Automation of hot/dead channel finder

2023/11/13

Nara Women’s University

M2 Yuka Sugiyama

Development of the hot channel algorithm

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Completing hot channel analysis and proceeding MIP analysis

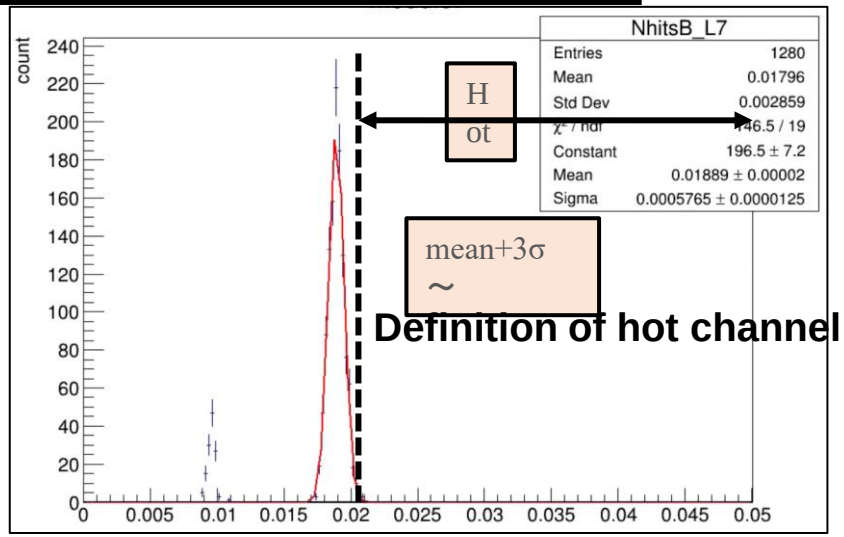
Goal in this workshop: [Establish hot channel algorithm for automation]

My To-Do List

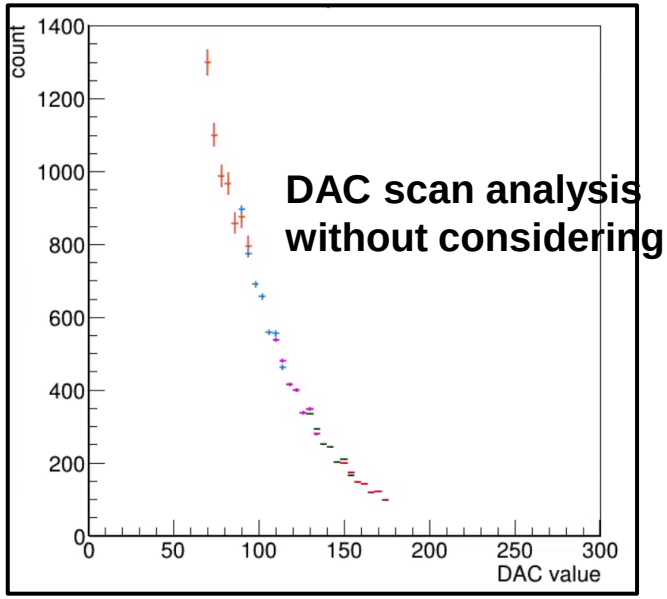
- ~~Applying BCO cut in my hot channel algorithm~~ **I'll report today.**
  - How many events are needed to decide the hot channel?

- Comparing the hot channel list with Jaein and Joseph
  - Jaein's and my algorithm is similar, but Joseph's is different.
  - Is each hot channel list consistent?
- Discussing about hot channel algorithm
  - Whose algorithm is adopted?

- MIP peak analysis with commissioning DAC scan data
  - Considering Z-vertex



Definition of hot channel



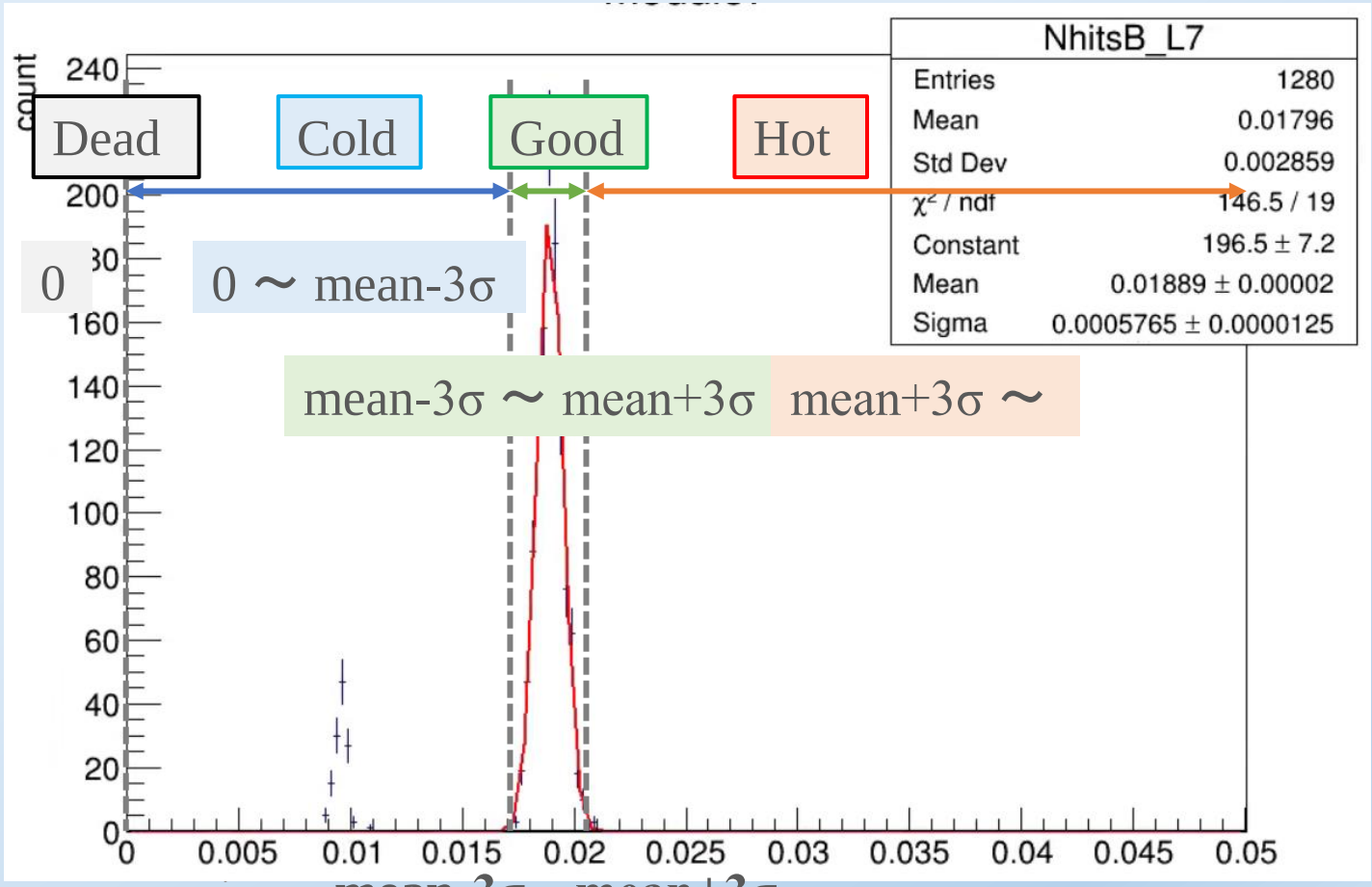
DAC scan analysis without considering Z-vertex

Definition of hot/good/cold/dead channels

I'm working on automating the hot/dead channel finder.

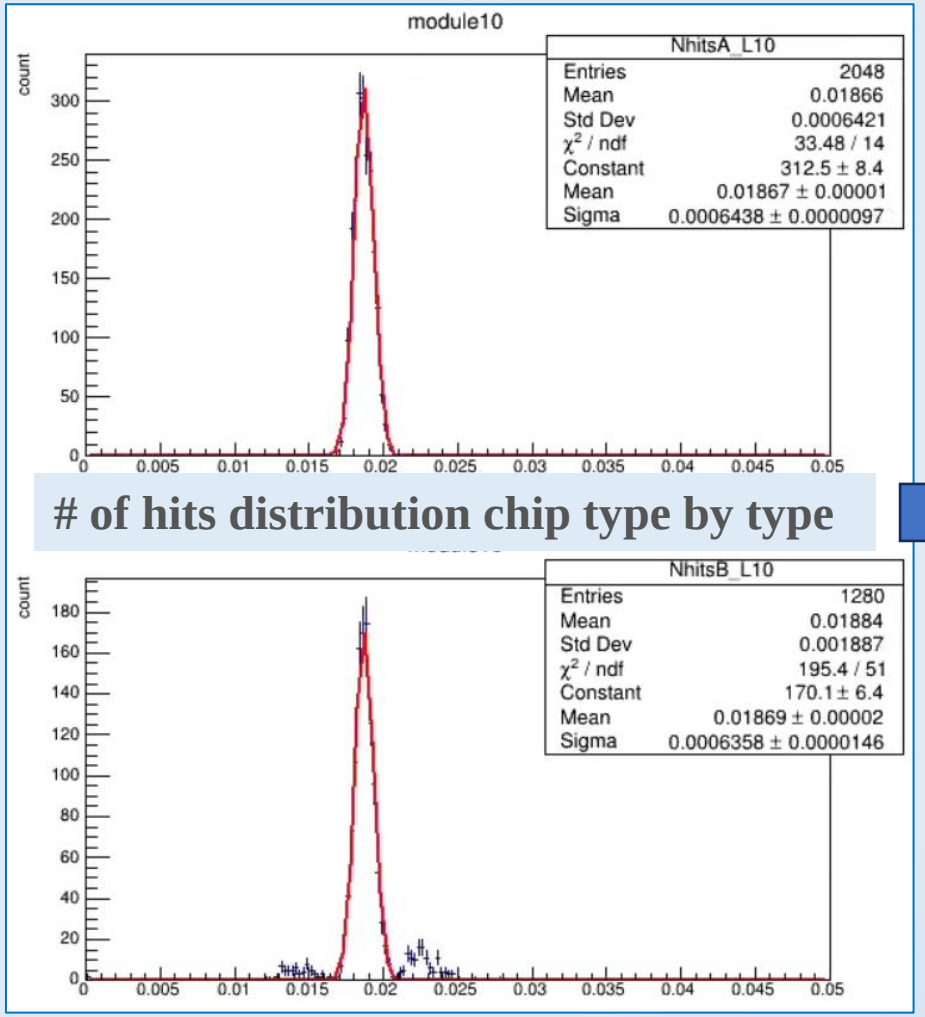
I did single-gaussian fitting on the # of hits distribution of beam data (Run20869).

1. Normalize # of hits/channel by chip length, acceptance, and # of events.
2. Make a # of hits distribution for each chip type.
3. Do single-gaussian fitting and define hot, good, cold, and dead channels.

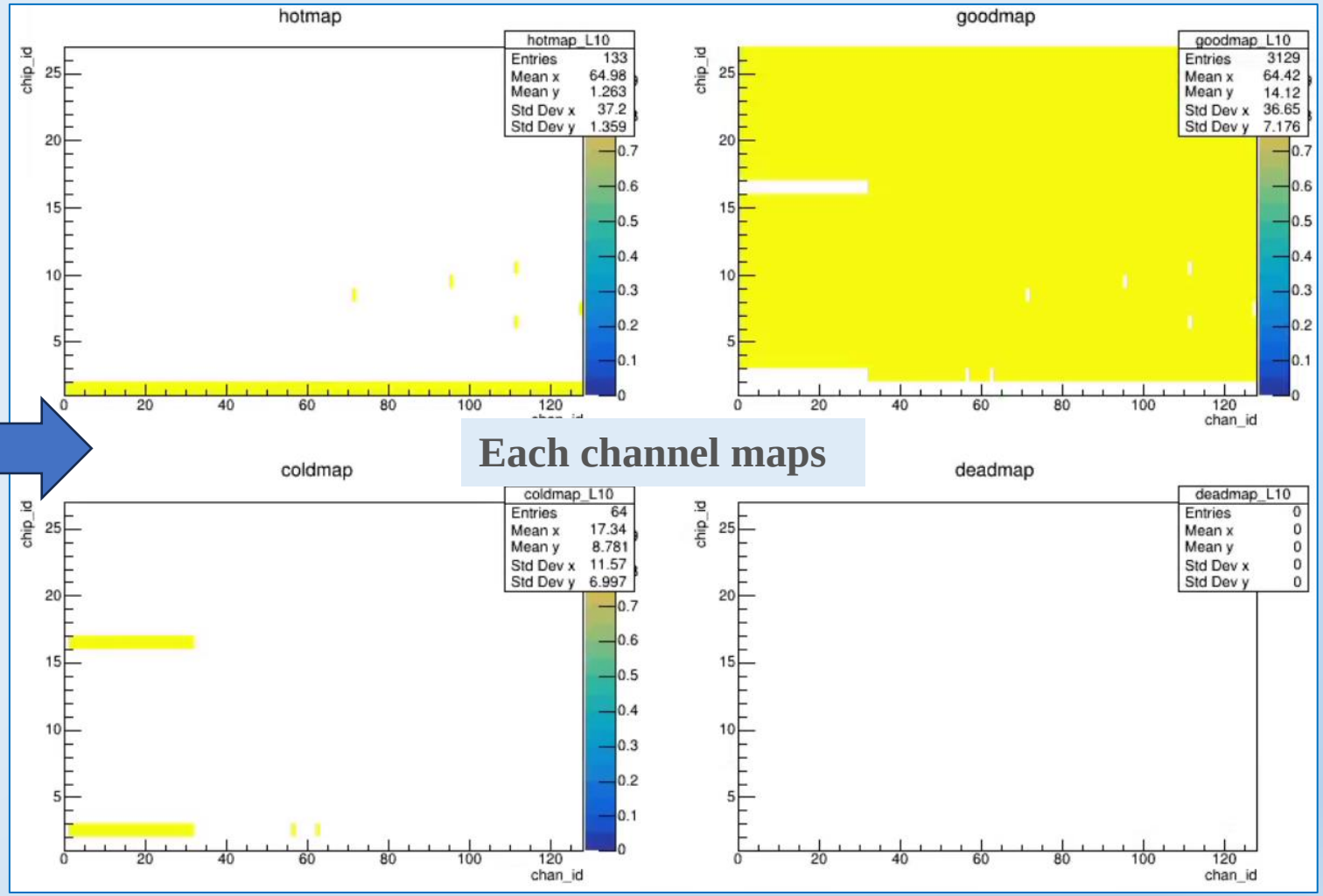


Map of hot/good/cold/dead channels

I made each channel maps from # of hits distribution. For example, I show each map in the following plots.



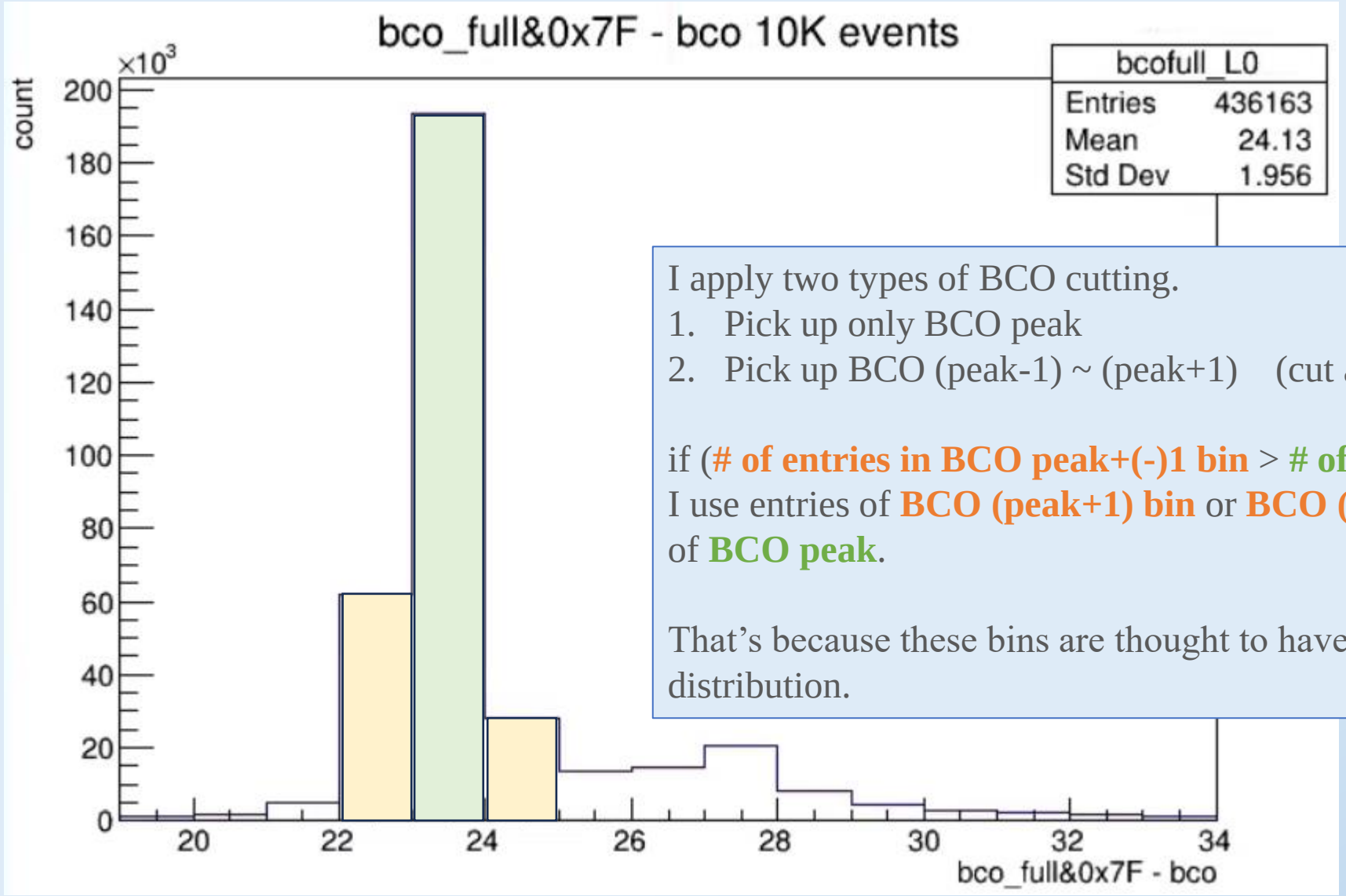
# of hits distribution chip type by type



Each channel maps

BCO distribution and BCO cut

Run20869（module 0 of Felix 1）



I apply two types of BCO cutting.

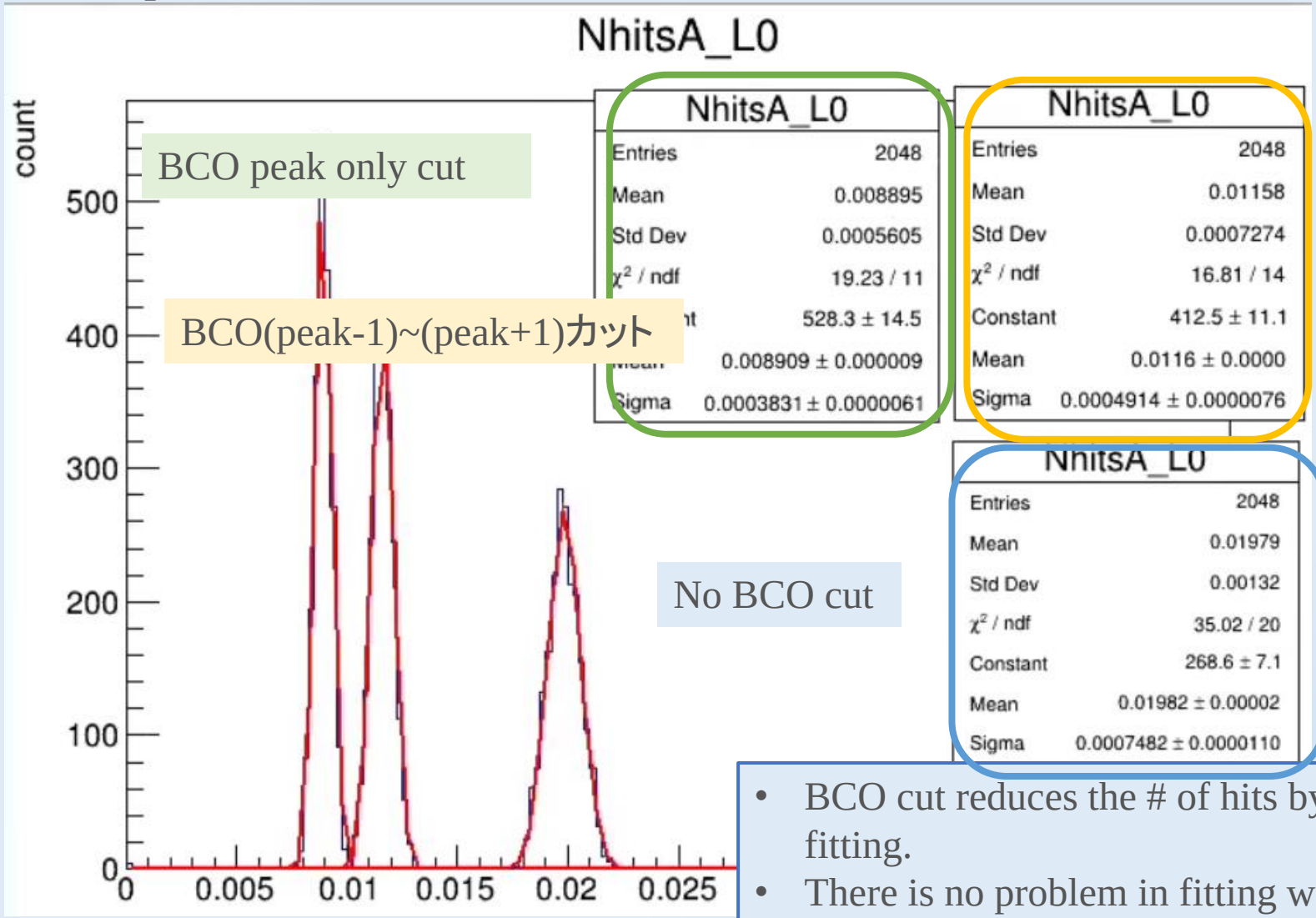
1. Pick up only BCO peak
2. Pick up BCO (peak-1) ~ (peak+1)　(cut as required)

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**.

That’s because these bins are thought to have a large effect on # of hits distribution.

