Automating hot channel hit removal

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Automating hot channel hit removal

I've analyzed a hot channel to automate the removal of hits in a hot channel.
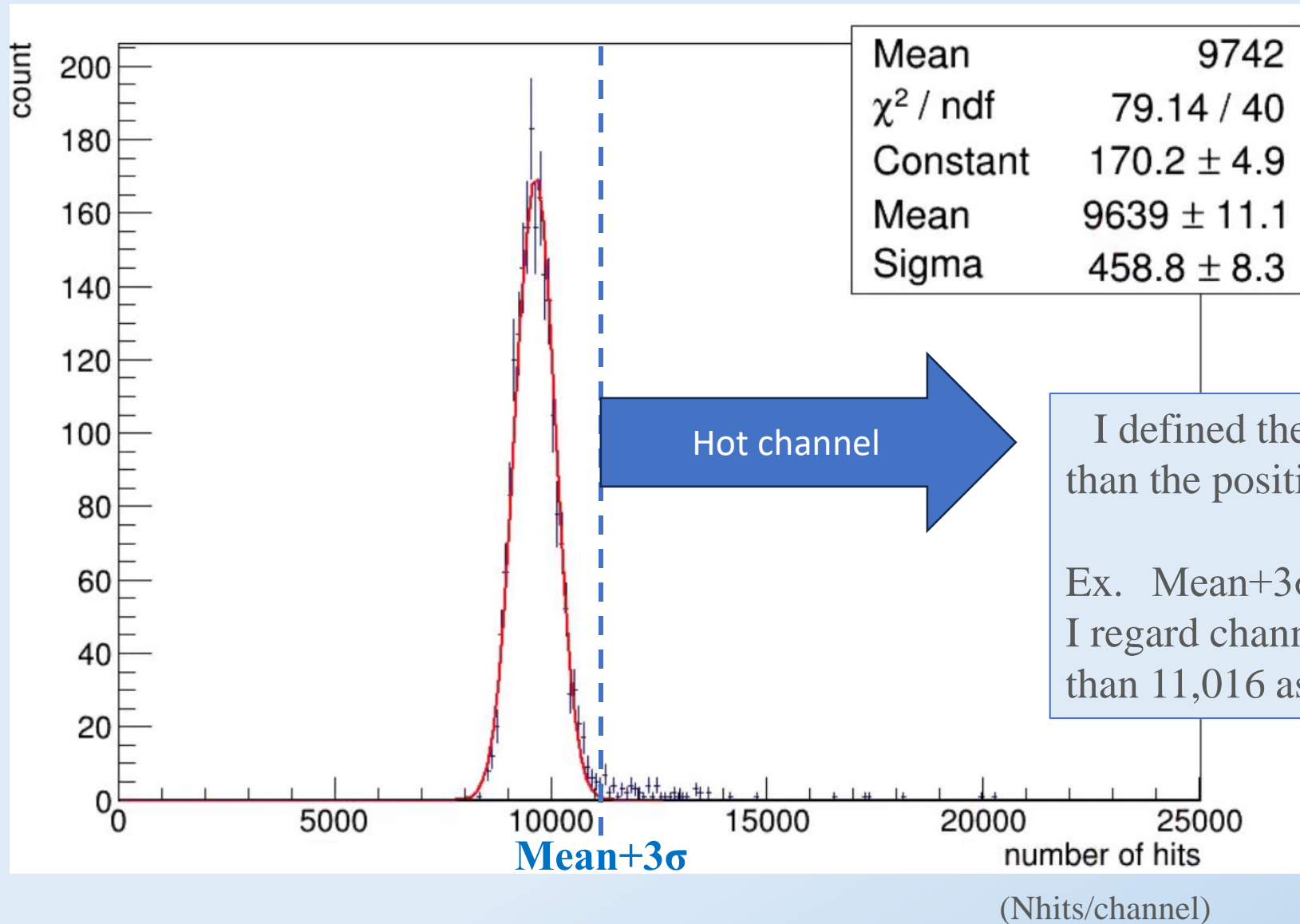
Analysis flow

1. Making 'a hit map' and '# of hits distribution'

2. Single-Gaussian Fitting

3. Hot channel definition

4. Making a hot channel map

I defined a hot channel using Single-Gaussian Fitting and made a Hot channel map.

I'll report on the process and problems.

