Timing scan for Run-25 p+p

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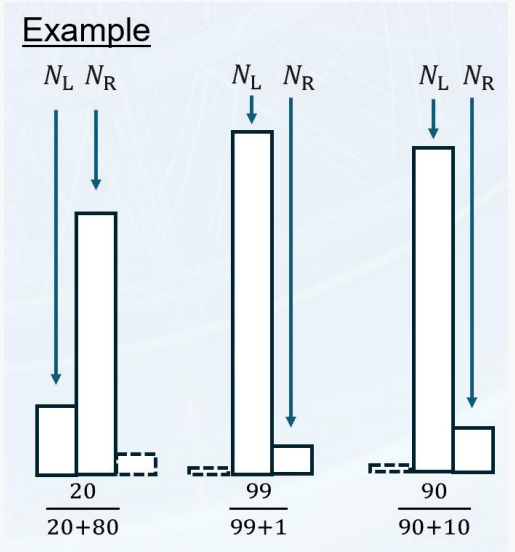
Previous timing scans

- **Definition of evaluation index:**

$$N_L/(N_L+N_R)$$

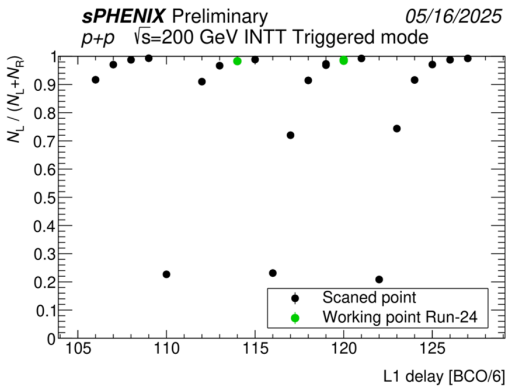
Value ~1 → Sharp peak
Value ~1/2 → Bad
Value ~0 → Also Sharp

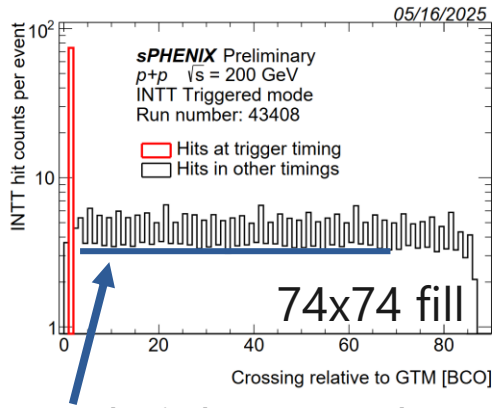


- The highest peak and its higher neighbor are chosen.

This definition was adopted for the clear periodic structure in the summary plot.

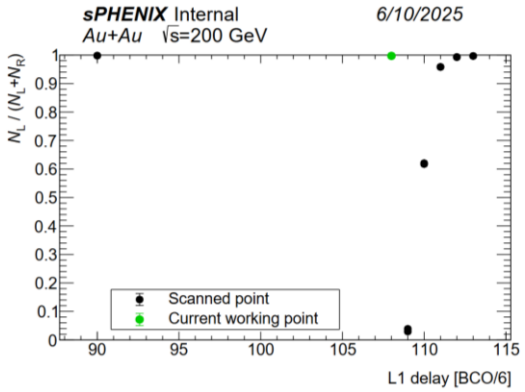
Run-24 p+p

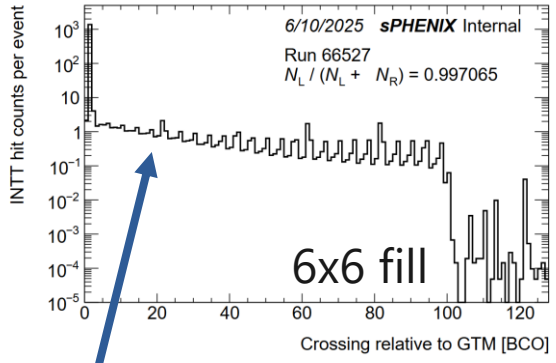




Plateau height was subtracted when calculating the index.

Run-25 Au+Au





Plateau height was **not** subtracted due to a complex plateau.

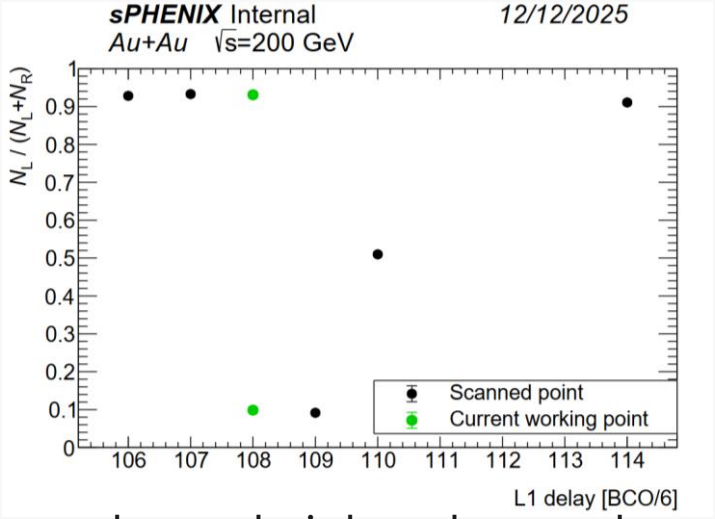
Timing Scan Run summary

111×111 bunches
Trigger mode
p+p

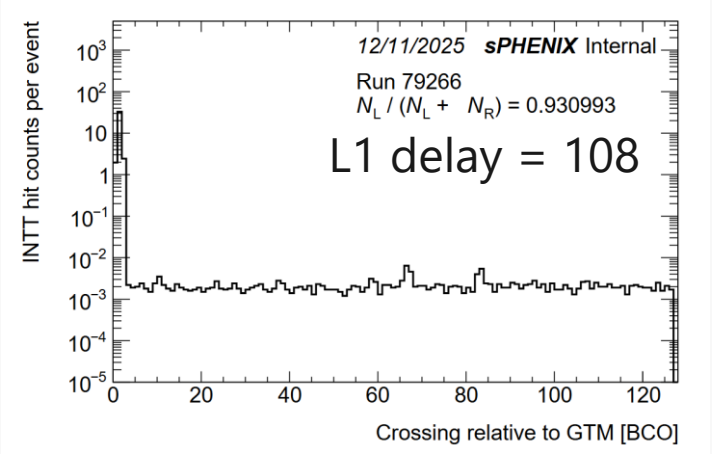
Date/Time	Run#	Run Type	Mag	Link	Duration (min)	Event (RCGUI)	MBD-NS [kHz]	Active Felix List	DAC0	L1 Delay	n_coll	open time
2025/12/11 12:50	79244	beam	On		5min		2kHz	All Felix	35	108	126	127
2025/12//11 13:19	79252	beam	On		5min		2kHz	All Felix	35	114	126	127
2025/12//11 13:58	79261	beam	On		5min		2.4kHz	All Felix	35	109	126	127
2025/12//11 14:32	79263	beam	On		5min		2.5kHz	All Felix	35	110	126	127
2025/12//11 14:19	79264	beam	On		5min		2.5kHz	All Felix	35	106	126	127
2025/12//11 14:46	79265	beam	On		5min		2.5kHz	All Felix	35	107	126	127
2025/12//11 14:21	79266	beam	On		5min		2.5kHz	All Felix	35	108	126	127

Results so far

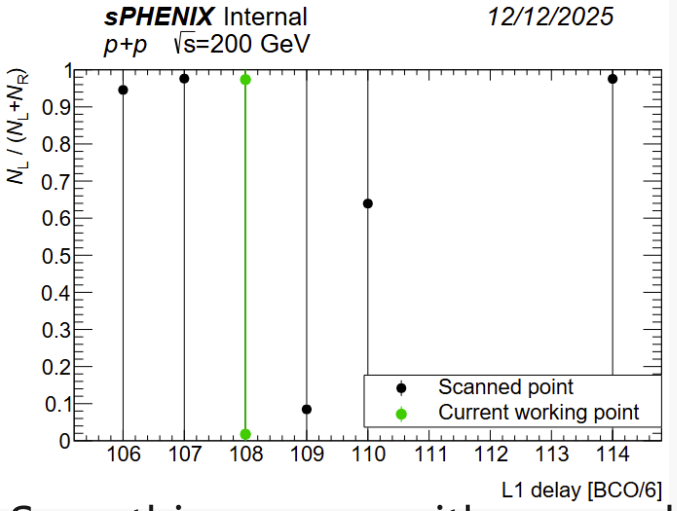
- My module



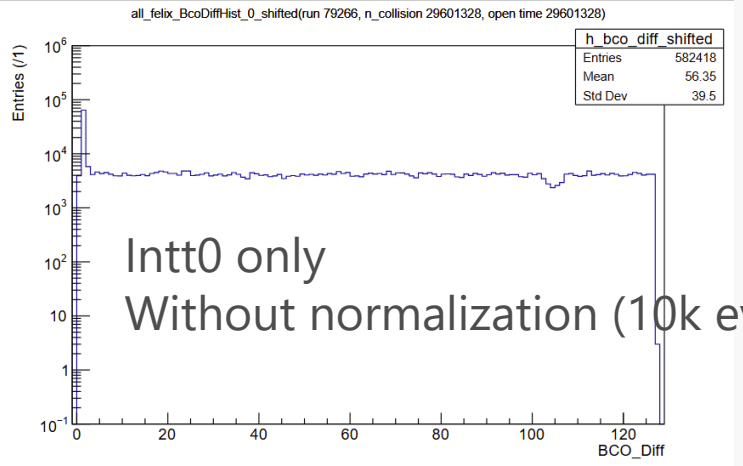
plateau height subtracted.



