

Development of the hot channel algorithm

Jaein Hwang
(Korea University)

[Establish the hot channel list]

Goal in this workshop: Establish the hot channel list specially for zero field run

My To-Do List

- ~~• Find a new fitting parameter with BCO cut to reduce the noise effect (done)~~
- Check the Fitting parameters with other zero field runs (~~20866, 20885~~)
- Modify the code to fit our software framework
- Compare the hot channel lists with Yuka(remote) and Joseph
 - Generally, Yuka and I have developed the hot channel algorithm with the same logic
 - Comparison with Yuka ~~before BCO cut~~/ **after BCO cut (ongoing)**
 - Joseph uses different logic to determine the hot channel.
- Check the stability of the hot channel to find the minimum required events to determine the hot channel
 - Make a hot channel list with 1k events, 10k events.. Compare to hot channel lists with total events.
(0~10000evt, 10000~20000evt)
 - ~~Prepare thesis topic presentation Nov. 10th~~

Comparison hot channel lists

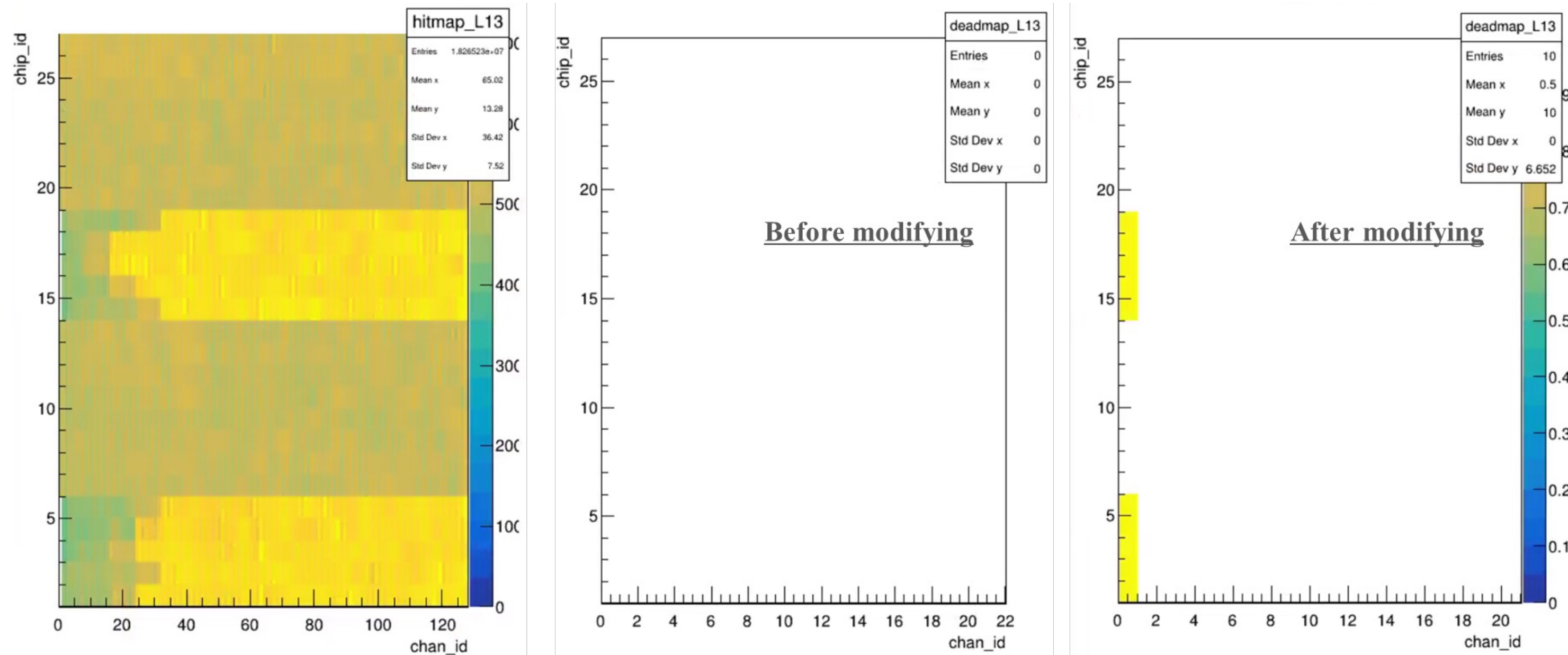
Jaein Hwang
(Korea University)

- During the hot channel comparison, we found some bugs on our code.

Ex) We realized that the # of dead channel from Yuka's and Jaein's hot channel lists were not consistent with each other.

The reason is Yuka's algorithm didn't count the 0 hit channel as the dead channel.

- Check and fix the bug on our code is ongoing.



81	# of hot channels only peaked up by Jaein
82	# of hot channels only peaked up by Yuka
5987	# of hot channels peaked up by both of us.
7	# of cold channels only peaked up by Jaein
28	# of cold channels only peaked up by Yuka
9363	# of cold channels peaked up by both of us.

$$\frac{\text{Total} - (\text{Jaein}) \cap (\text{Yuka})}{(\text{Jaein}) \cup (\text{Yuka})} = \frac{(81 + 82)}{(81 + 82 + 5987)} = \frac{163}{6,150} \sim 0.027$$

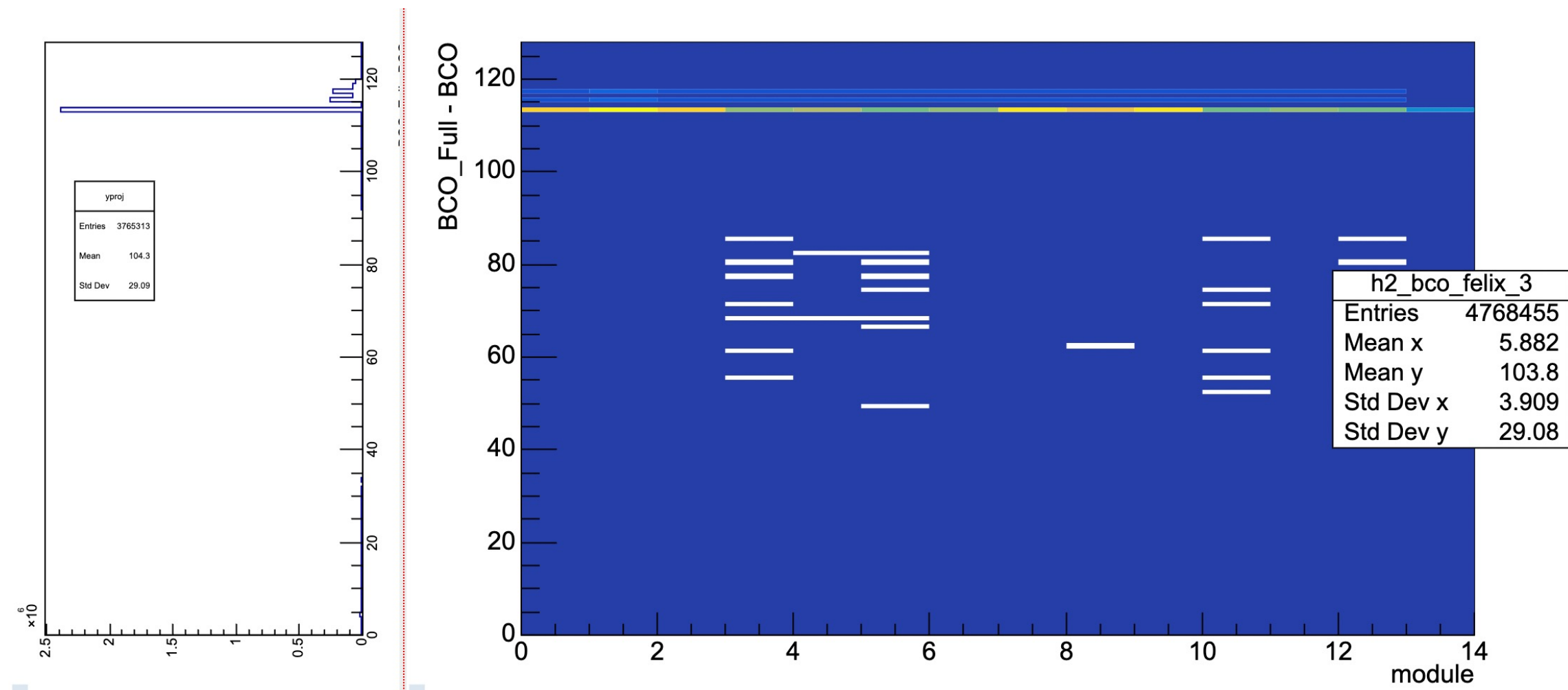
$$\frac{\text{Total} - (\text{Jaein}) \cap (\text{Yuka})}{(\text{Jaein}) \cup (\text{Yuka})} = \frac{(7 + 28)}{(7 + 28 + 9363)} = \frac{35}{9,398} \sim 0.004$$