Mean	9742
χ^2 / ndf	79.14 / 40
Constant	170.2 ± 4.9
Mean	9639 ± 11.1
Sigma	458.8 ± 8.3

Hot channel

Mean+3σ

(Nhits/channel)
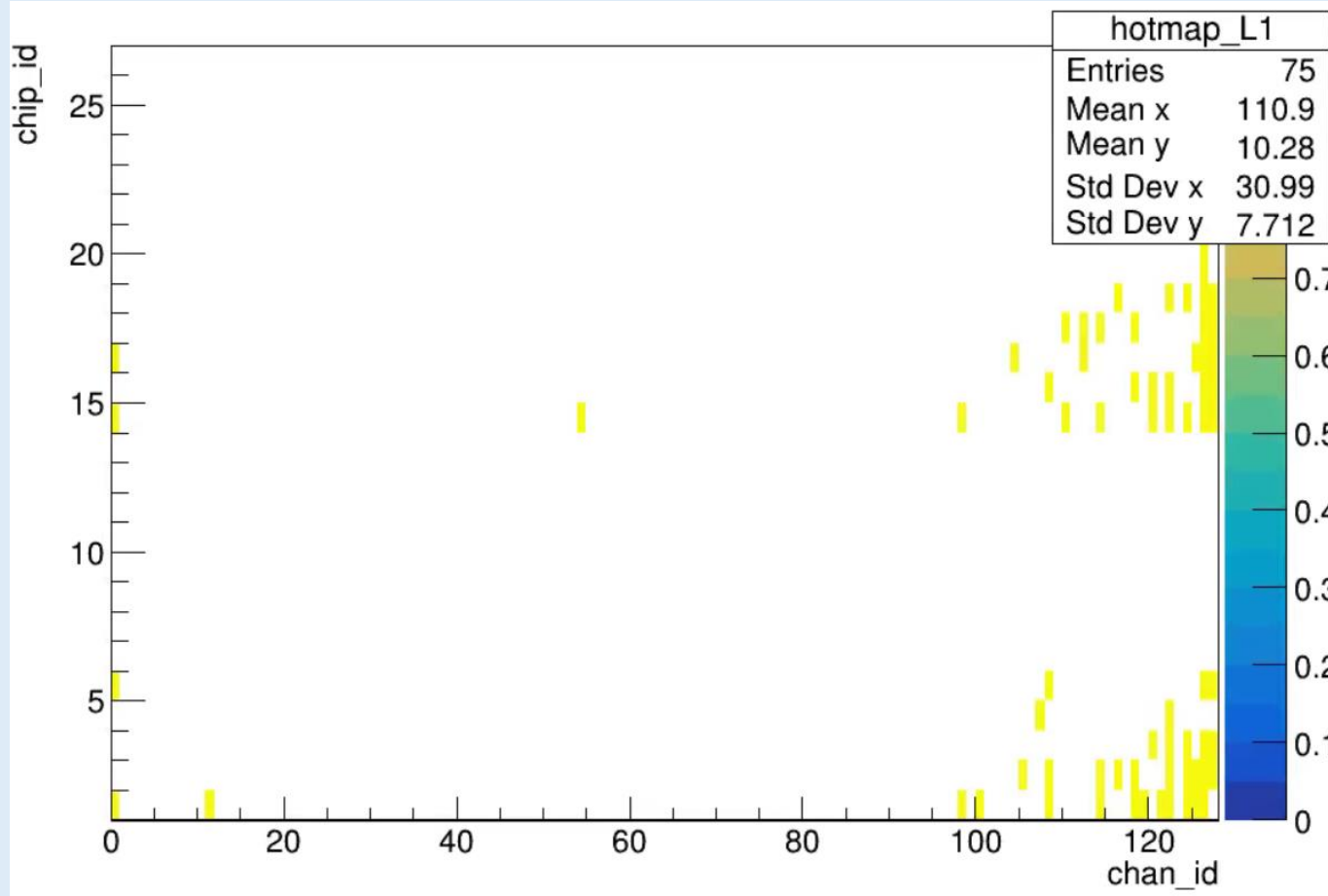
I defined the channel, which has more hits than the position mean+3σ away, as hot channel.