Comparison before and after BCO cut

Run20869（module 0 of Felix 1）



NhitsA_L0	
Entries	2048
Mean	0.008895
Std Dev	0.0005605
χ^2 / ndf	19.23 / 11
t	528.3 ± 14.5
	0.008909 ± 0.000009
Sigma	0.0003831 ± 0.0000061

NhitsA_L0	
Entries	2048
Mean	0.01158
Std Dev	0.0007274
χ^2 / ndf	16.81 / 14
Constant	412.5 ± 11.1
Mean	0.0116 ± 0.0000
Sigma	0.0004914 ± 0.0000076

NhitsA_L0	
Entries	2048
Mean	0.01979
Std Dev	0.00132
χ^2 / ndf	35.02 / 20
Constant	268.6 ± 7.1
Mean	0.01982 ± 0.00002
Sigma	0.0007482 ± 0.0000110

- BCO cut reduces the # of hits by about 40%, but there is no problem with fitting.
- There is no problem in fitting with both **BCO (peak-1)~(peak+1) cut** and **BCO peak only cut**.

→I think we should apply **BCO(peak-1)~(peak+1) cut**. That's because it has more hits than **BCO peak only cut.**

Summary and plan

- I made dead, cold, good, and hot channel maps.
- I applied BCO cut and compared before and after BCO cut, and differences of BCO peaks.

→With BCO cut, I could do single-gaussian fitting well.

→I think we should apply BCO (peak-1) ~ (peak+1) cut because it has more hits.

- Compare hot channel list with Jaein and Joseph
- Analyze in other Runs
- Discuss which hot channel algorithm we should adopt
- Confirm how much minimum # of events we need to find hot channels.
- Confirm how much maximum # of events we need to find dead channels.

Back up

No BCO cut

Felix 0～7

No BCO cut

felix0

Run20869

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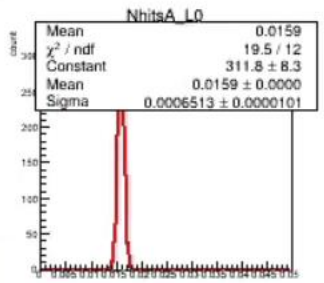

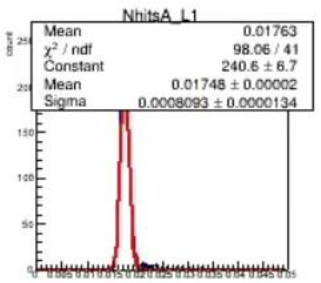

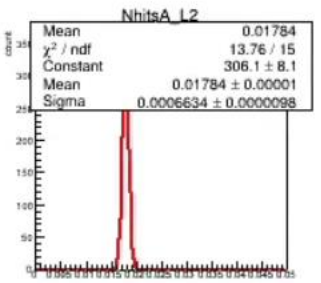

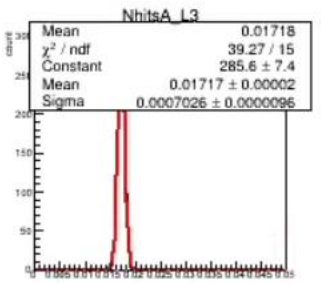

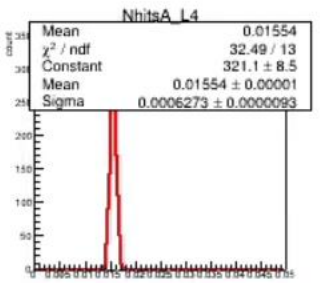

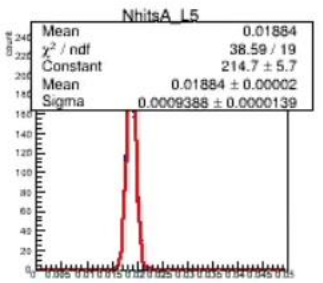

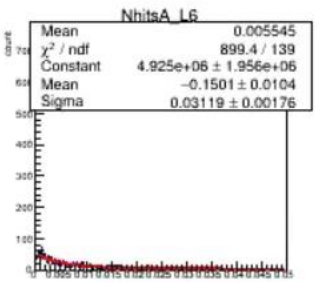

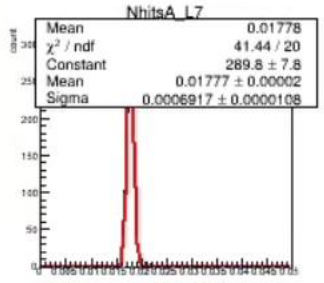

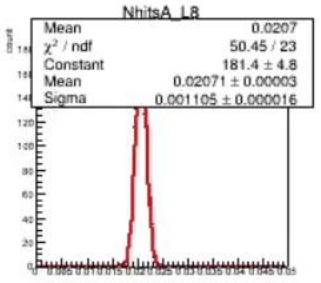

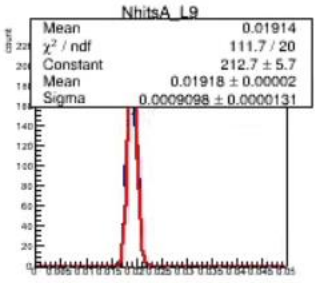

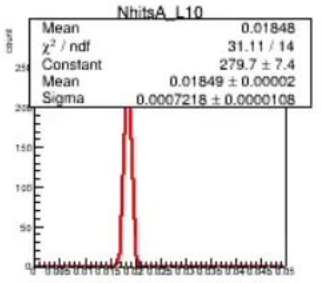

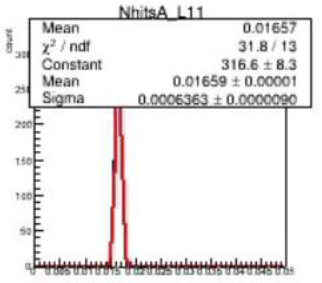

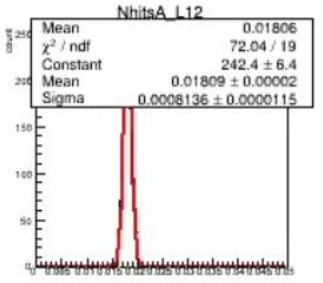

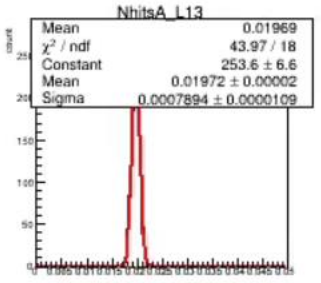

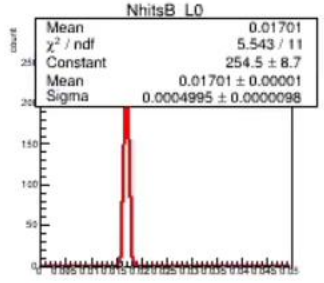

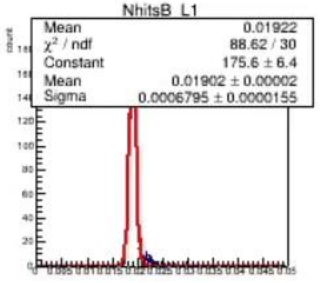

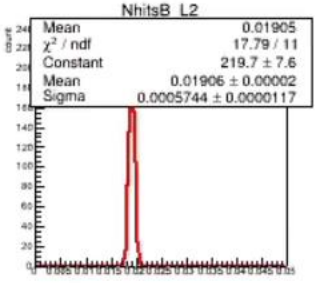

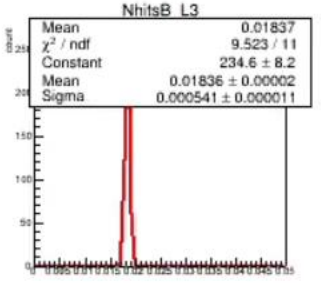

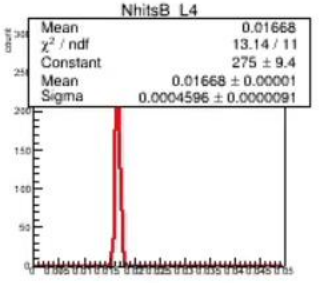

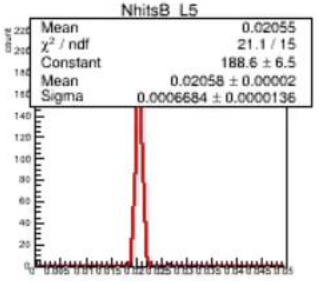

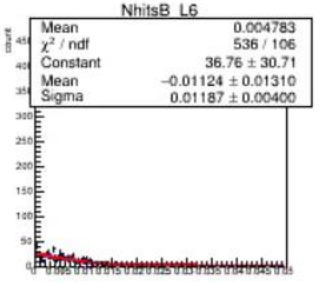

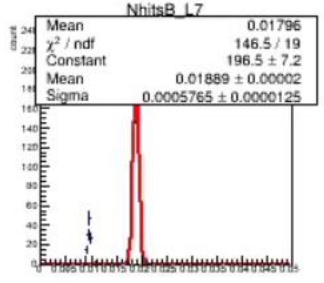

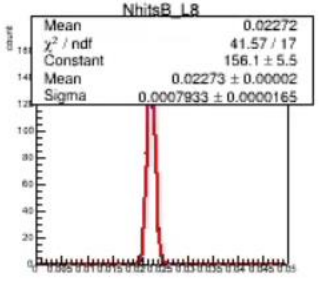

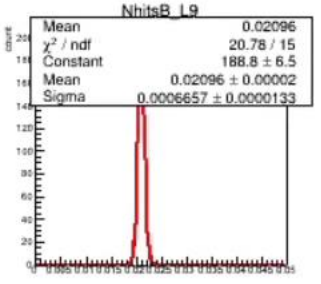

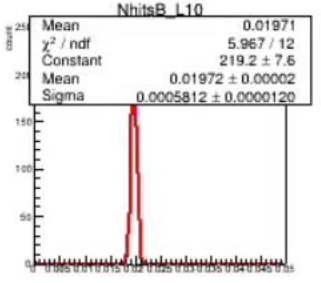

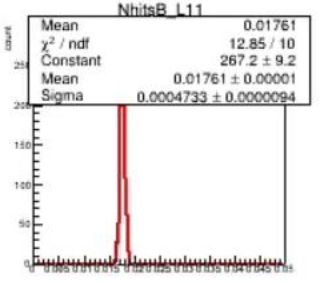

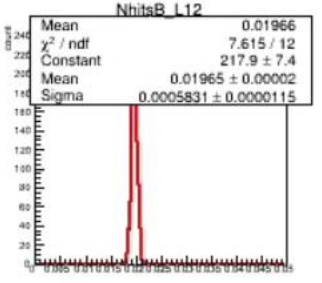

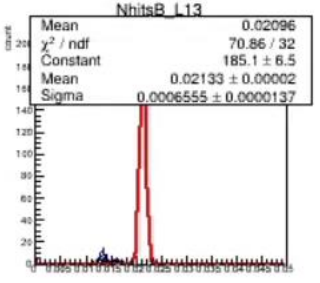

No BCO cut

felix1

Run20869

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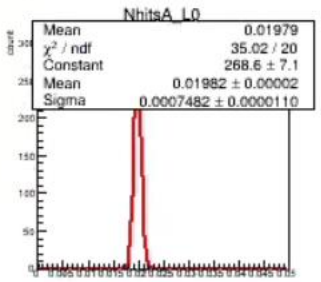

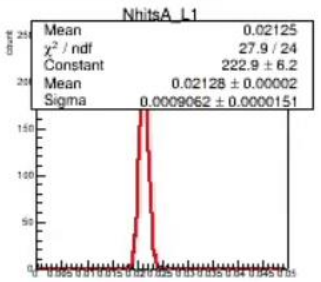

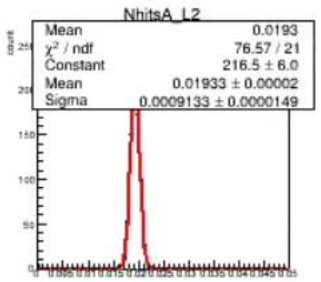

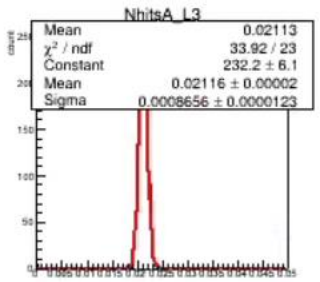

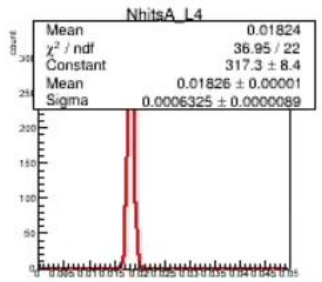

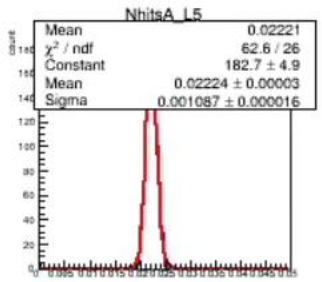

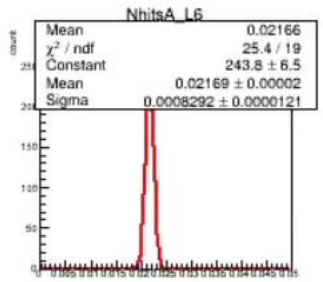

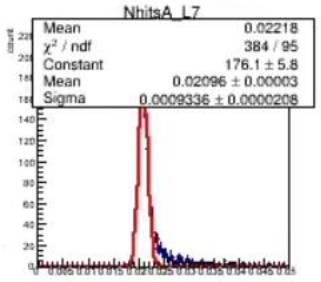

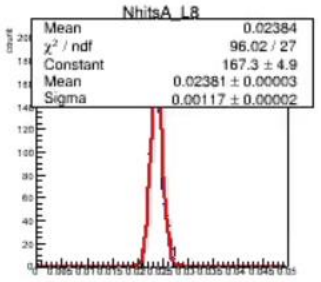

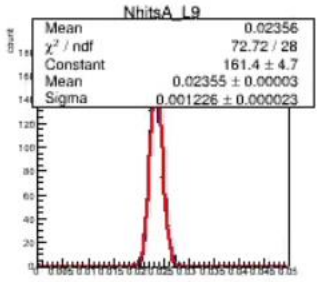

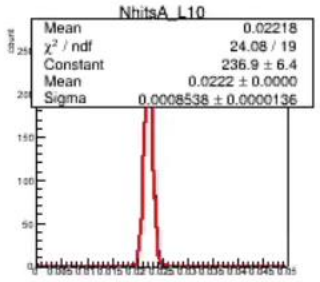

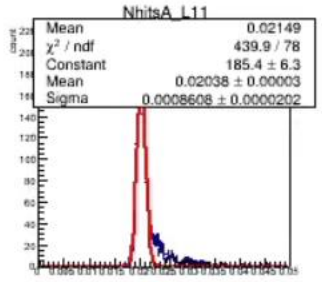

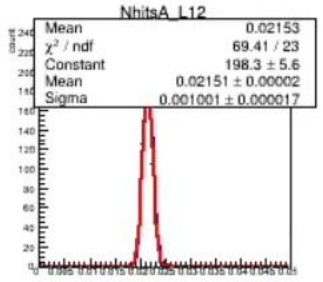

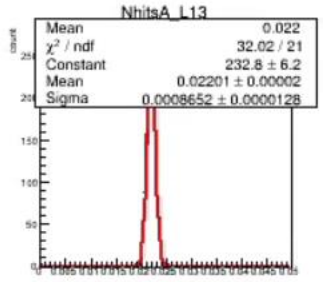

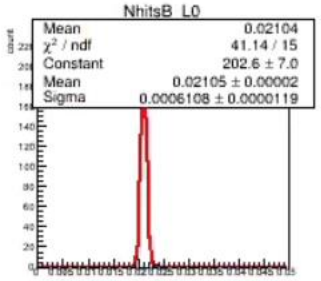

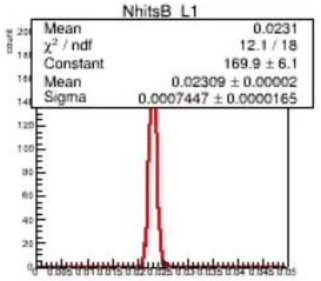

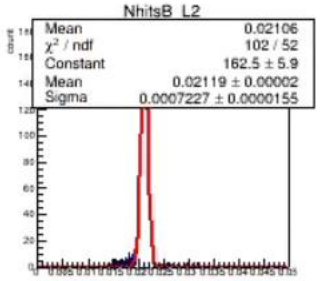

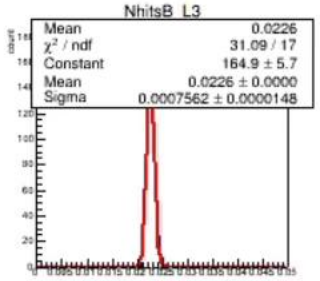

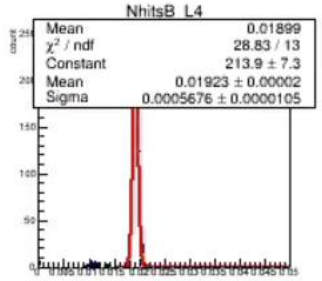

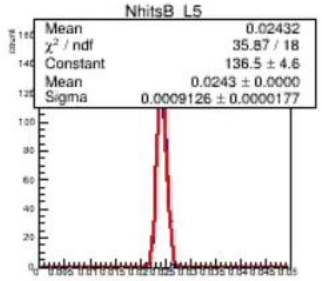

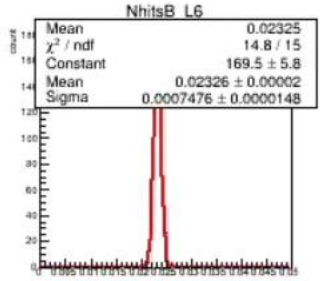

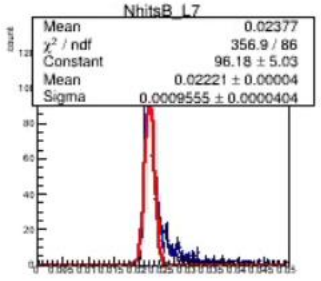

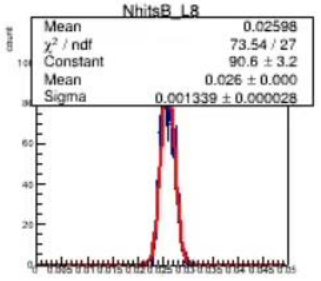

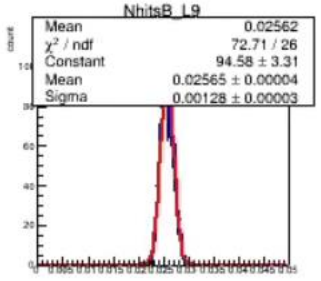

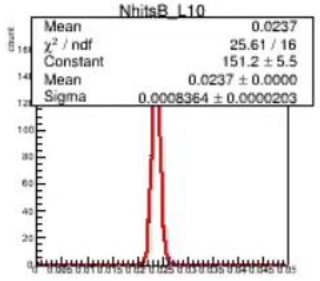

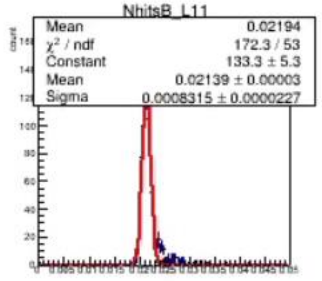

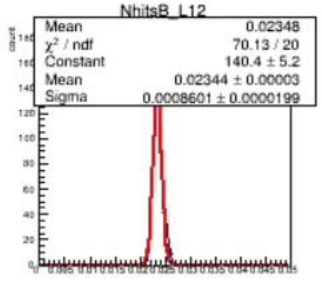

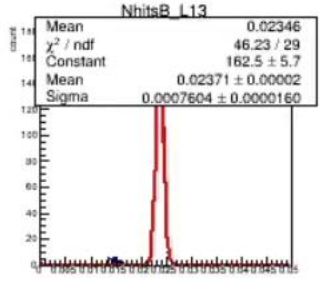

No BCO cut

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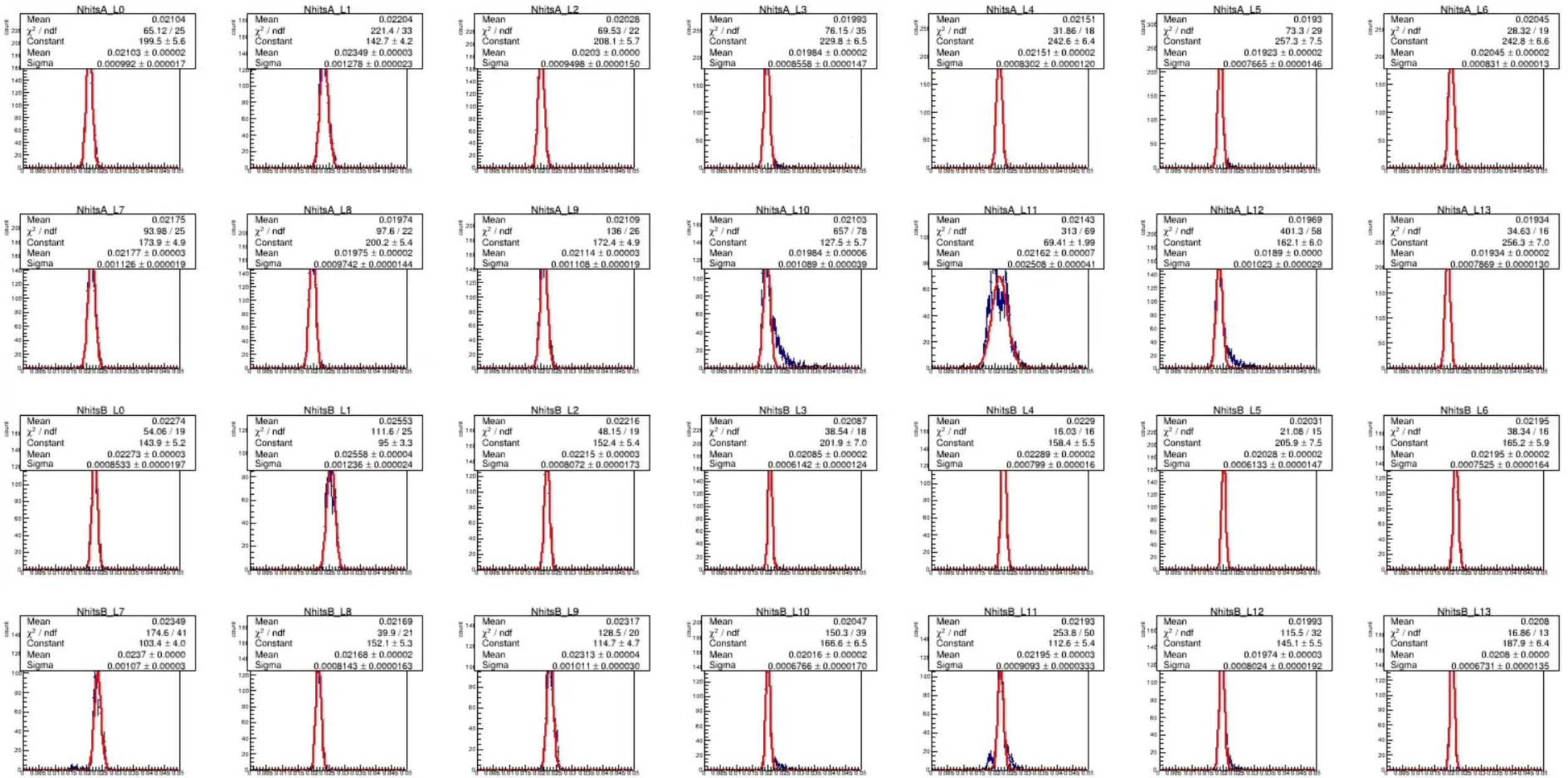
File Edit View Options Tools Help