BCO cut Apply

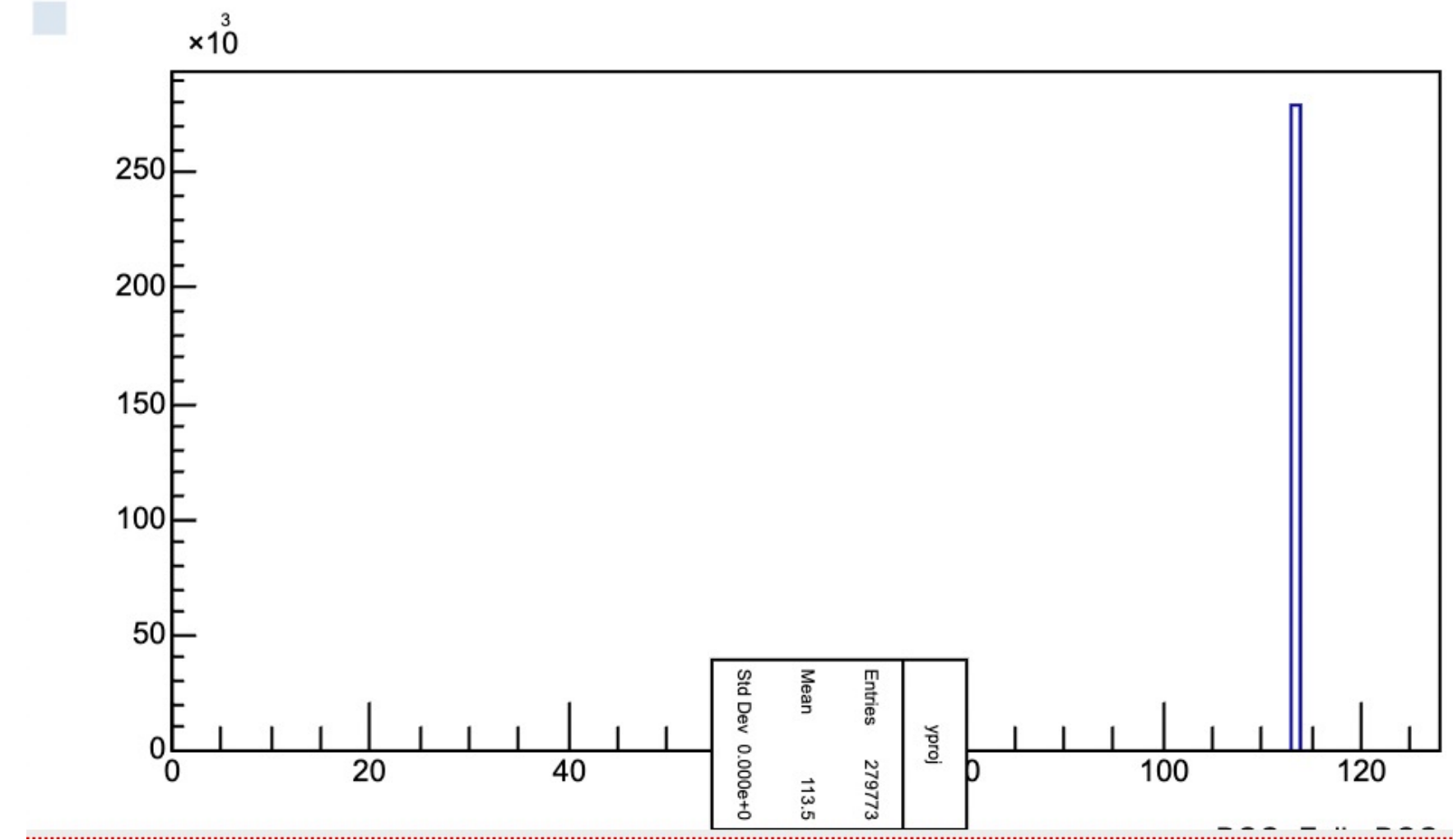
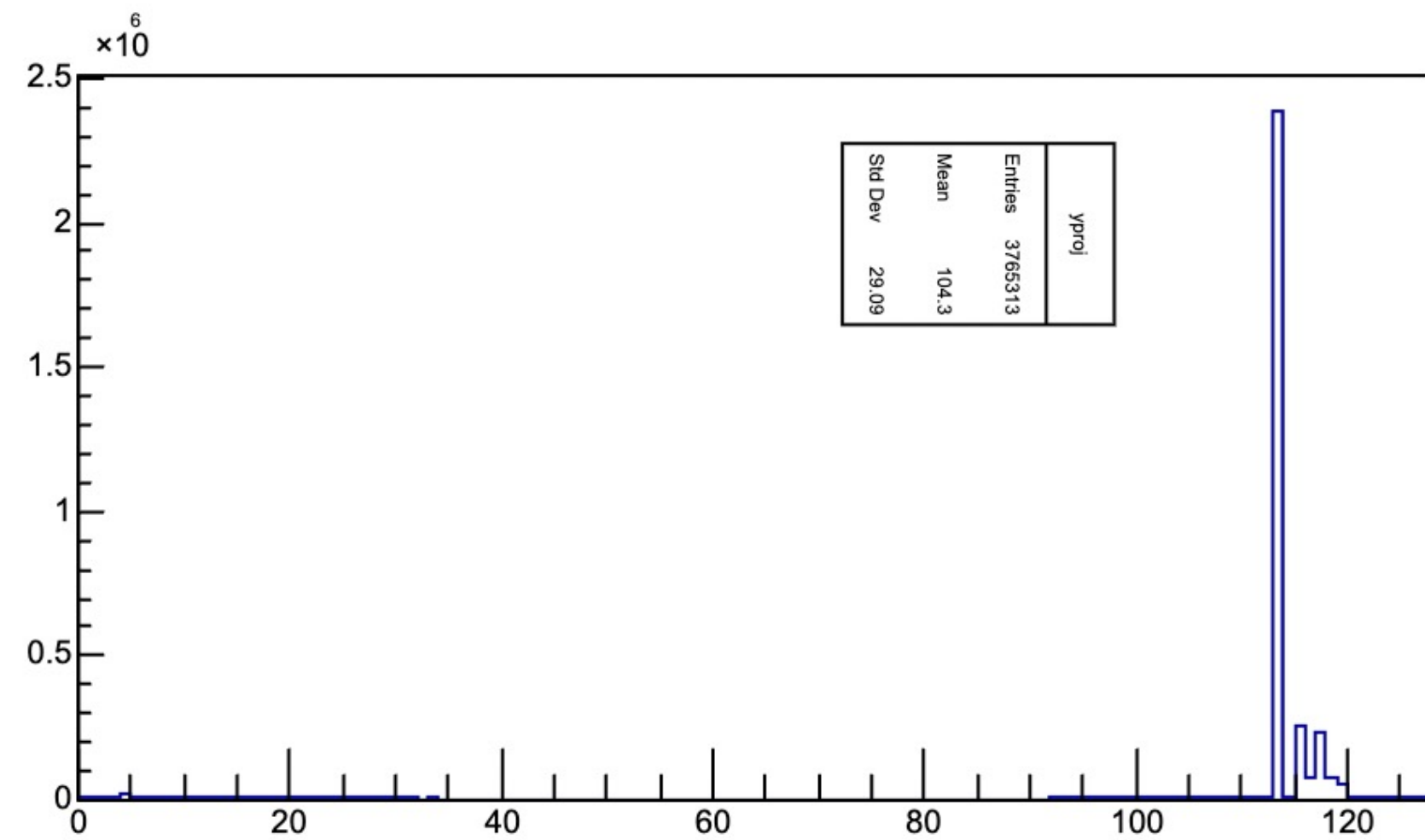
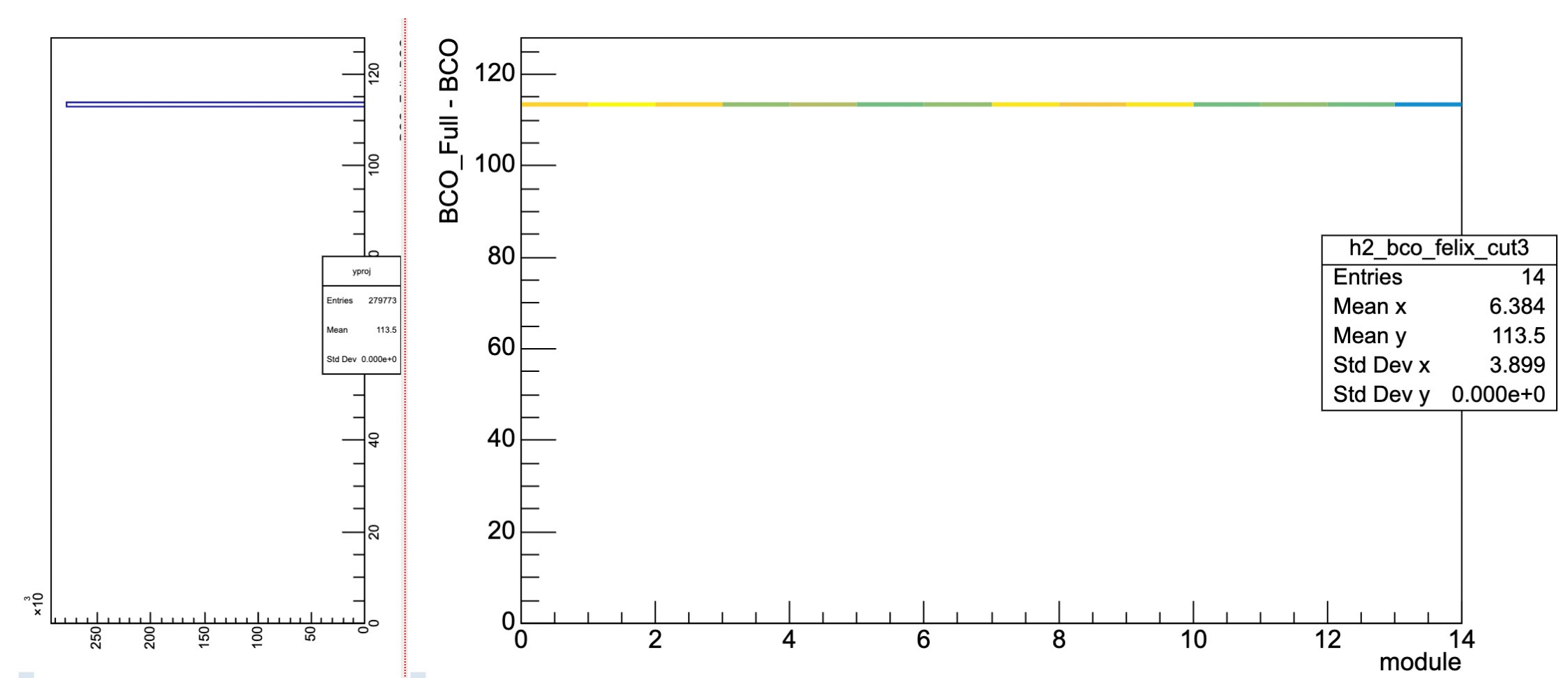
if (# of entries in BCO peak+(-)1 bin > # of entries in BCO peak *0.3),
I use entries of BCO (peak+1) bin or BCO (peak-1) bin in addition to entries of BCO peak.

