Run-25 Commissioning: Timing Scan and Carried-Over Hits

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Timing Scan

- We took timing scan data on 2025/06/09

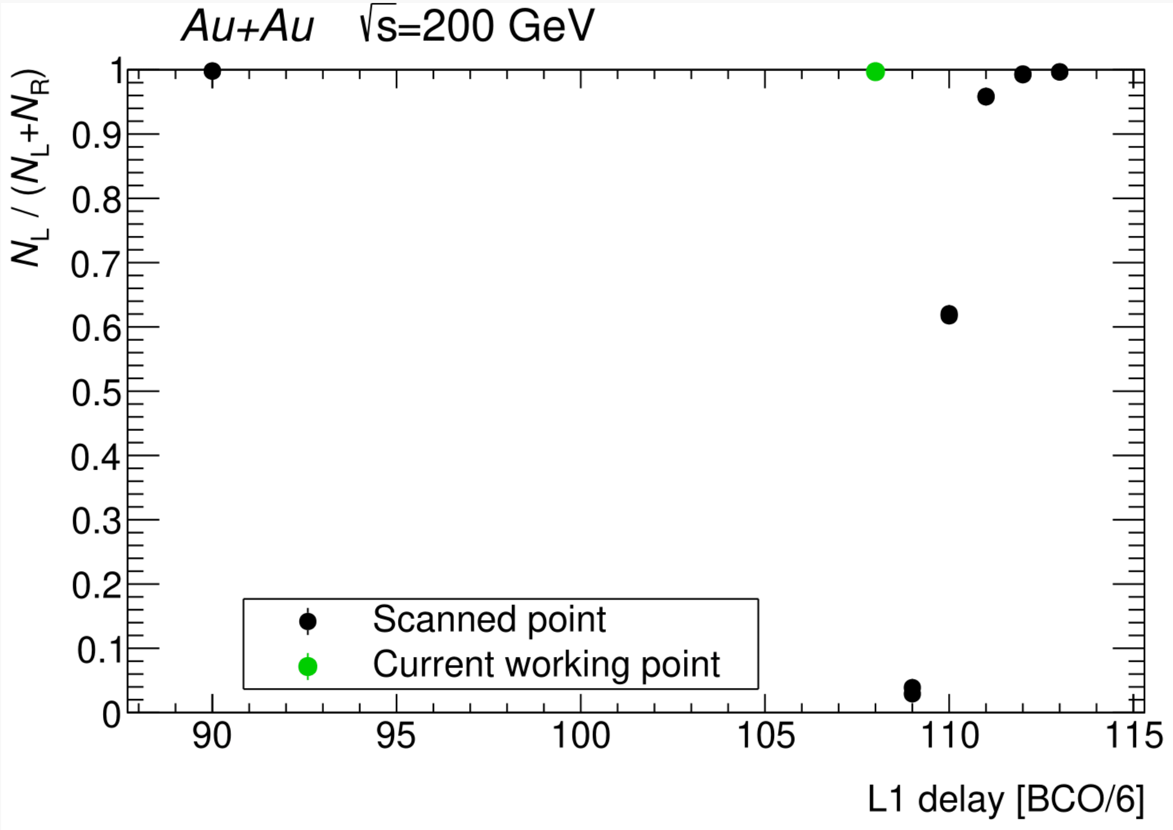
* 6×6 bunches

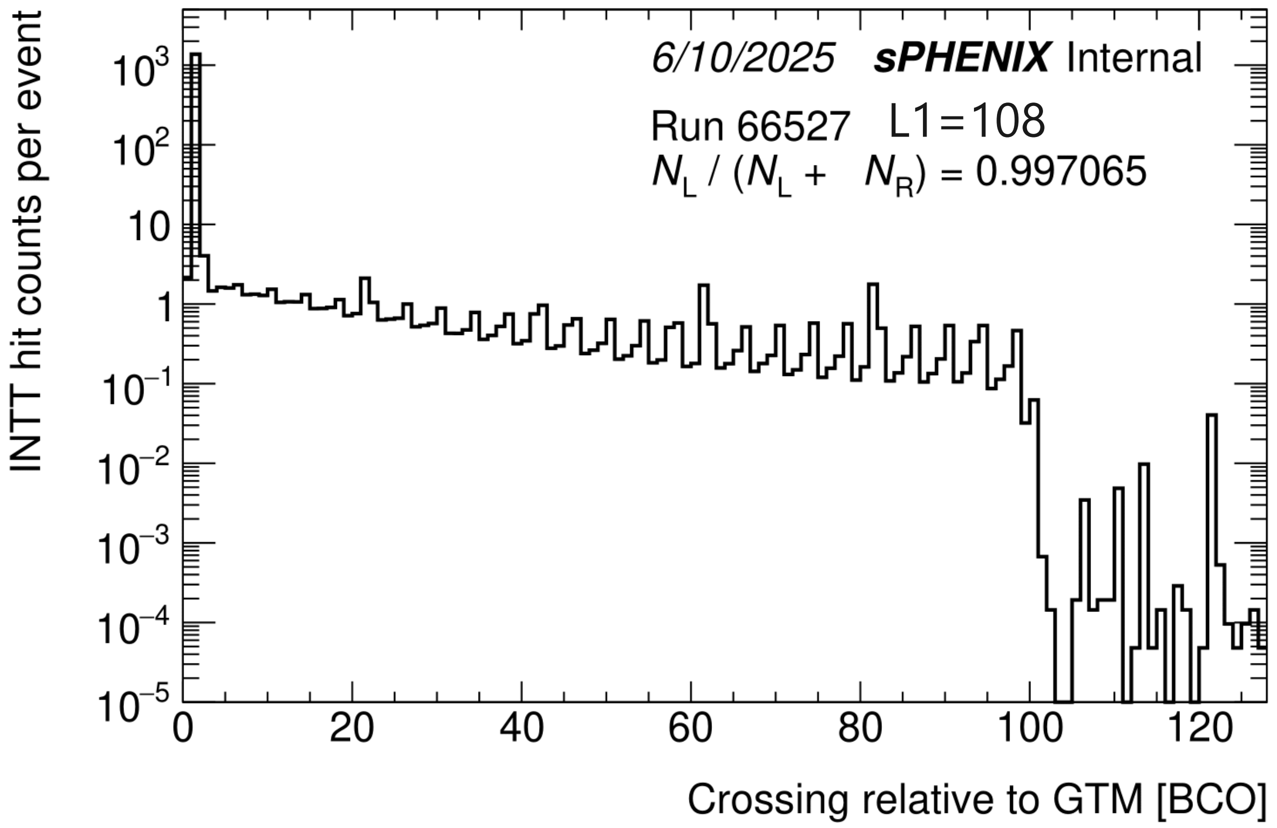
Date/Time	Run#	Run Type	Mag	Link	Duration (min)	Event (RCGUI)	MBD-NS [kHz]	Active Felix List	DAC0	L1 Delay	n_coll	open time
2025/6/9 18:31	**66523**	beam	On	plot	66sec			All Felix	35	**90**	100	60
2025/6/9 18:34	**66525**	beam	On	plot	59sec			All Felix	35	**90**	100	60
2025/6/9 18:38	**66526**	beam	On	plot	60sec			All Felix	35	**90**	100	60
2025/6/9 18:58	**66527**	beam	On	plot	67sec			All Felix	35	**108**	100	60
2025/6/9 19:01	**66529**	beam	On	plot	58sec			All Felix	35	**108**	100	60
2025/6/9 19:10	**66531**	beam	On	plot	70sec			All Felix	35	**109**	100	60
2025/06/09 19:12	**66532**	beam	On	plot	61sec			All Felix	35	**109**	100	60
2025/06/09 19:30	**66534**	beam	On	plot	62sec			All Felix	35	**110**	100	60
2025/06/09 19:31	**66535**	beam	On	plot	64sec			All Felix	35	**110**	100	60
2025/06/09 19:47	**66539**	beam	On	plot	60sec			All Felix	35	**111**	100	60
2025/6/9 19:49	**66540**	beam	On	plot	63sec			All Felix	35	**111**	100	60
2025/6/9 20:00	**66542**	beam	On	plot	63sec			All Felix	35	**112**	100	60
2025/6/9 20:03	**66543**	beam	On	plot	60sec			All Felix	35	**112**	100	60
2025/6/9 20:15	**66544**	beam	On	plot	59sec			All Felix	35	**113**	100	60
2025/6/9 20:16	**66545**	beam	On	plot	60sec			All Felix	35	**113**	100	60