- Cheng-Wei's module

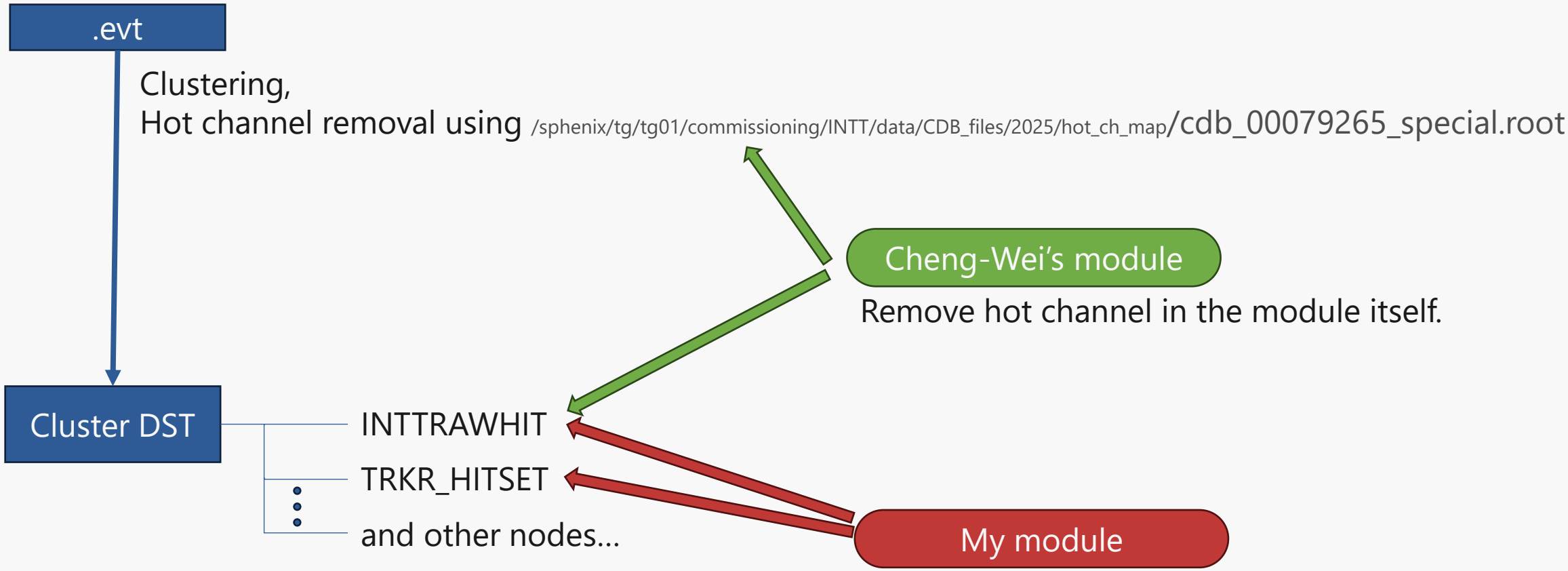


Something wrong with error calculation when subtracting the plateau height



Difference

- **Analysis Flow**

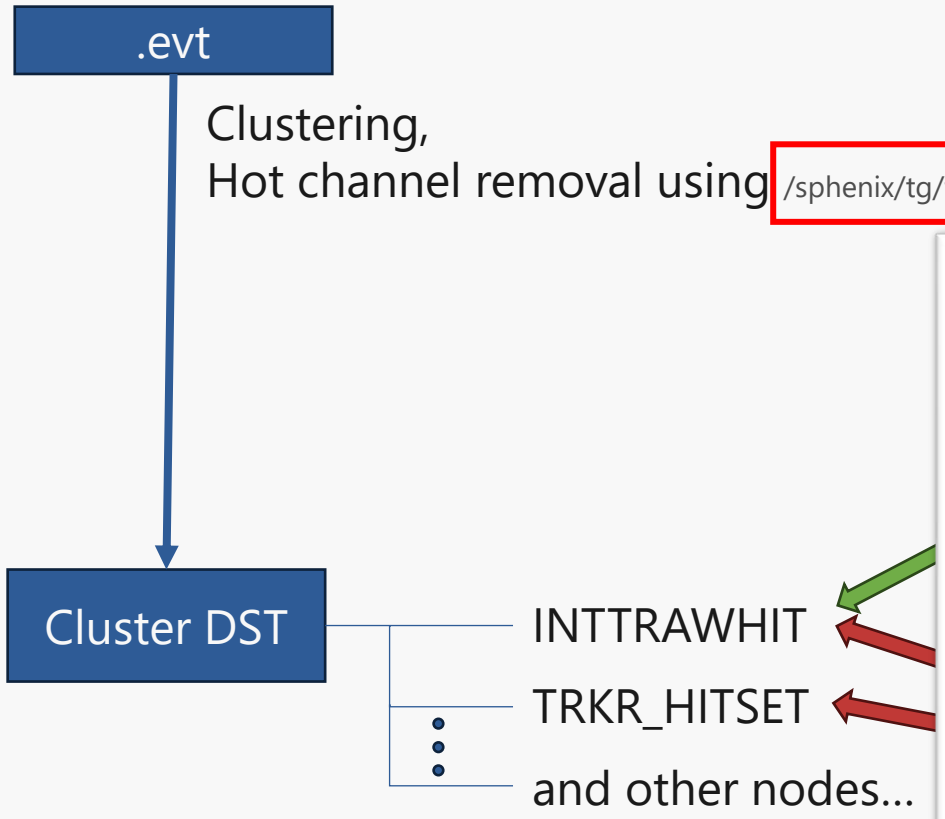


Both module takes the same cluster DST as an input.

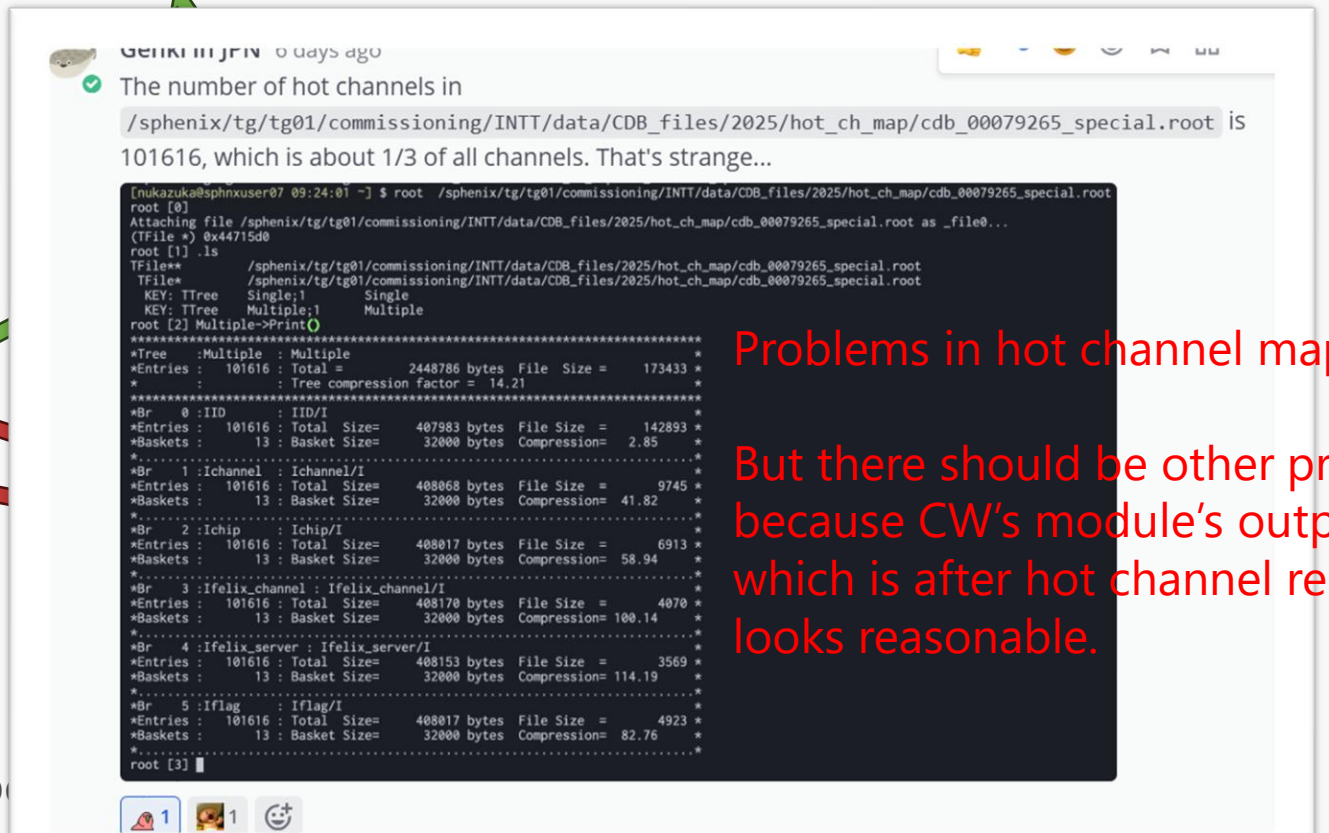
eg. /sphenix/tg/tg01/commissioning/INTT/data/dst_files/2025/DST_beam_intt-00079265_no_hot_special.root

Difference

- **Analysis Flow**



/sphenix/tg/tg01/commissioning/INTT/data/CDB_files/2025/hot_ch_map/cdb_00079265_special.root



Problems in hot channel map???

