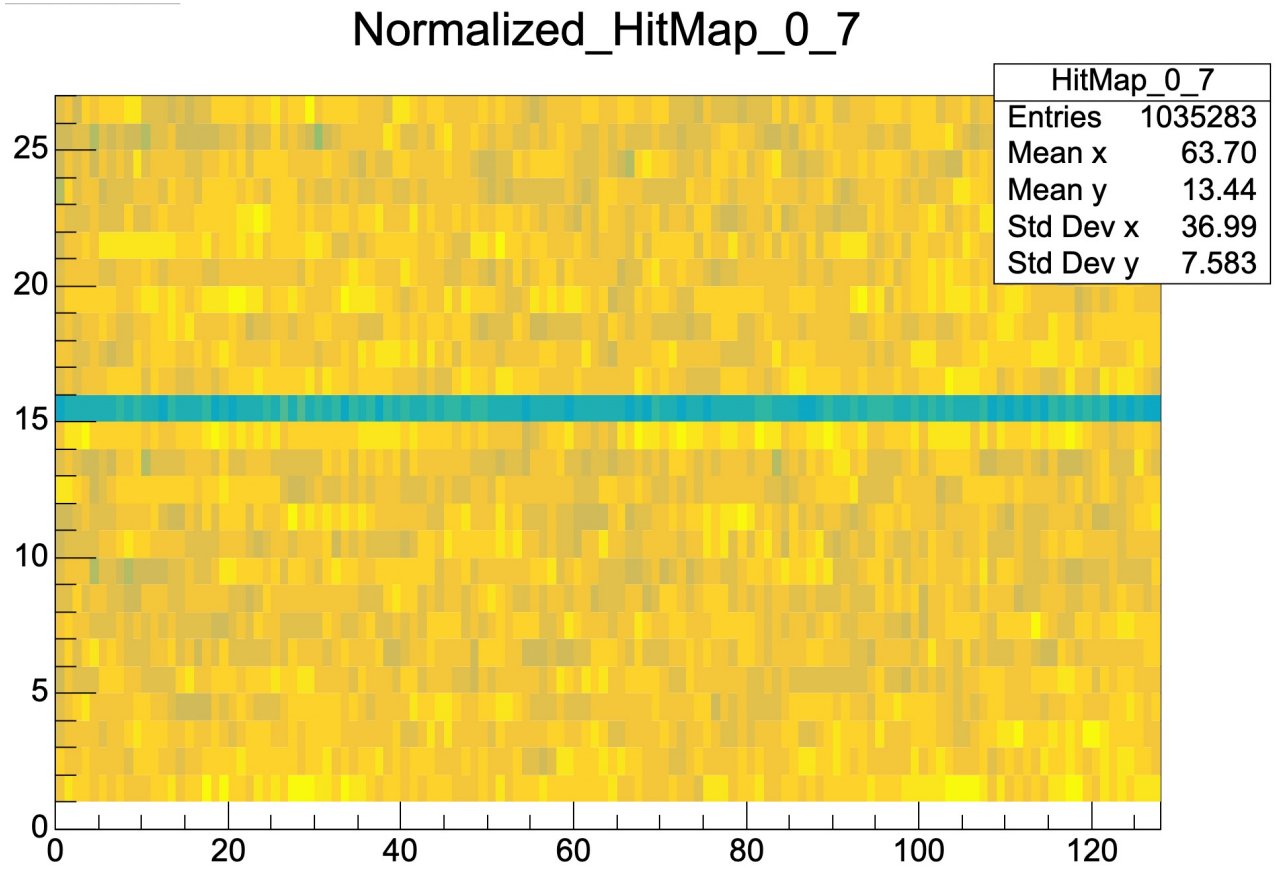
- Due to channels close to masked channel 0