Run24/25 AuAu Commissioning RunLog

Method and Results

- **The procedure is same as I did with the p+p data**

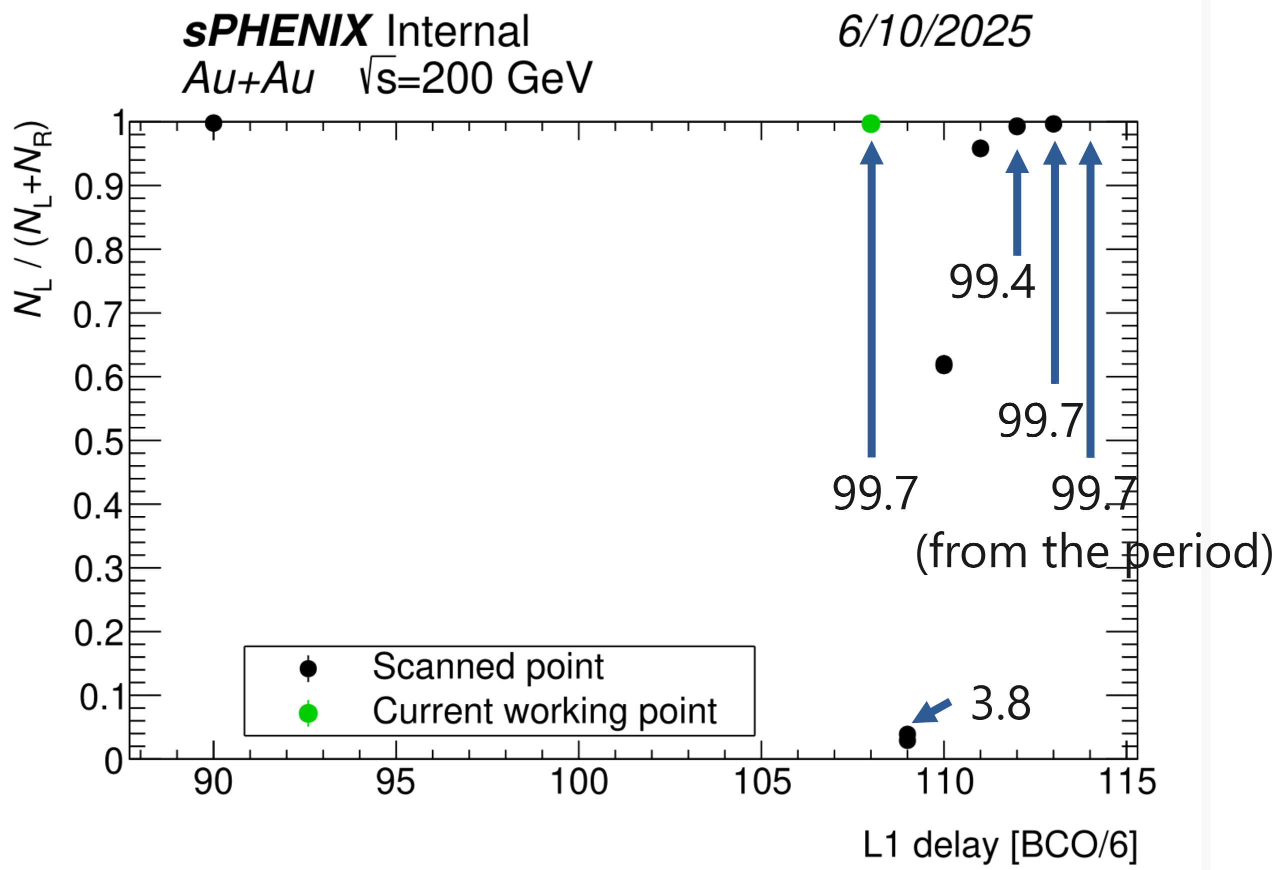


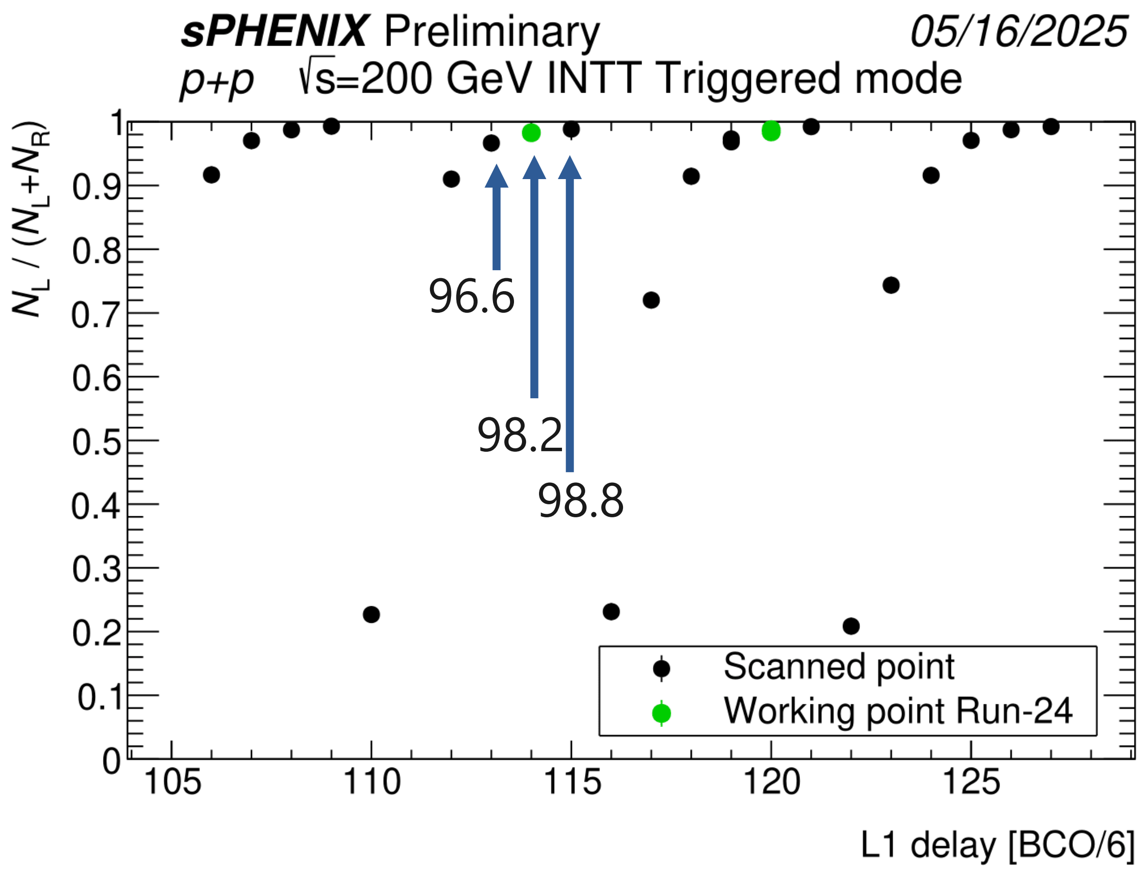


(All BCO_diff Plots in backup slides)

Comparison with p+p

- We chose the current working point seeing online BCO_diff plots.