No BCO cut

felix3

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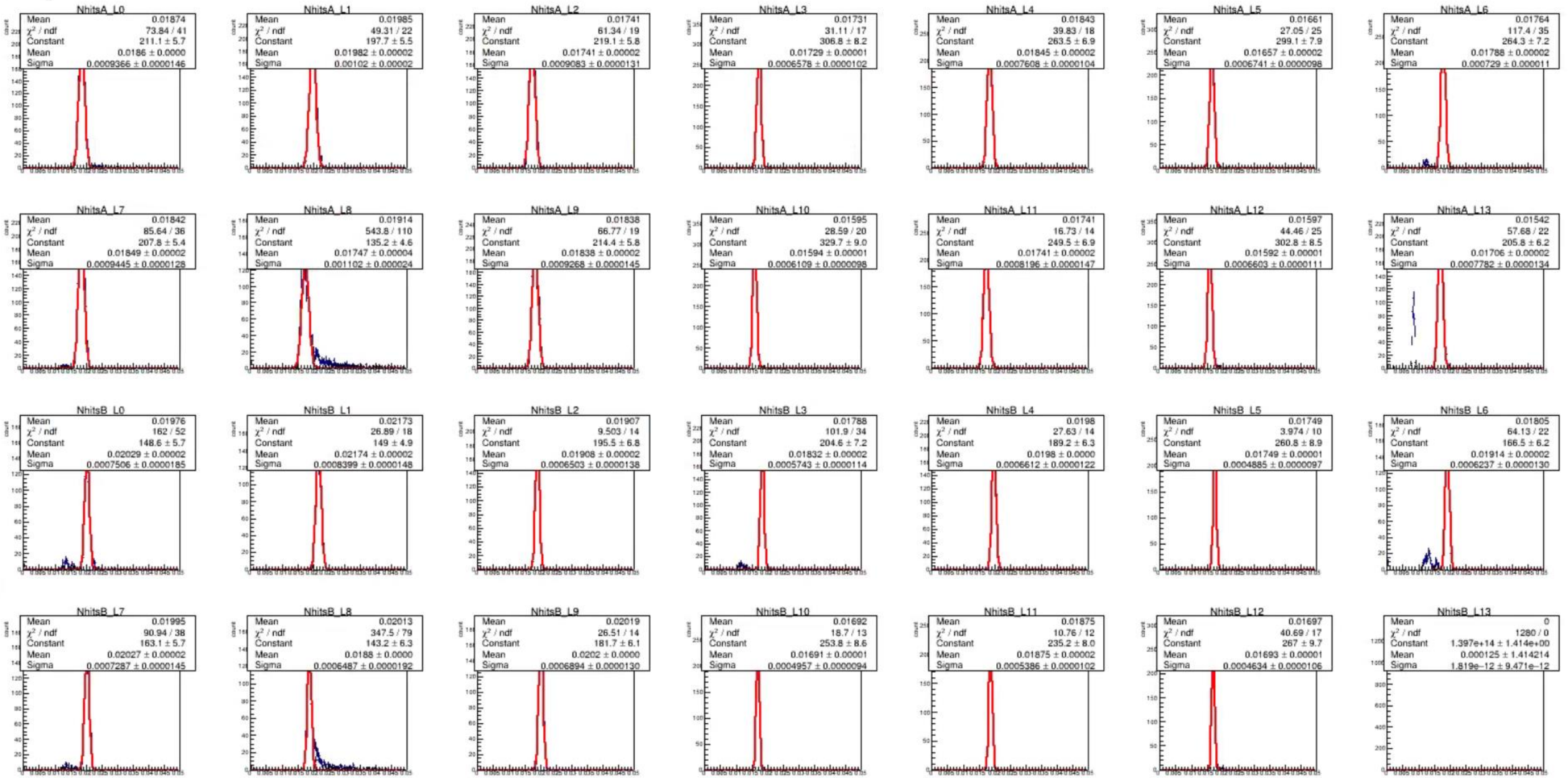
File Edit View Options Tools Help



No BCO cut

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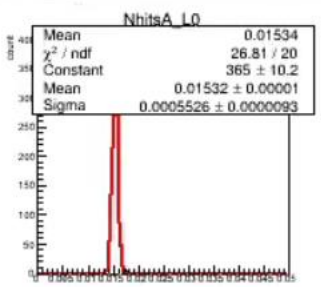
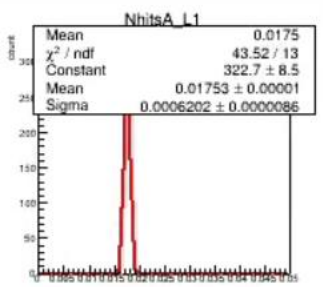
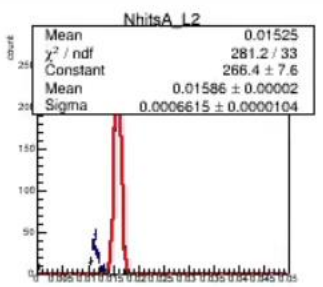
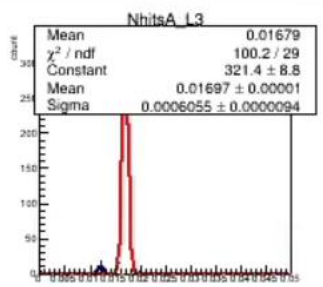
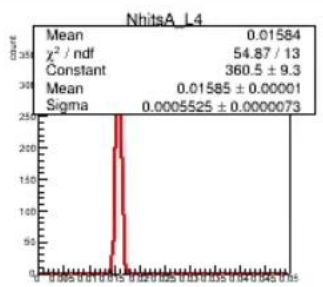
File Edit View Options Tools Help

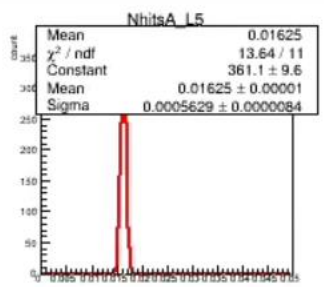


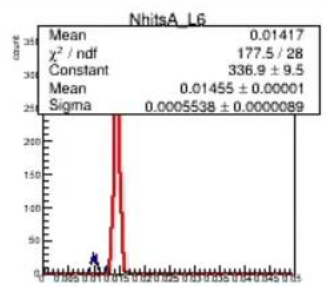


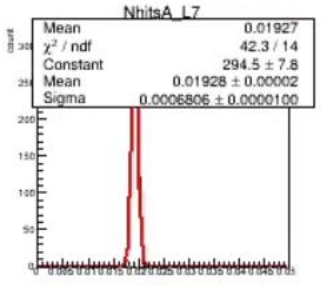


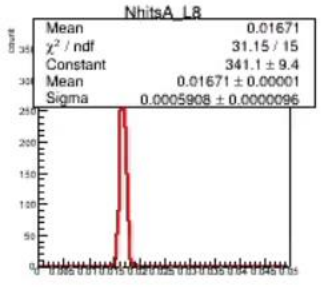


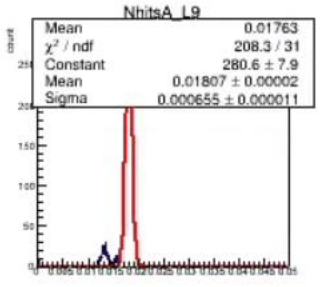


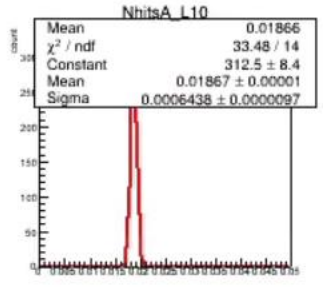


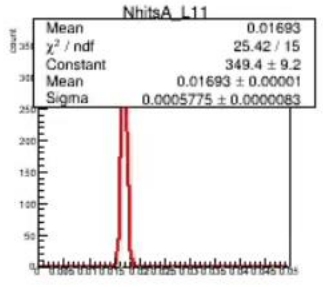


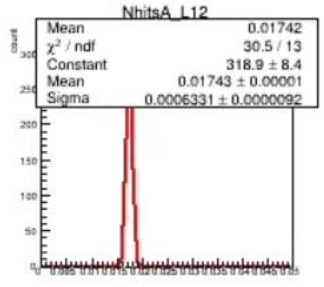


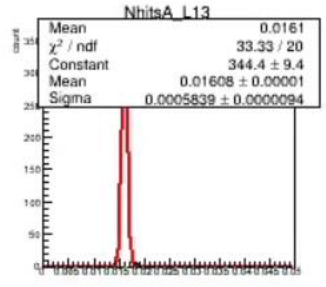


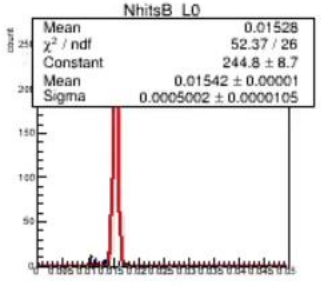


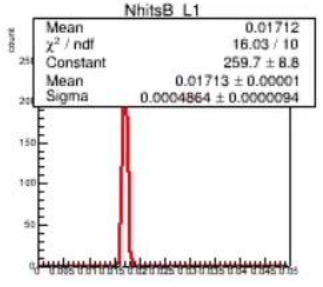


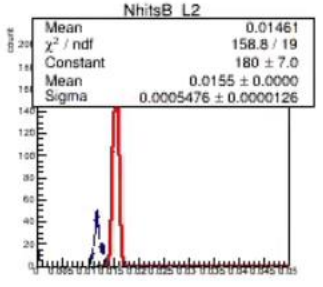


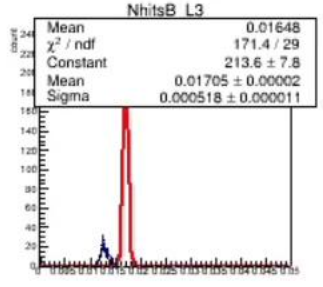


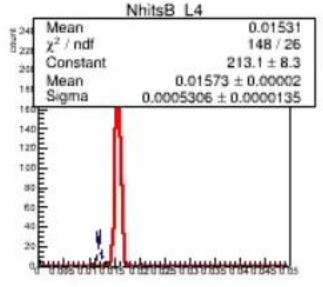


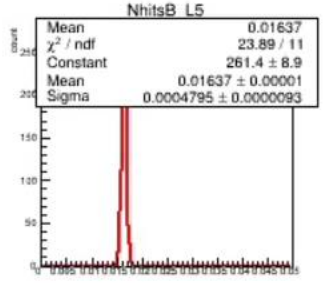


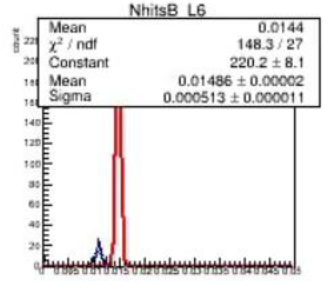


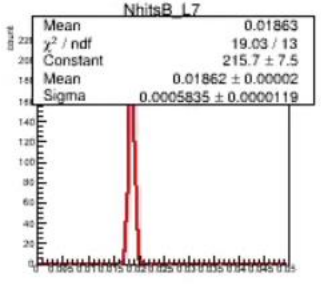


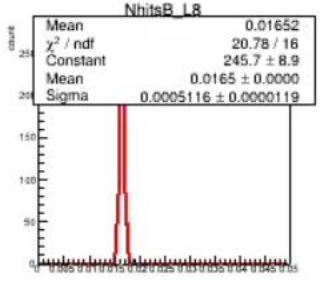


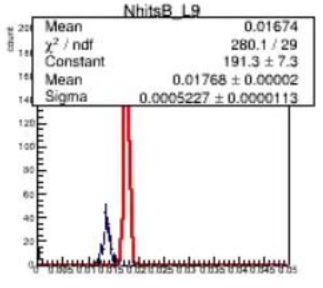


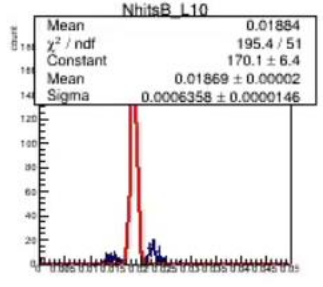


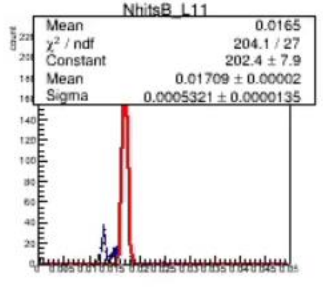


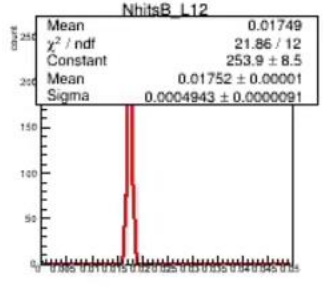


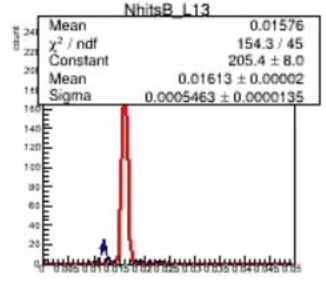












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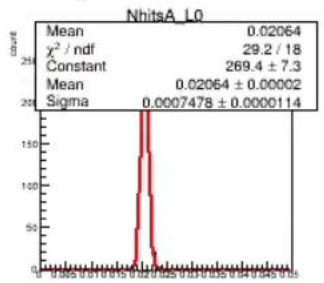
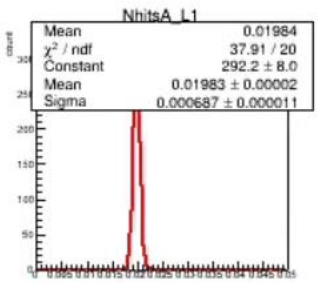
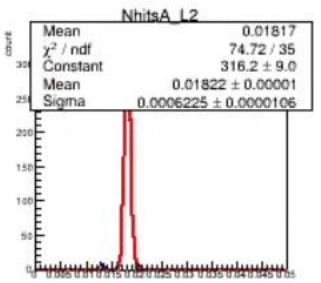
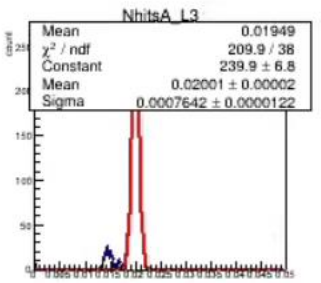
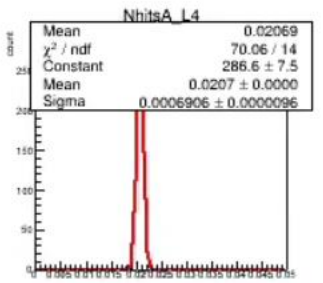
File Edit View Options Tools Help