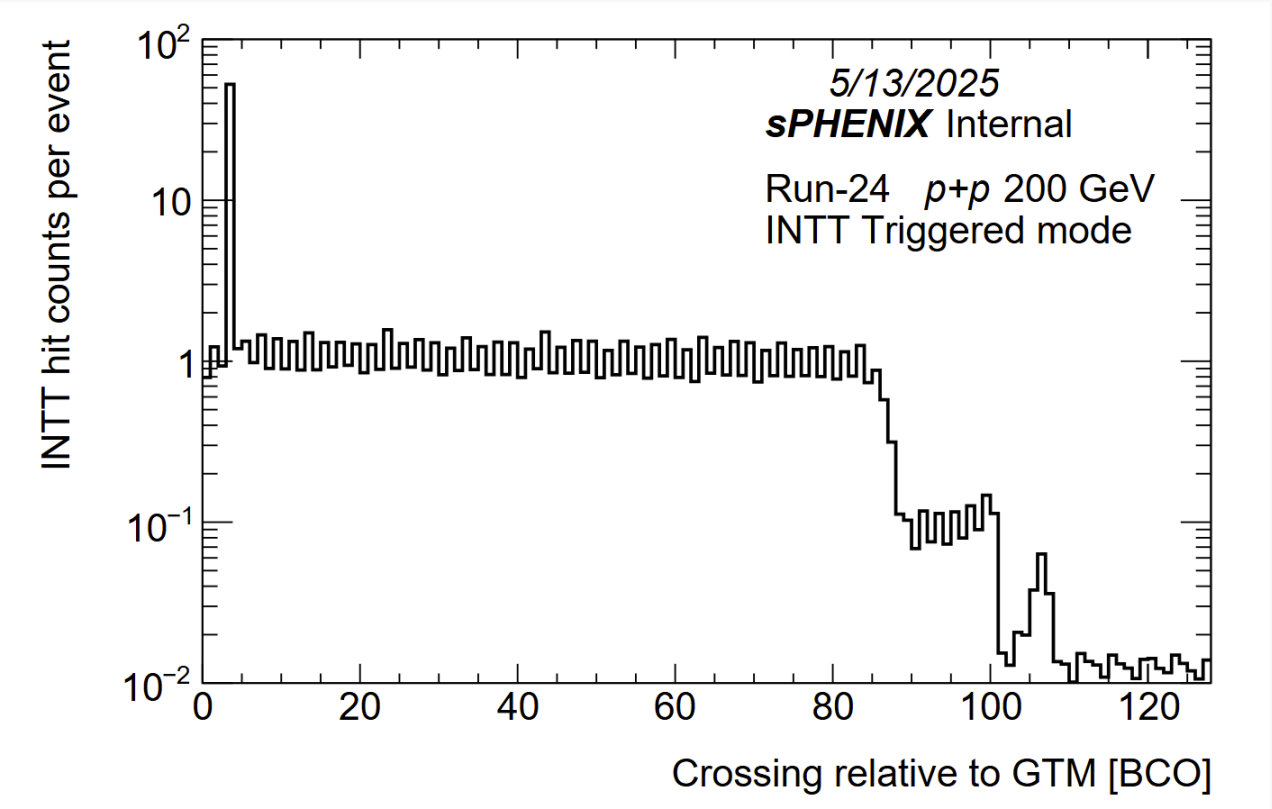
But there should be other problems because CW's module's output, which is after hot channel removal, looks reasonable.

eg. /sphenix/tg/tg01/commissioning/INTT/data/dst_files/2025/DST_beam_intt-00079265_no_hotsp

Comparison with last year

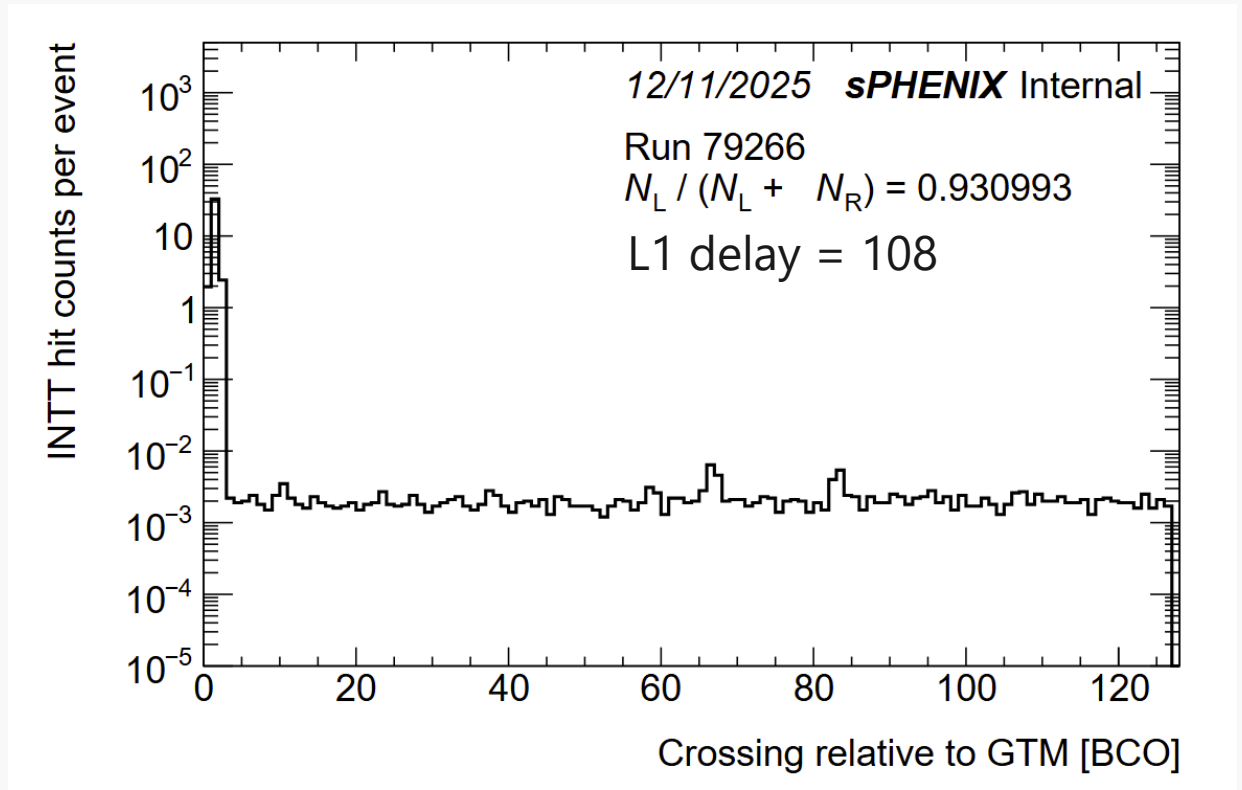
Both produced with my module

Run-24 p+p



n_collision = 100
open_time = 60

Run-25 p+p
(cluster)



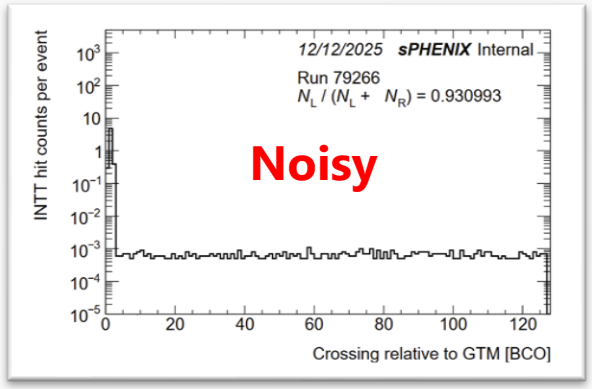
n_collision = 126
open_time = 127

Why is the peak broad?

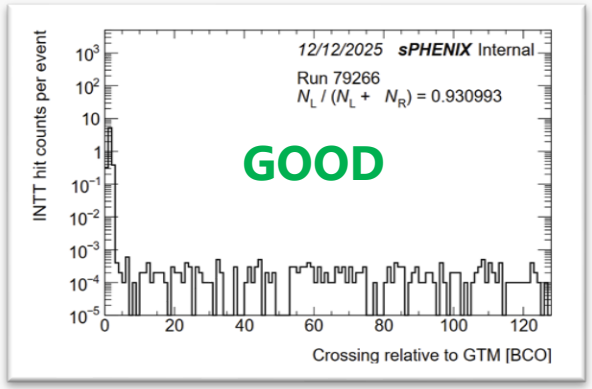
- Because of felix-by-felix misalignment? → No.

run 79266 (L1 delay=108)