- Maybe L1 delay = 107 or 113 is the best, not 108 (current value).



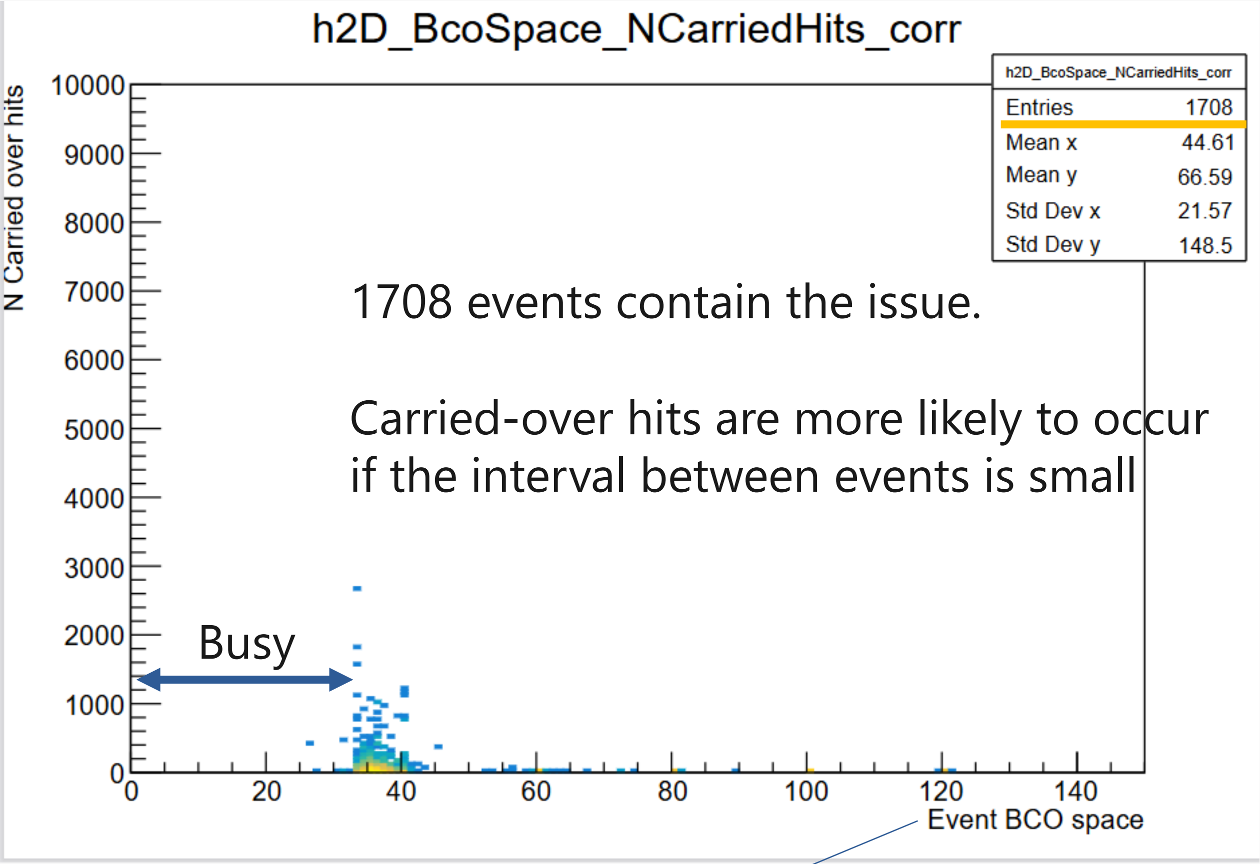


Carried-over hits

- **Carried-over hits are under investigation with Cheng-Wei's module.**
- **Runs of interest are**
  - 66522: first physics run this year. 6×6 bunches.
  - 66682: after timing scan. 56×56 bunches.