Jaemin Hwang
(Korea University)

Before



After

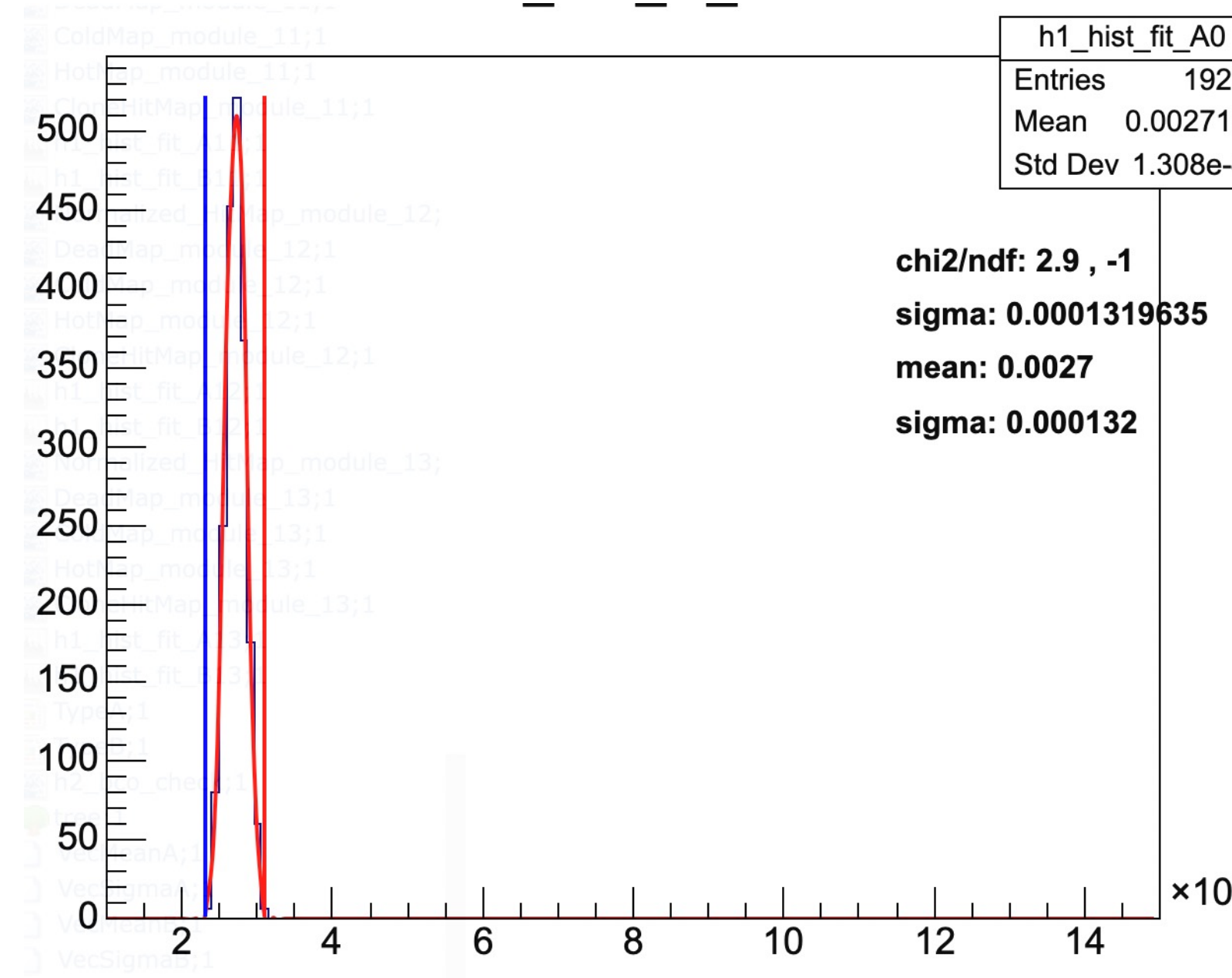
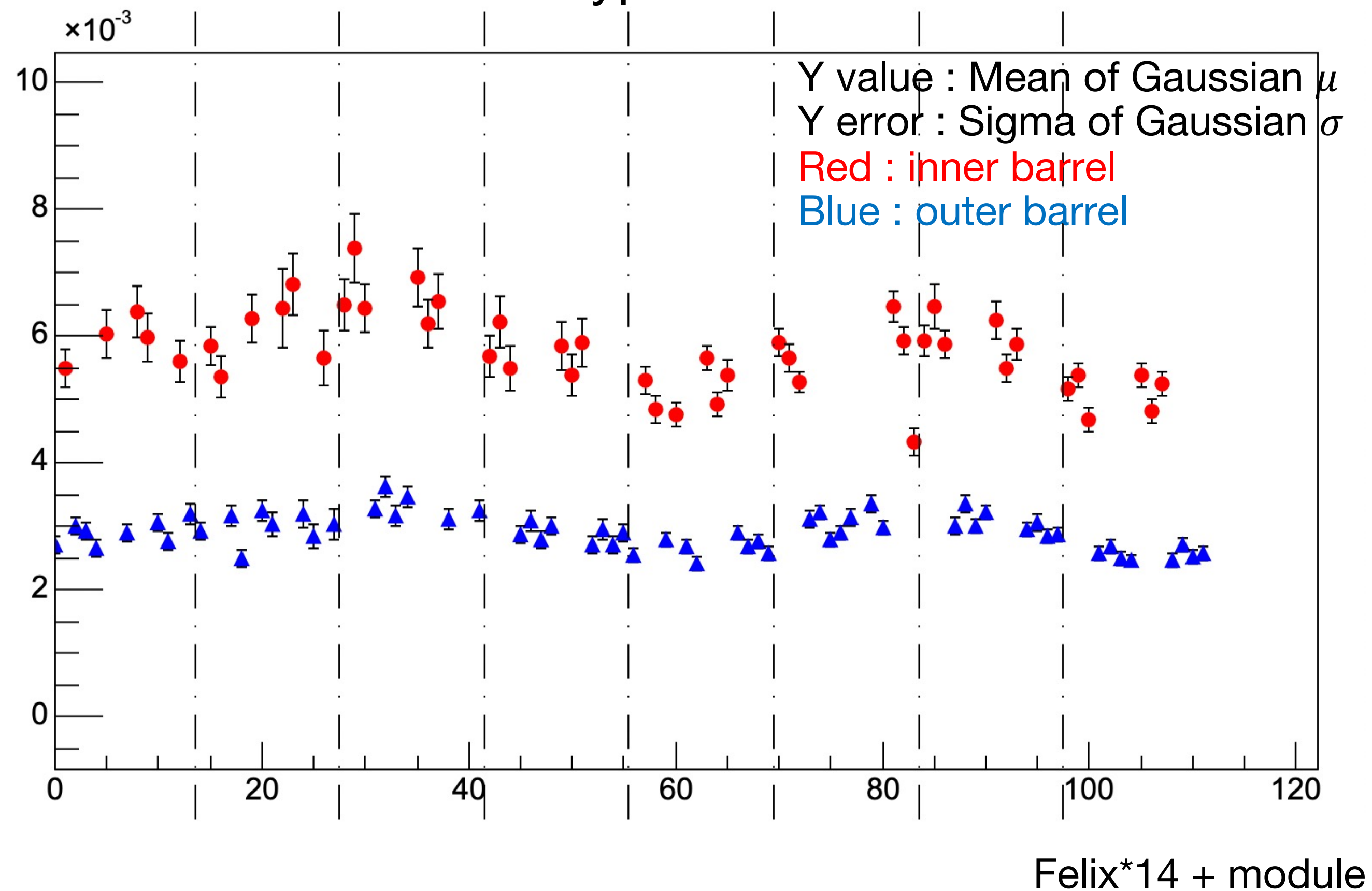


Location of the root files
/sphenix/tg/tg01/commissioning/INTT/work/jaemin/BCOFinder/Felix/rootfile

Problematic ladders

Jaemin Hwang
(Korea University)