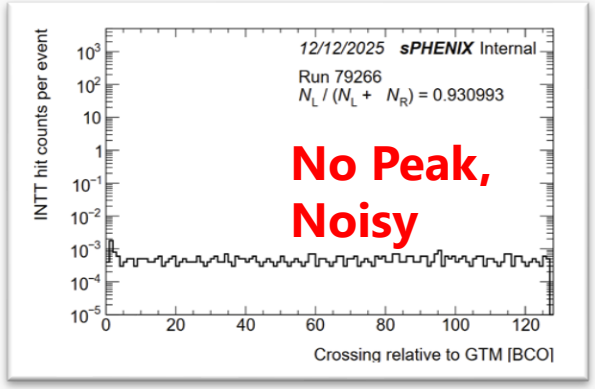
Intt 4



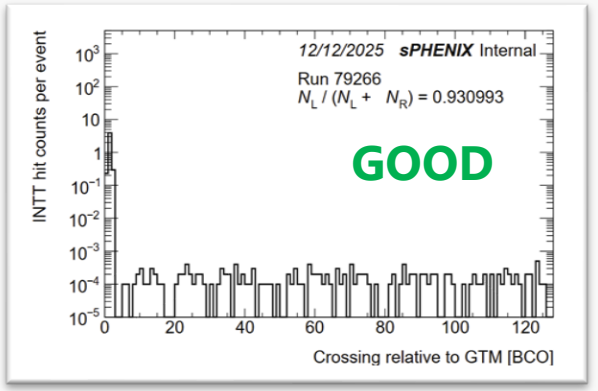
Intt 5



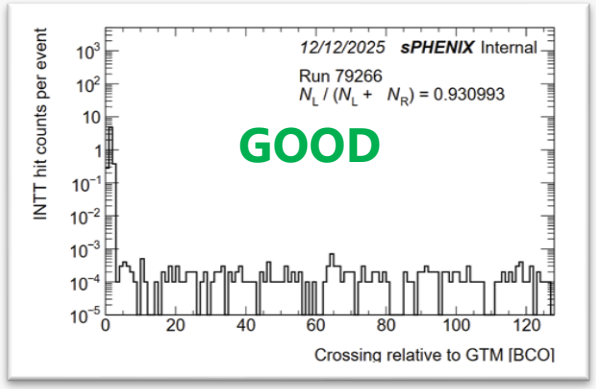
Intt 6



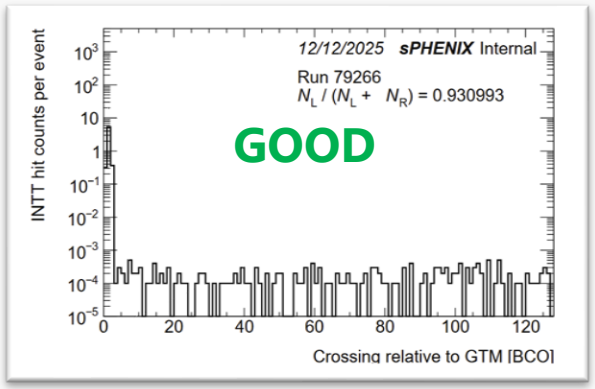
Intt 7



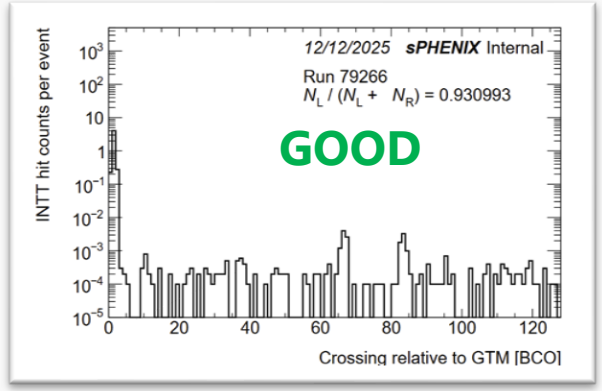
Intt 0



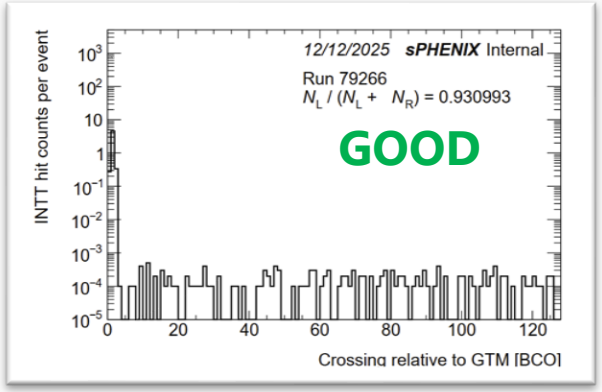
Intt 1



Intt 2



Intt 3

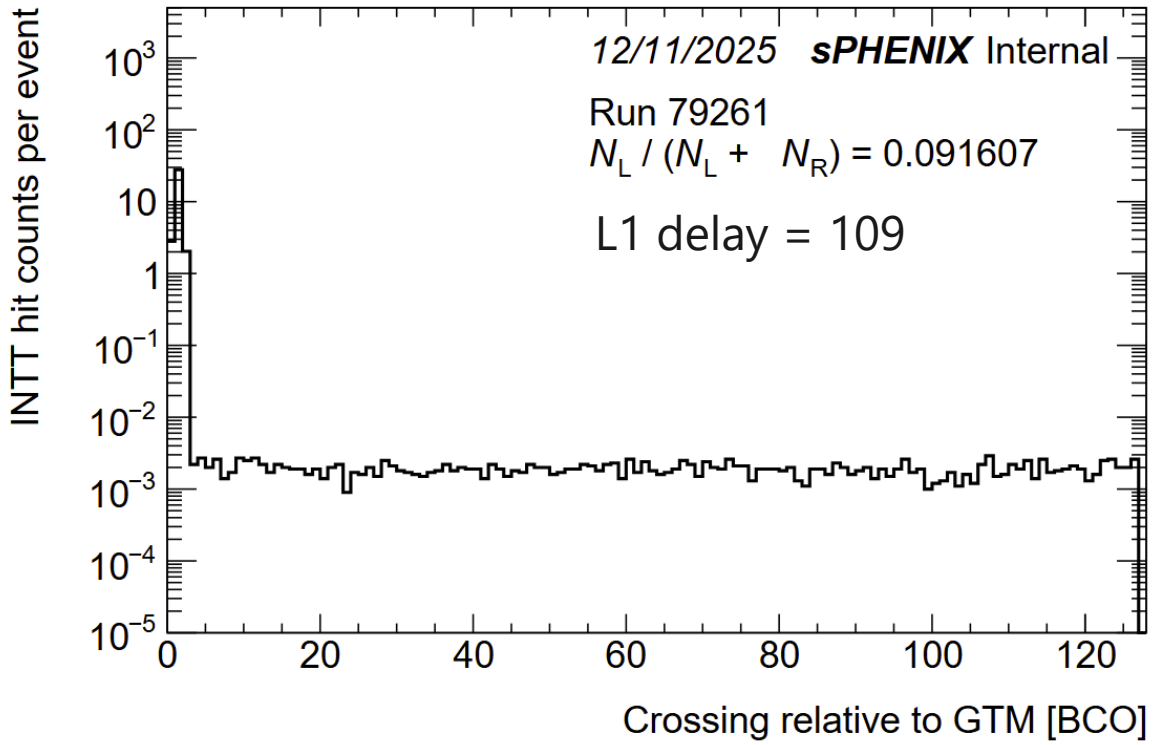


*** Even the GOOD ones does not show as sharp peak as that of Run-24**

Why is the peak broad?

- **No idea, but something is definitely wrong with cluster information.**

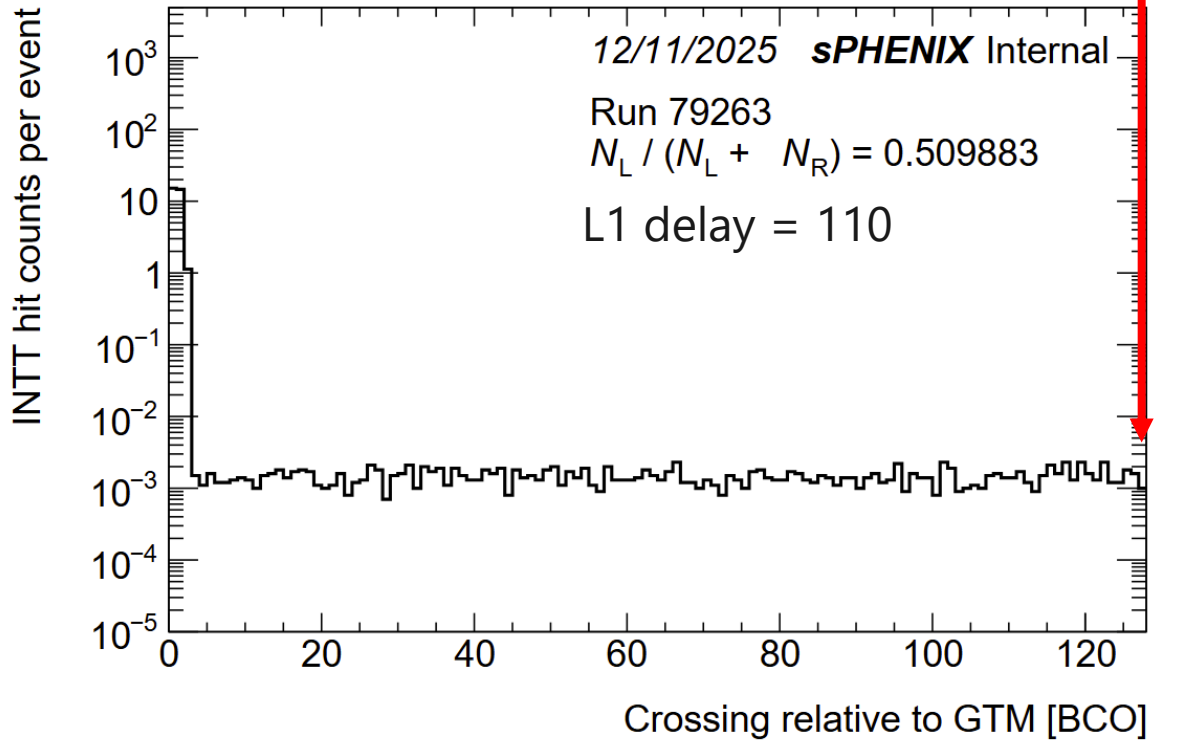
Good example (cluster)



n_collision = 126
open_time = 127

Bad run (cluster)

The last bin should be empty, as n_collision=126

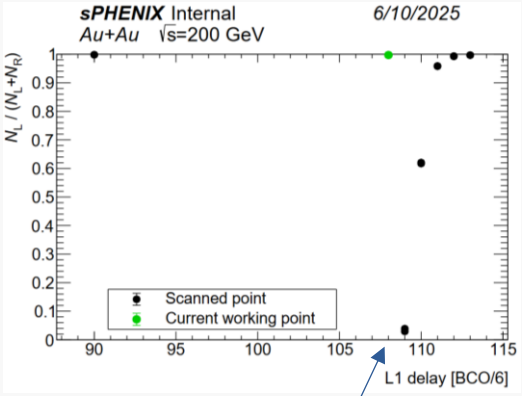


n_collision = 126
open_time = 127

What is the optimal value?

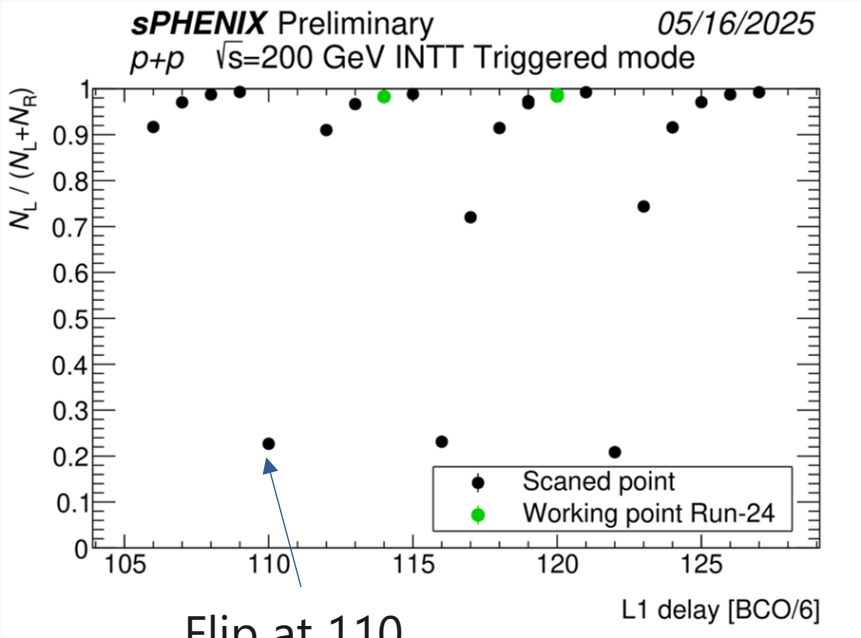
- Current working point: 108
- It may be next to the “flipping point”. 107 might be safe?