Run 66522

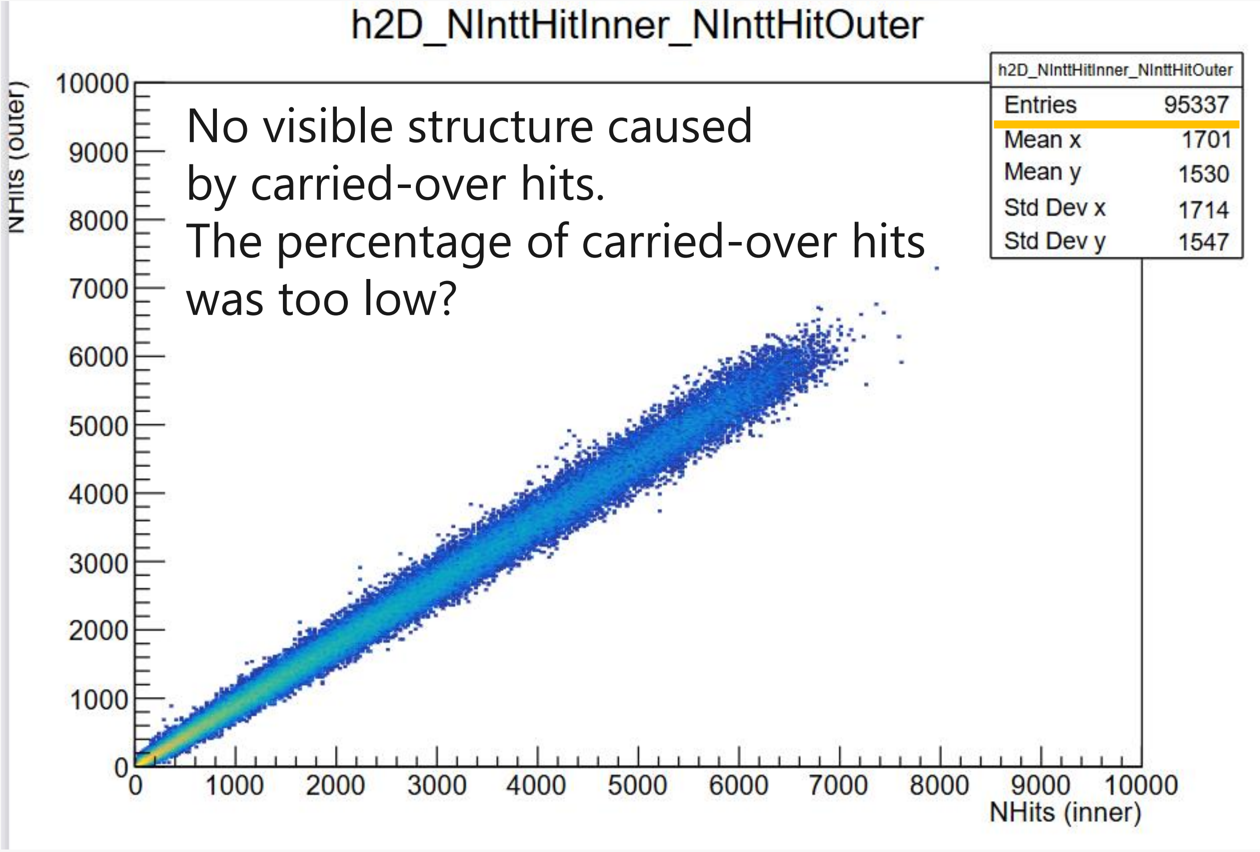
- **400k events processed (including no-INTT-hit events)**



1708 events contain the issue.

Carried-over hits are more likely to occur if the interval between events is small

Interval between the original event and the next event



No visible structure caused by carried-over hits.
The percentage of carried-over hits was too low?

~10(?)% of hits of 1.8% events are affected by the issue/

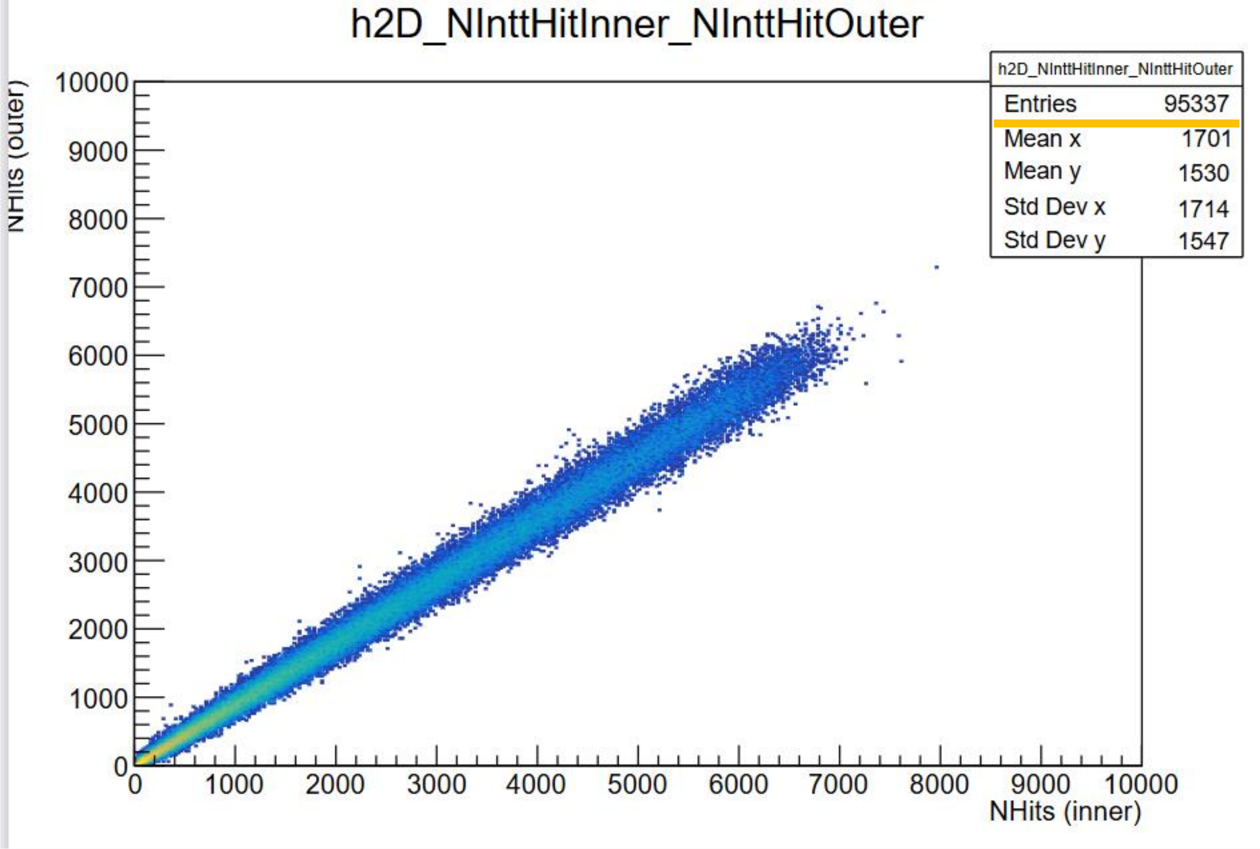
(100 hits / 1000 hits, 1708 events / 95337 events)