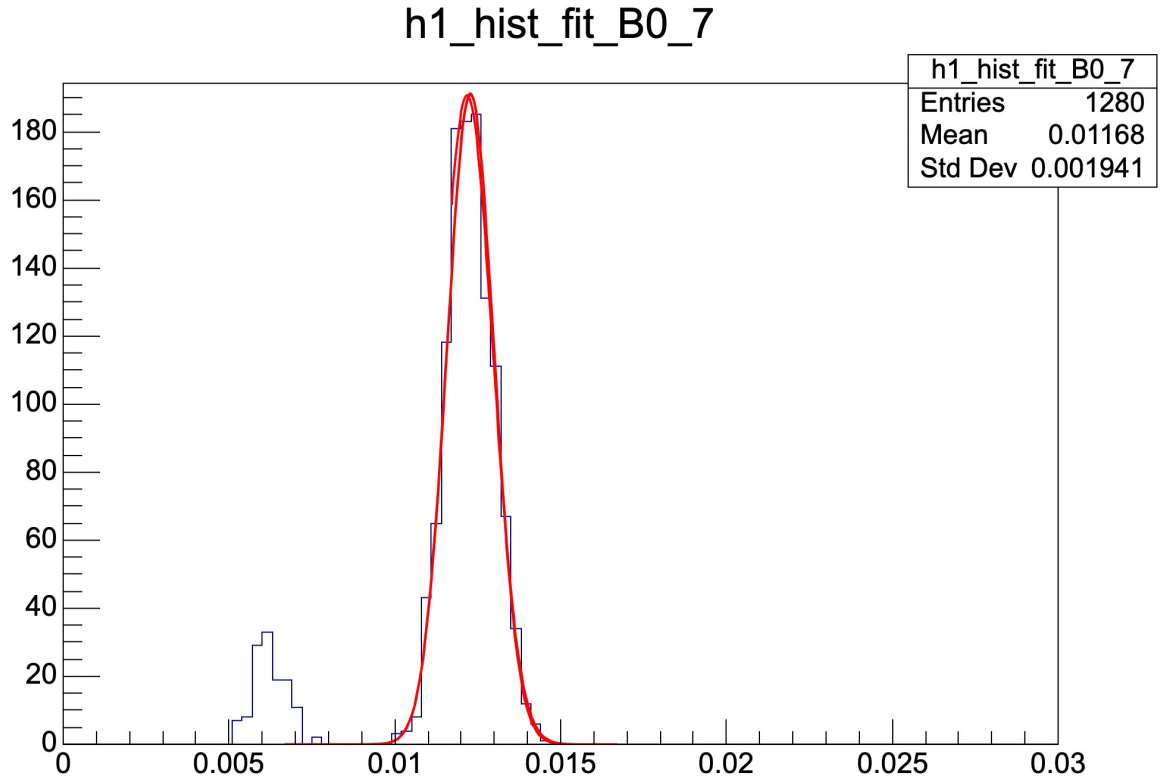
Suggest to unmask channel 0 and make sure that this

backup

Felix 0; Moule 7; chip 15(hitmap & hitrate distribution)

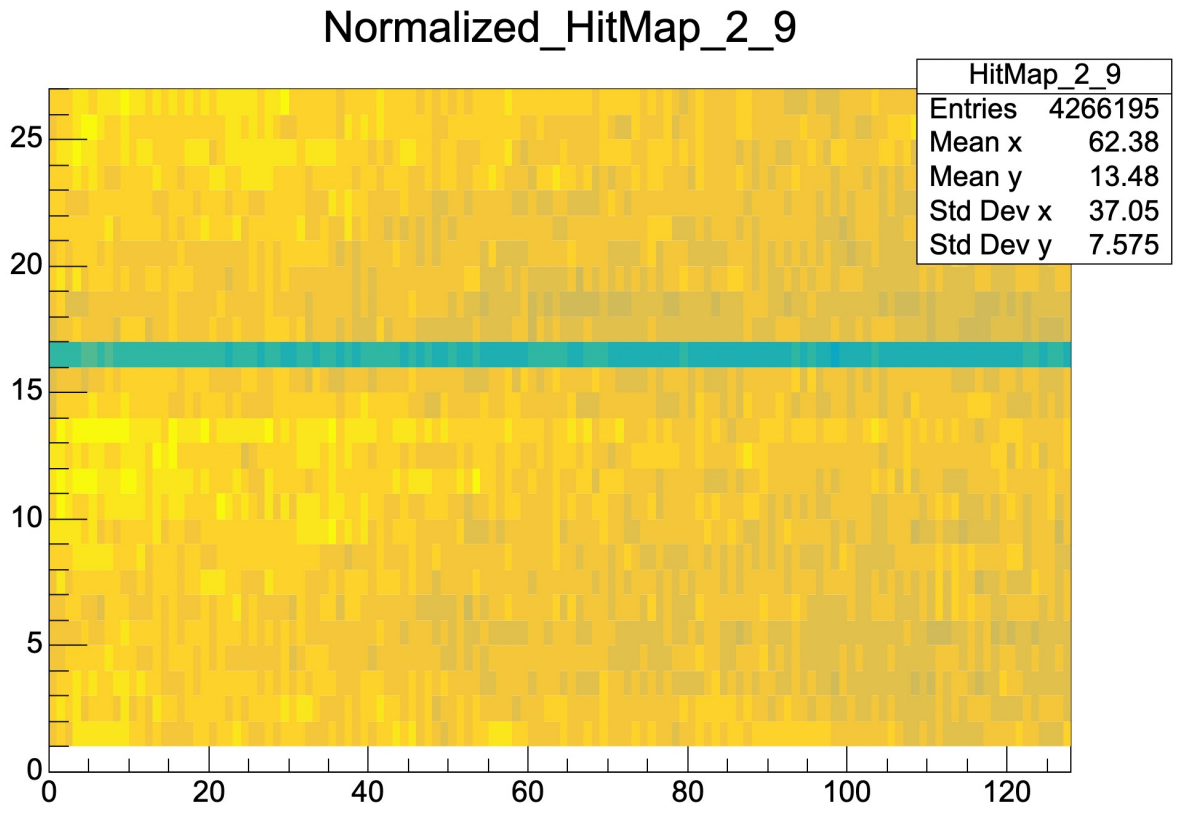
From Run 24767 (24768 was last beam data)