Run-25 Au+Au



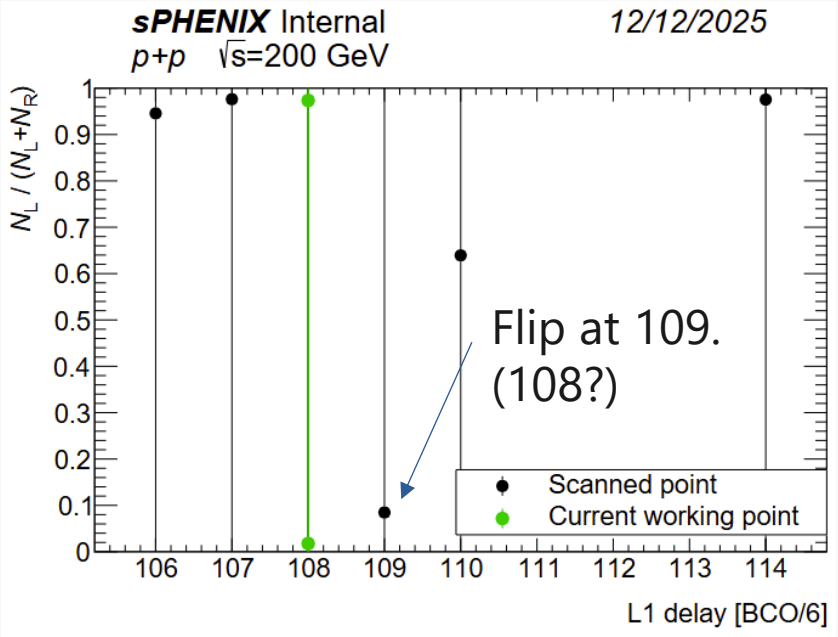
The flip at 109 was already seen in Au+Au.

Run-24 p+p



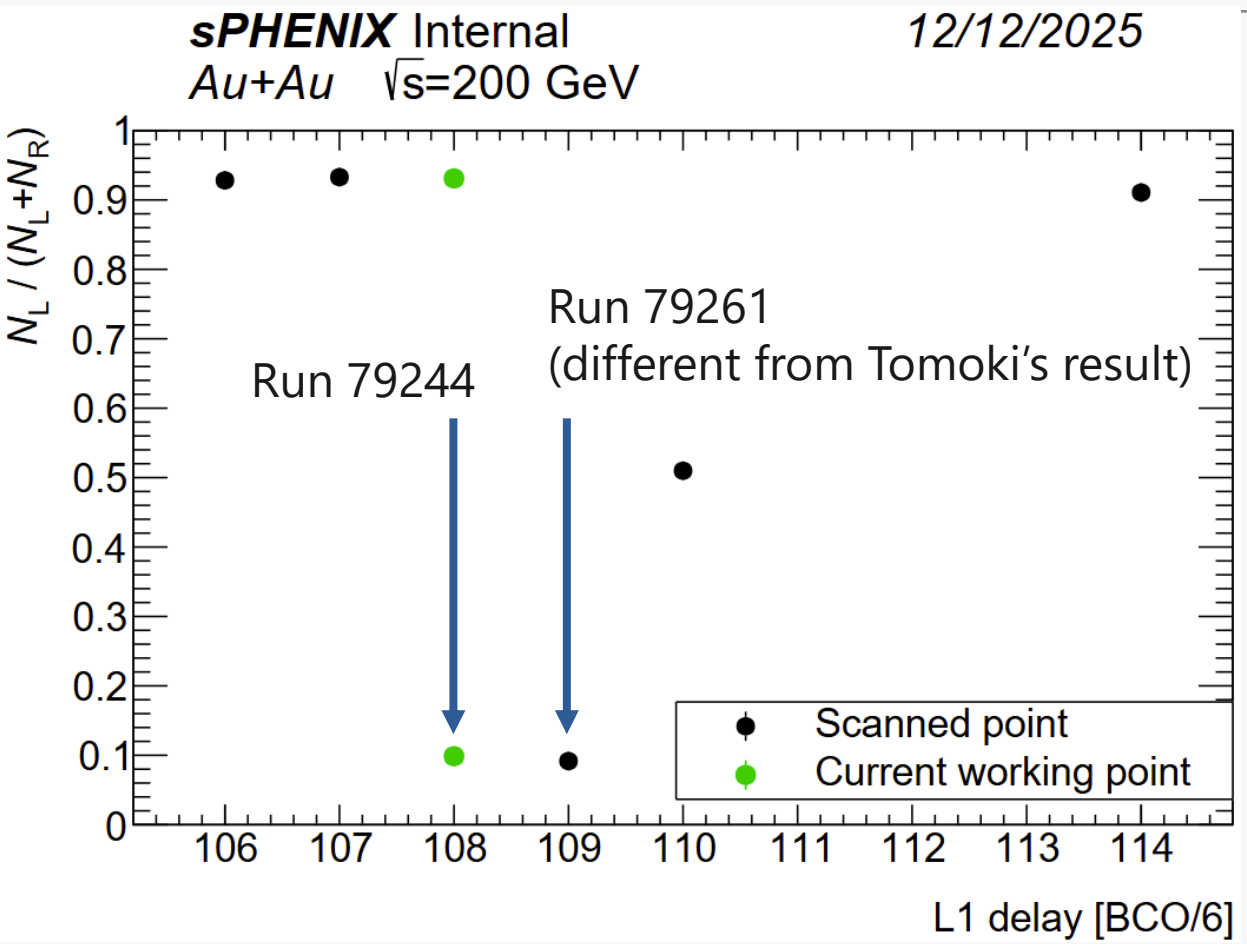
Flip at 110.

Run-25 p+p

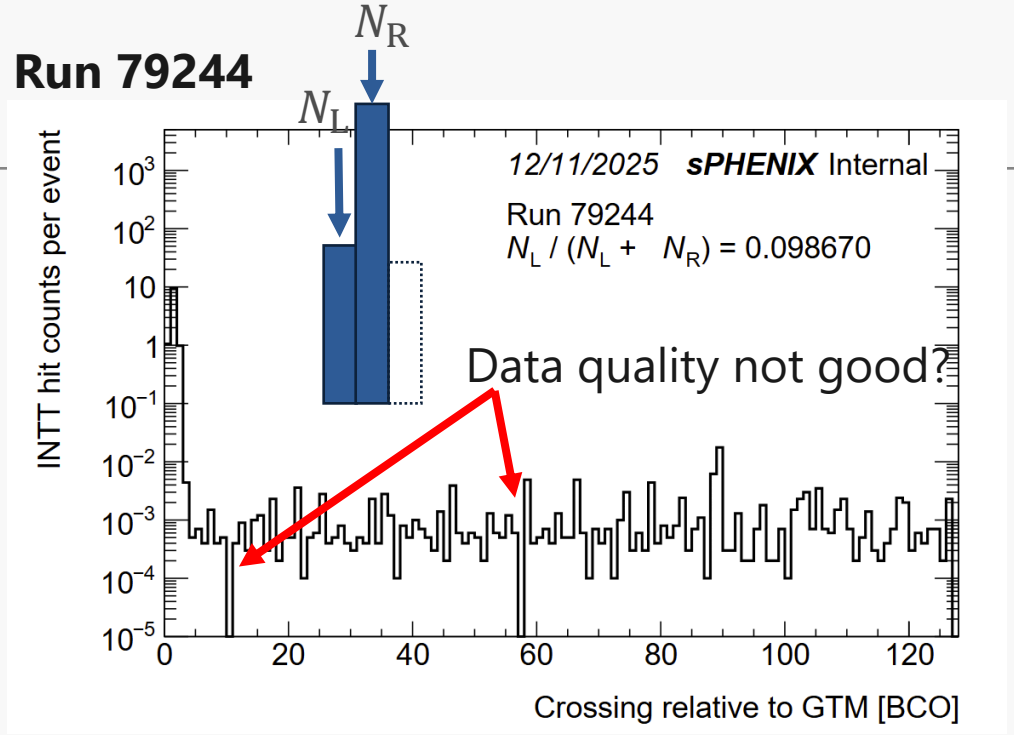


Flip at 109. (108?)