Run 66682

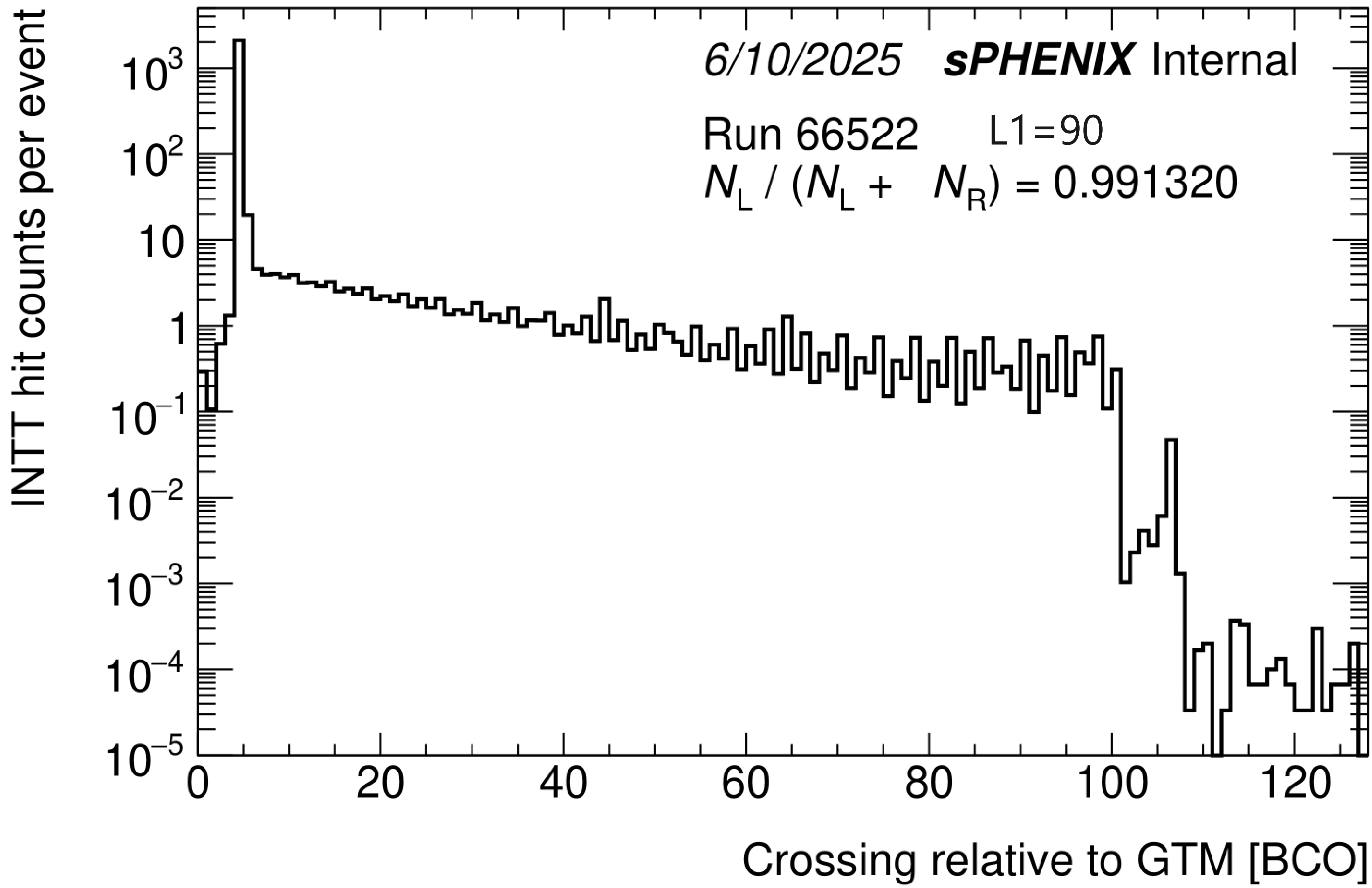
- **Batch job didn’t finish until this meeting**