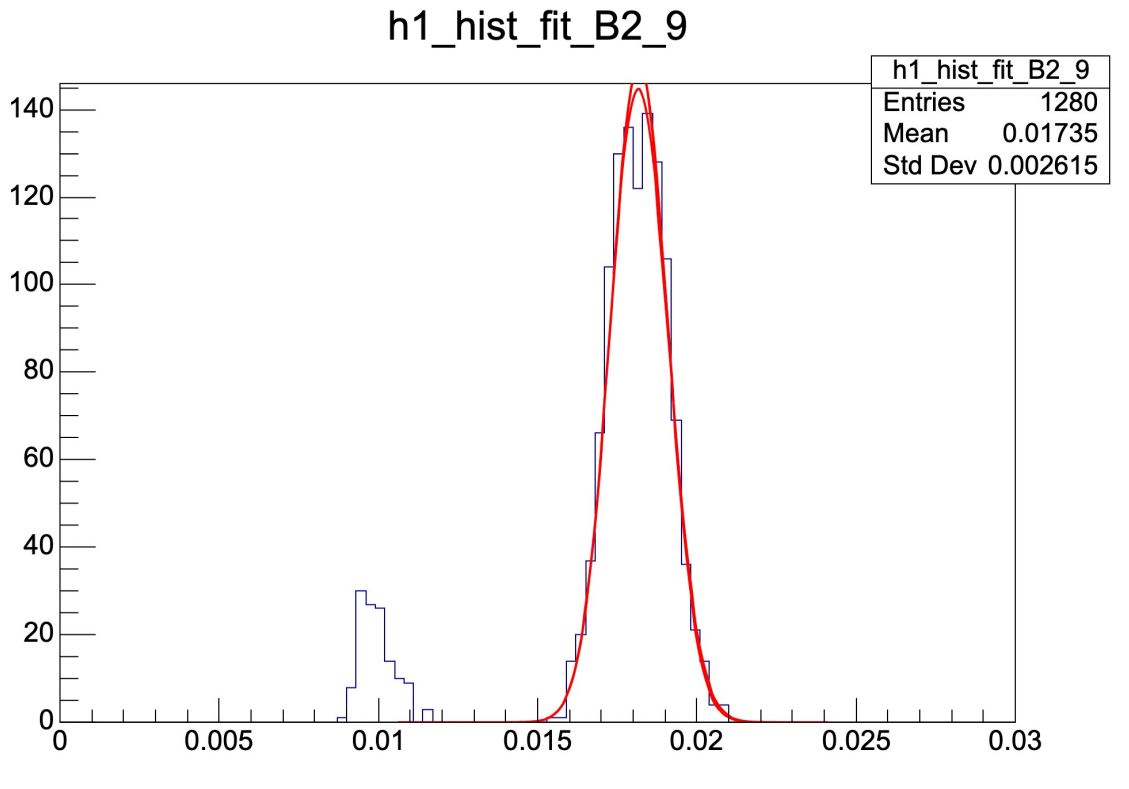




Felix 2; Moule 9; chip 16(hitmap & hitrate distribution)