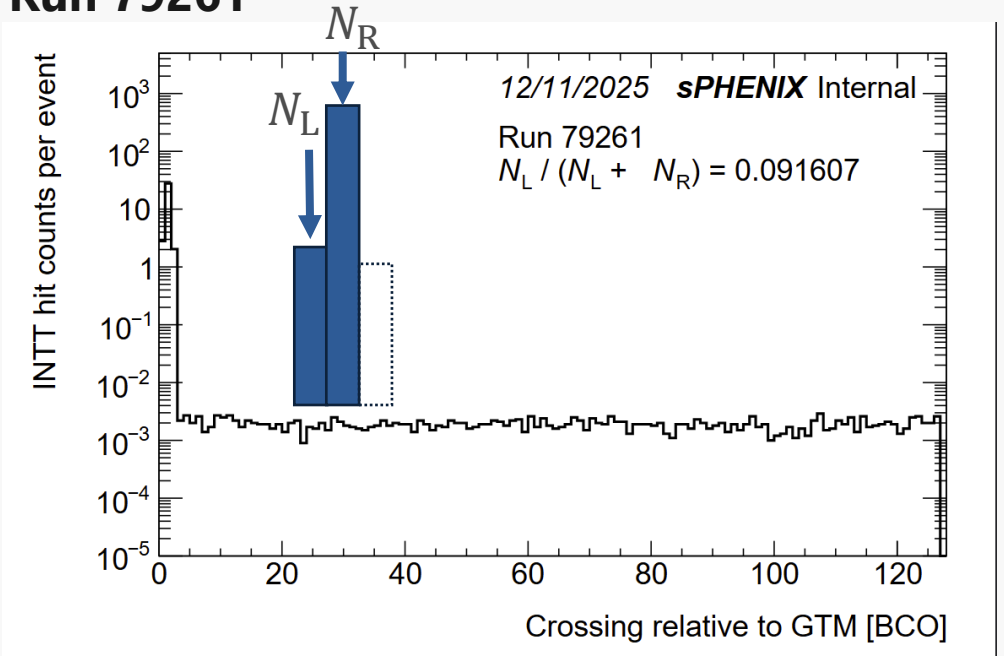
Backup



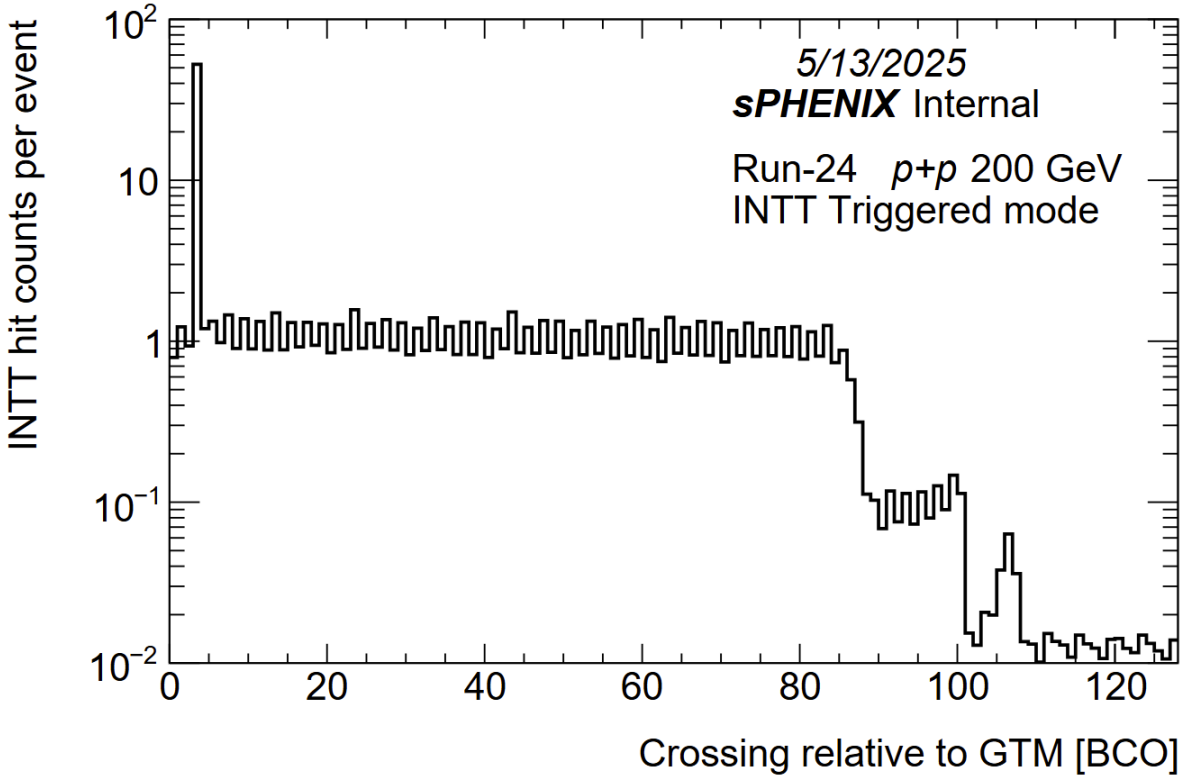
Run 79244



Run 79261

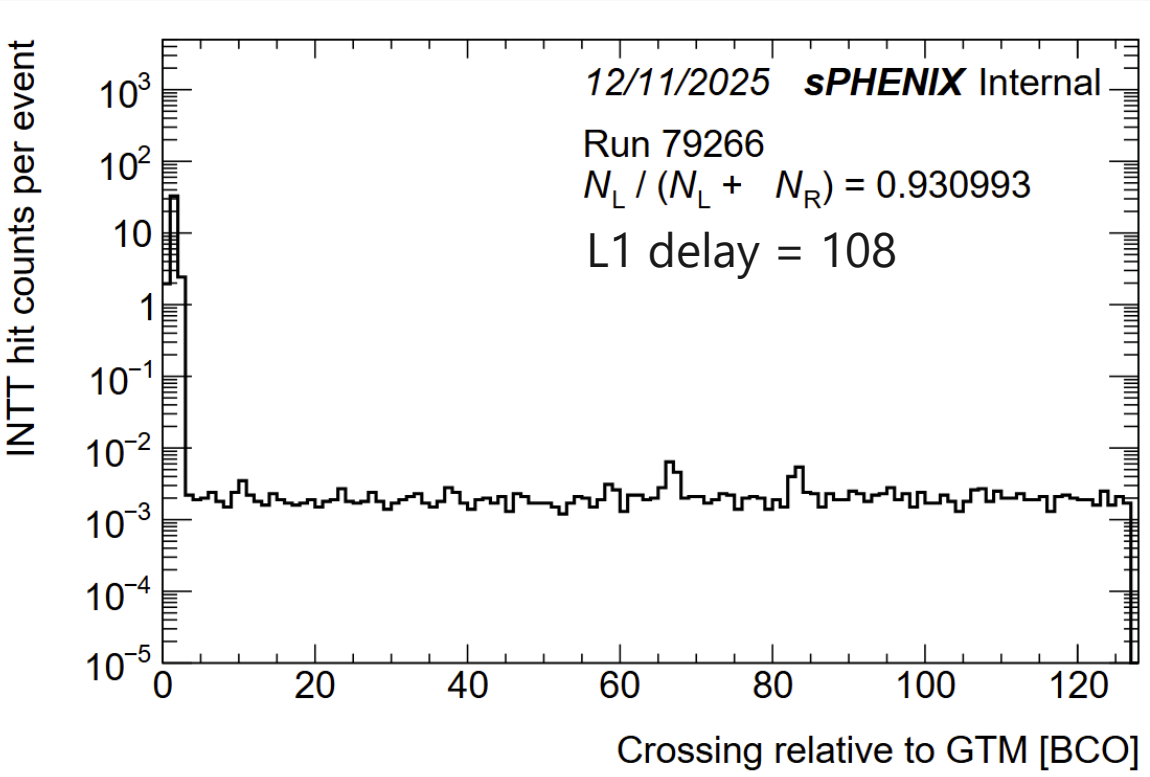


Run-24 p+p



n_collision = 100
open_time = 60

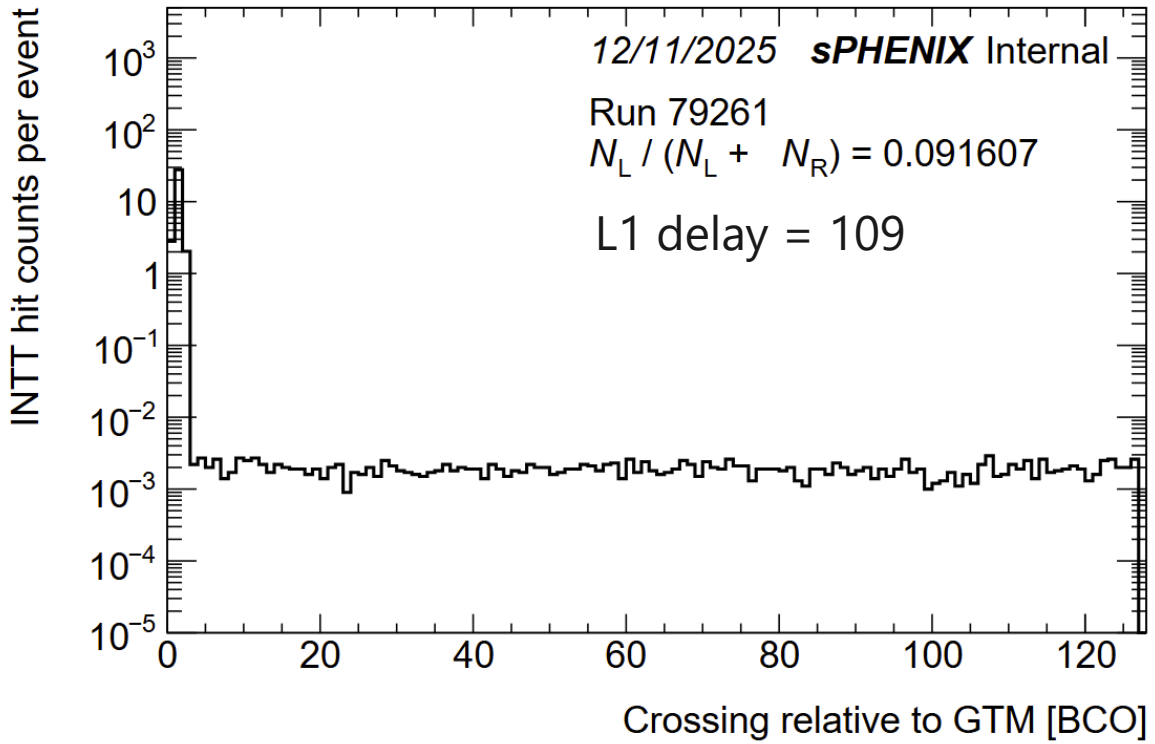
Run-25 p+p



n_collision = 126
open_time = 127

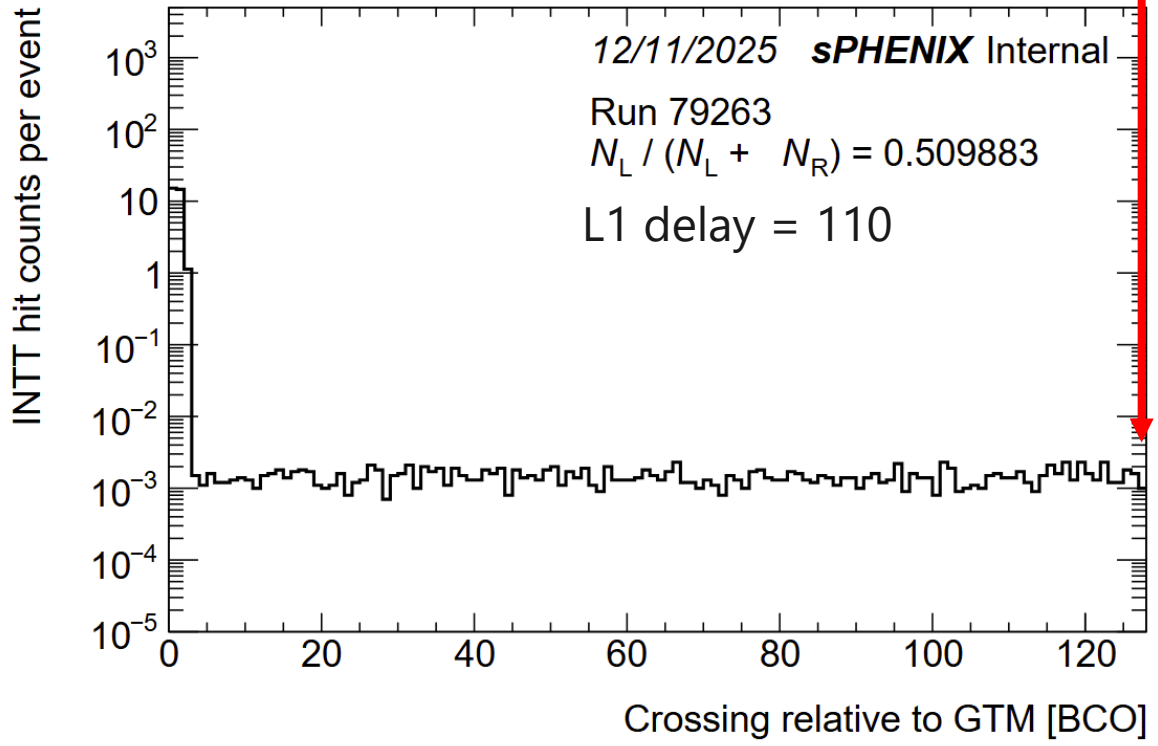
The last bin should be empty, assuming n_collision=126