Type A



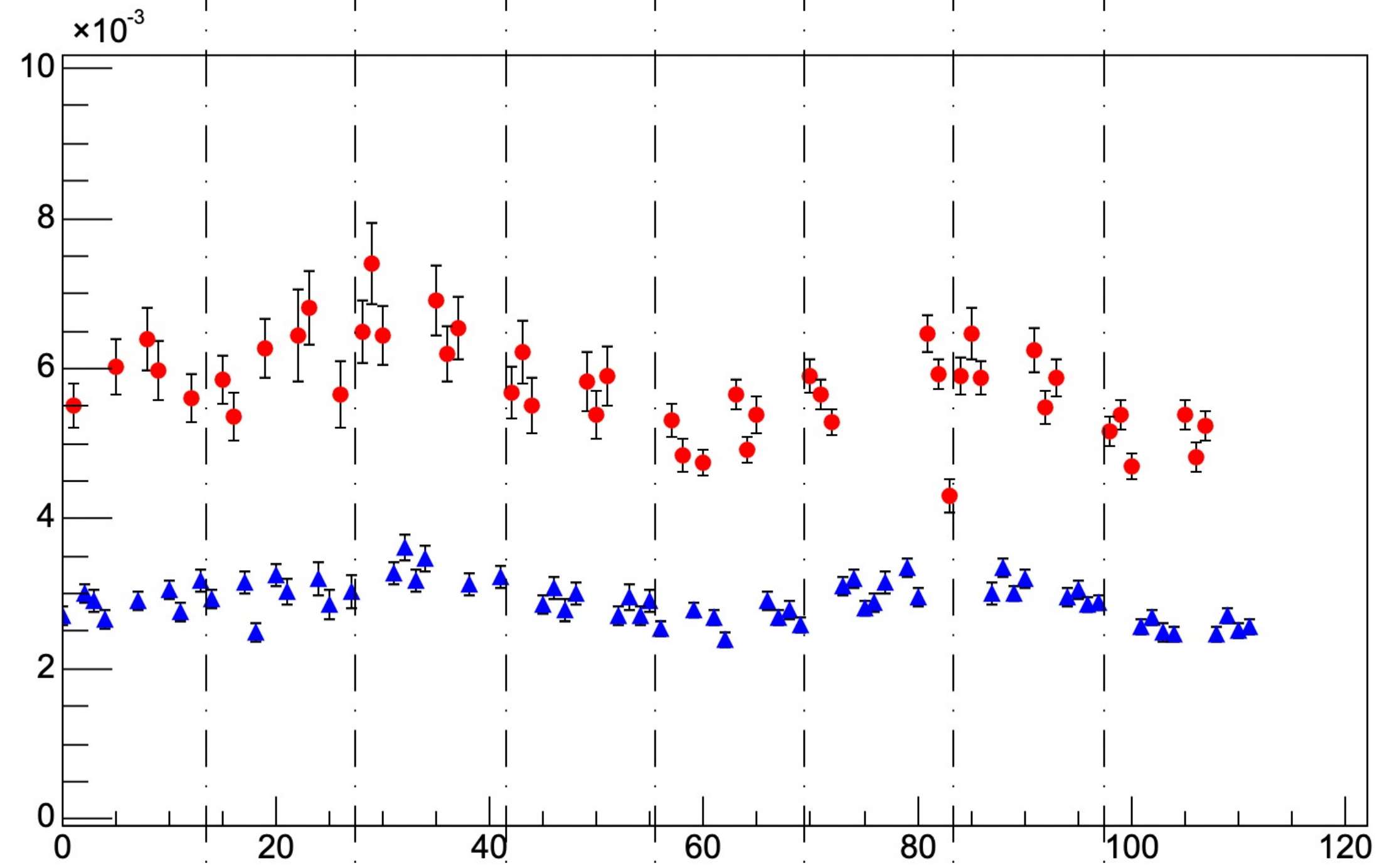
Location of the root files

/sphenix/tg/tg01/commissioning/INTT/work/jaemin/HotChannelFinder/event_base_finder/1113/rootfile/normalized

Problematic ladders (Half Entry)

Jaemin Hwang
(Korea University)

Type A



Y value : Mean of Gaussian μ

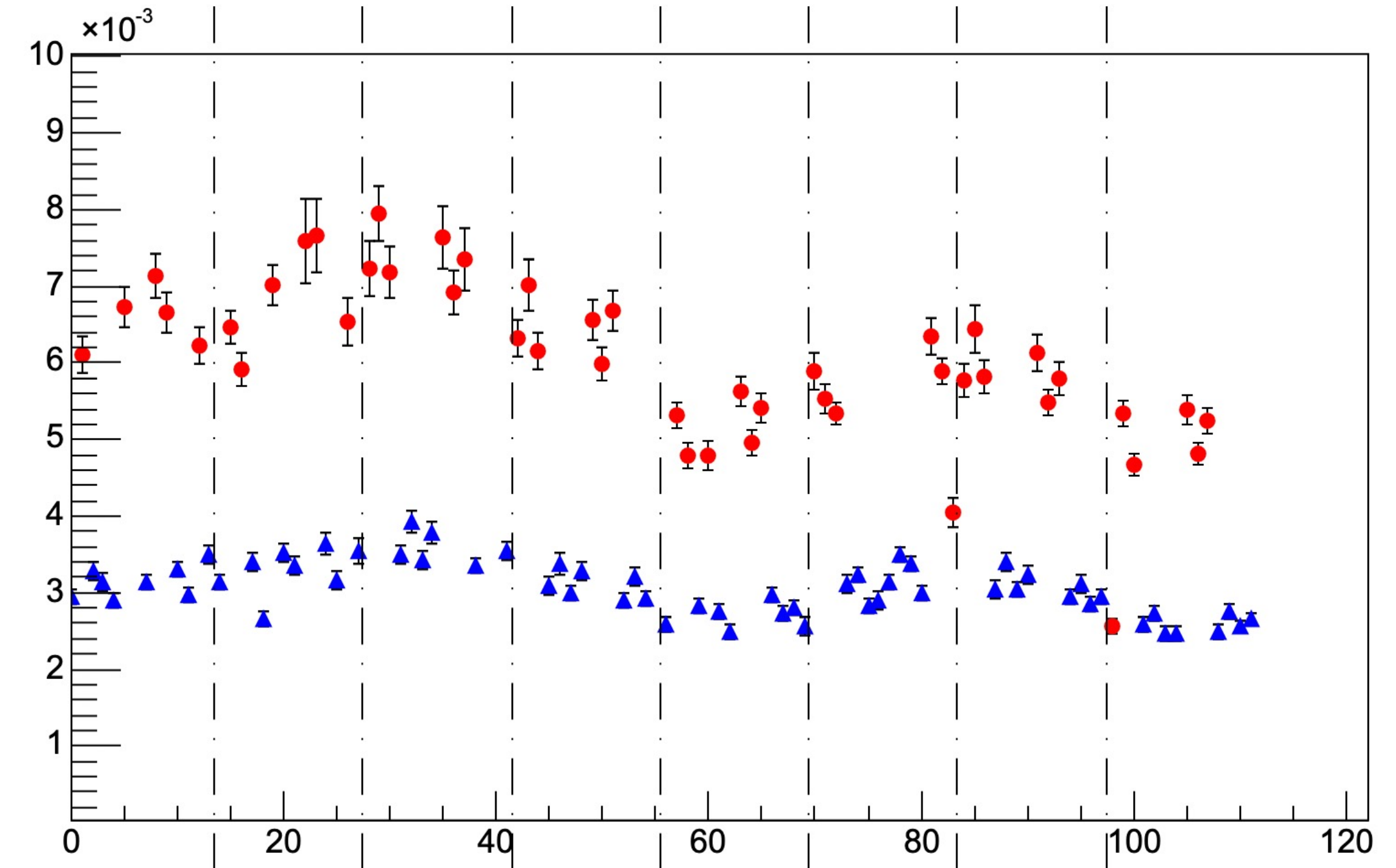
Y error : Sigma of Gaussian σ

Red : inner barrel

Blue : outer barrel

Felix x 14 + module

Type B



Y value : Mean of Gaussian μ

Y error : Sigma of Gaussian σ

Red : inner barrel

Blue : outer barrel

Felix x 14 + module

Location of the hot channel lists AFTER BCO CUT

/sphenix/tg/tg01/commissioning/INTT/work/jaemin/HotChannelFinder/event_base_finder/1113/rootfile/normalized