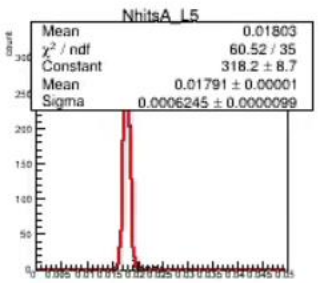


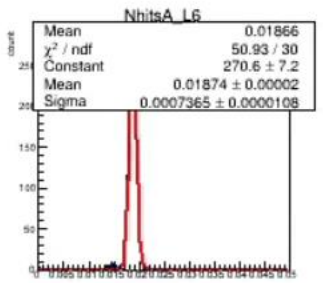


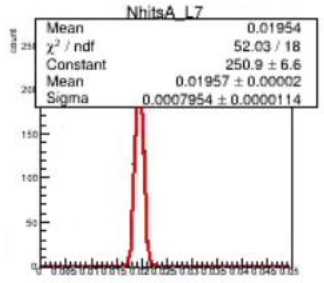


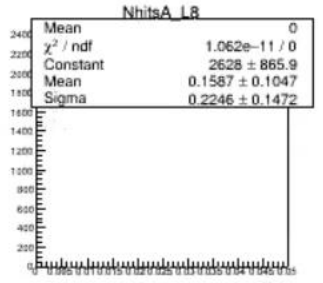


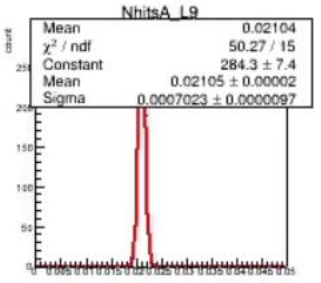


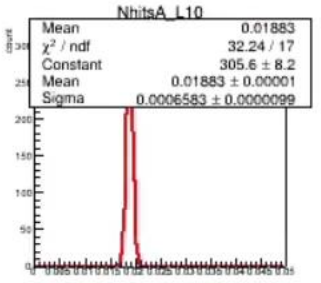


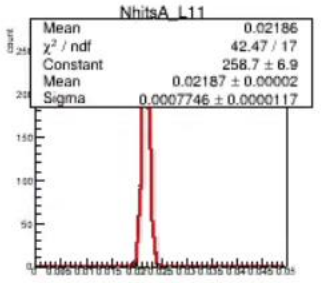


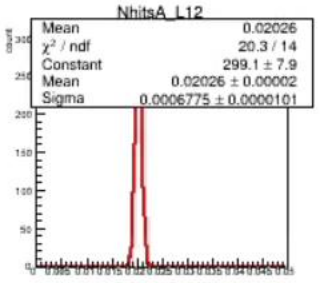


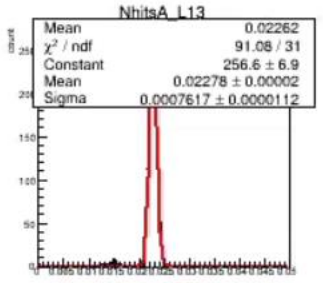


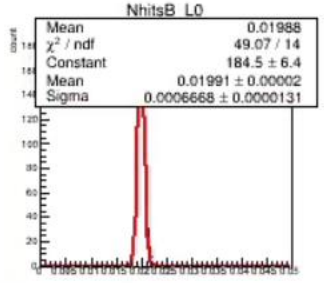


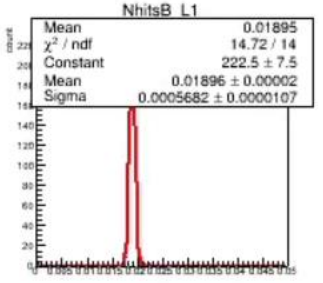


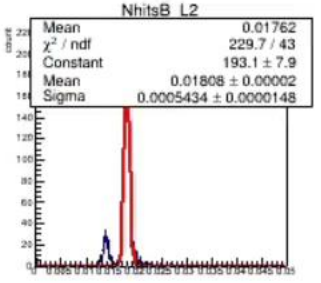


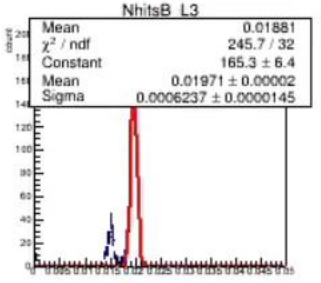


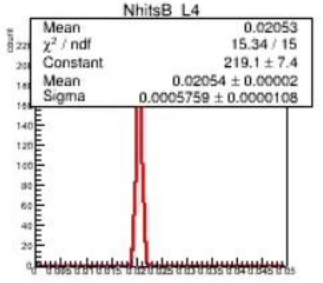


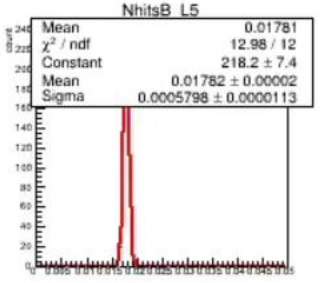


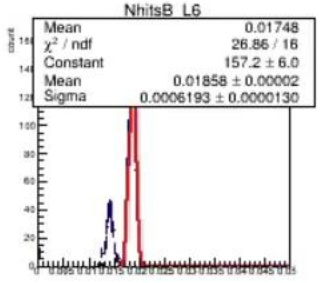


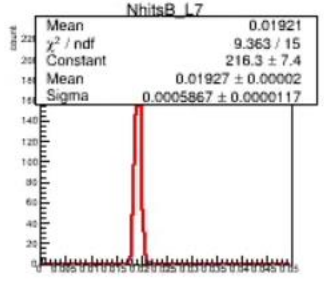


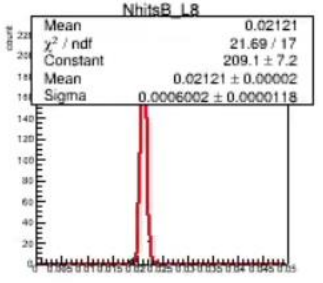


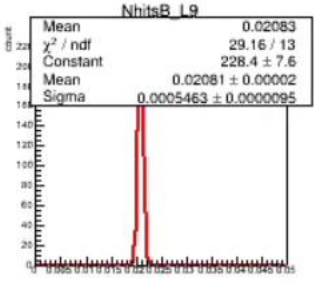


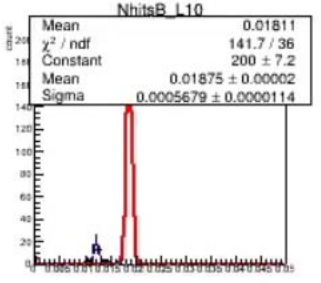


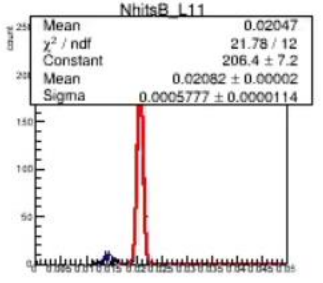


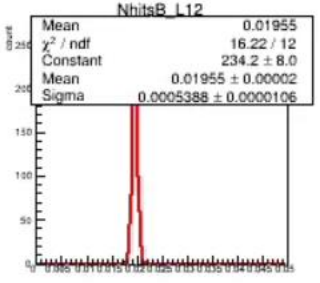


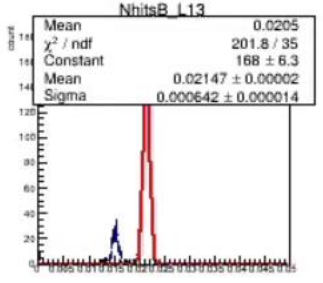










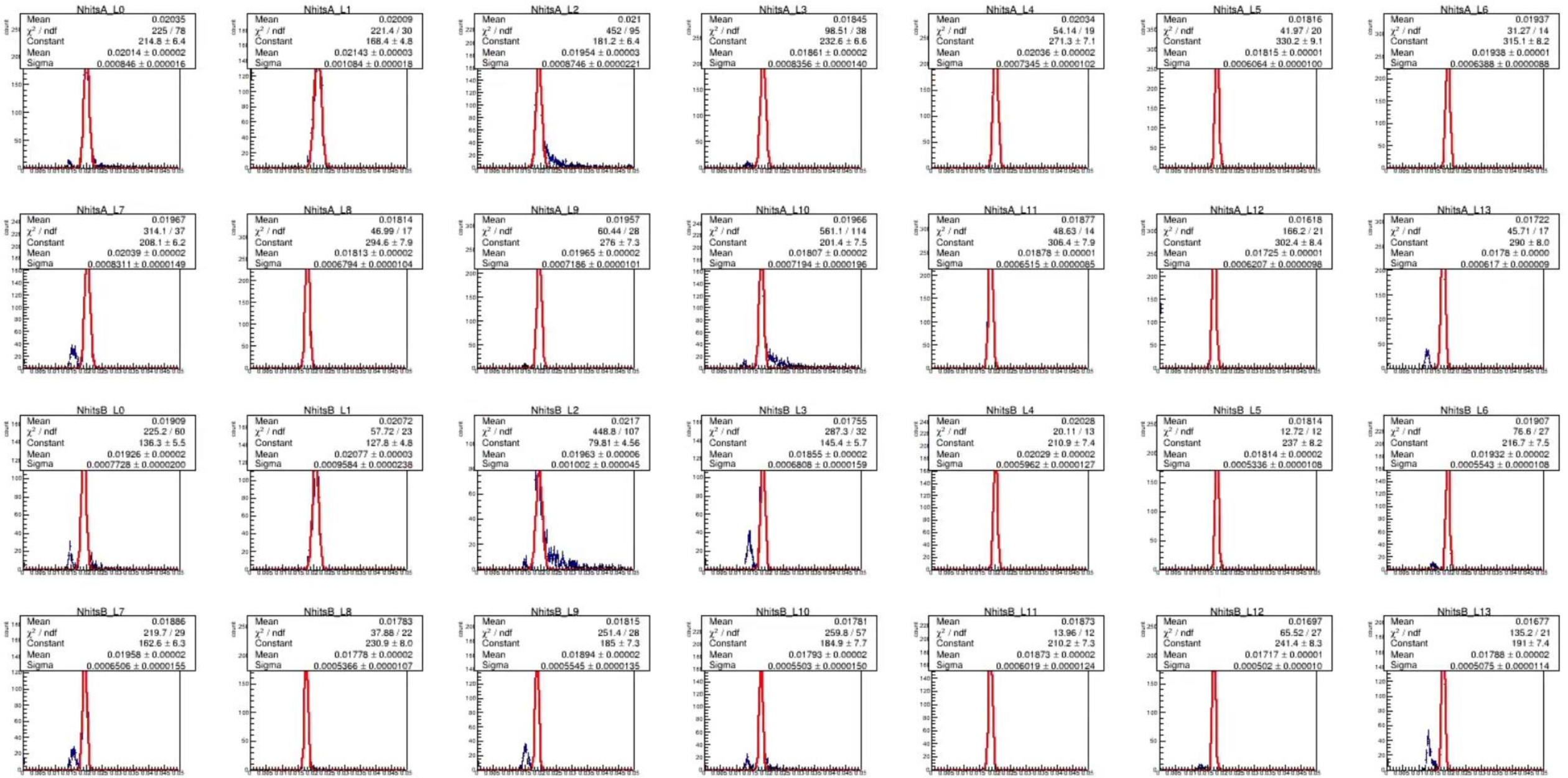


No BCO cut

felix6

Run20869

File Edit View Options Tools Help

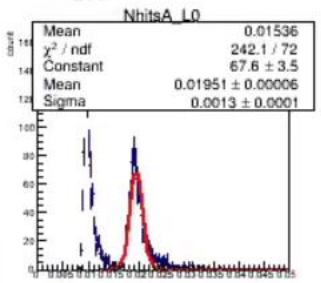


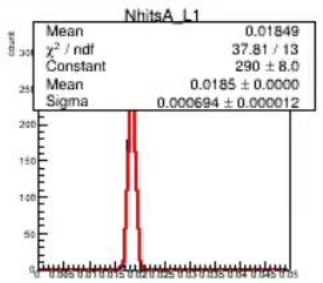
No BCO cut

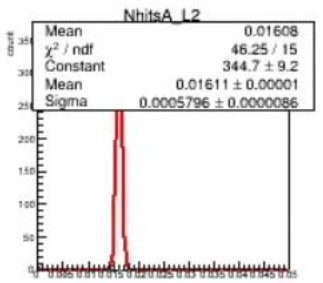
felix7

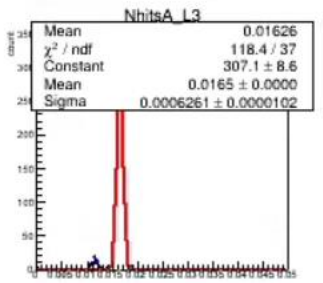
Run20869

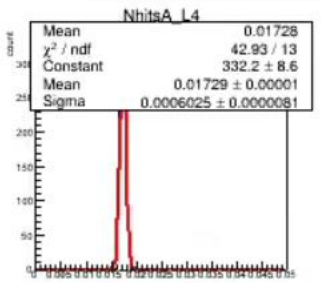
File Edit View Options Tools Help

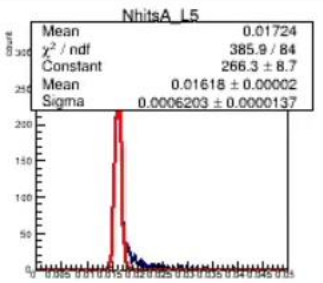


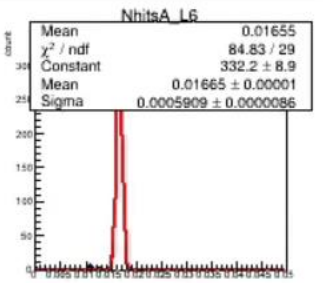


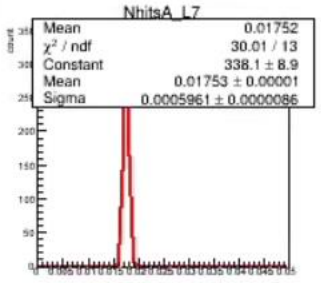


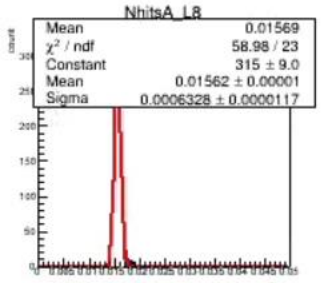


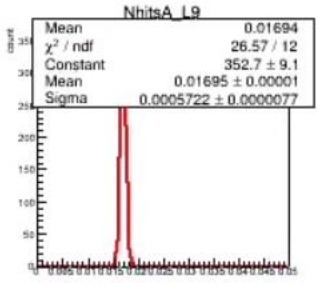


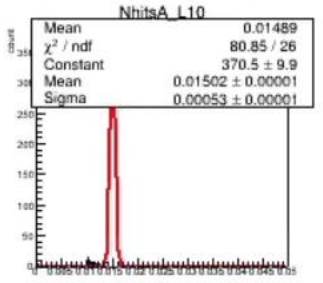


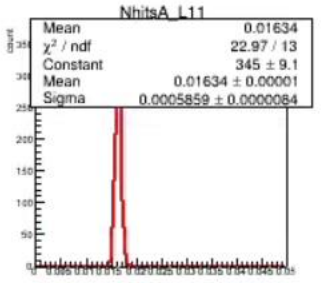


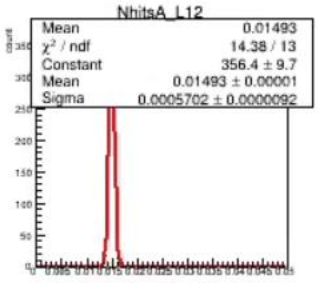


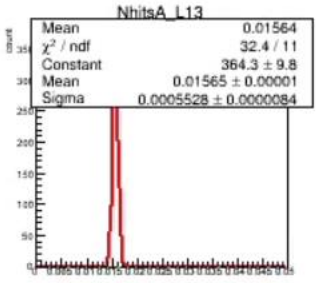


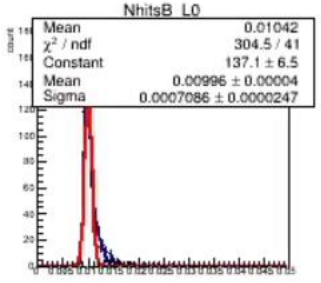


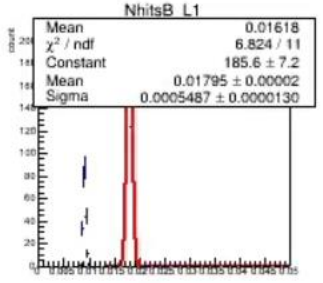


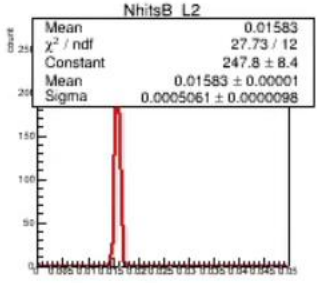


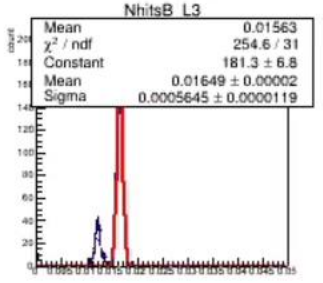


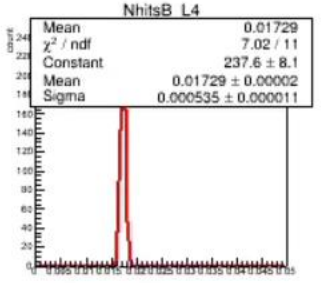


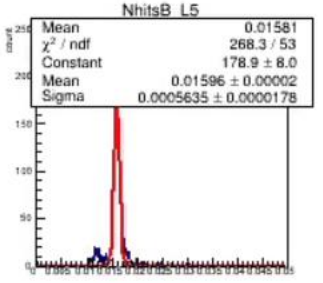


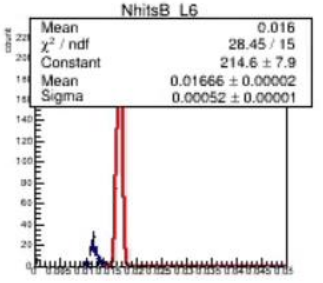


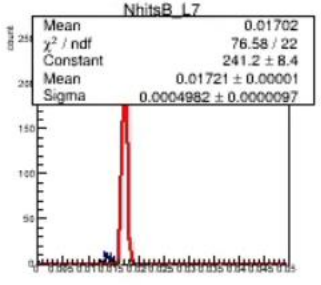


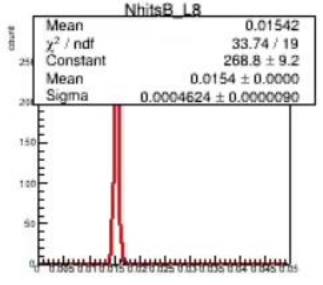


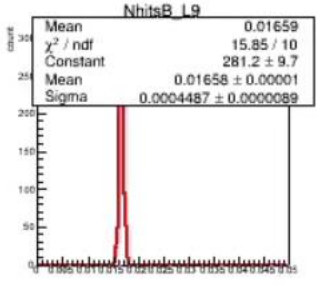


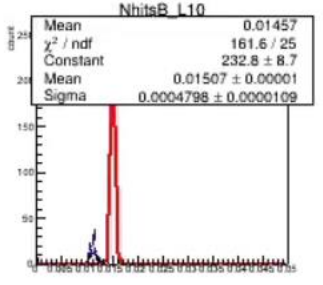


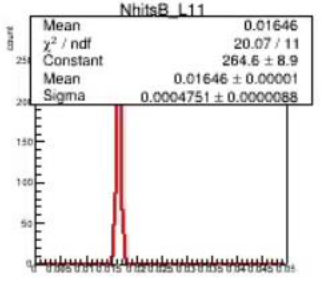


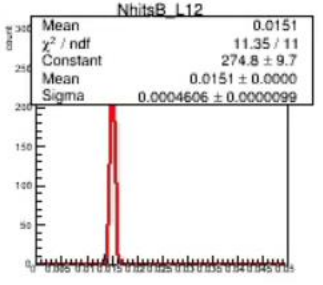


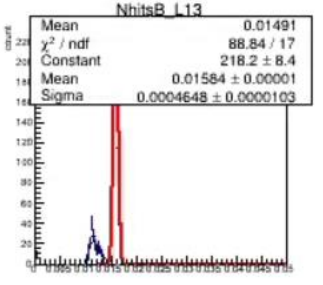












Only BCO peak cut

Felix 0～7

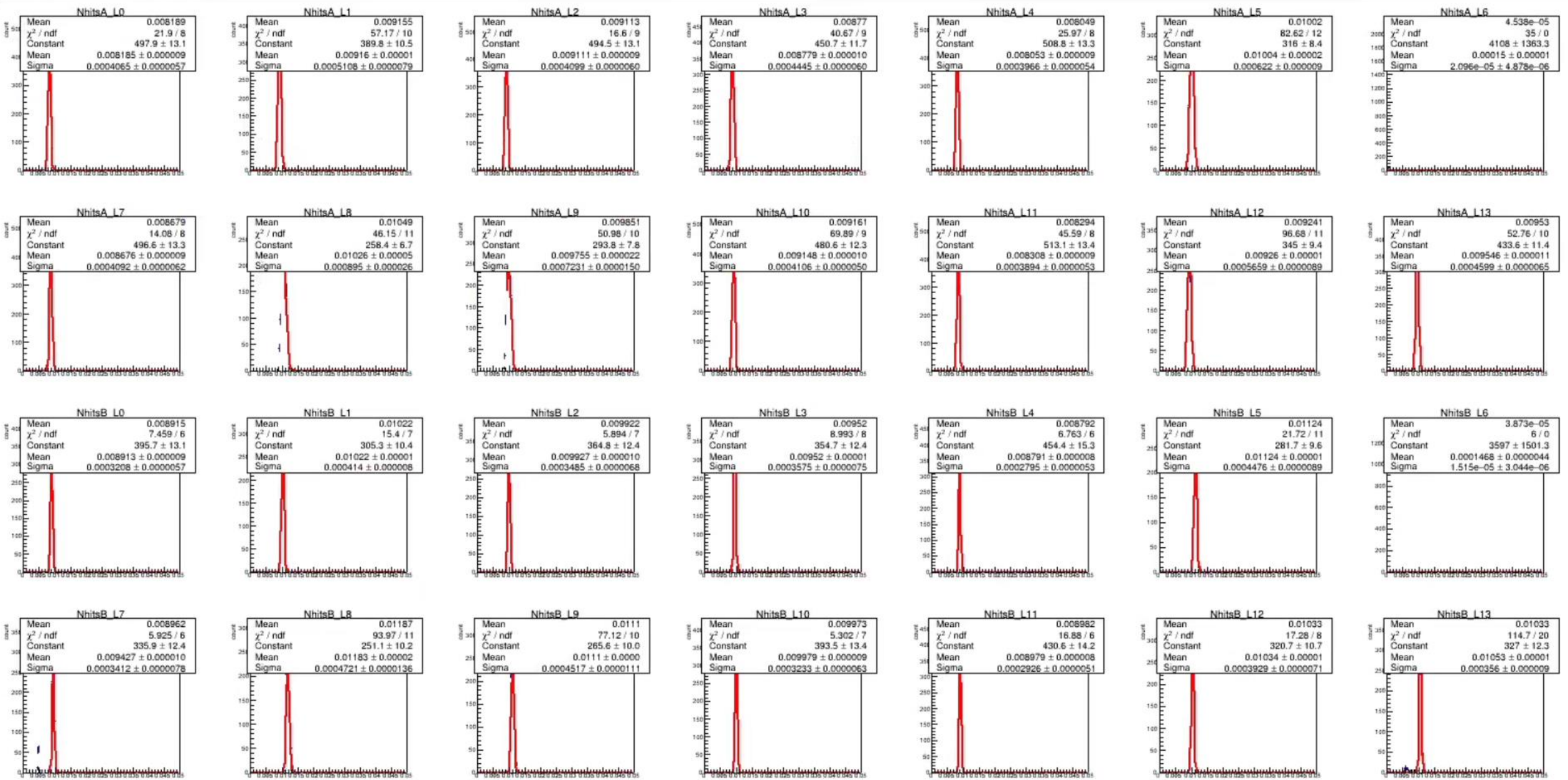
Activities felix0 Mon 01:26

Only BCO peak cut

felix0

Run20869

File Edit View Options Tools Help



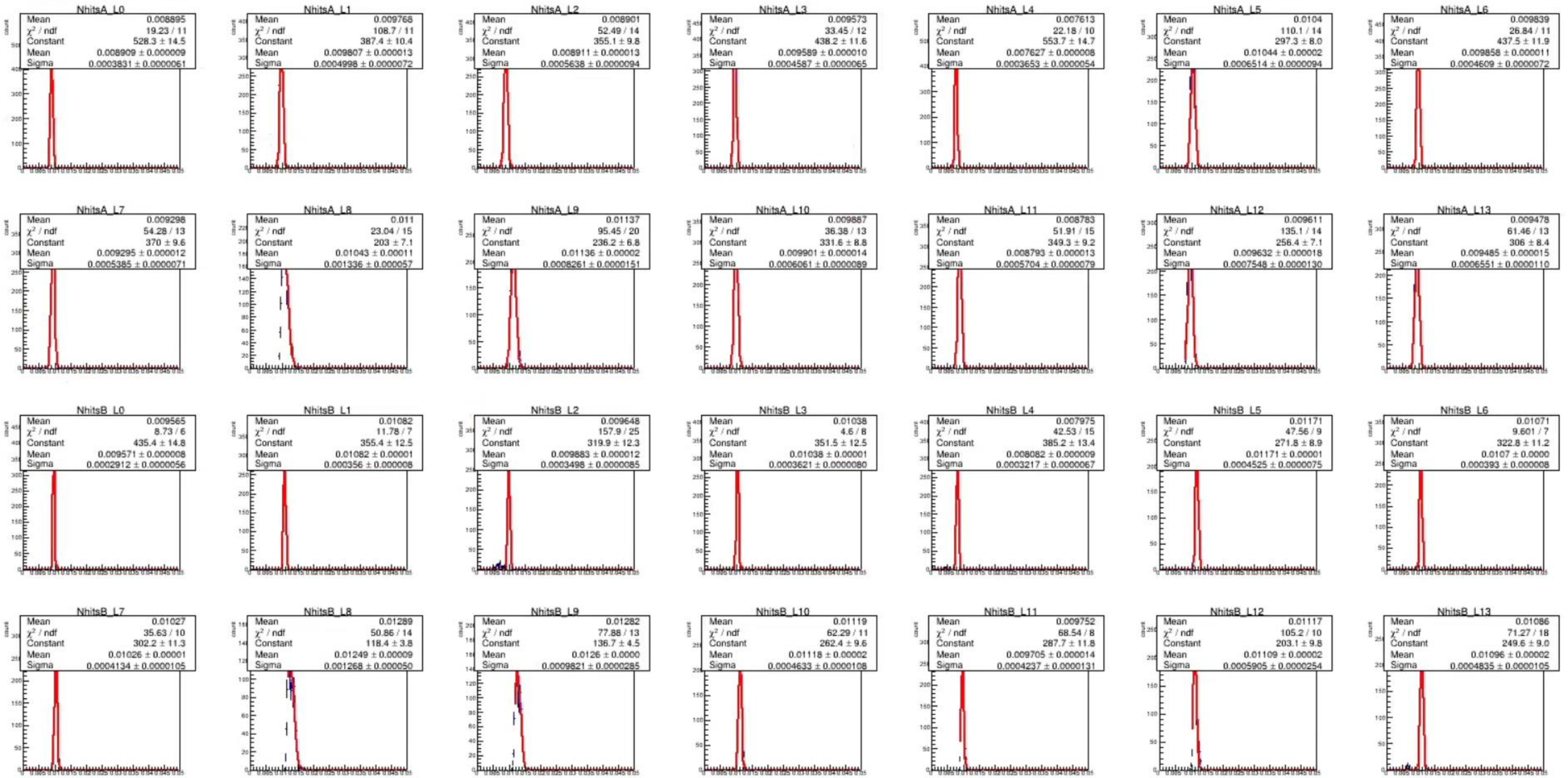
Activities felix1 Mon 01:25

Only BCO peak cut

felix1

Run20869

File Edit View Options Tools Help

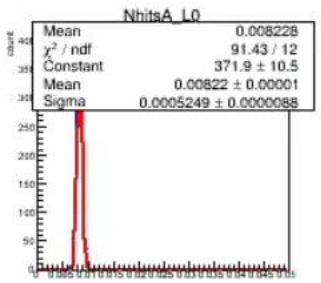


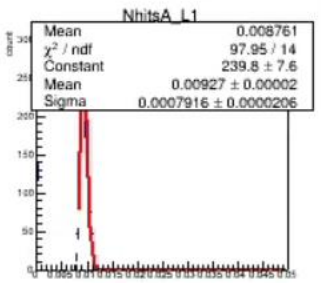
Only BCO peak cut

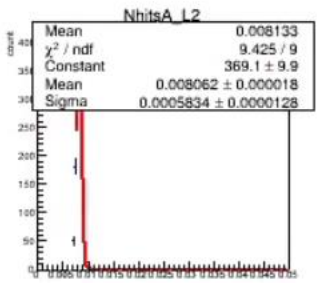
felix2

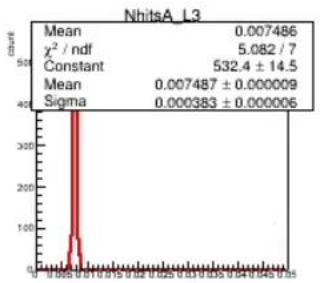