Ex.   Mean+3σ = 11,015.4
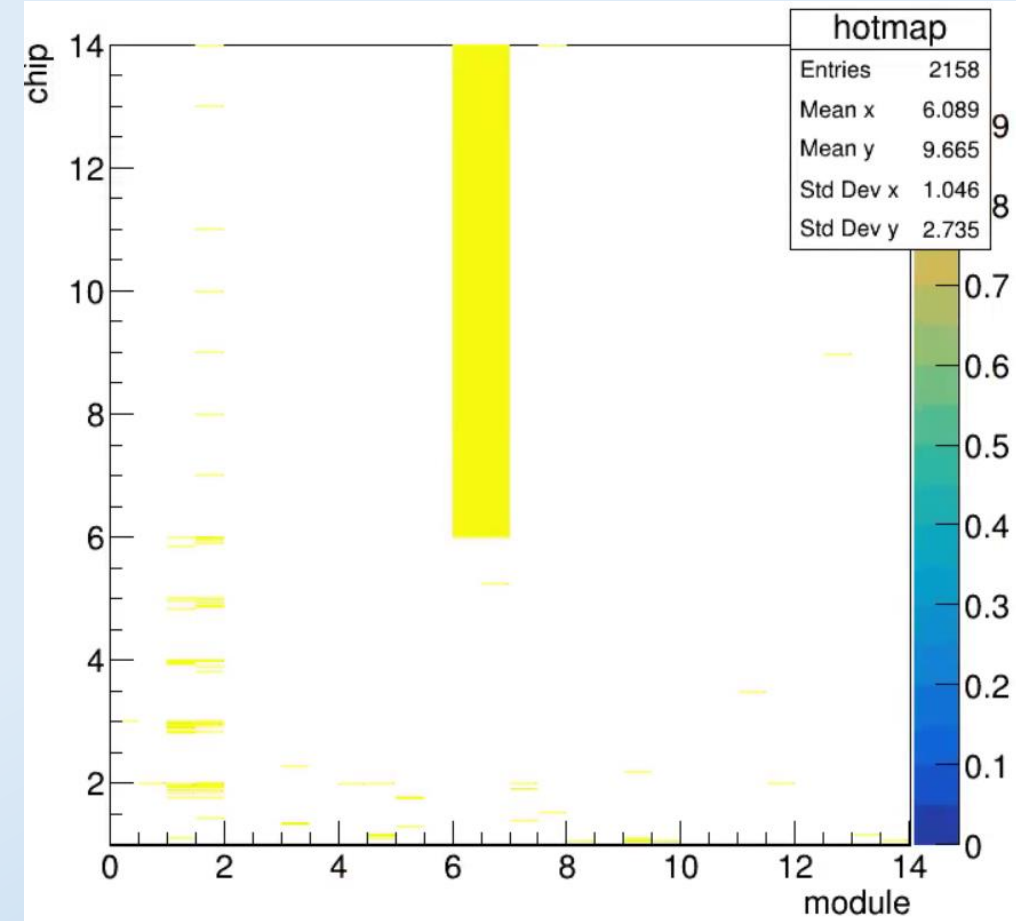I regard channel which has much number of hit than 11,016 as hot channel.

Hot channel map
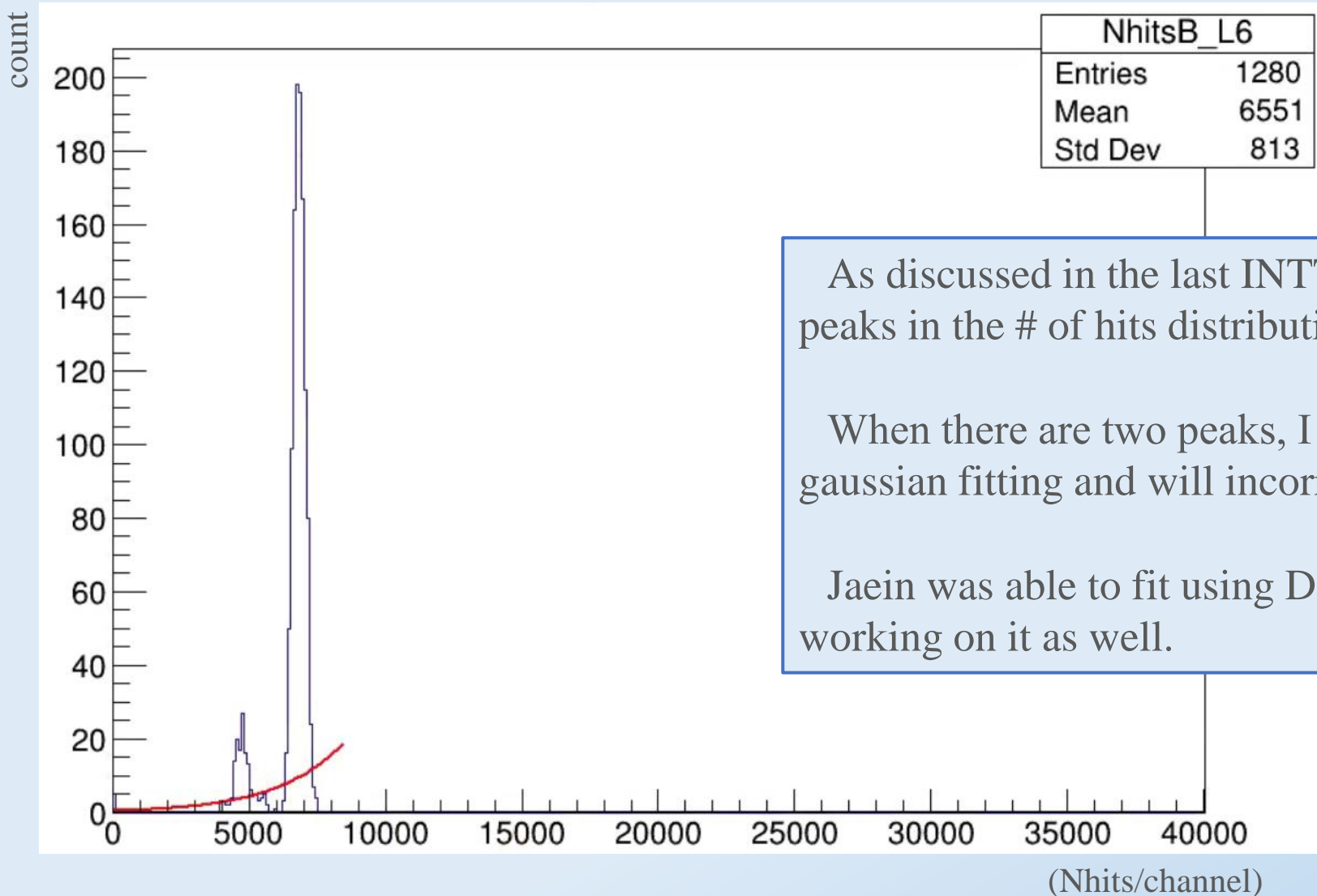
I made a hot channel map so that you can see the defined hot channels at a glance.