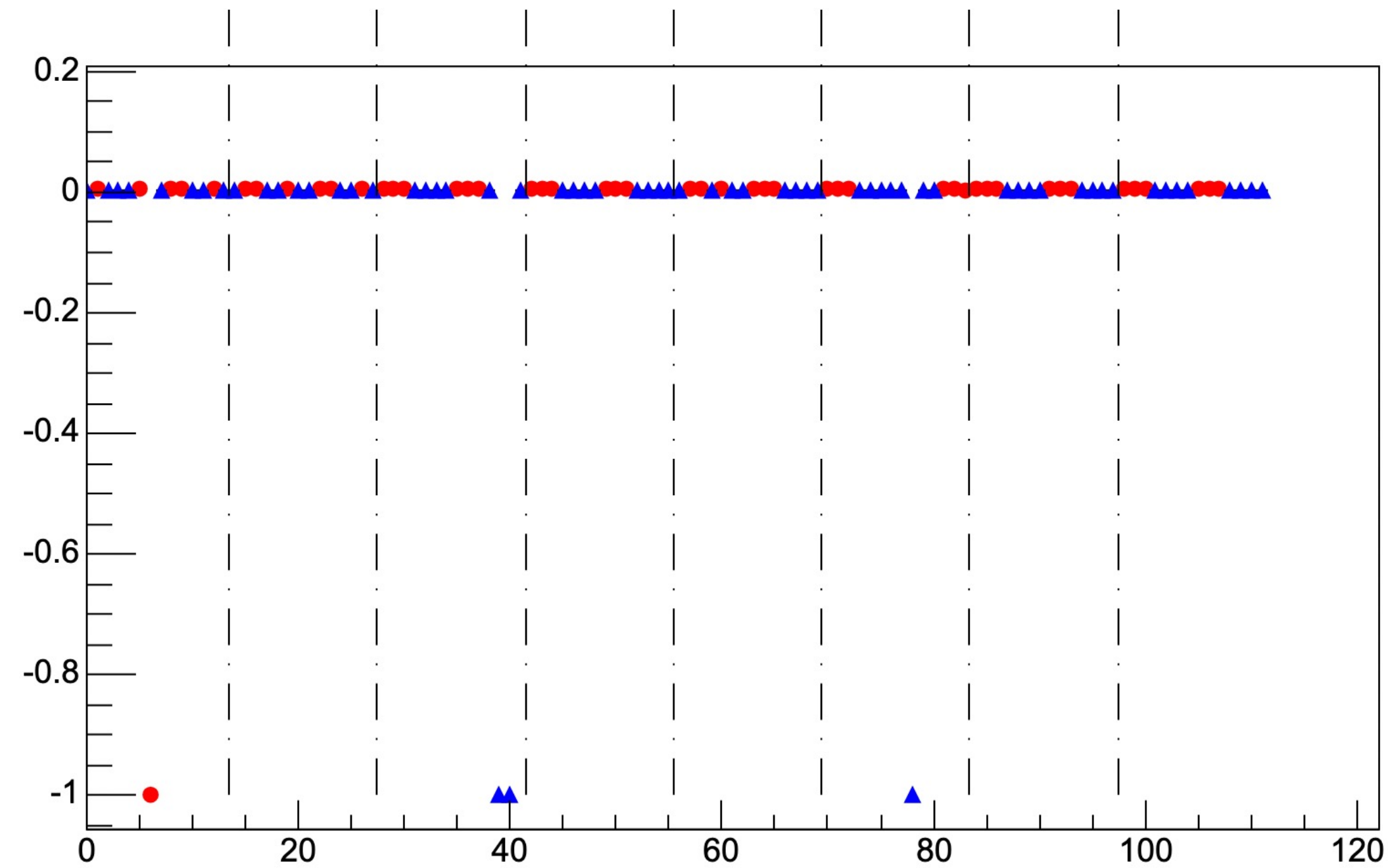
Problematic ladders

Jaemin Hwang
(Korea University)

Type A

Zoom out of previous plots

Type B

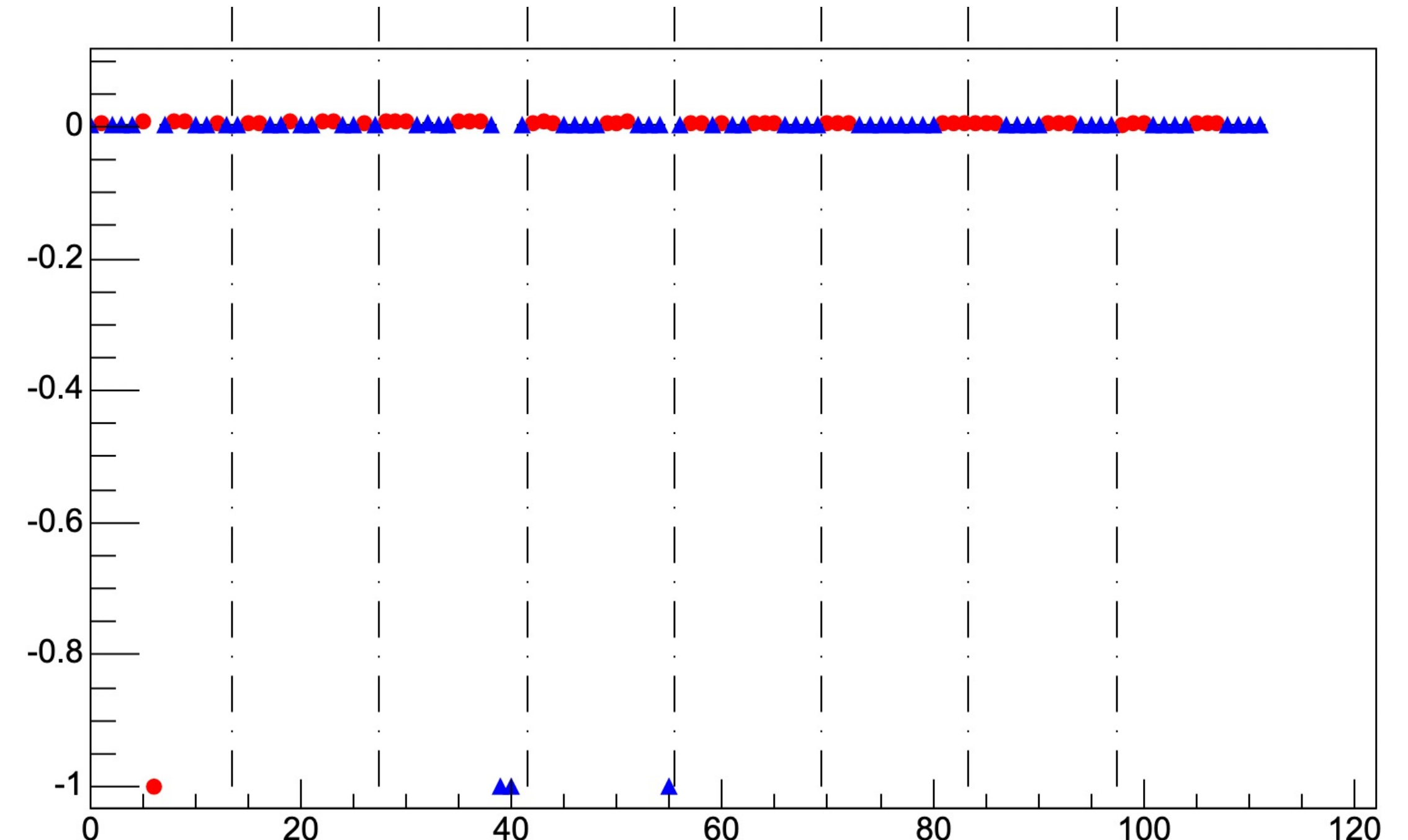


Y value : Mean of Gaussian μ
Y error : Sigma of Gaussian σ

Red : inner barrel
Blue : outer barrel

List of problematic ladders

Felix 0 Half ladder 6 Type A
Felix 2 Half ladder 11, 12 Type A
Felix 5 Half ladder 8 Type A (Masked due to no bias)