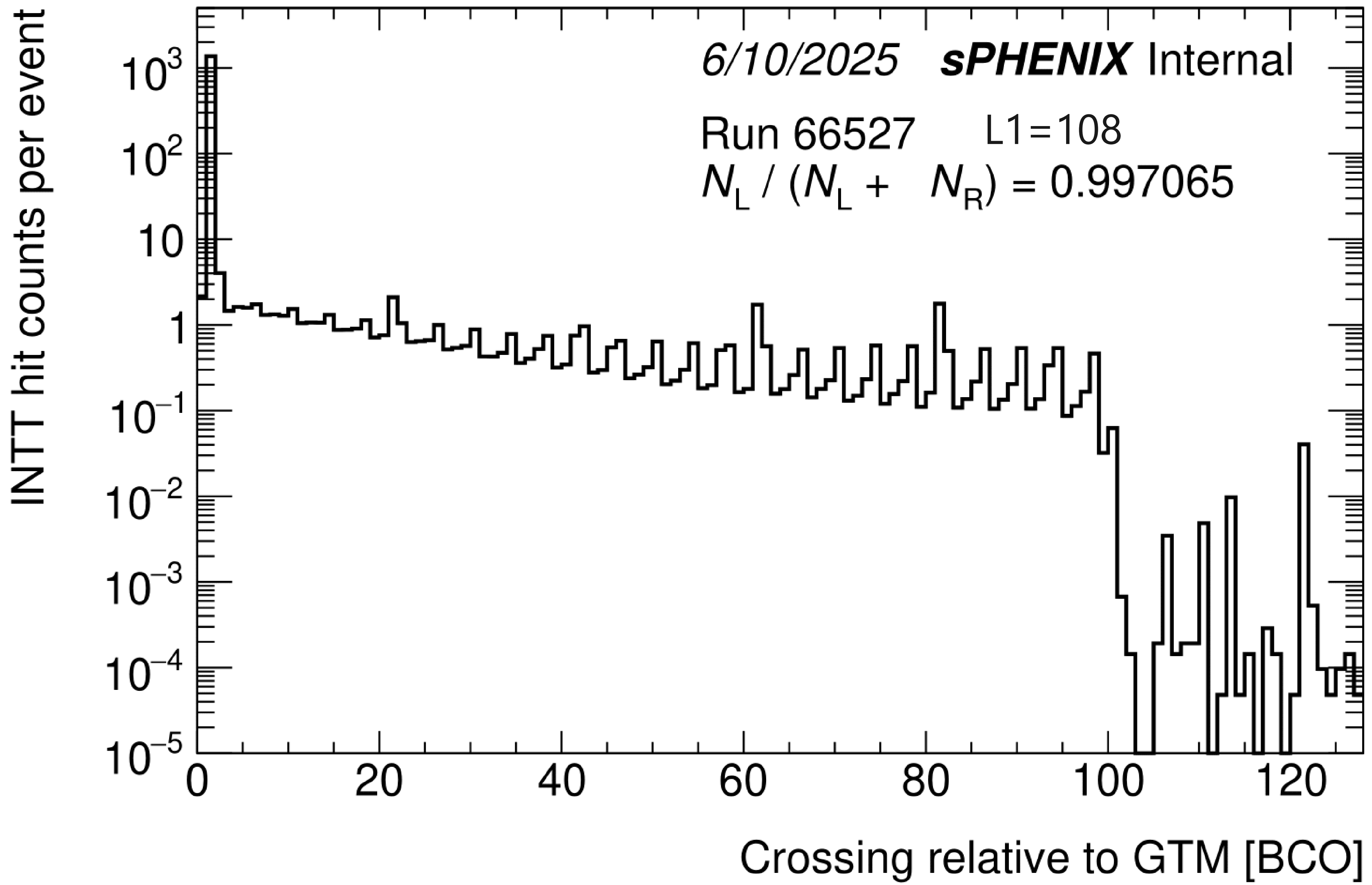
One thing strange …

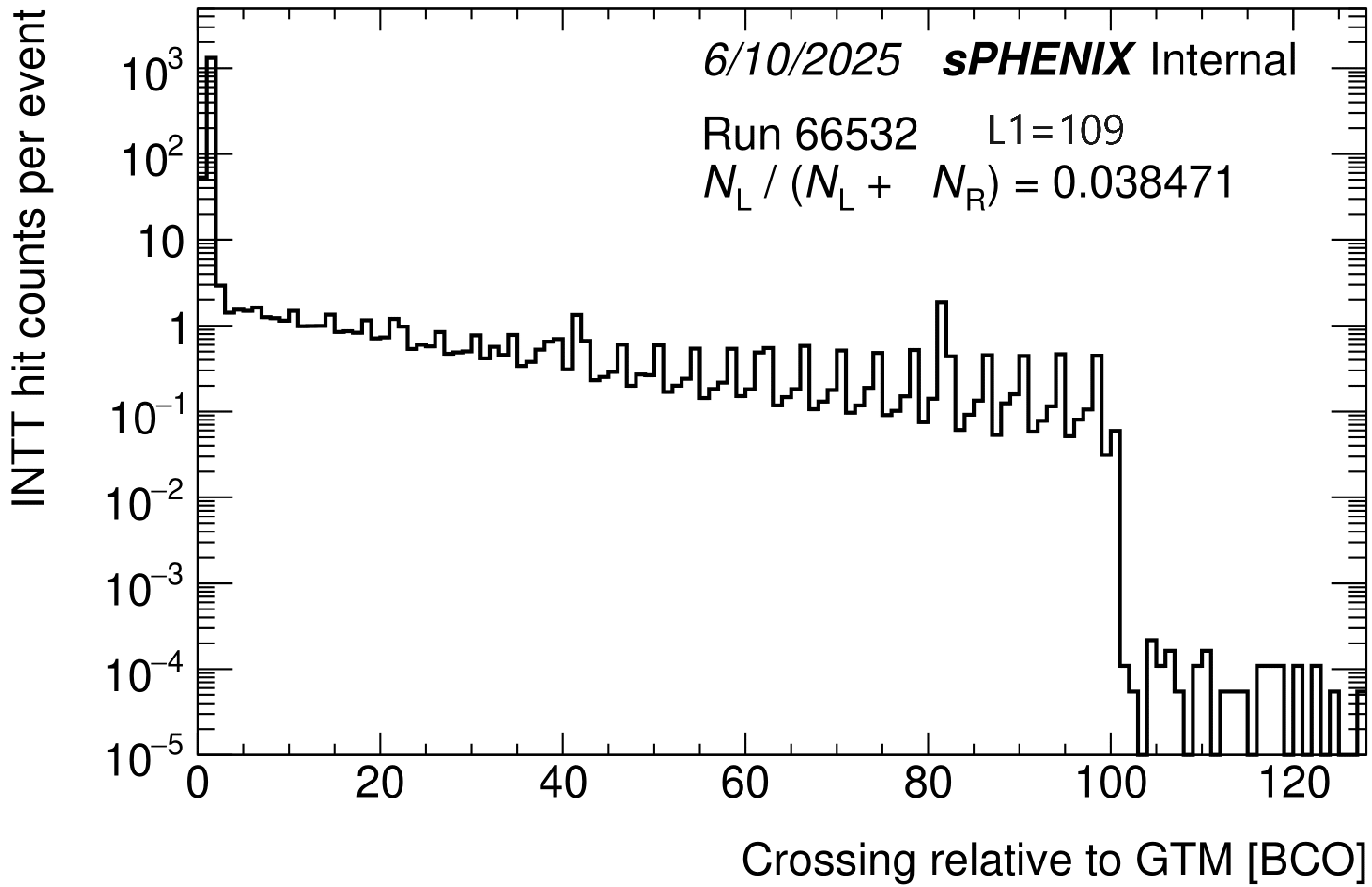
- Why do we have only 95k entries (events with at least 1 hit) even though 400k events are processed?