File location: /sphenix/tg/tg01/commissioning/INTT/work/ysugiyama/root_file/hotmap

Single-Gaussian fitting problem

count

NhitsB_L6	
Entries	1280
Mean	6551
Std Dev	813

As discussed in the last INTT meeting, I also confirmed two peaks in the # of hits distribution.

When there are two peaks, I can't also do well single gaussian fitting and will incorrectly define the hot channel.

Jaein was able to fit using Double-gaussian, so I'm currently working on it as well.
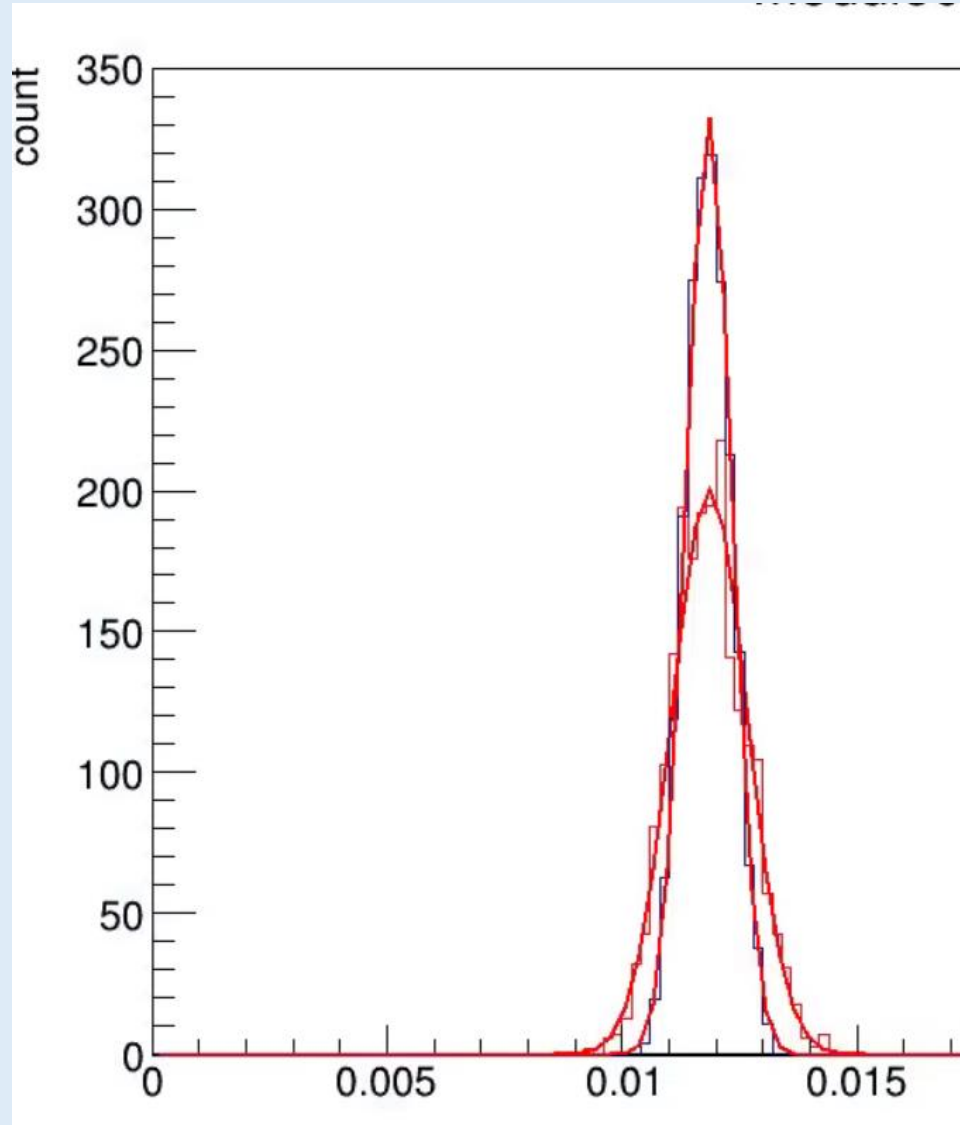
(Nhits/channel)

Run20869（INTT0, module6, Type-B）

Normalization by # of events

normalized by (# of hits) / (# of event)

Run20869（550,123 event）

Entries	2048
Mean	0.01183
Std Dev	0.0004808
χ^2 / ndf	11.22 / 11
Constant	332.5 ± 8.9
Mean	0.01183 ± 0.00001
Sigma	0.0004908 ± 0.0000078

Run20866（26,404 event）

Entries	2048
Mean	0.01186
Std Dev	0.0008062
χ^2 / ndf	39.6 / 23
Constant	200.1 ± 5.5
Mean	0.01185 ± 0.00002
Sigma	0.0008024 ± 0.0000132

I normalized the # of hits distribution by the # of events.
- the peaks generally matched in each run.
- σ is smaller when the # of events is larger. It's thought to be due to the central limit theorem.