Good example

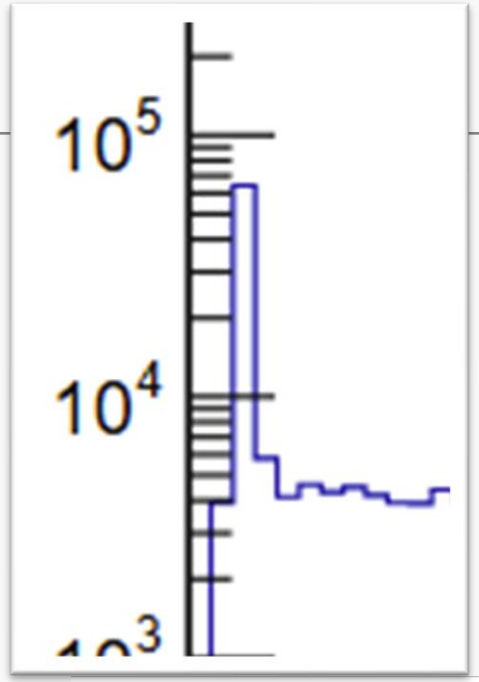


n_collision = 126 ?
open_time = 127 ?

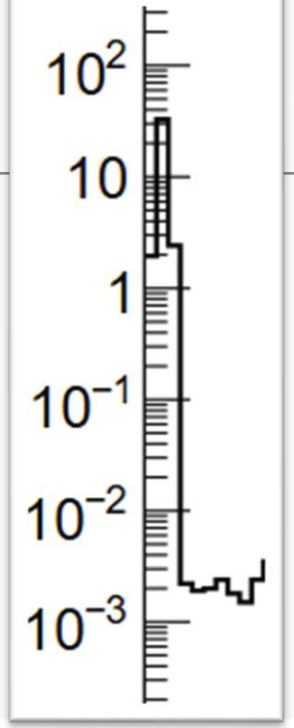
Bad run



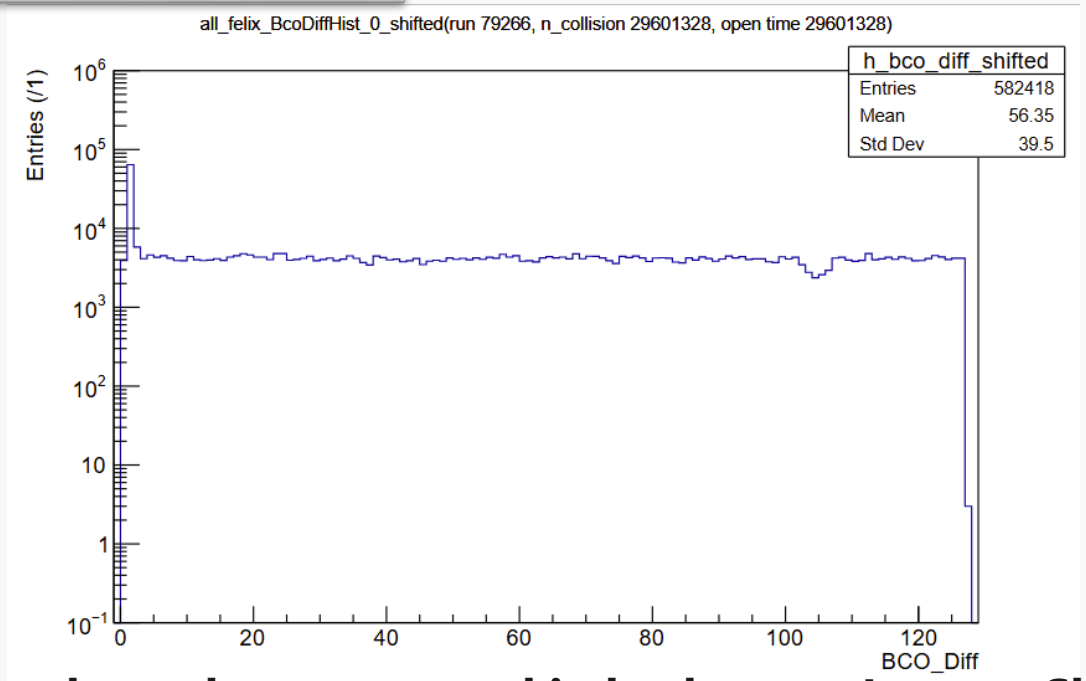
n_collision = 126 ?
open_time = 127 ?

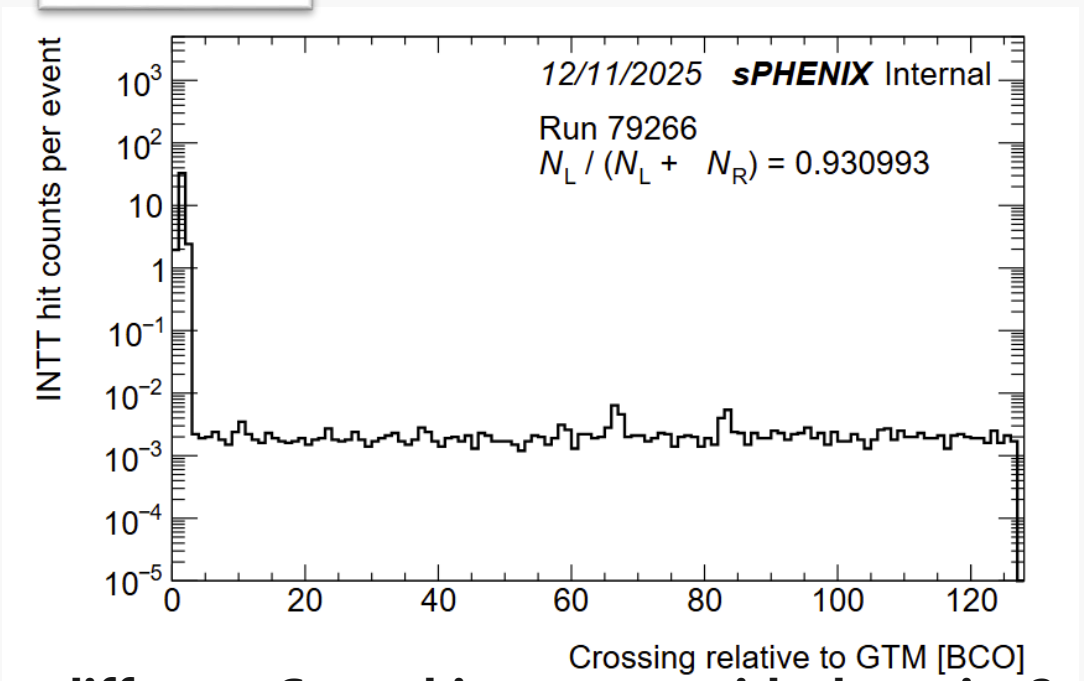


Result from InttRawHit (using Cheng-Wei's module)

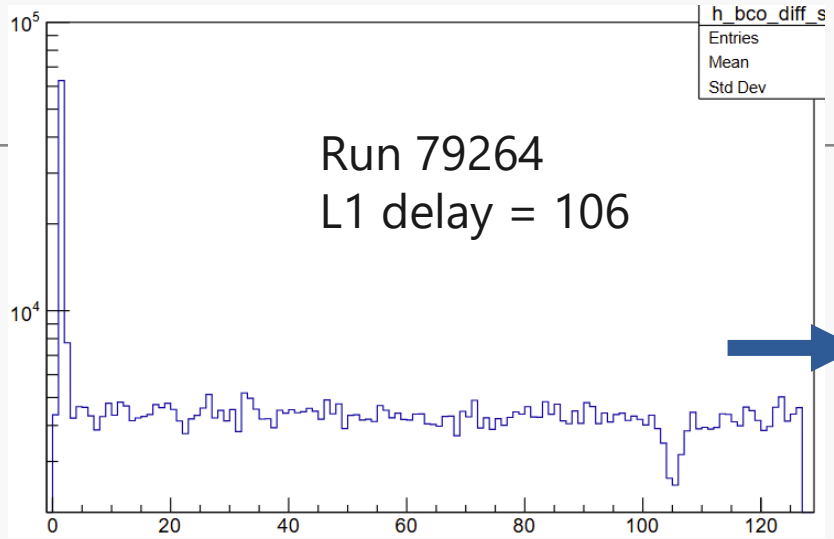


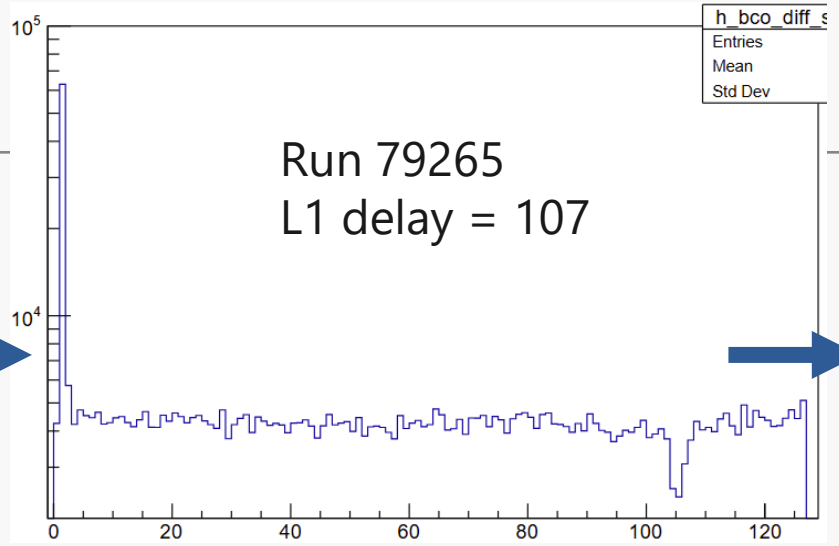
Result from TRKR_HITSET (using my module)