Run20869

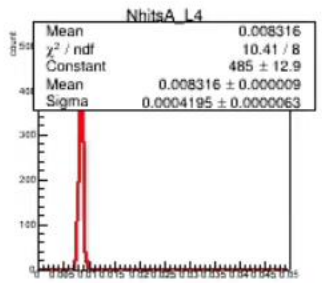
File Edit View Options Tools Help

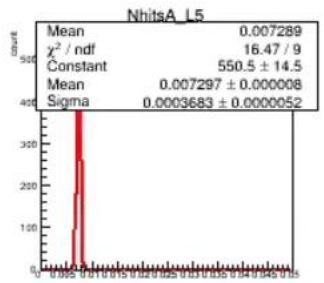


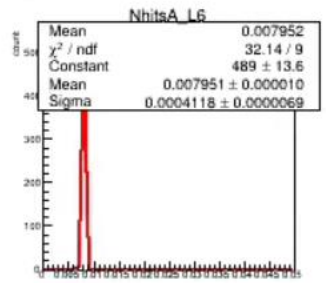


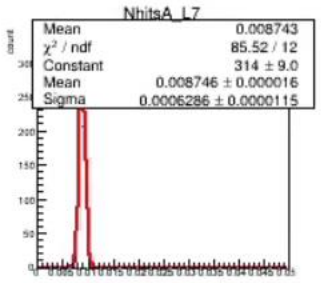


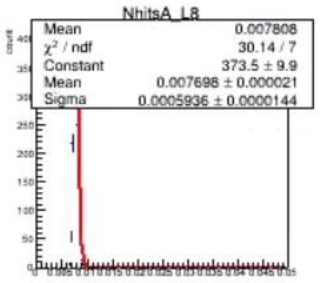


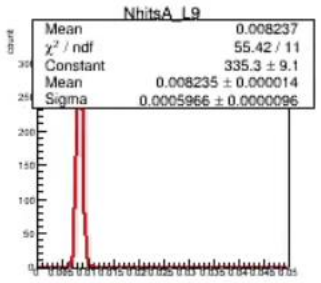


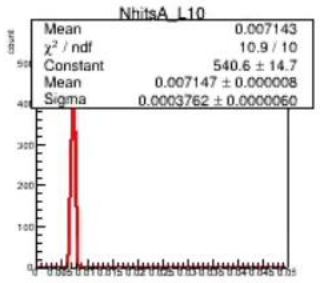


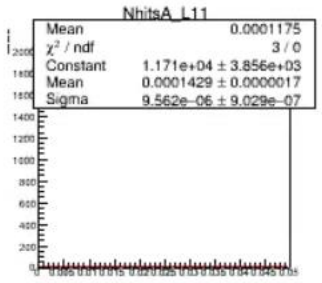


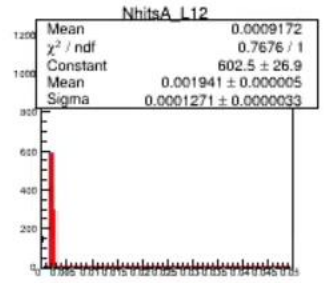


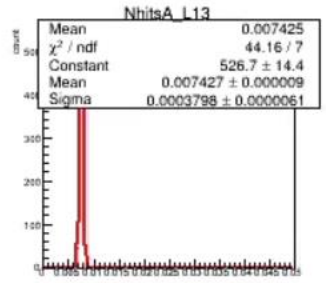


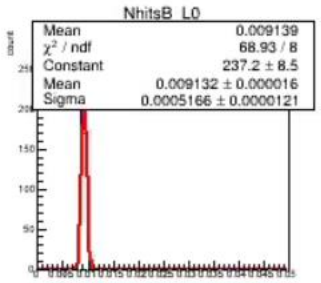


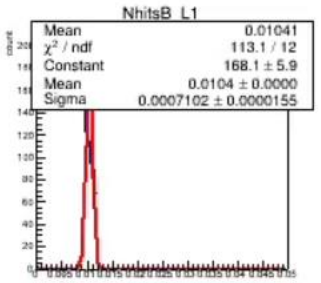


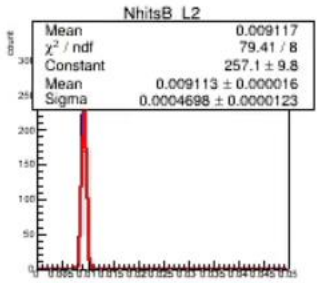


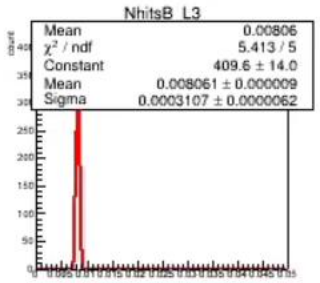


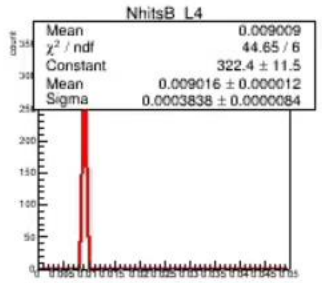


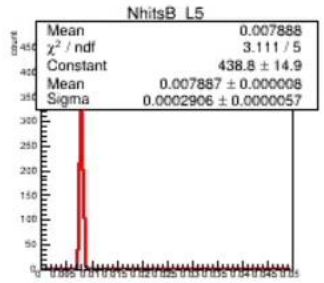


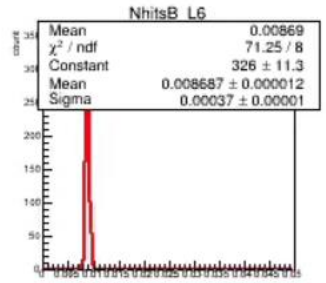


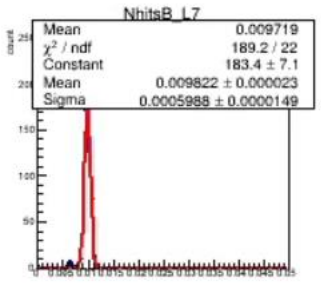


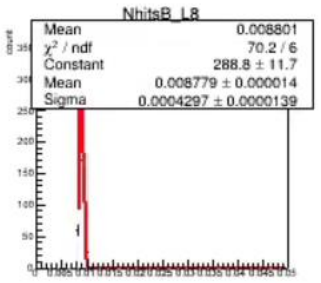


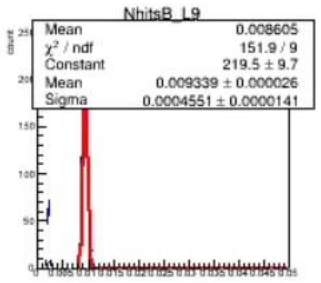


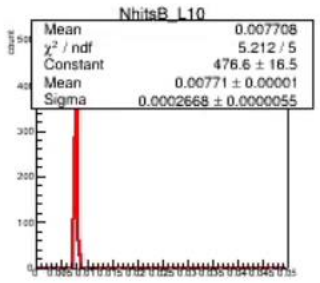


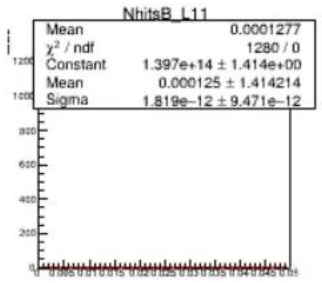


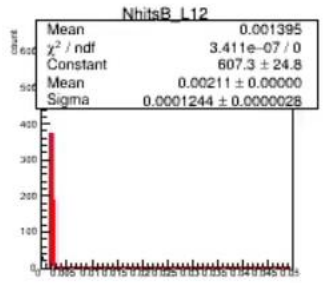


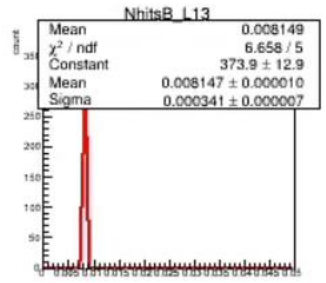












Only BCO peak cut

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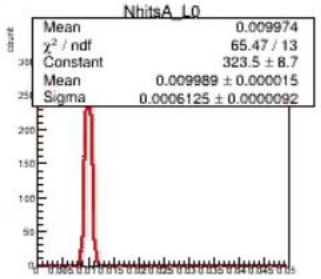
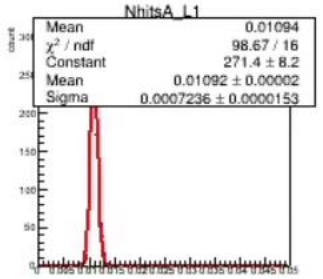
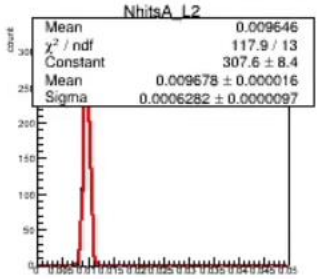
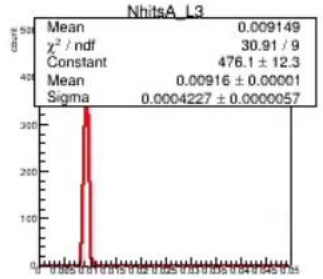
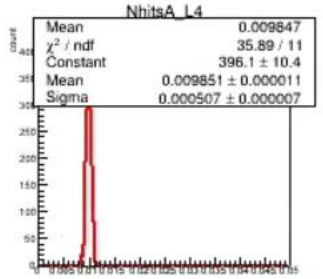
File Edit View Options Tools Help

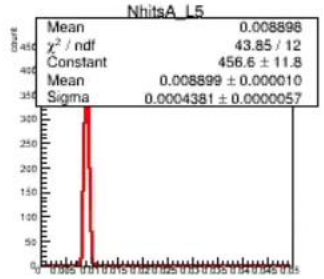


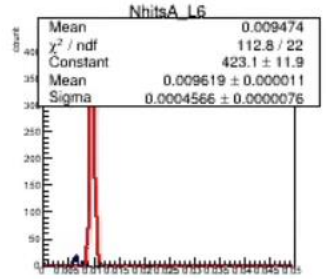


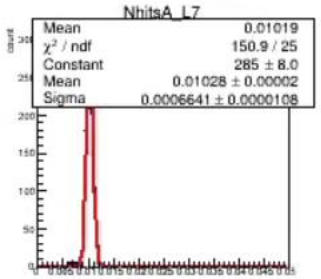


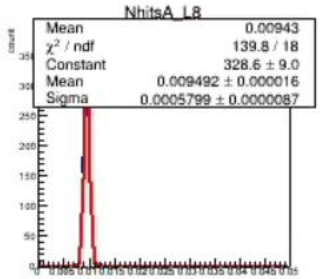


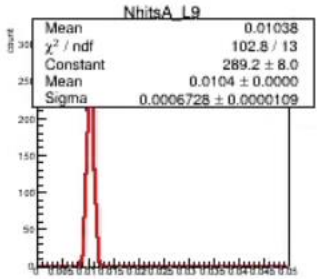


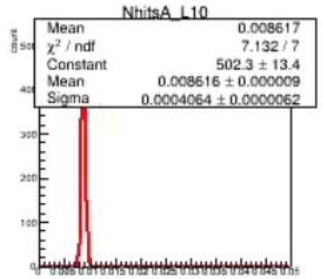


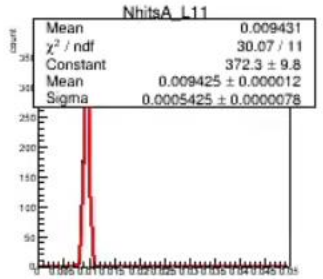


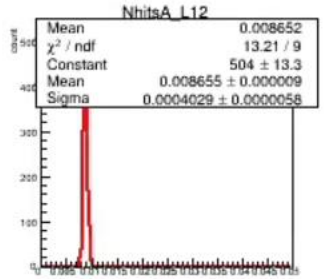


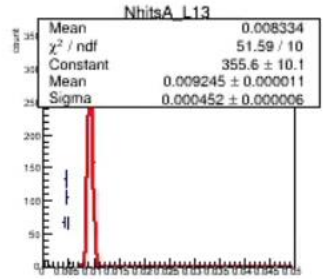


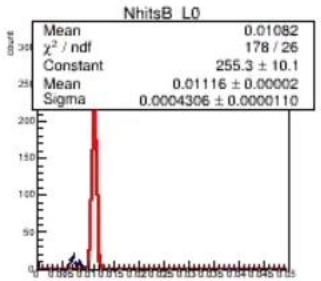


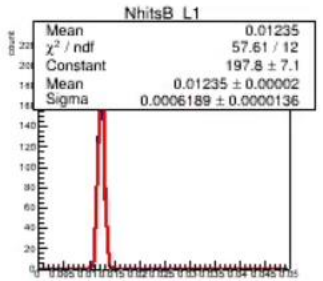


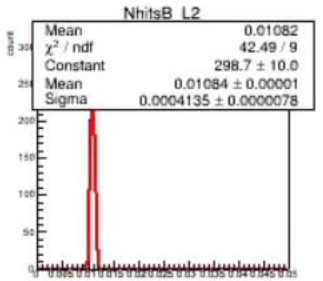


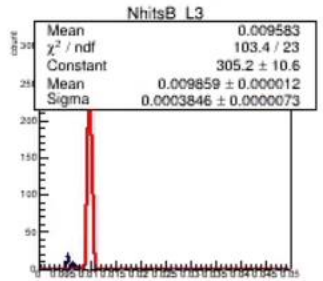


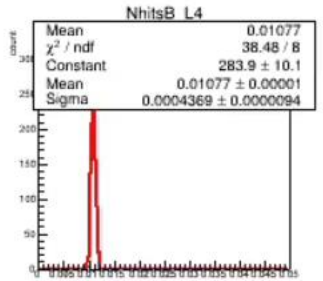


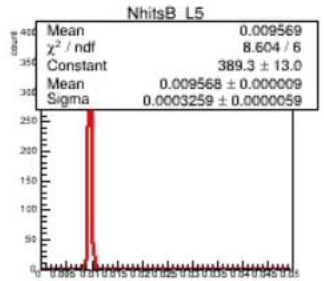


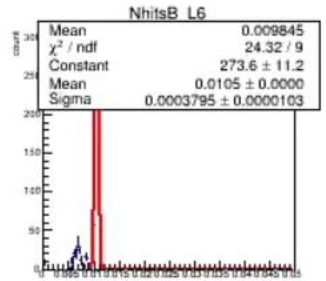


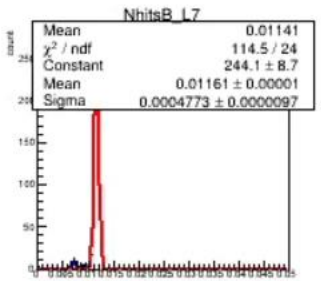


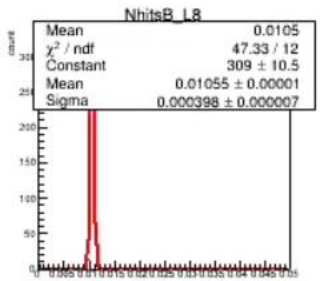


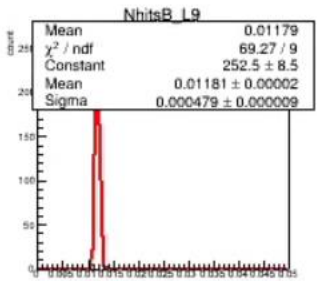


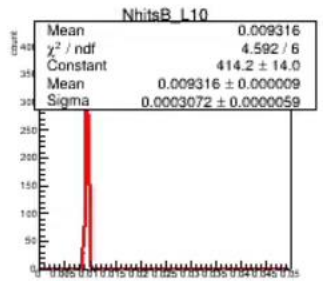


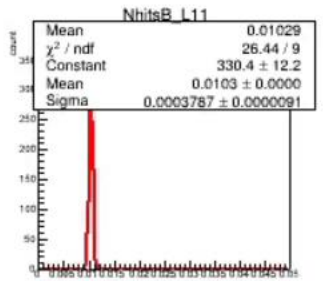


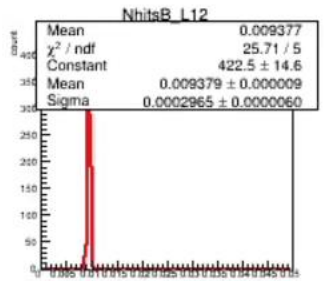


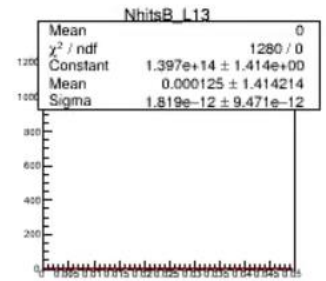












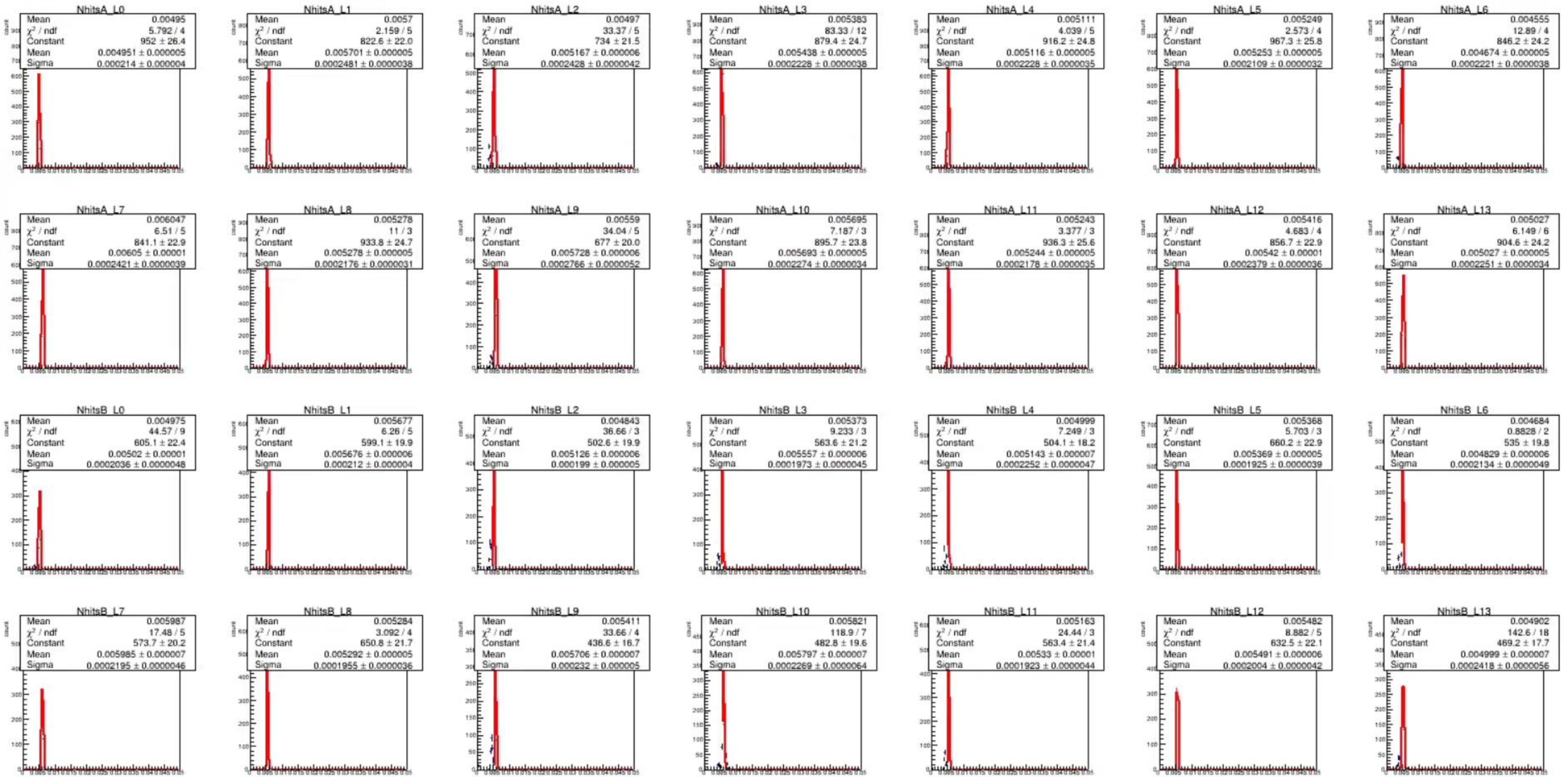
Activities felix4 Mon 01:24

Only BCO peak cut

felix4

Run20869

File Edit View Options Tools Help



Only BCO peak cut

felix5

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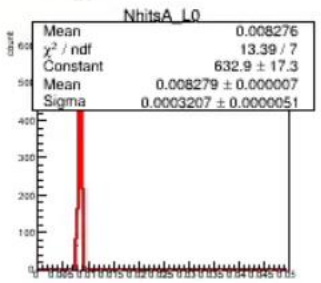
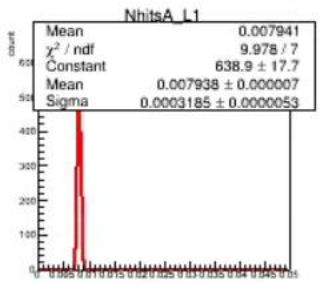
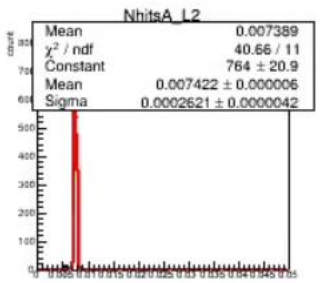
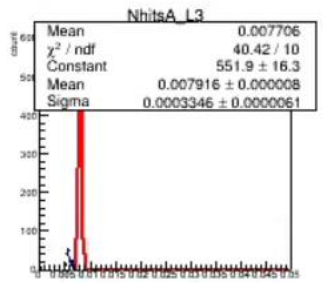
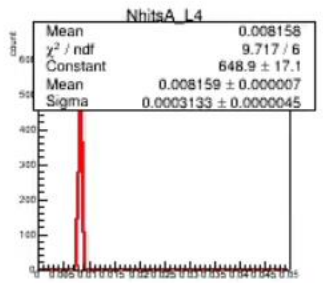
File Edit View Options Tools Help