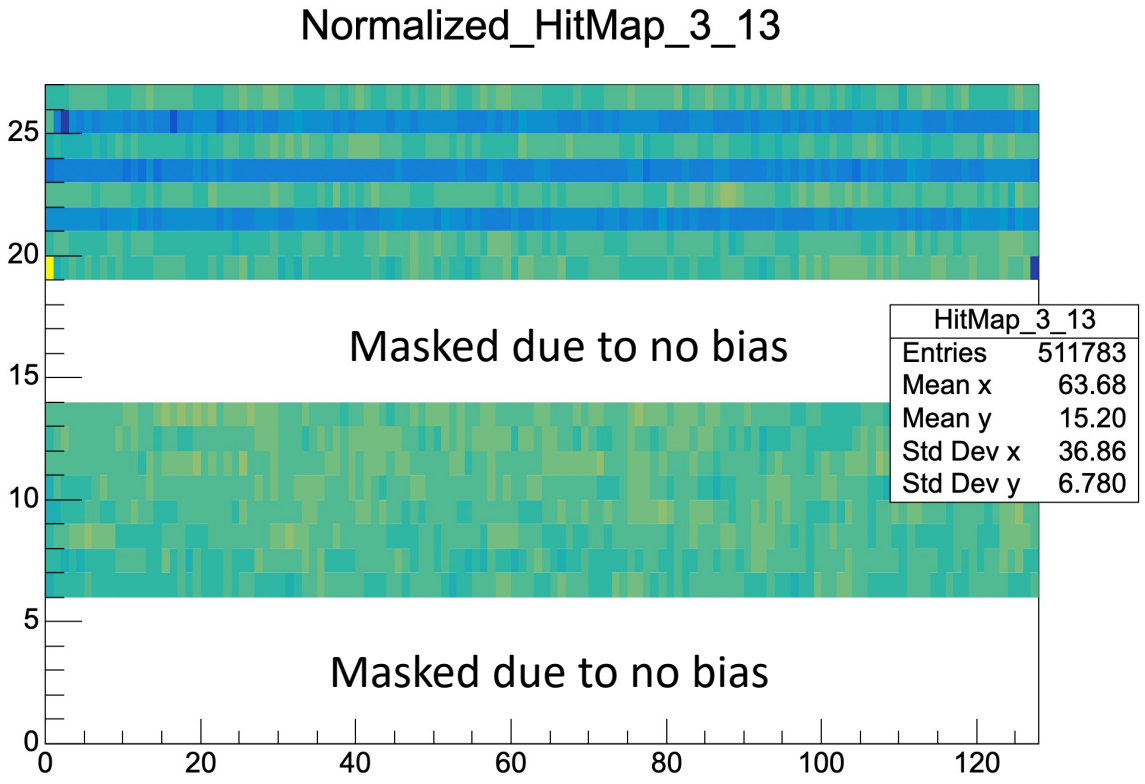
From Run 24767 (24768 was last beam data)