Run20869,20866（INTT0, module0, Type-B）

To do list

Hot channel map

 If the ADC value in a hot channel hit is 0, the hit is considered to be noise. In order to verify whether the hot channel is caused by the threshold value of DAC0, I'll obtain the hot channel map of ADC=1 or higher.
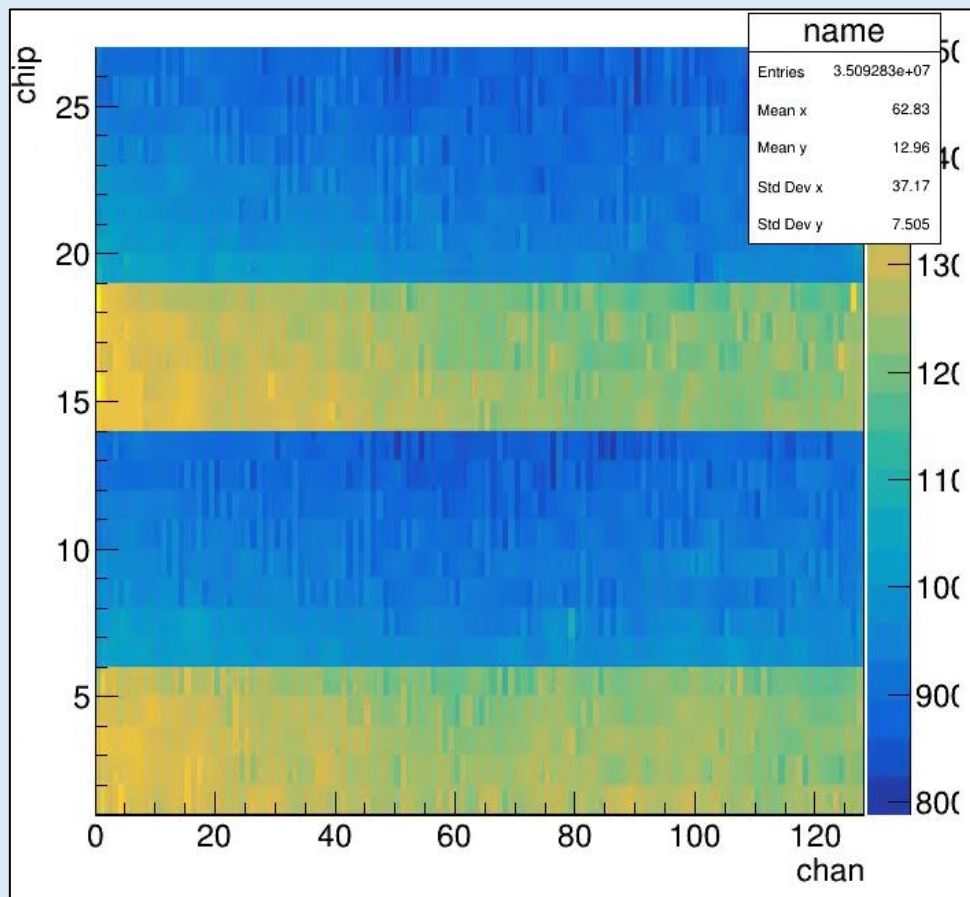
2 peaks problem

- When some modules have two peaks in the # of hit distribution, I need to fit with Double-Gaussian.