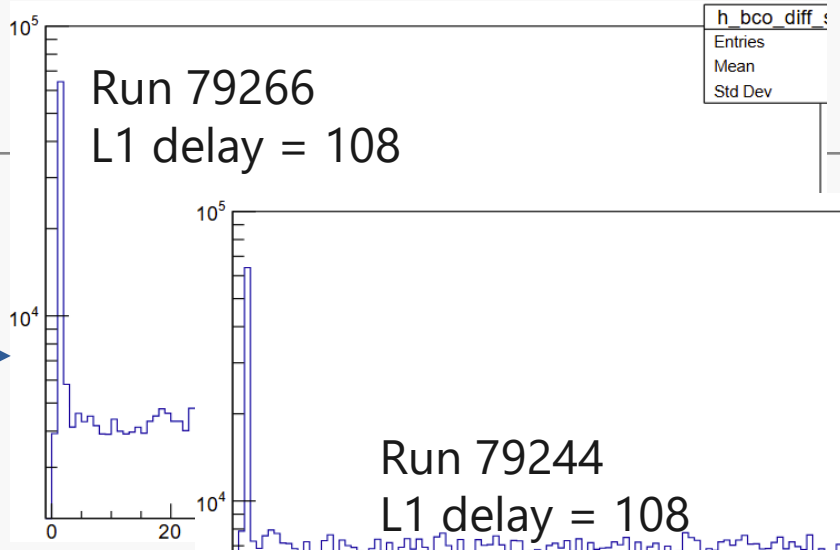




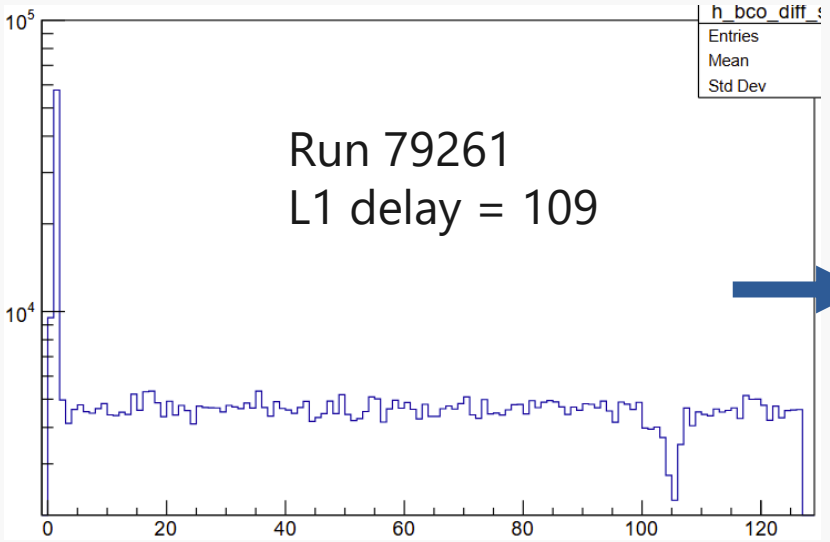
Hot channels are removed in both ways, I guess. Shape is very different. Something wrong with clustering?


h_bco_diff_s
Entries
Mean
Std Dev
Run 79264
L1 delay = 106

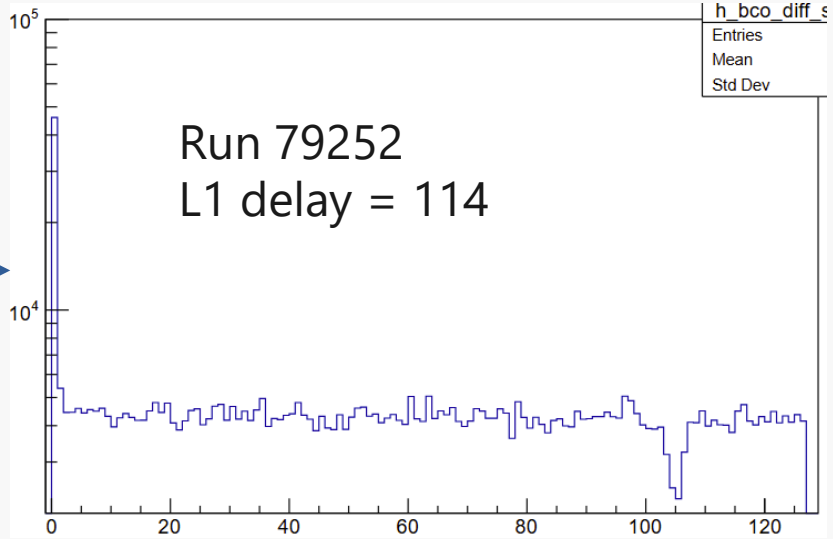

h_bco_diff_s
Entries
Mean
Std Dev
Run 79265
L1 delay = 107

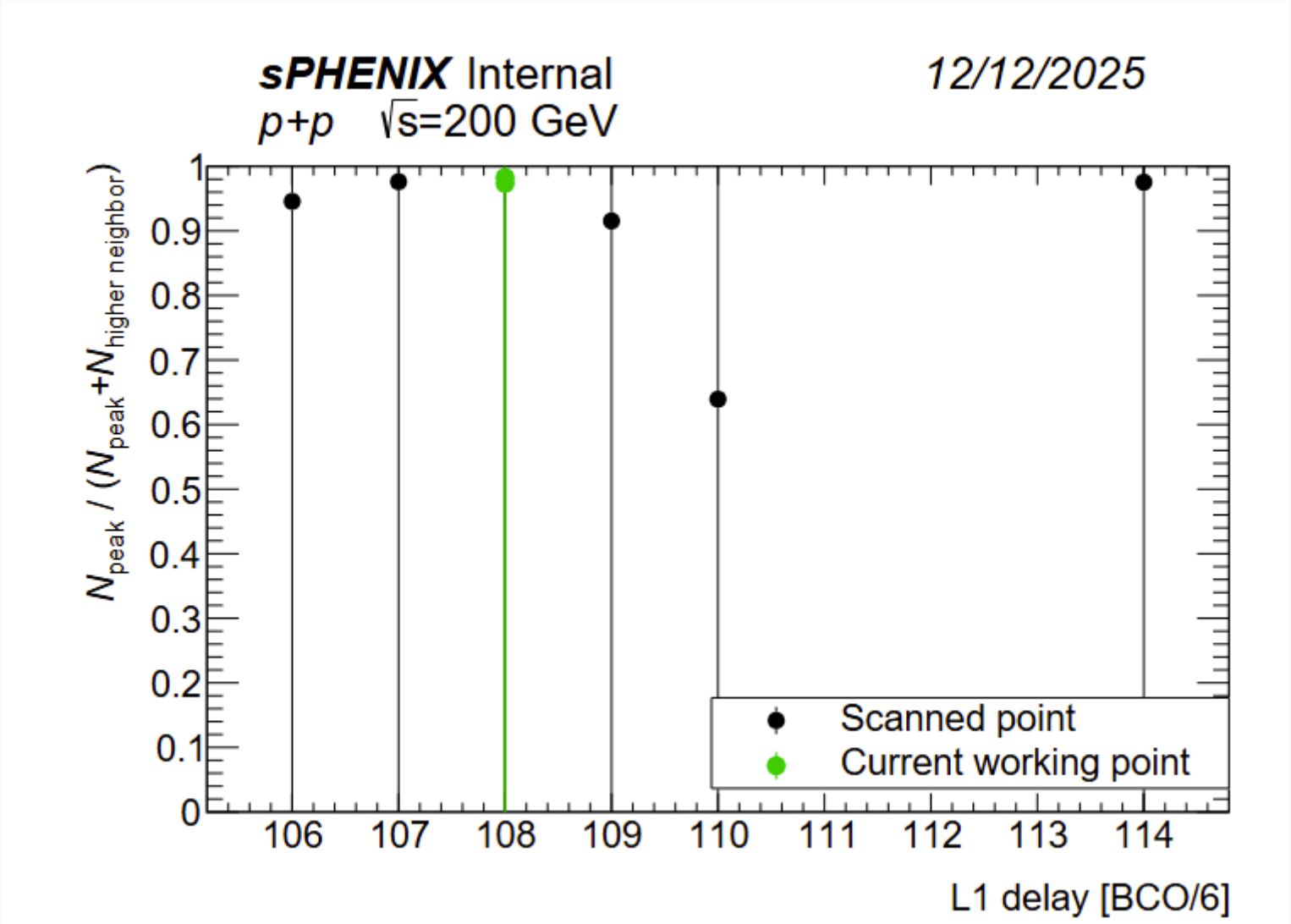

h_bco_diff_s
Entries
Mean
Std Dev
Run 79266
L1 delay = 108

Run 79244
L1 delay = 108


h_bco_diff_s
Entries
Mean
Std Dev
Run 79261
L1 delay = 109


h_bco_diff_s
Entries
Mean
Std Dev
Run 79263
L1 delay = 110


h_bco_diff_s
Entries
Mean
Std Dev
Run 79252
L1 delay = 114


sPHENIX Internal
p+p √s=200 GeV
12/12/2025
N_peak / (N_peak+N_higher neighbor)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
106
107
108
109
110
111
112
113
114
Scanned point
Current working point
L1 delay [BCO/6]