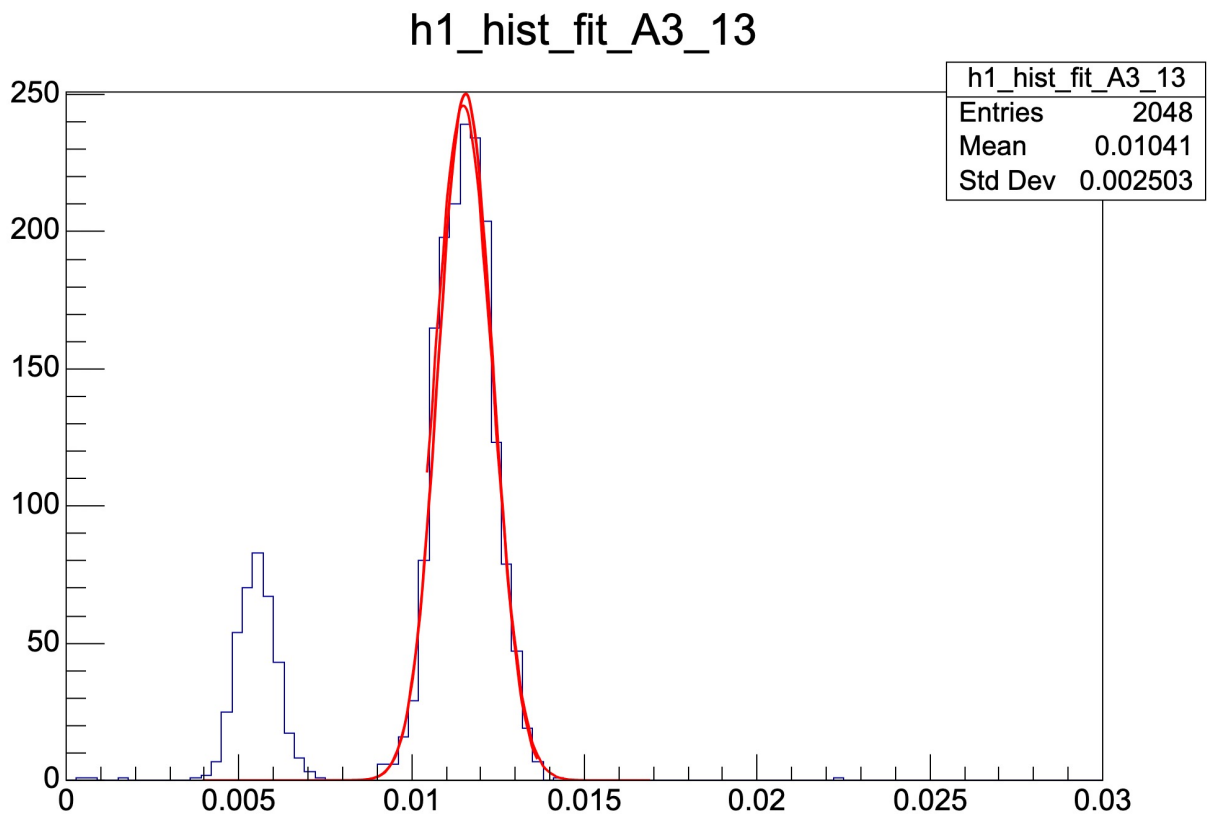




Felix 3; Moule 13; chip 21,23,25(hitmap & hitrate distribution)