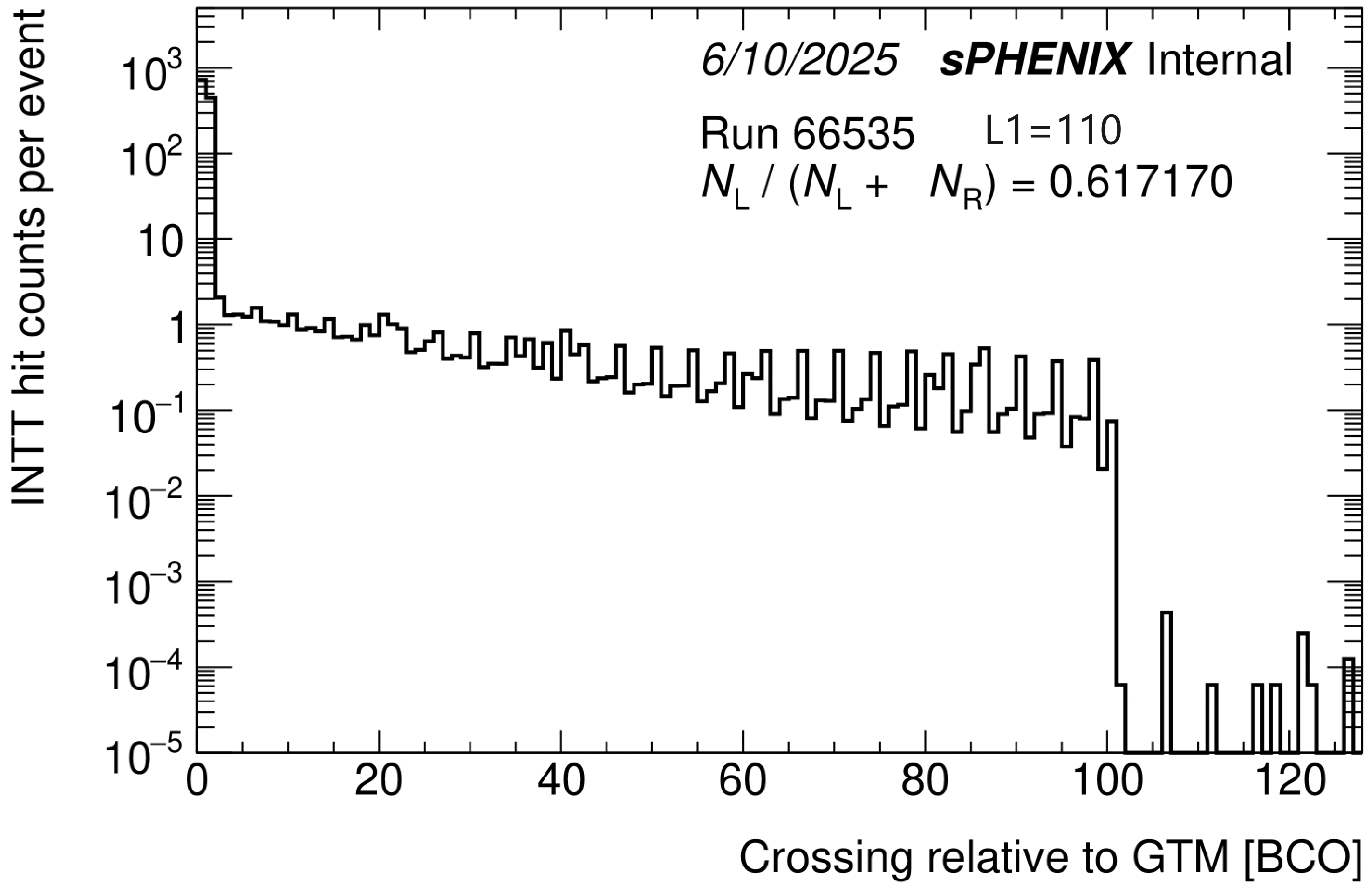


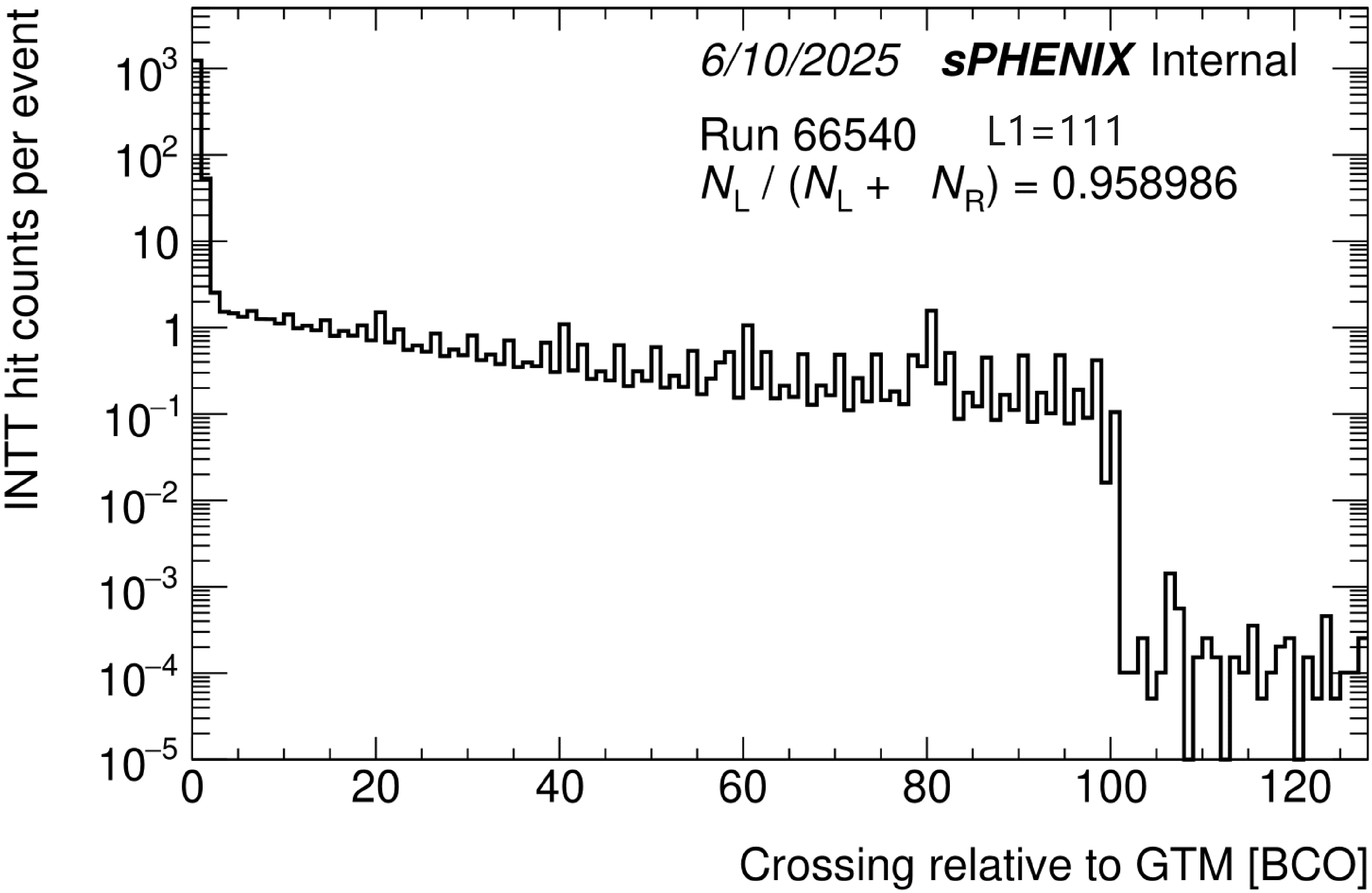
Backup

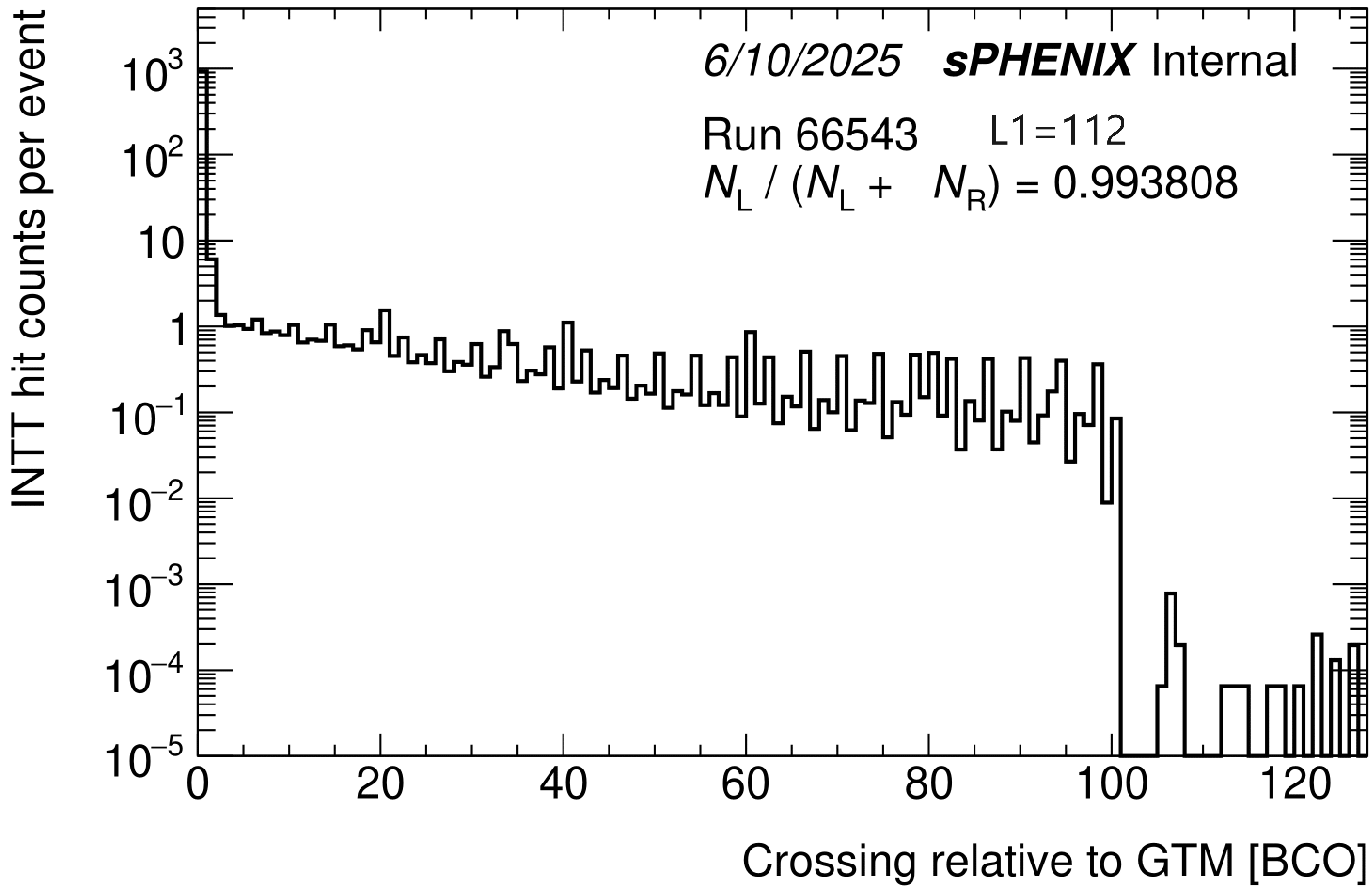

6/10/2025 sPHENIX Internal
Run 66522 L1=90
$N_L / (N_L + N_R) = 0.991320$
INTT hit counts per event
Crossing relative to GTM [BCO]
10^{3}
10^{2}
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
20
40
60
80
100
120

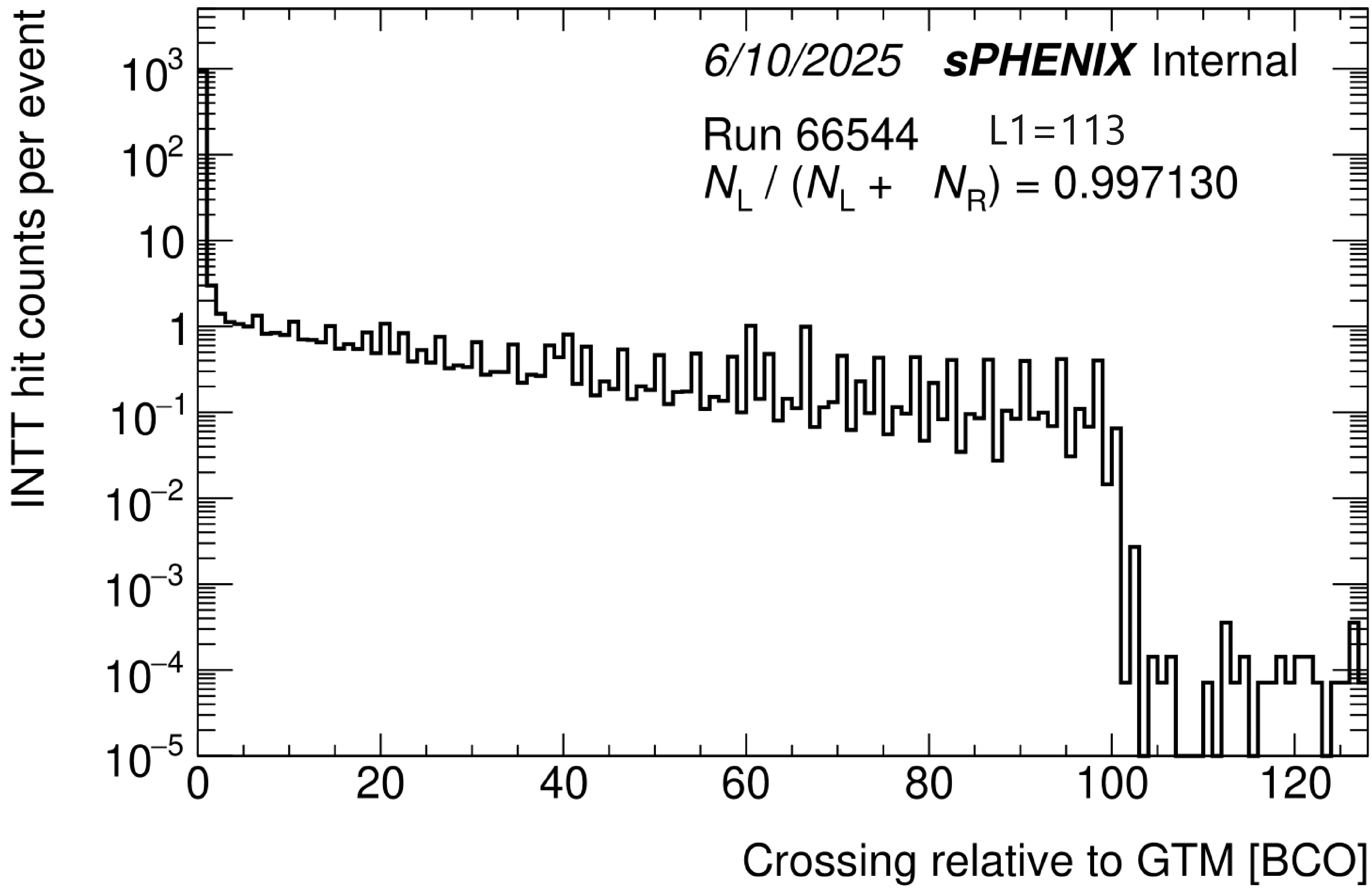

6/10/2025 sPHENIX Internal
Run 66527 L1=108
N_L / (N_L + N_R) = 0.997065
INTT hit counts per event
Crossing relative to GTM [BCO]
0
20
40
60
80
100
120
10^3
10^2
10
1
10^-1
10^-2
10^-3
10^-4
10^-5


6/10/2025 sPHENIX Internal
Run 66532
L1=109
N_L / (N_L + N_R) = 0.038471
INTT hit counts per event
Crossing relative to GTM [BCO]
0
20
40
60
80
100
120
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}


6/10/2025 sPHENIX Internal
Run 66535 L1=110
N_L / (N_L + N_R) = 0.617170
INTT hit counts per event
Crossing relative to GTM [BCO]
10^{3}
10^{2}
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
20
40
60
80
100
120


6/10/2025 sPHENIX Internal
Run 66540 L1=111
$N_L / (N_L + N_R) = 0.958986$
INTT hit counts per event
Crossing relative to GTM [BCO]
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
20
40
60
80
100
120


6/10/2025 sPHENIX Internal
Run 66543
L1=112
$N_L / (N_L + N_R) = 0.993808$
INTT hit counts per event
Crossing relative to GTM [BCO]
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
20
40
60
80
100
120


6/10/2025 sPHENIX Internal
Run 66544
L1=113
$N_L / (N_L + N_R) = 0.997130$
INTT hit counts per event
Crossing relative to GTM [BCO]
10^{3}
10^{2}
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
20
40
60
80
100
120