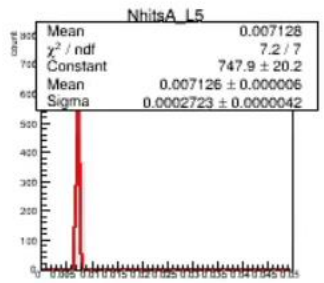


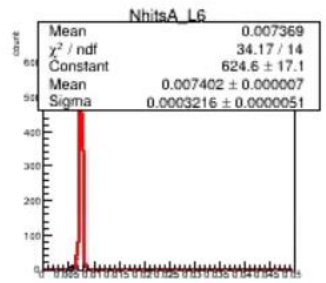


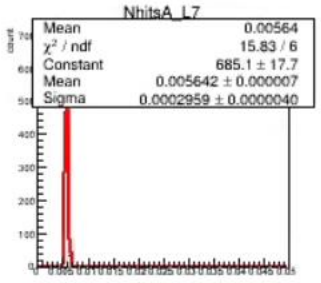


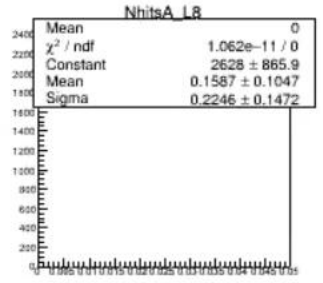


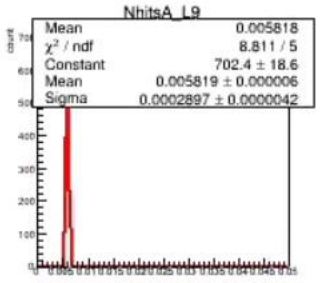


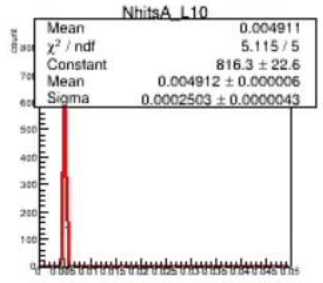


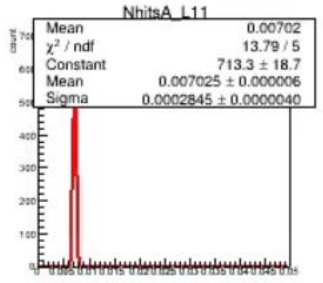


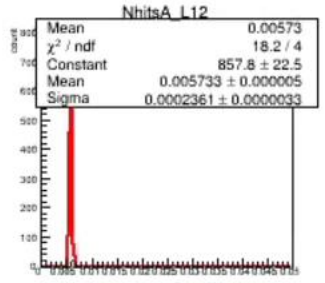


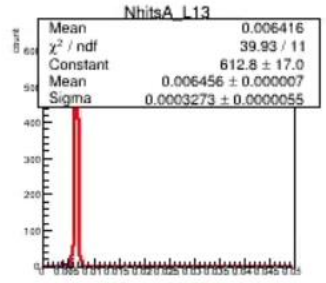


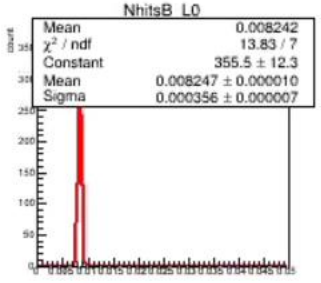


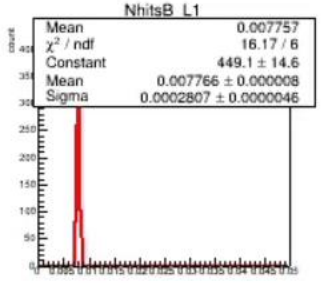


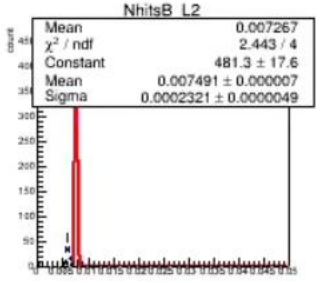


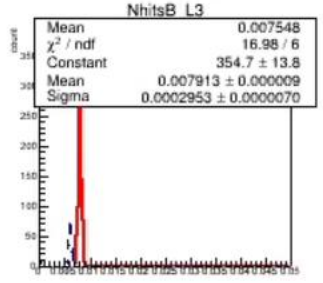


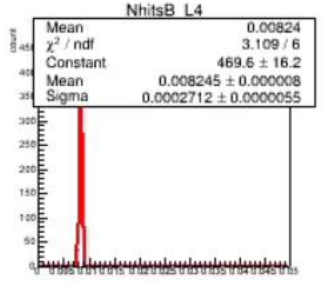


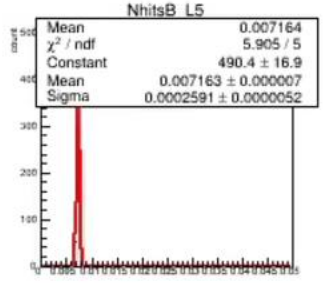


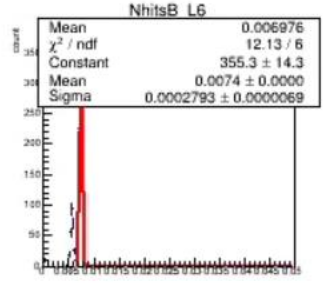


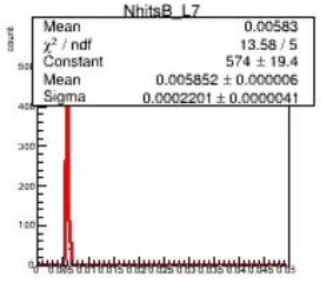


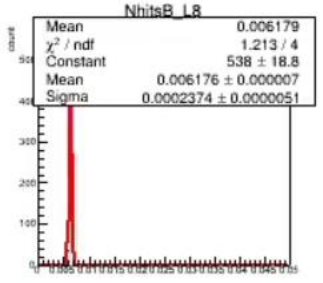


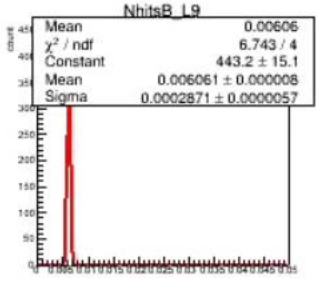


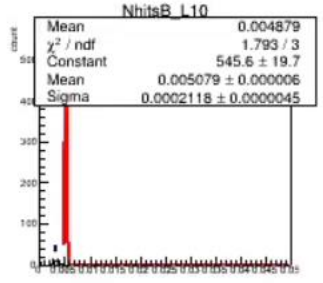


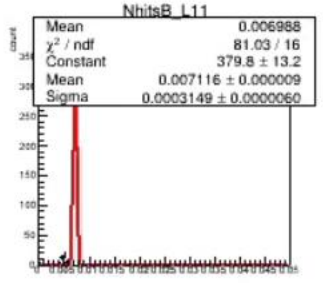


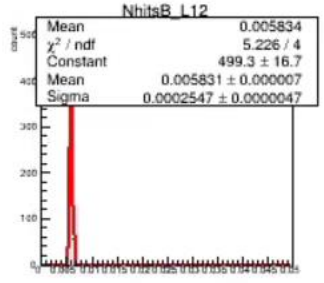


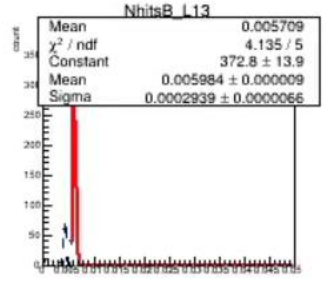










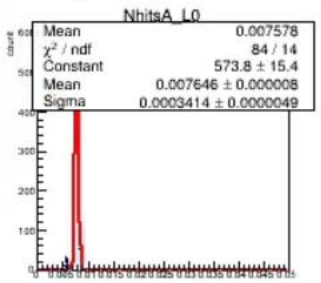


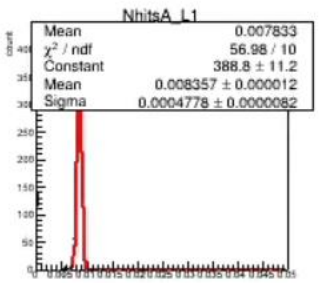
Only BCO peak cut

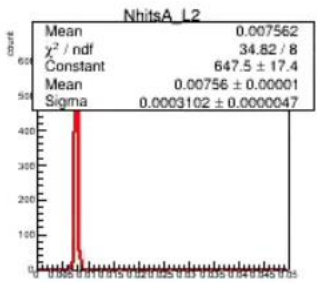
felix6

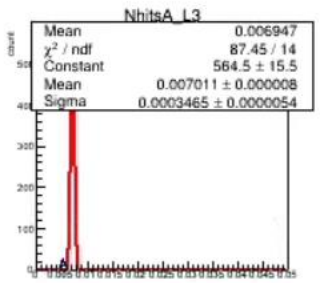
Run20869

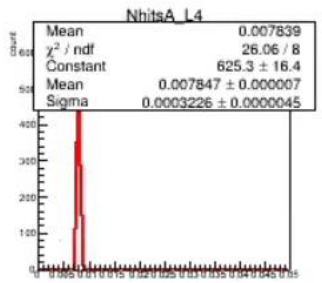
File Edit View Options Tools Help

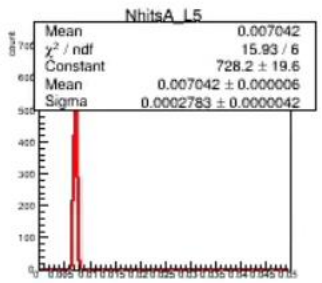


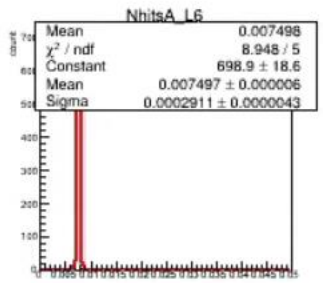


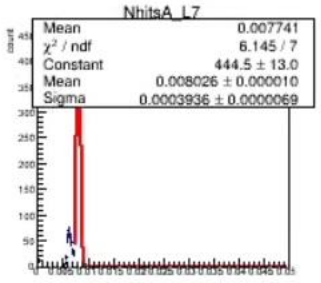


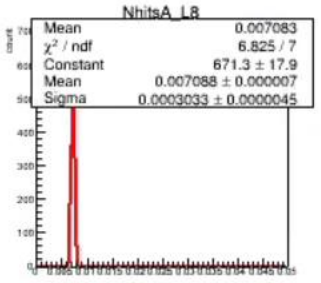


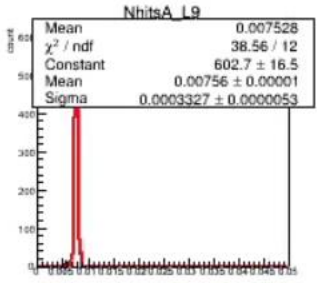


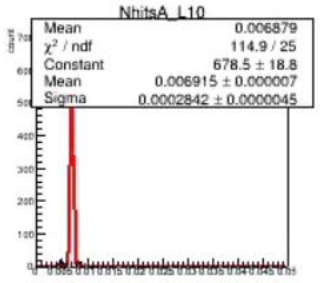


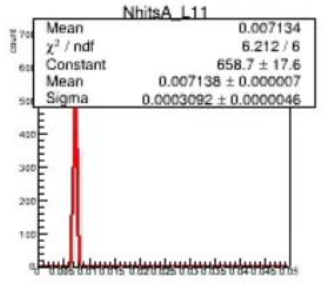


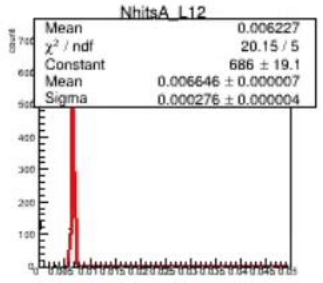


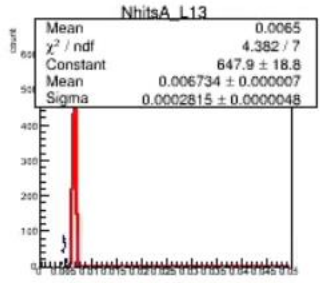


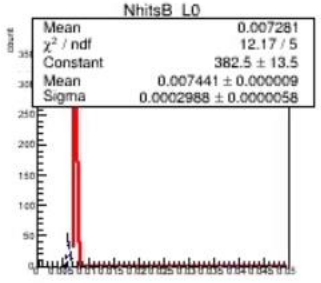


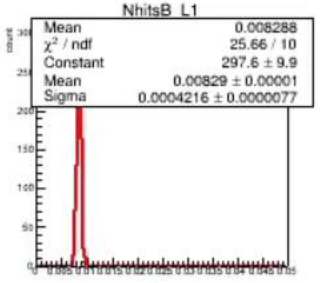


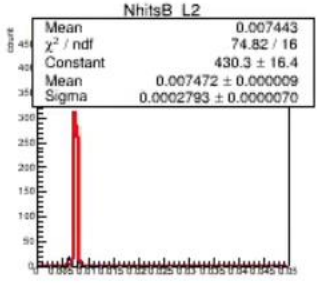


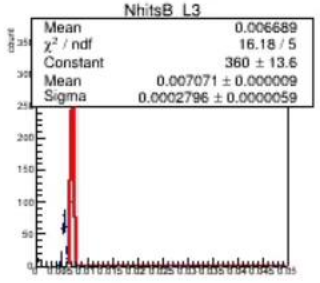


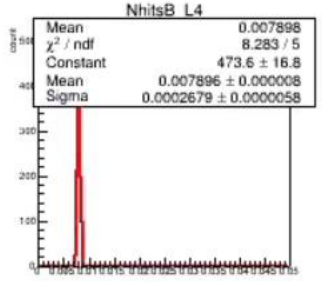


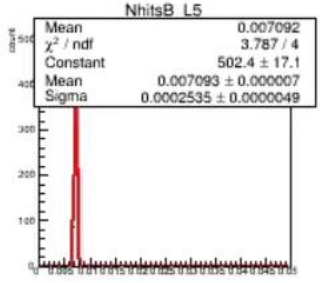


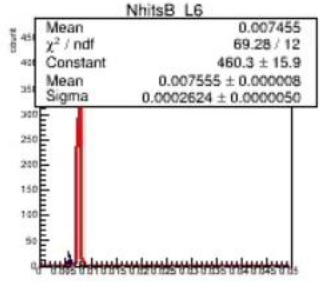


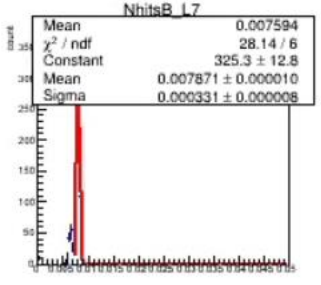


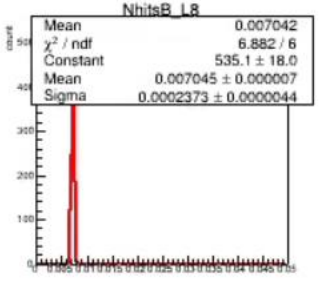


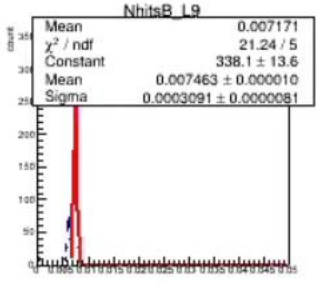


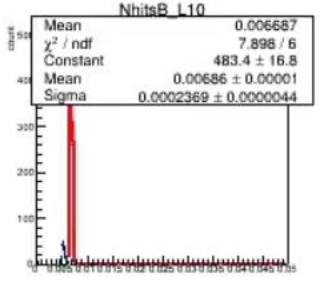


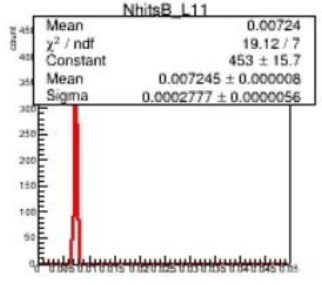


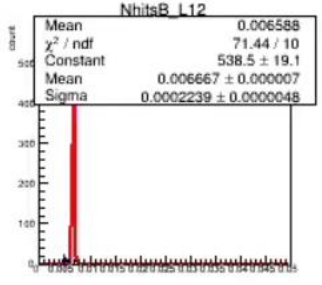


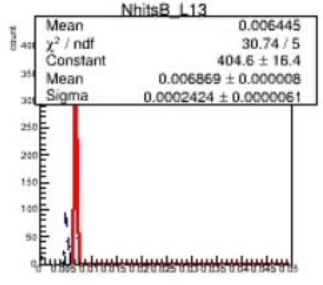