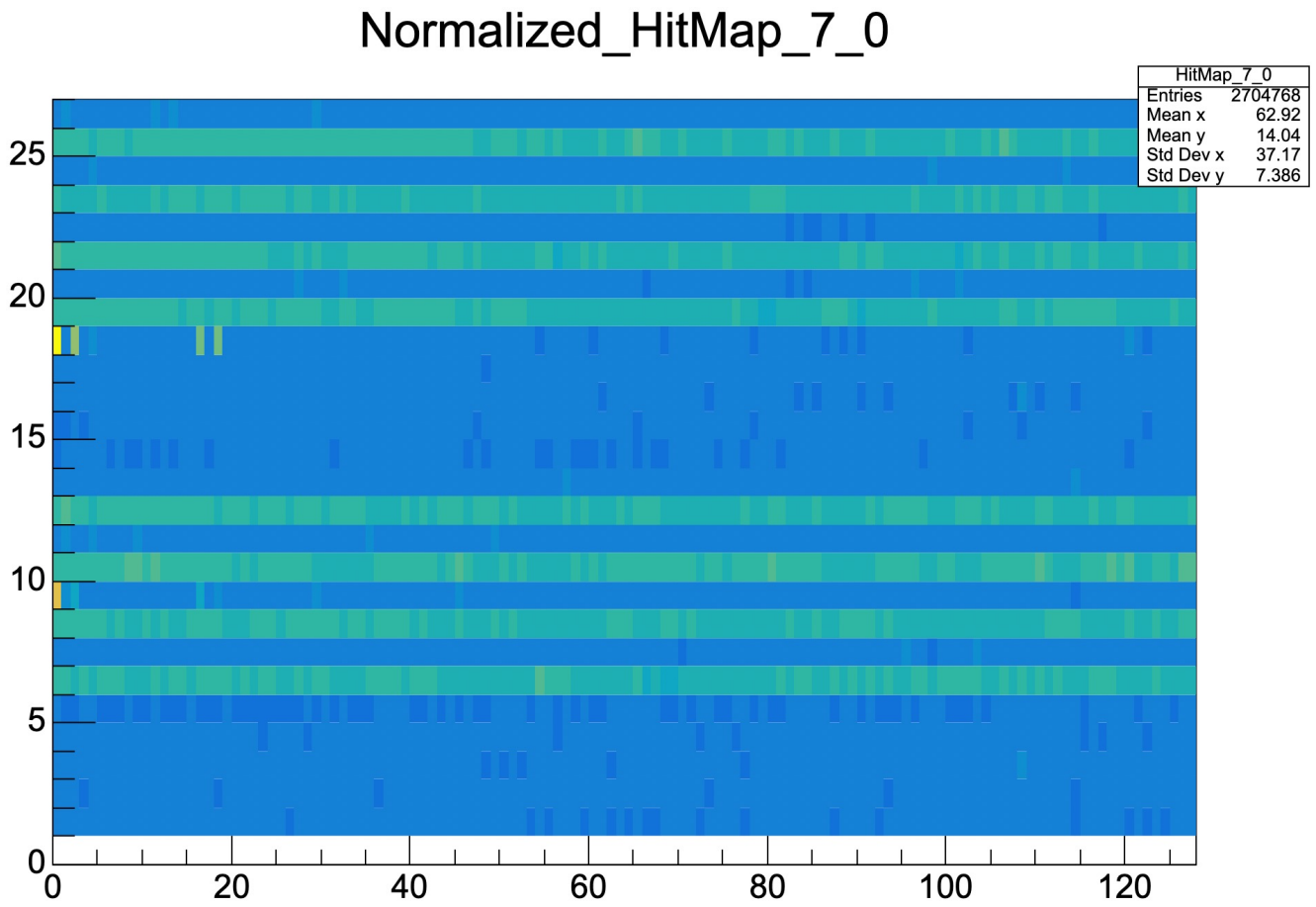
From Run 22986

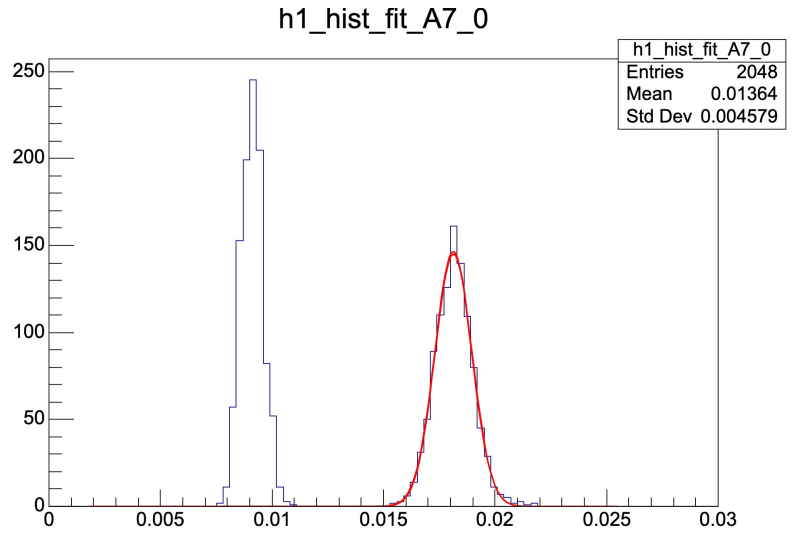


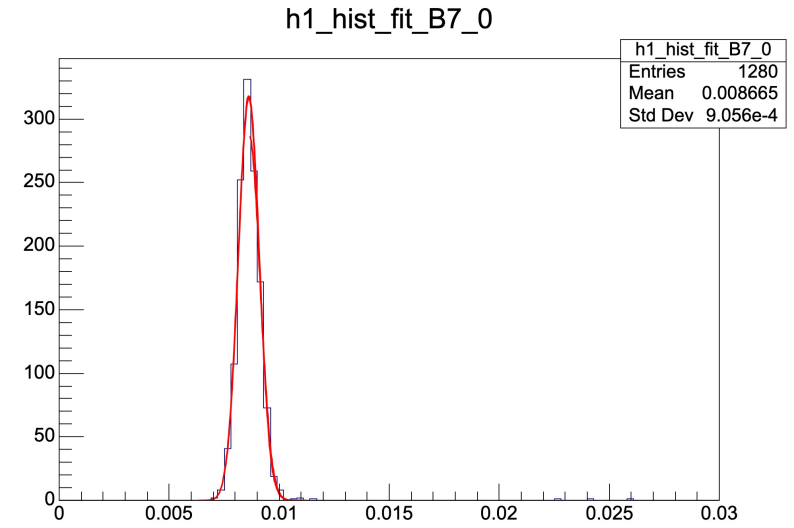


Felix 7; Moule 0; Type B /
Chip 6,8,10,12, 19,21,23,25(hitmap & hitrate distribution)

From Run 24767 (24768 was last beam data)