- Two peaks in # of hits distribution is expected to be caused by half entry. In order to identify the location of half-entry, I'll make # of hits distribution with the vertical axis of chip and the horizontal axis of channel.
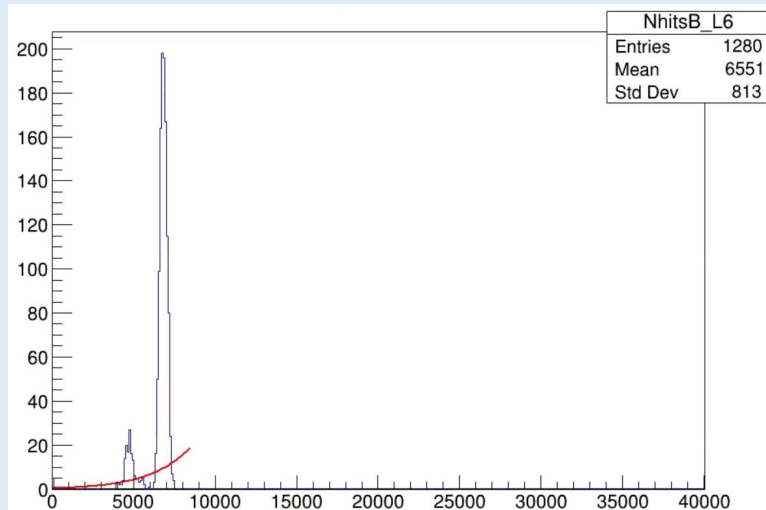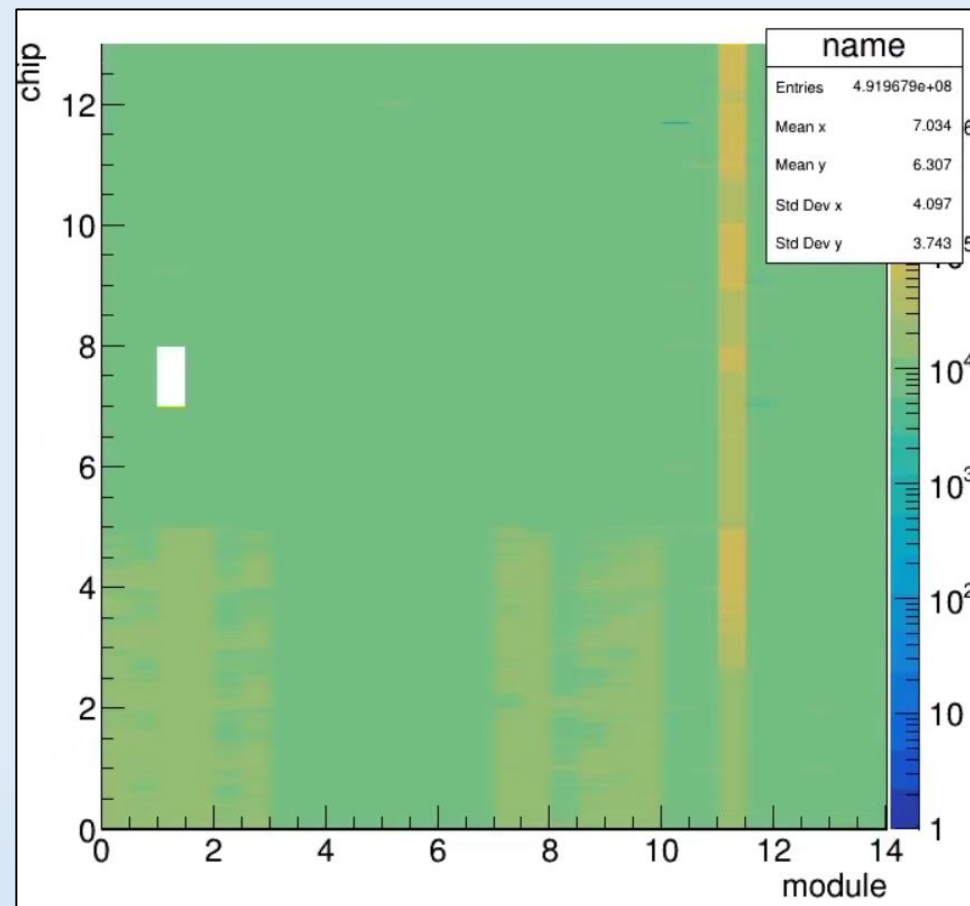
INTT MT
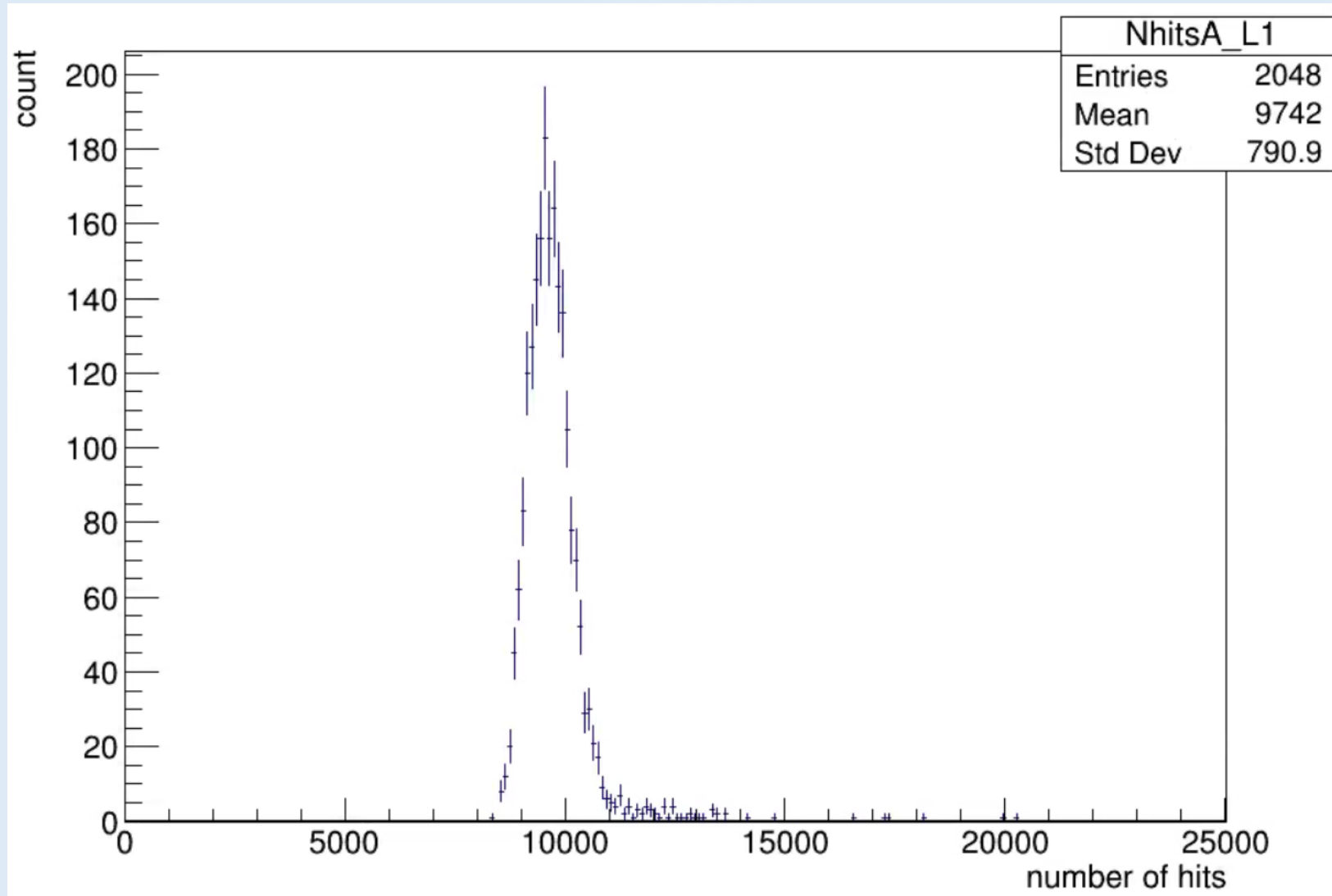
Back up