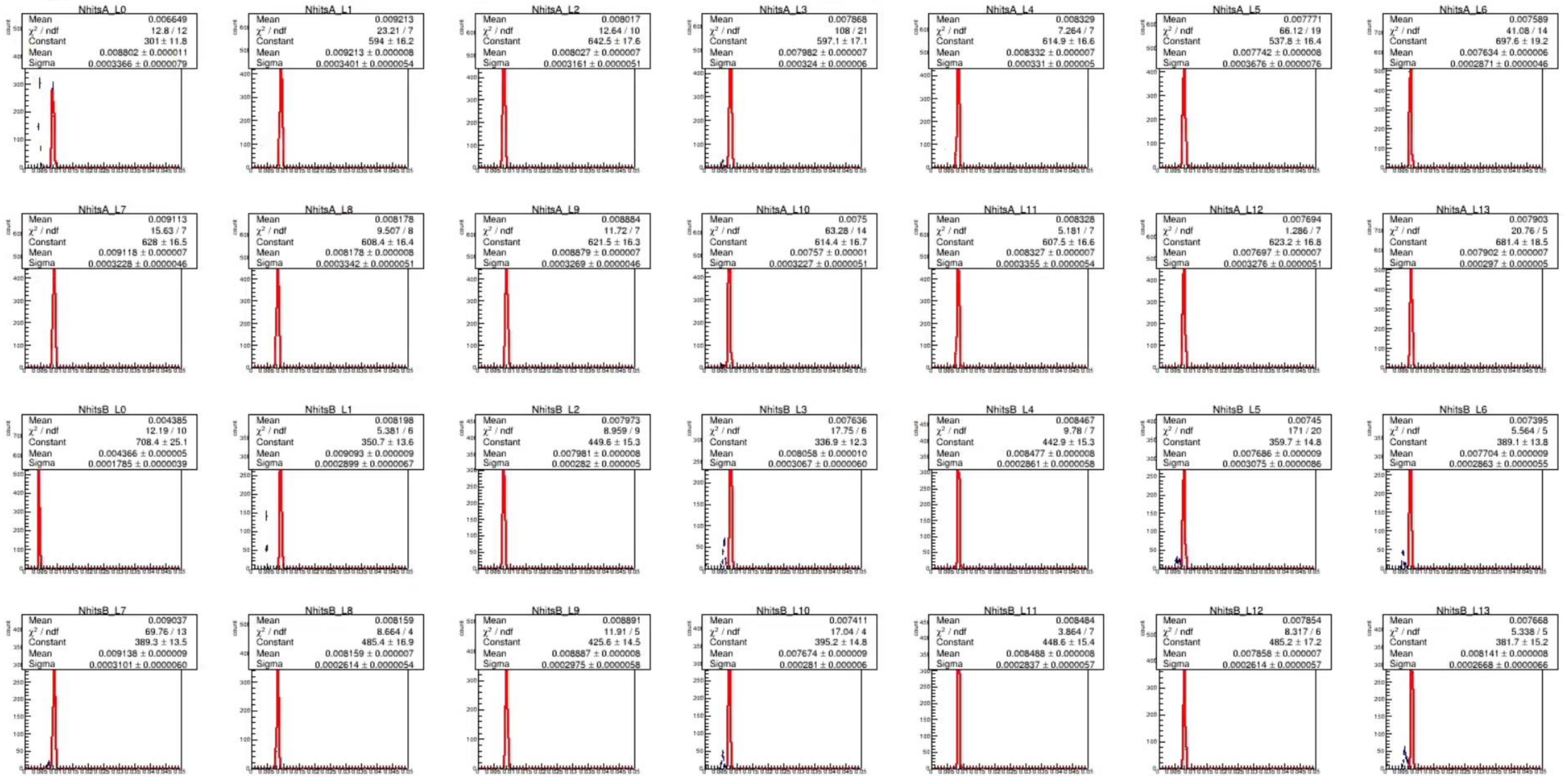
Activities felix7 Mon 01:23

Only BCO peak cut

felix7

Run20869

File Edit View Options Tools Help

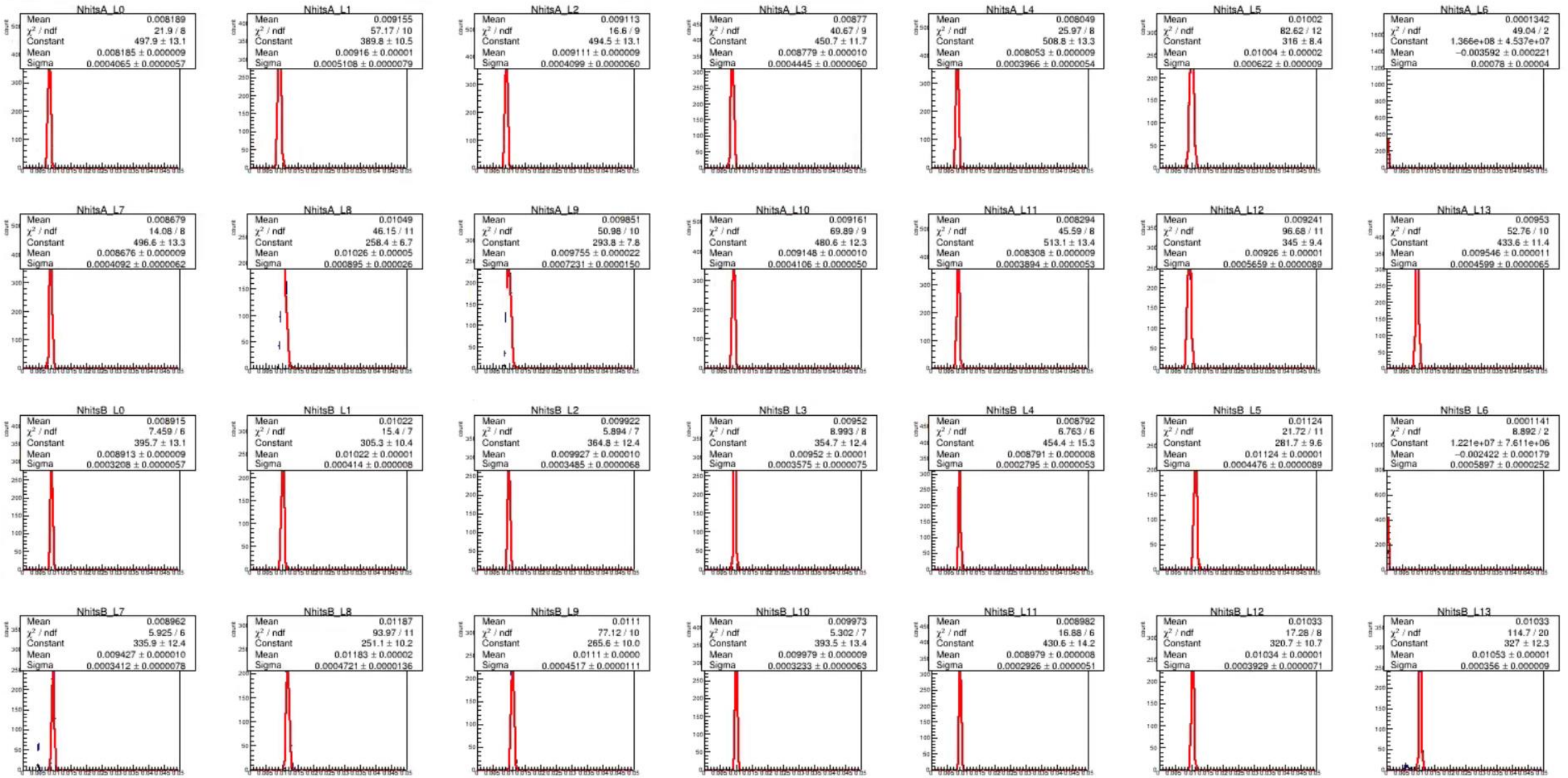


BCO (peak-1) ~ (peak+1) cut

Felix 0～7

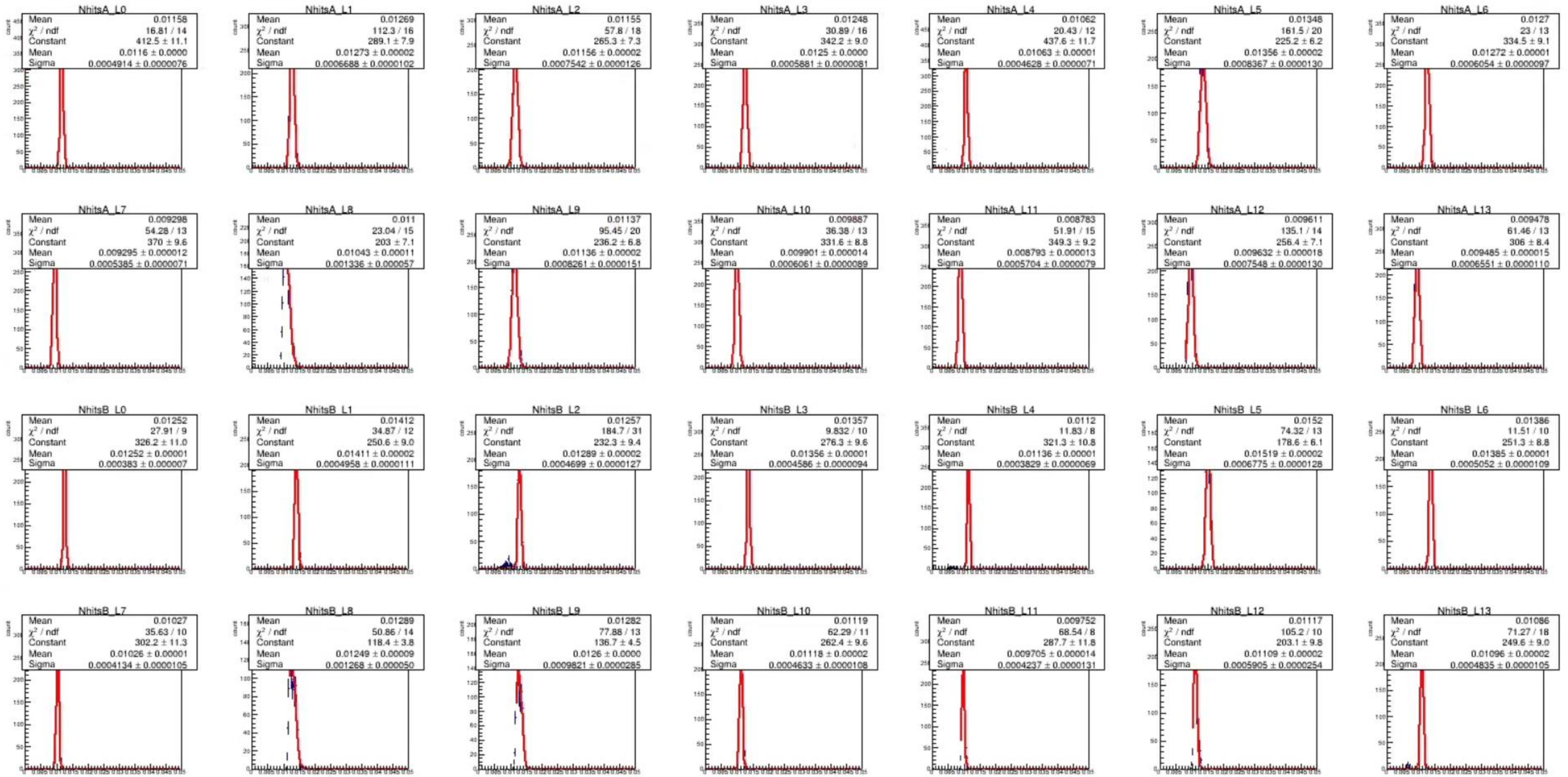
BCO (peak-1)~(peak+1) cut

File Edit View Options Tools Help



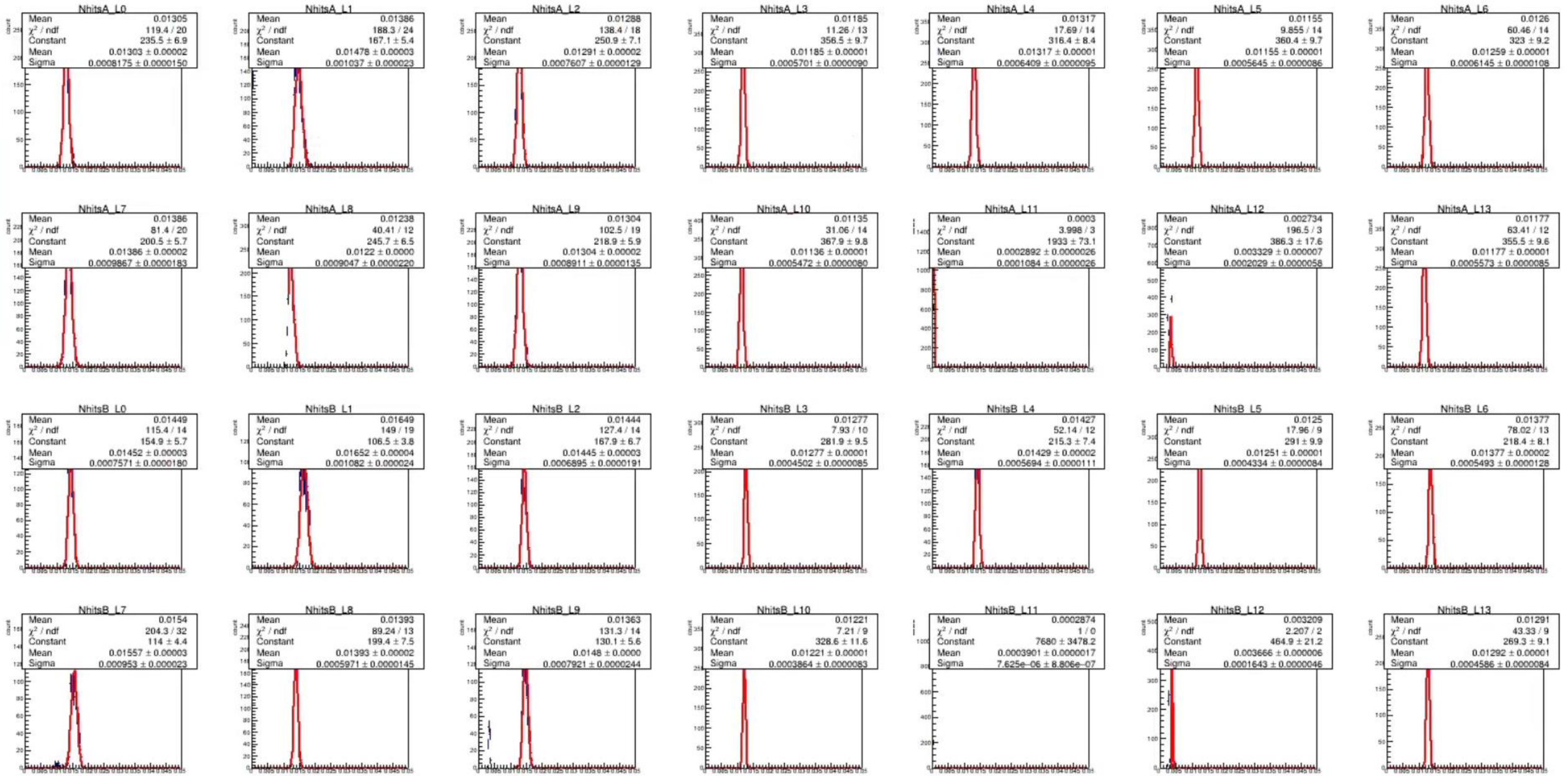
BCO (peak-1)~(peak+1) cut

File Edit View Options Tools Help



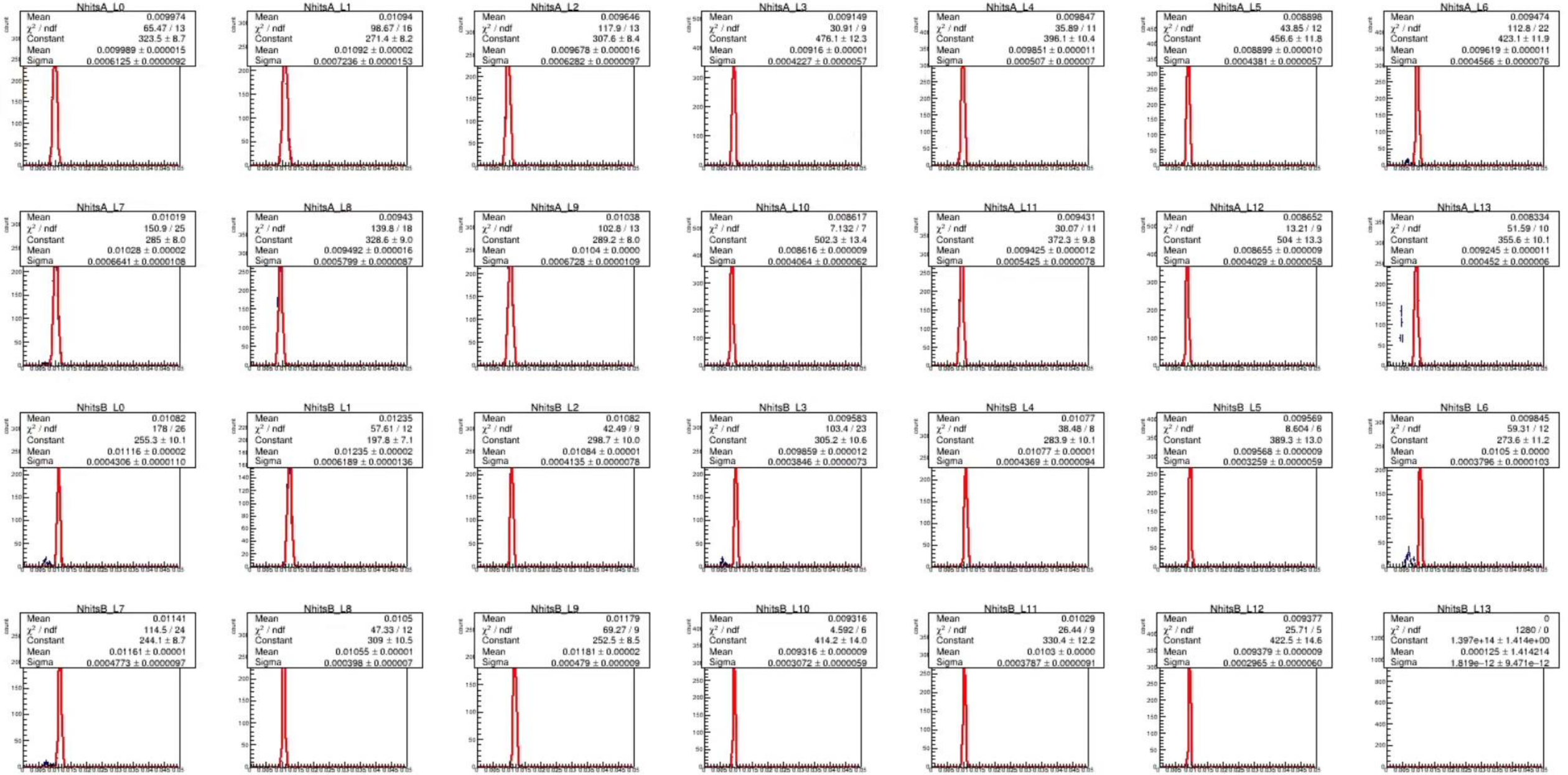
BCO (peak-1)~(peak+1) cut

File Edit View Options Tools Help



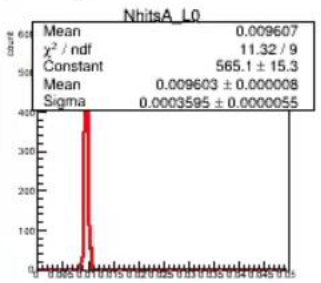
BCO (peak-1)~(peak+1) cut

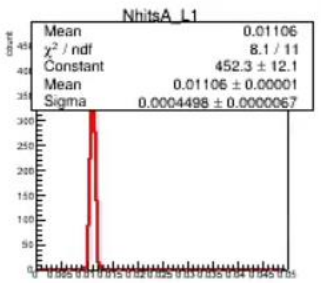
File Edit View Options Tools Help

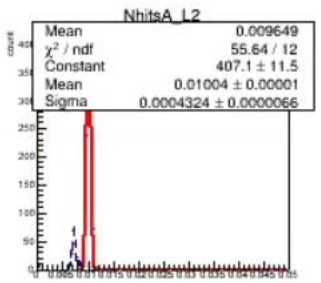


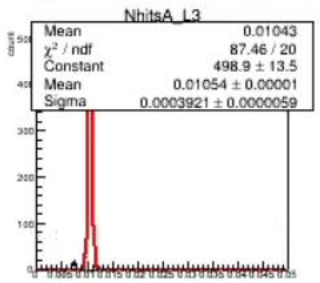
BCO (peak-1)~(peak+1) cut

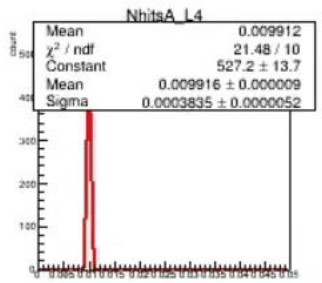
File Edit View Options Tools Help

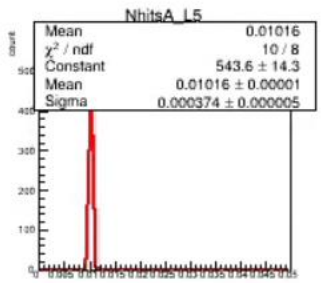


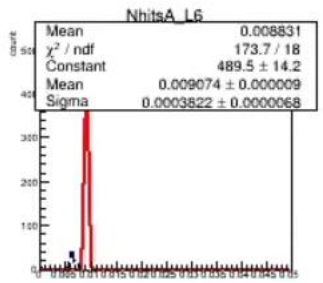


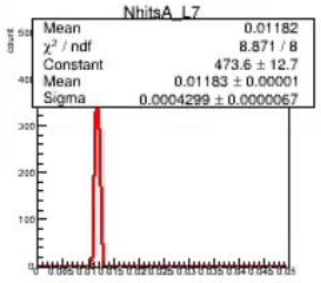


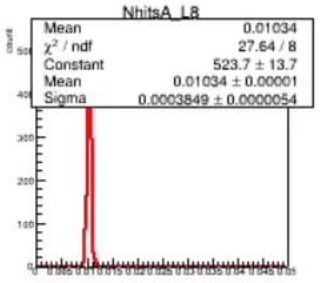


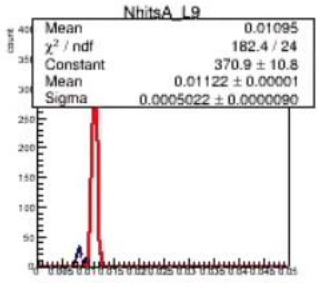


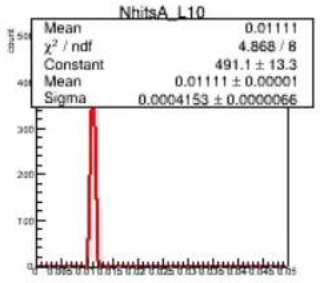


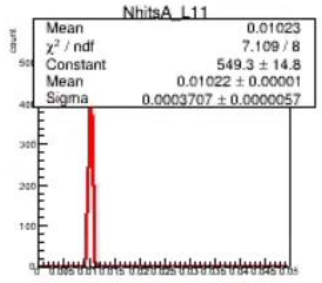


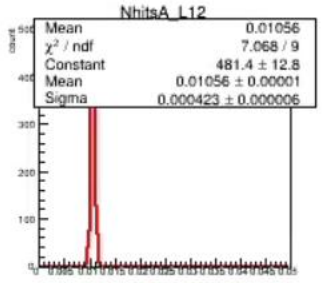


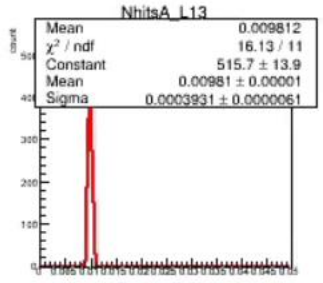


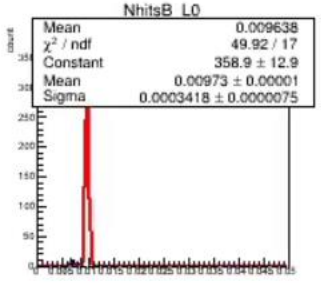


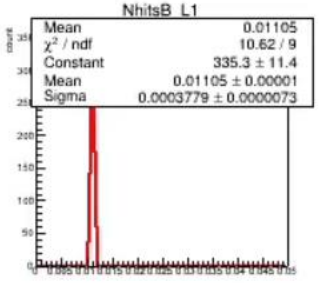


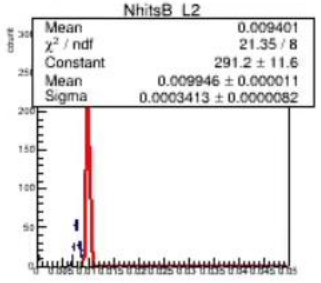


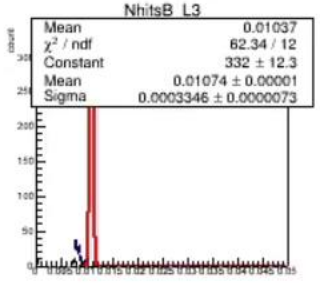


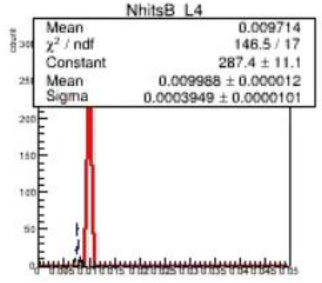


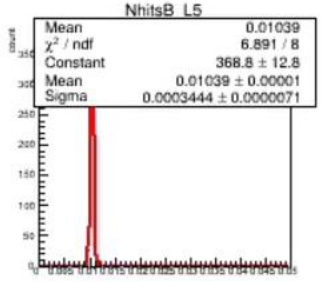


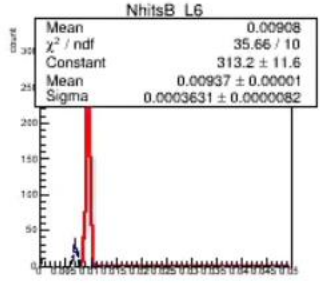


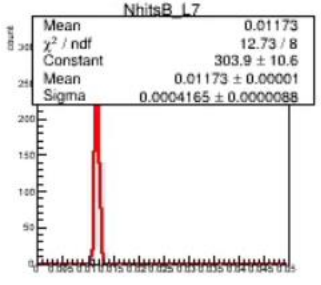


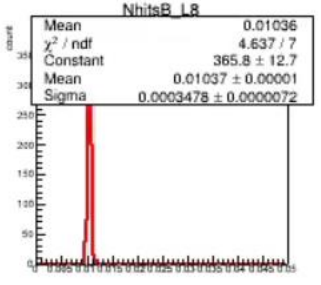


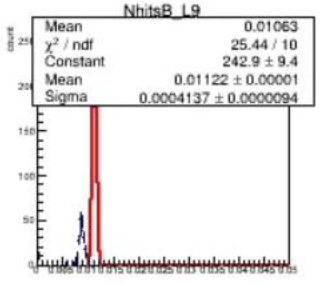


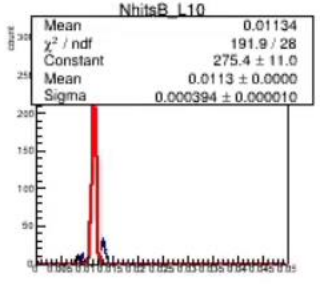


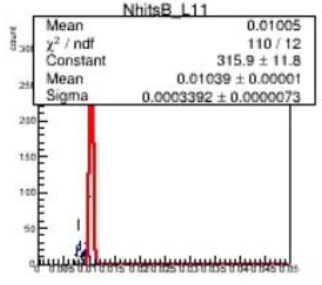


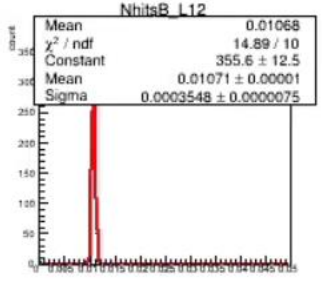


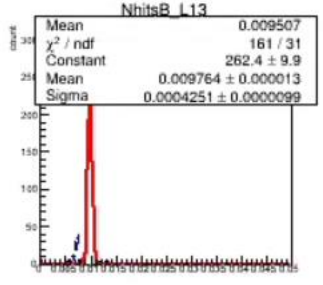












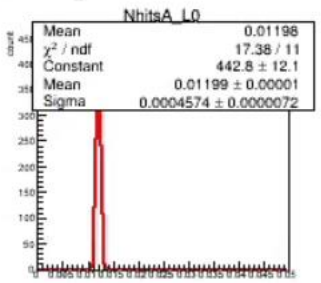
Activities felix5 Mon 01:44

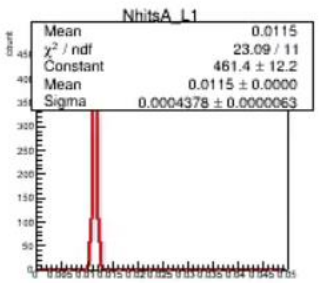
BCO (peak-1)~(peak+1) cut

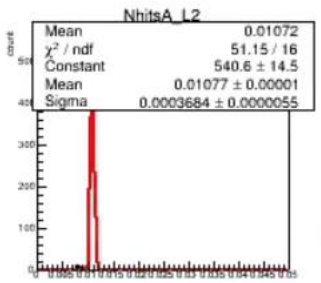
felix5

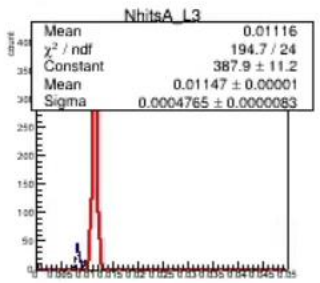
Run20869

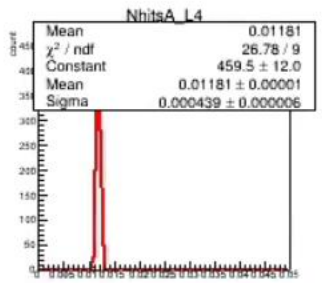
File Edit View Options Tools Help

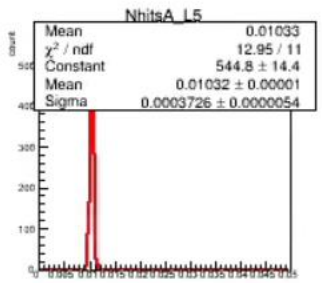


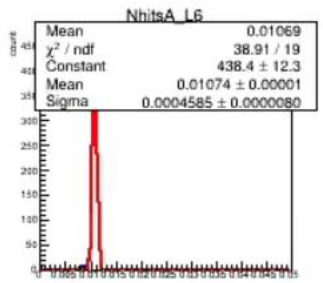