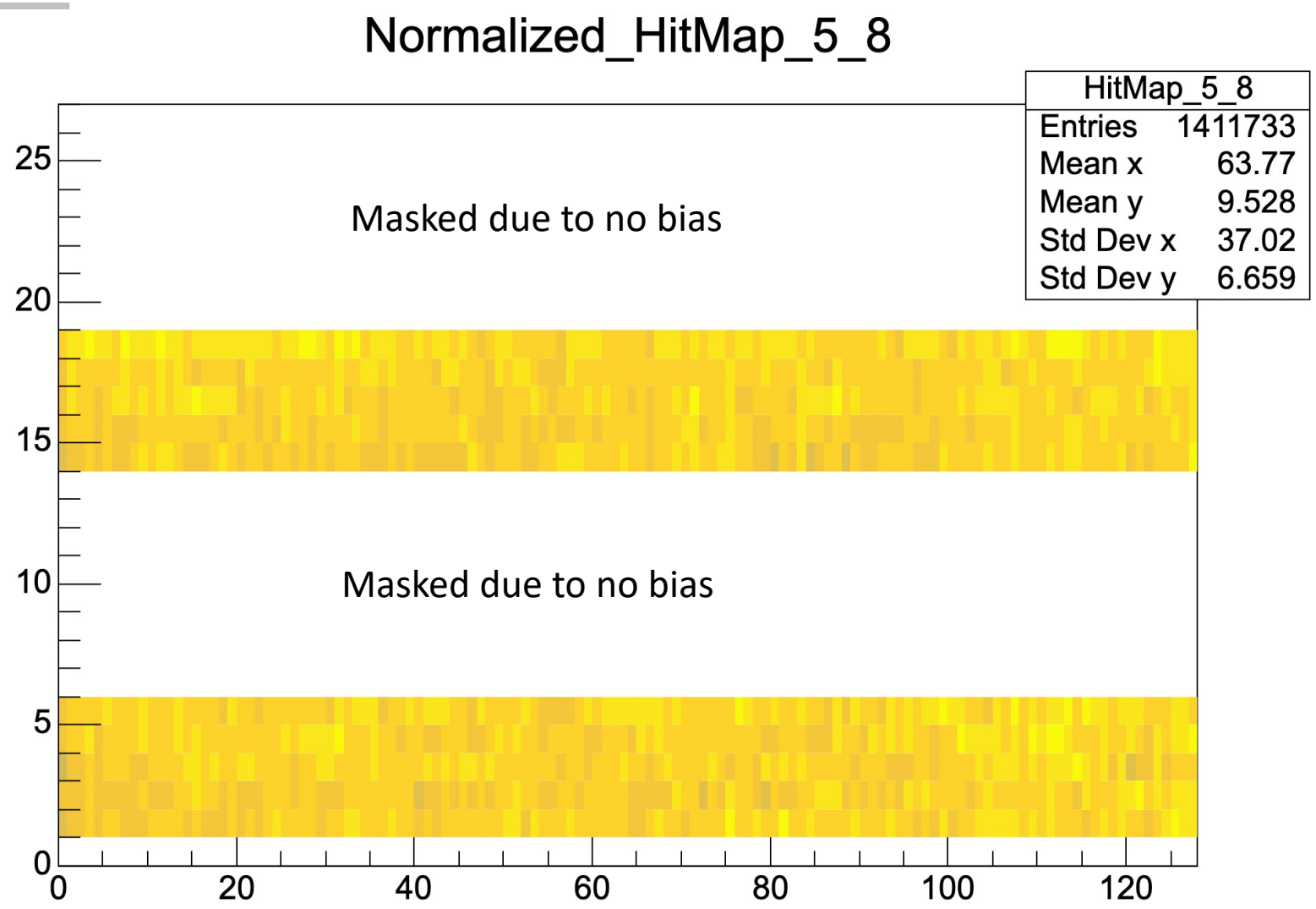




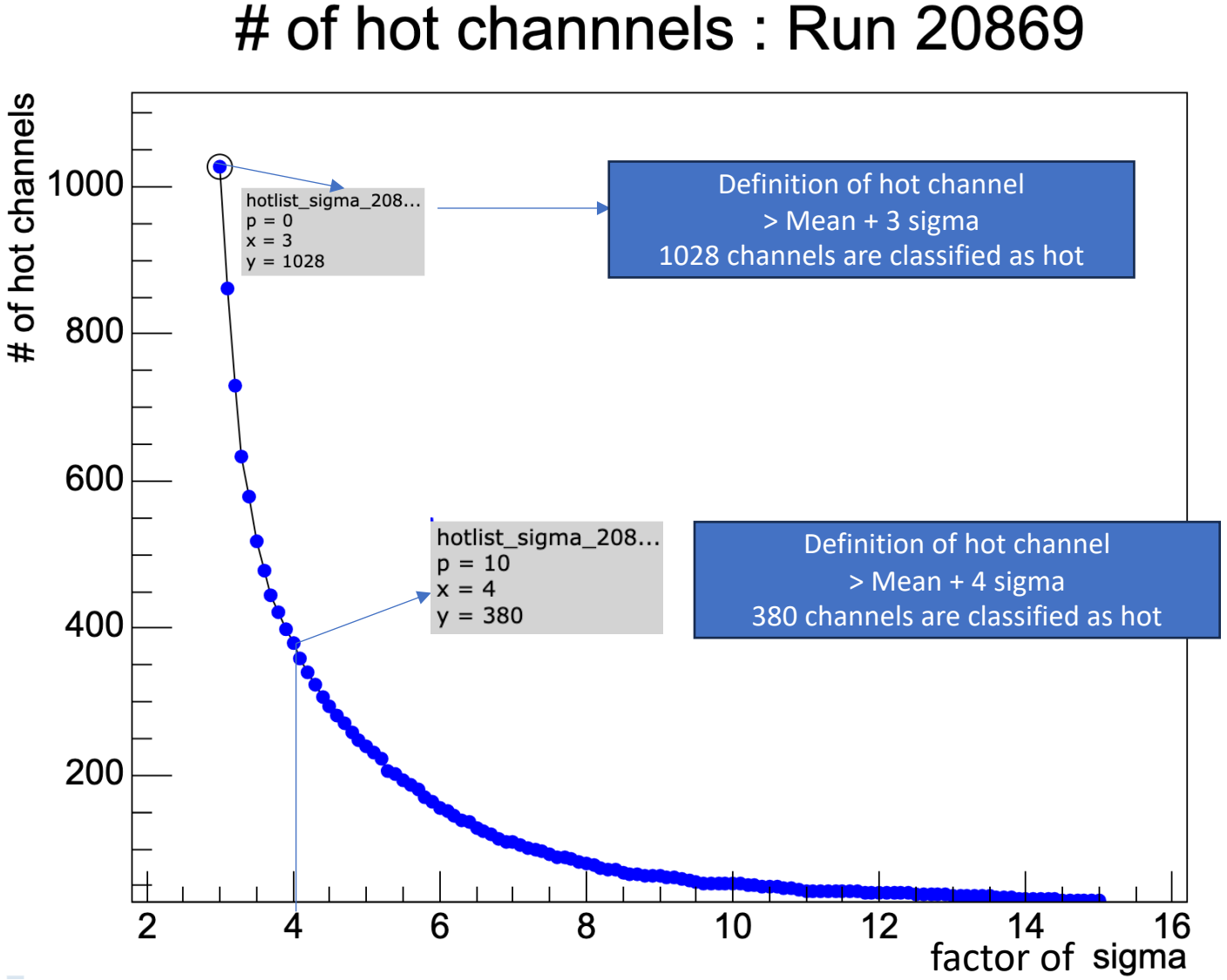


Felix 3; Moule 13; chip 21,23,25(hitmap & hitrate distribution)

From Run 24767 (24768 was last beam data)



of hot channels as a function of sigma



X axis : constant value used for hot channel definition > mean+C*sigma

Y axis : # of hot channels

# of hot channels

mean + 3 sigma : 1028
mean + 3.5 sigma : 518
mean + 4 sigma : 380
mean + 5 sigma : 239
mean + 8 sigma : 81
mean + 10 sigma : 53

Remaining question : Which cut should we use?

- Based on hot channel stability?

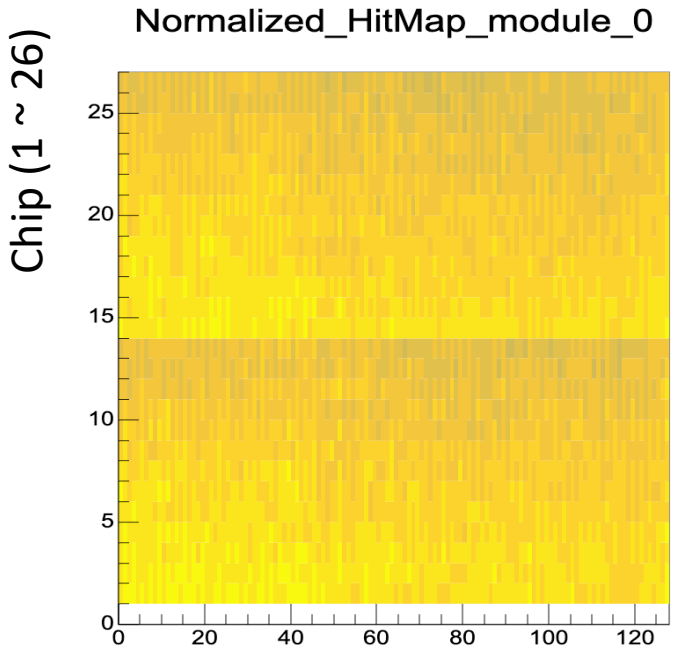
Location of the file

/sphenix/tg/tg01/commissioning/INTT/work
/jaein/HotChannelFinder/event_base_finder
/1220/result/hotlist_sigma_20869.root

Hot Channel algorithm

Reminder : Procedure of hot channel classifier

1. Make a normalized hit map distribution
normalized by :
- number of event
- Acceptance difference depending on the chip type
(Type A and Type B) and layer (inner and outer)



2. Draw Hit rate distribution for every half ladders.
Each half ladder have two hit rate distributions, one is distribution of Type A, the other is for Type B.

3. Definition of channel

Hot Channel : mean + 3sigma
Cold Channel : mean – 3sigma
Dead Channel : 0 hit