Y value : Mean of Gaussian μ
Y error : Sigma of Gaussian σ

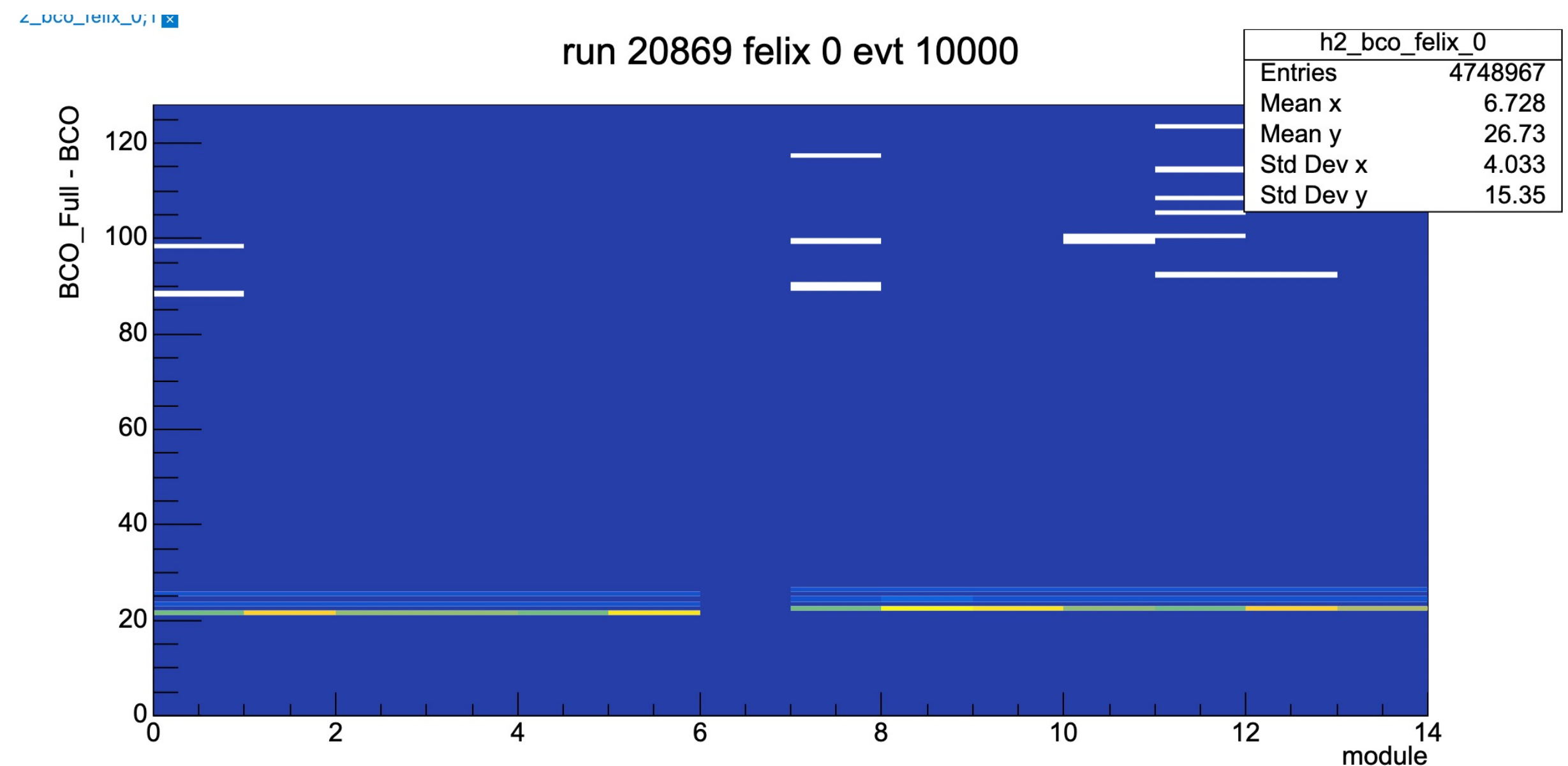
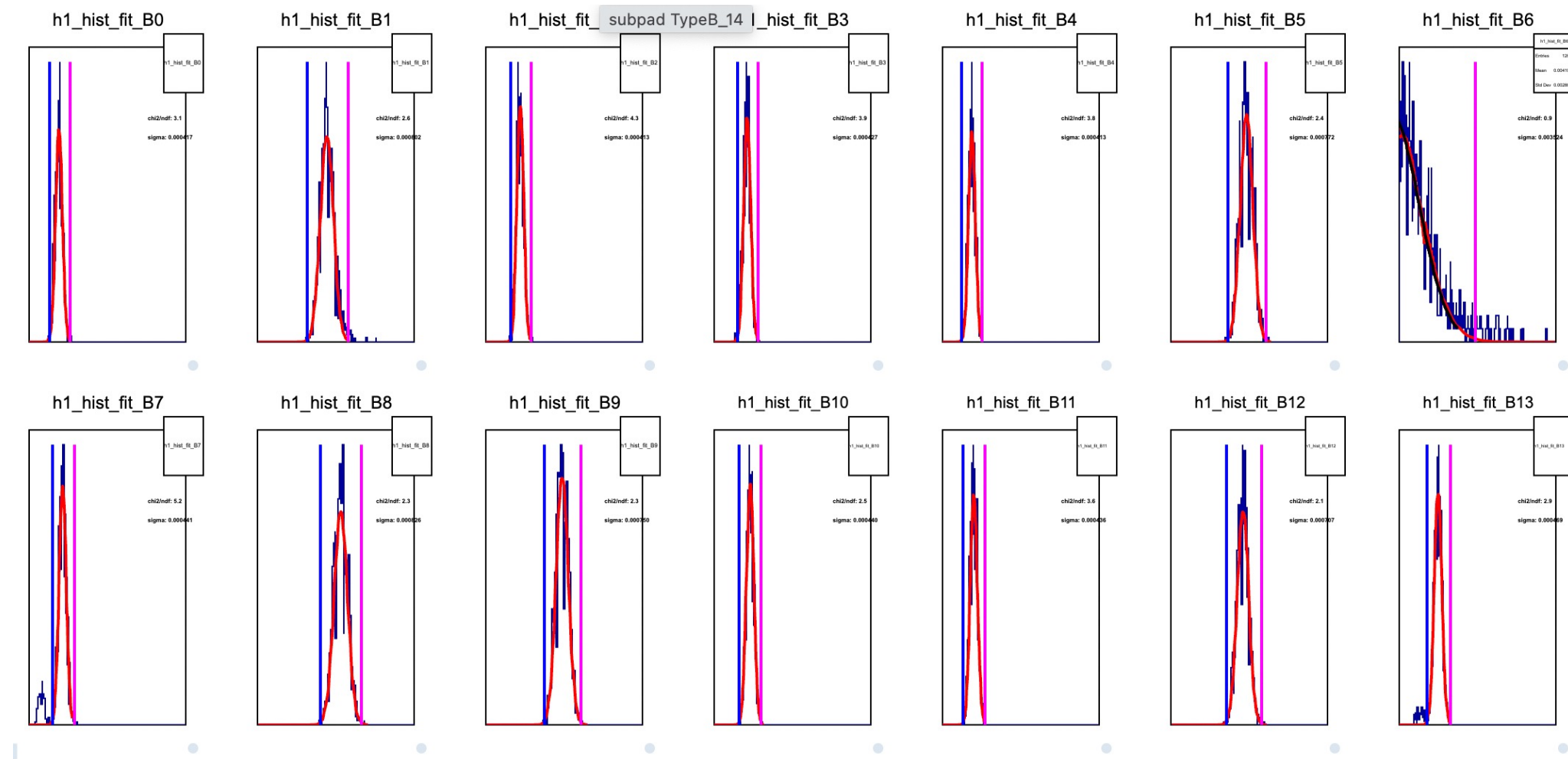
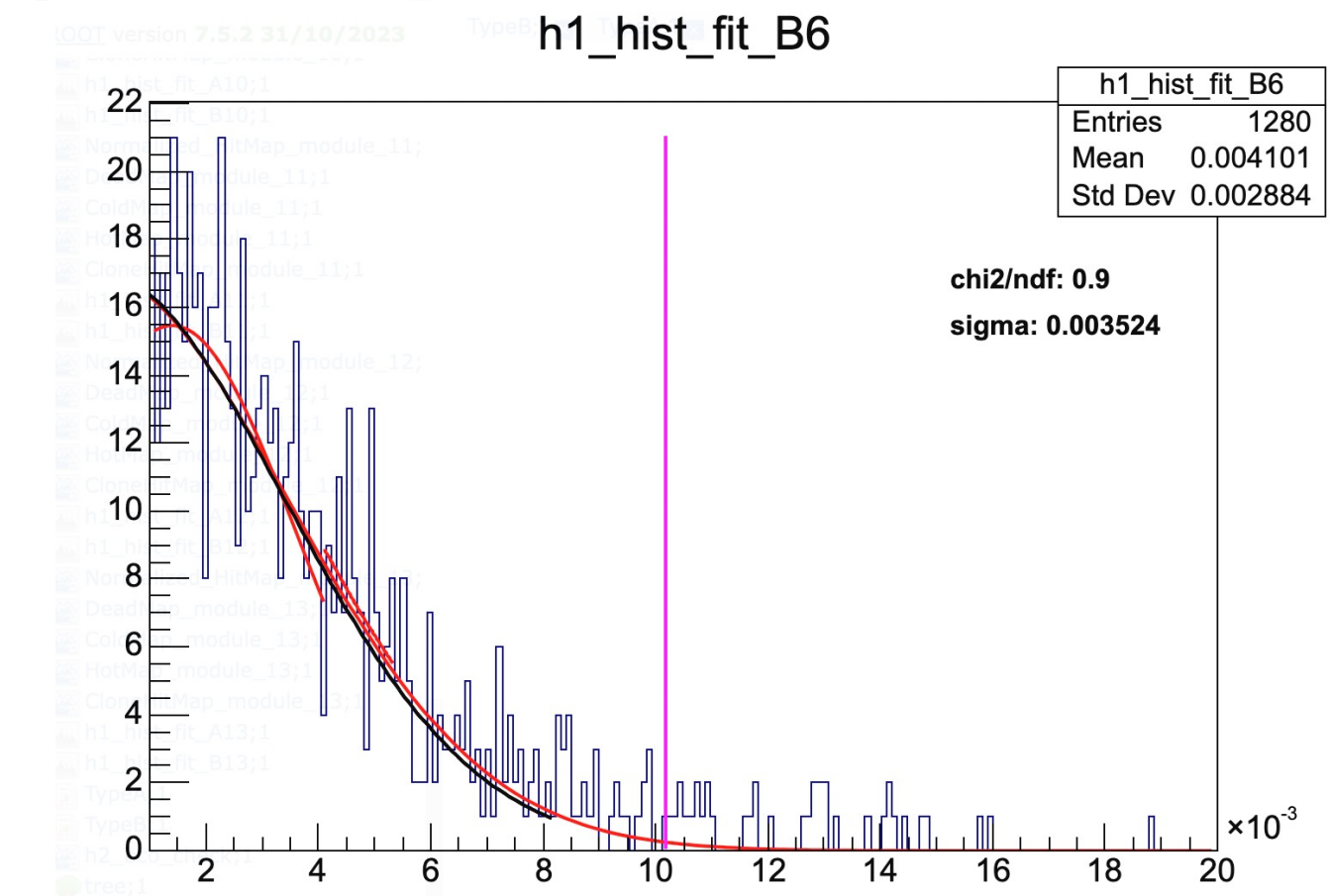
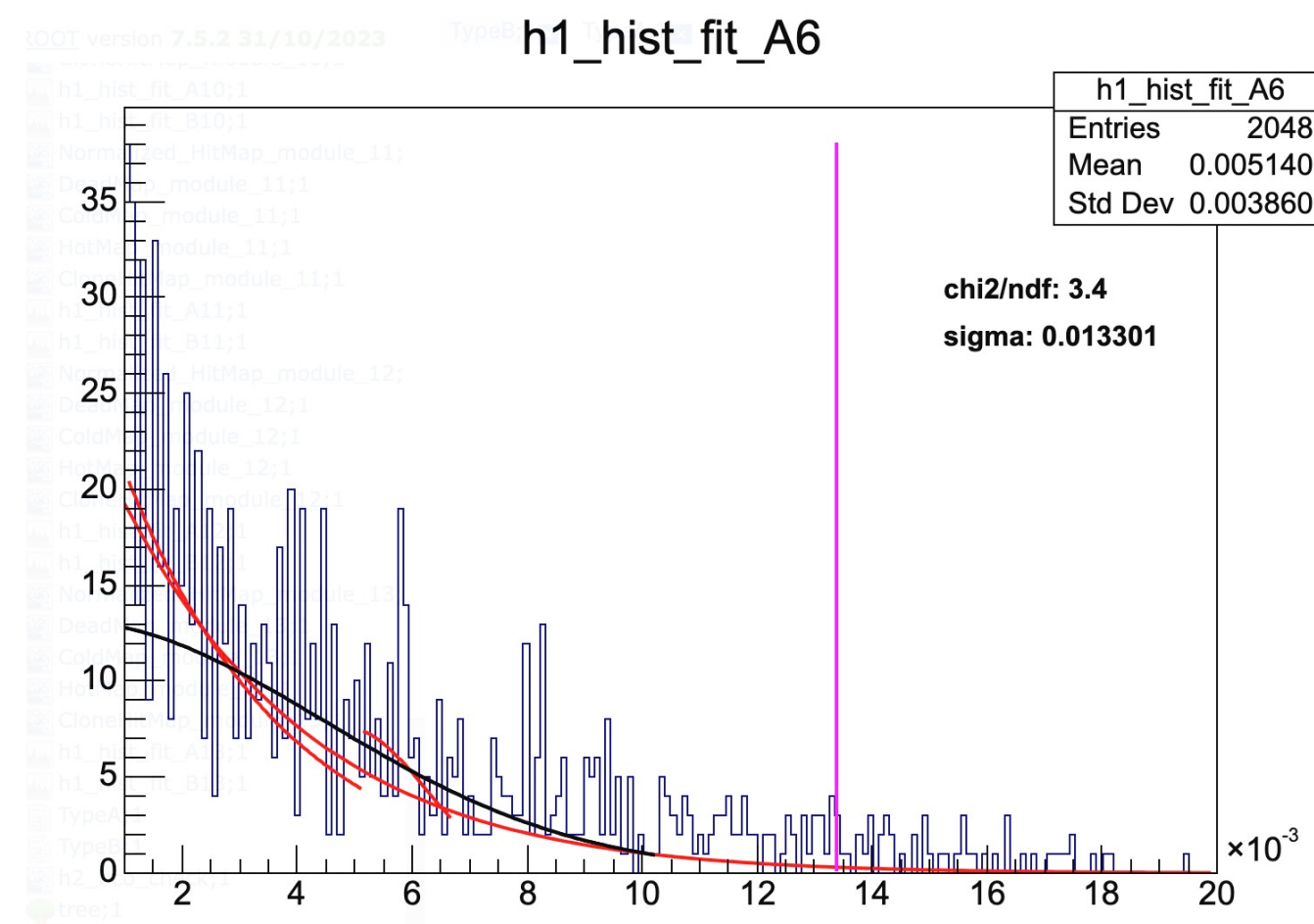
Red : inner barrel
Blue : outer barrel

List of problematic ladders

Felix 0 Half ladder 6 Type B
Felix 2 Half ladder 11, 12 Type B
Felix 3 Half ladder 13 Type B (Masked due to no bias)

Problematic ladders(Felix 0 module 6)

Hit rate distribution before BCO cut – No clear time peak in BCO distribution



Problematic ladders(Felix 2 module 11,12)

Hit rate distribution before BCO cut – Weird shape of BCO distribution