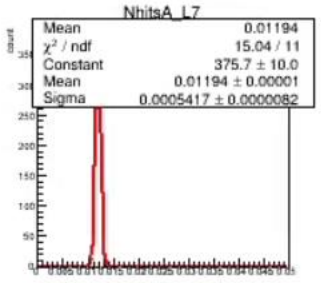


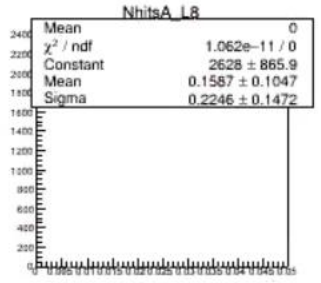


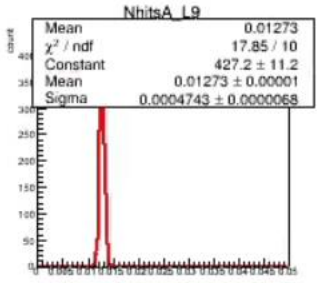


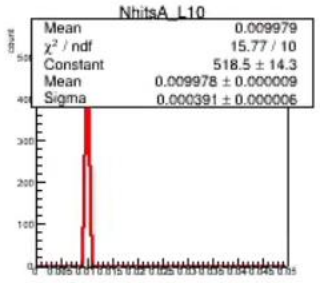


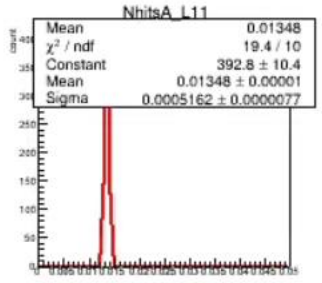


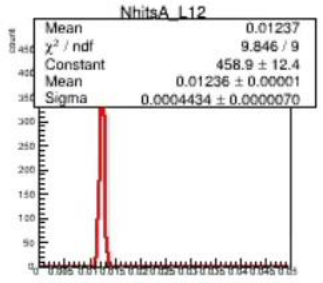


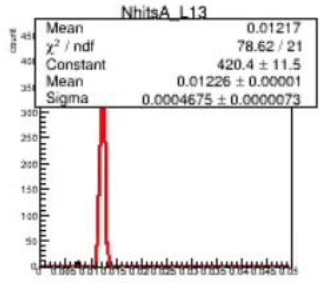


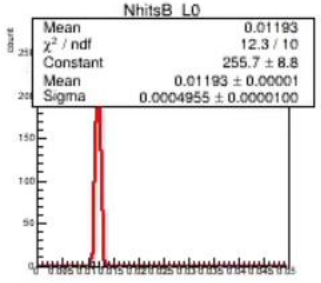


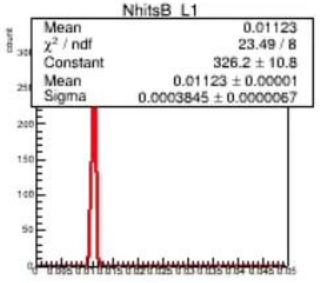


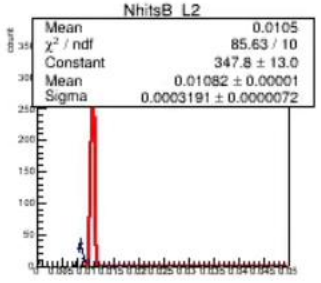


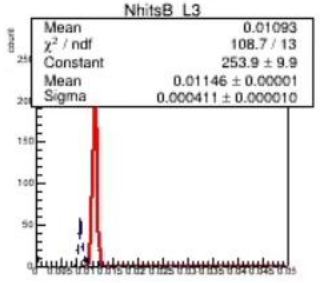


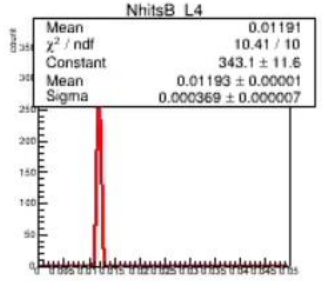


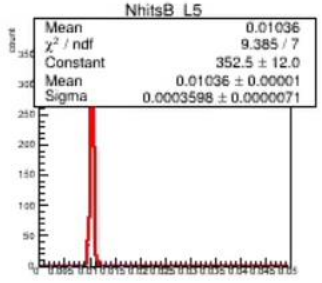


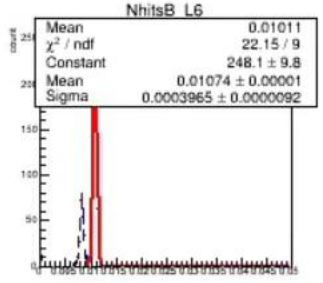


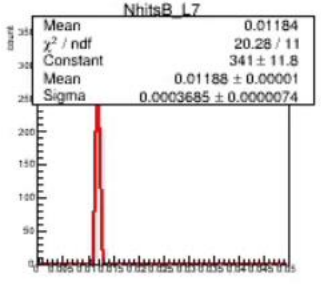


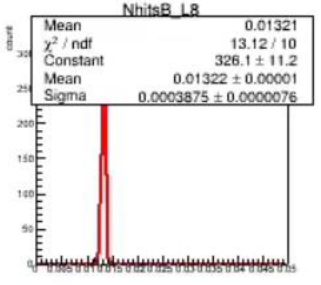


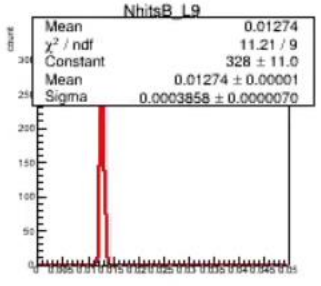


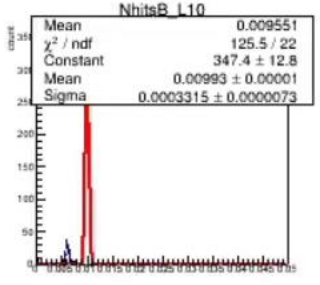


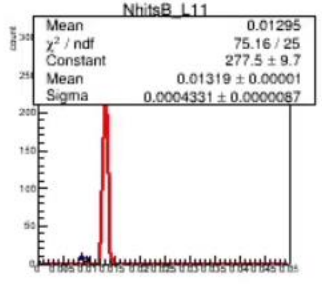


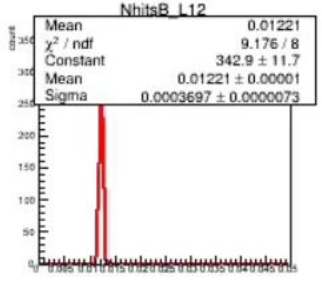


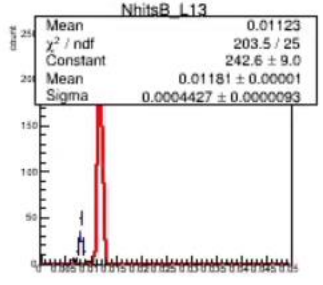












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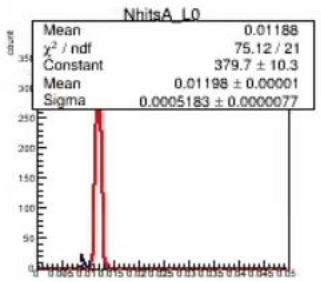

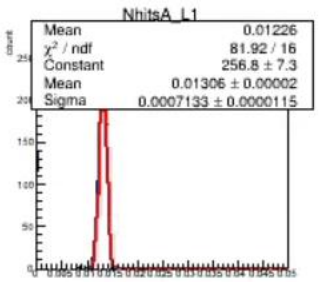

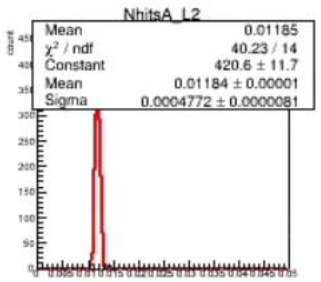

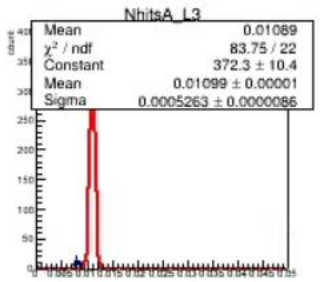

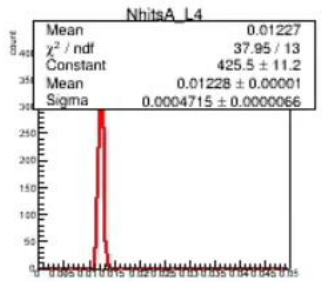

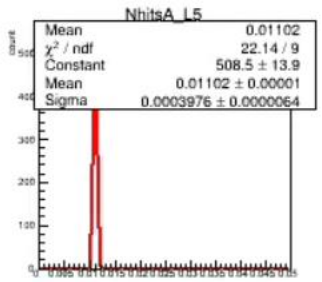

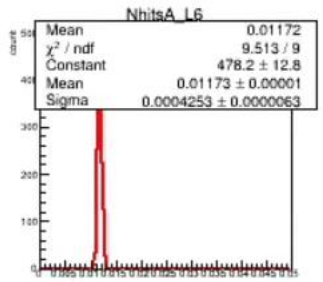

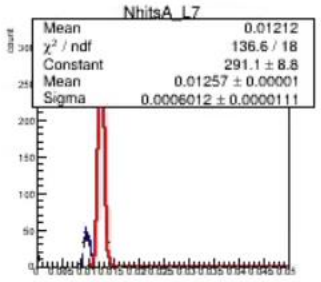

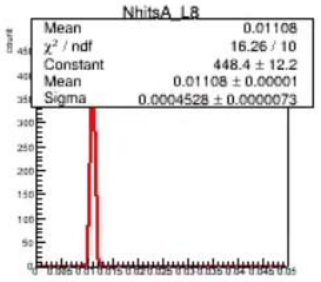

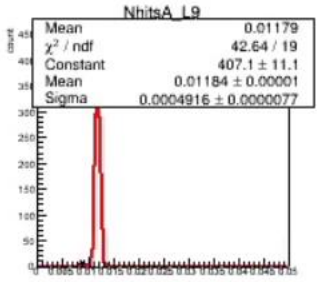

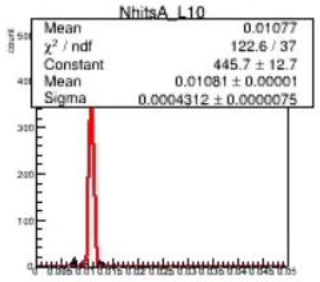

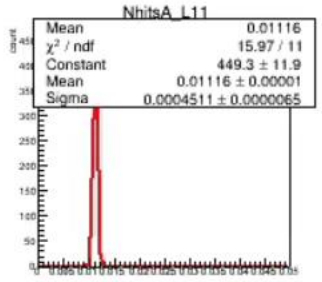

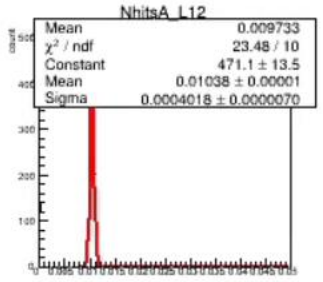

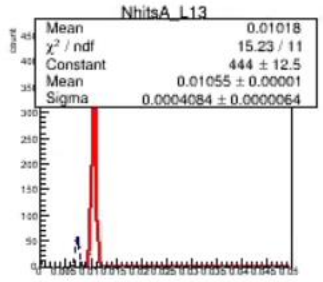

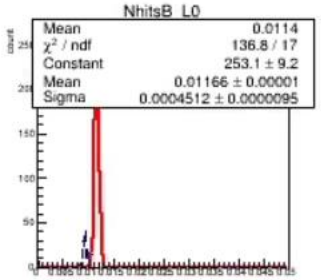

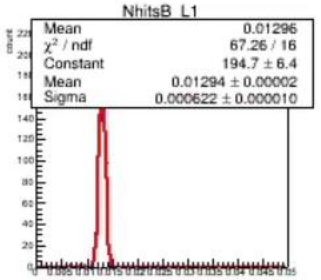

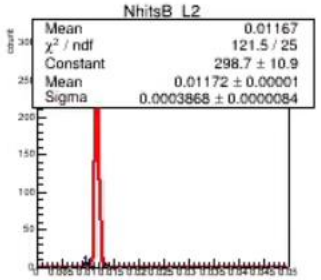

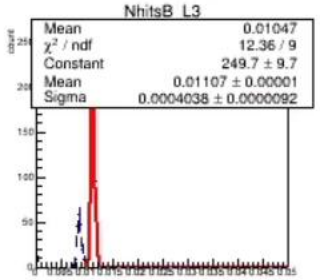

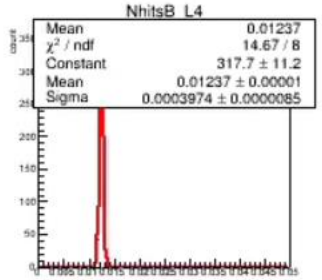

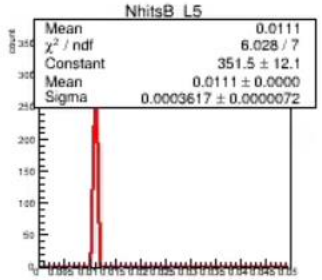

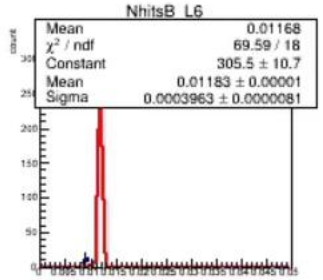

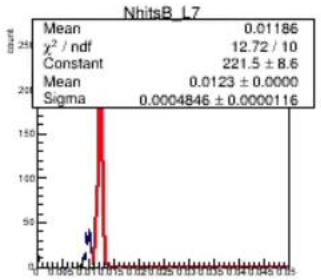

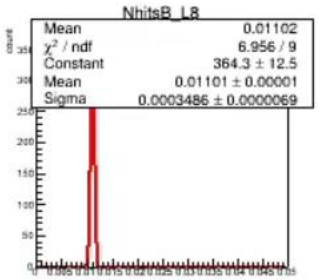

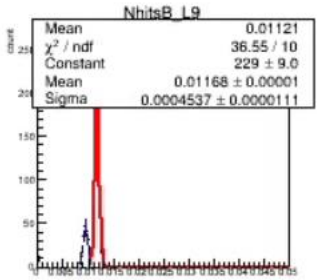

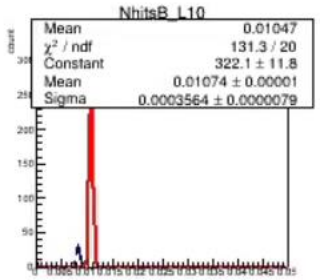

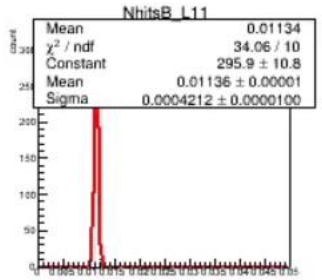

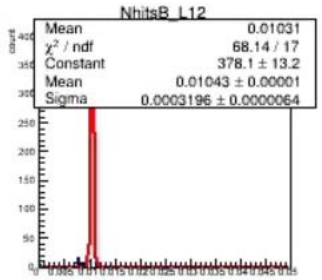

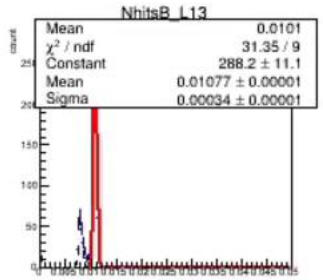

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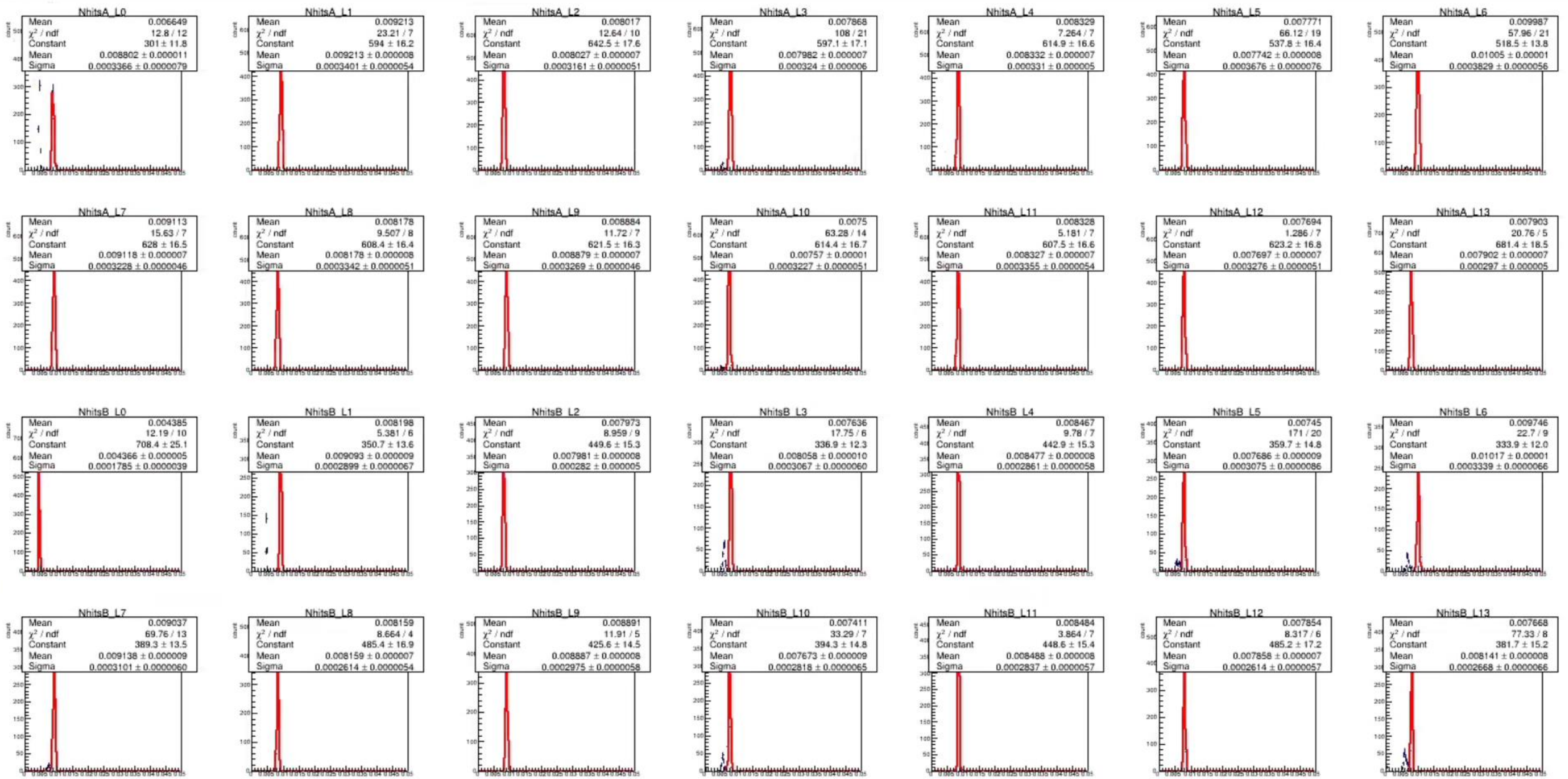
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