1. Hit map

Hit map by a half ladder

（Run20869, INTT2, module0）

Hit map by INTT (FELIX)

（Run20869, INTT2, module0-13）

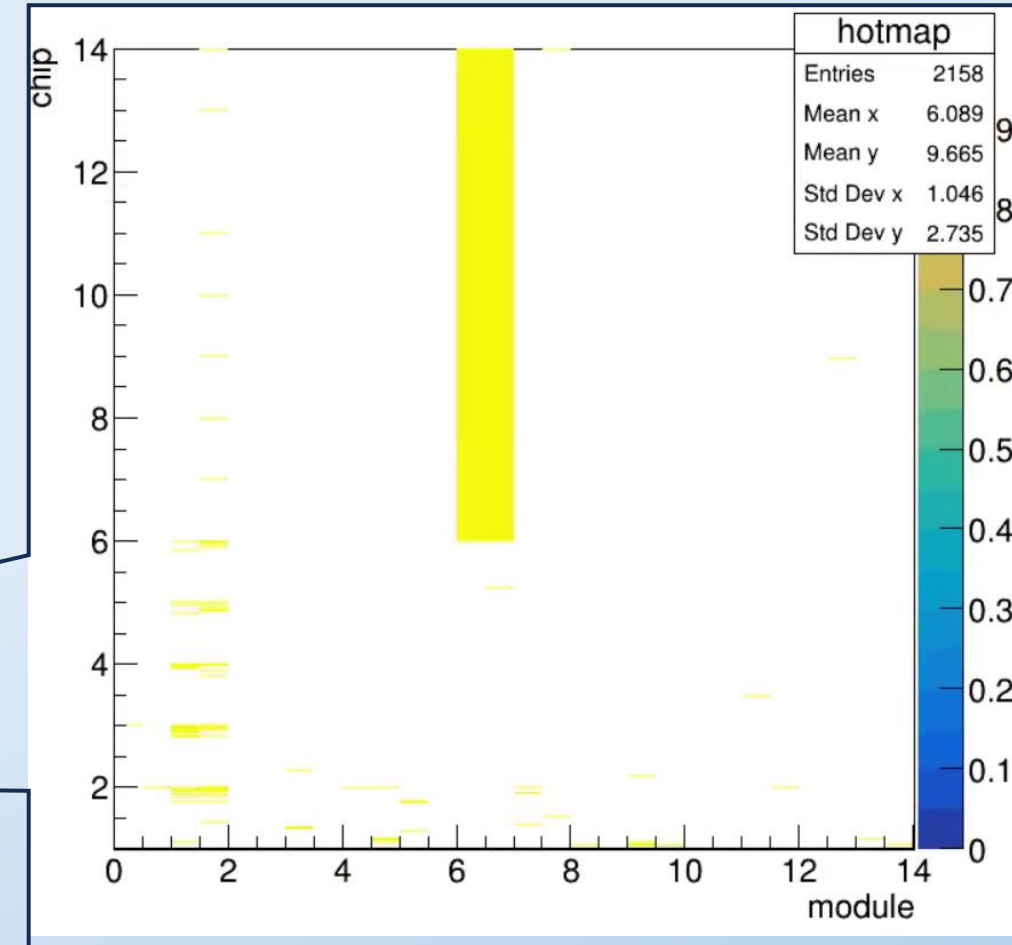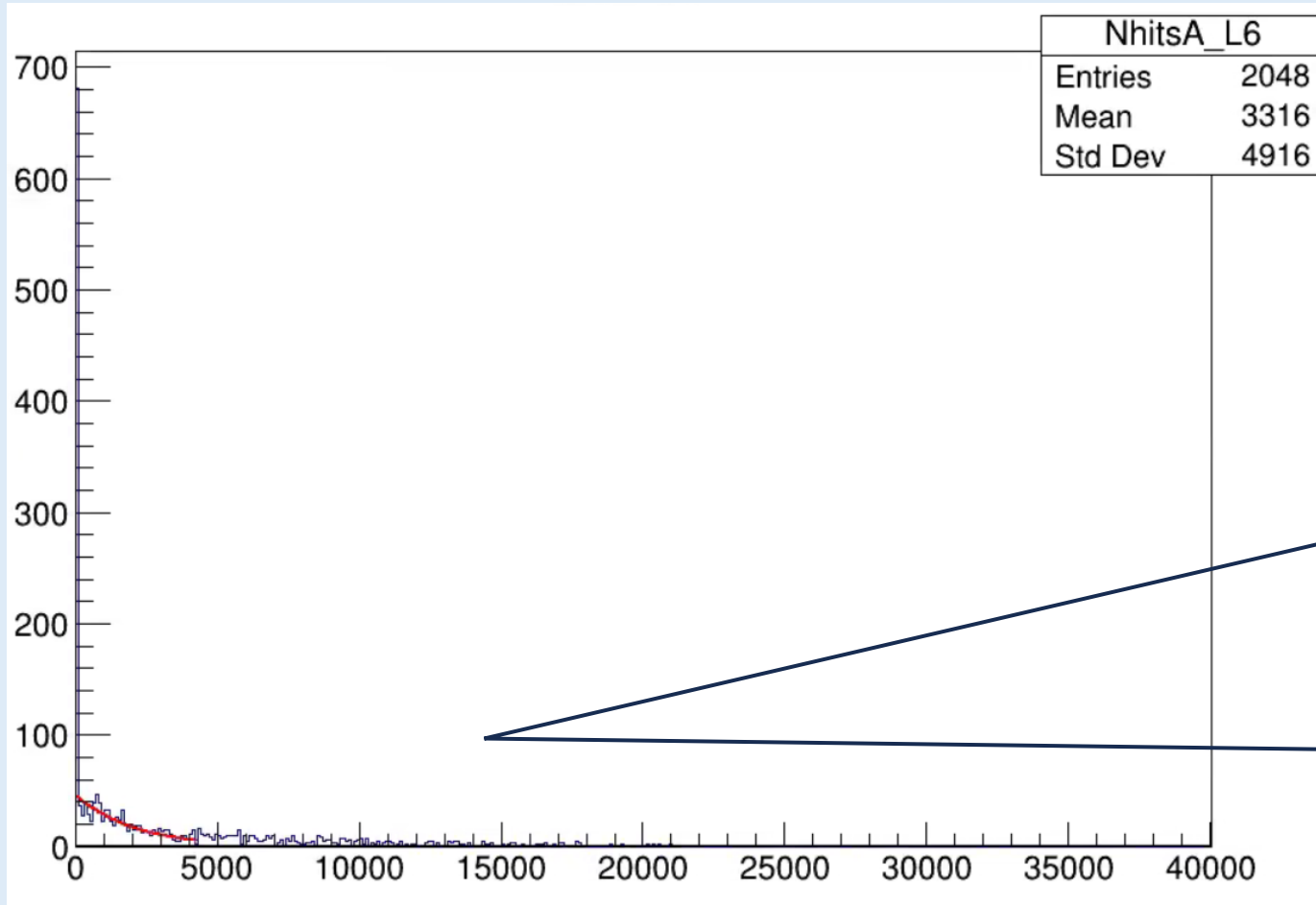## 2. Nhits/channel distribution

Run20869（INTT0, module1, Type-A）

Behavior of # of hits distribution and hot channel map

of hits distibution
Run20869（INTT0, module6, Type-A）

Hot channel map
Run20869（INTT0）

The behavior of the # of hits distribution is different from other modules.

Double-Gaussian fitting

Run20869（INTT7, module1, Type-B）　　　　　Run20869（INTT7, module6, Type-B）

Half entry…?

Not half entry…?

I'm thinking about how to define the fitting range in Double-Gaussian fitting.