INTT chip saturation issue

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Chip saturation

- Use Cheng-Wei's module

Current focus runs

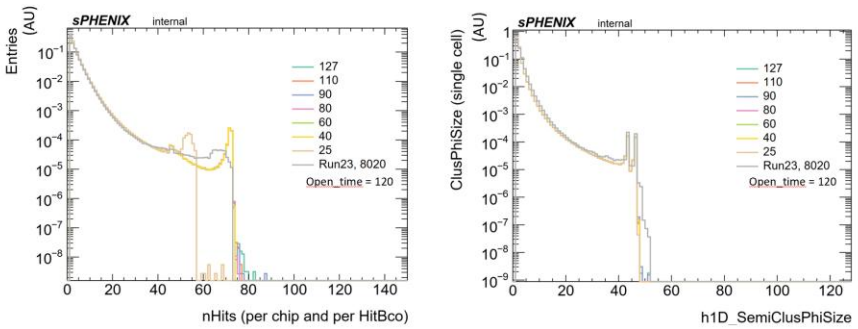
Date/Time	Run#	Run Type	Mag	Link	DAC0	L1 Delay	n_coll	open time
2025/6/15 13:09	67542	beam	On	plot	35	108	100	127
2025/6/15 13:16	67544	beam	On	plot	35	108	100	110
2025/6/15 13:22	67545	beam	On	plot	35	108	100	90
2025/6/15 13:27	67546	beam	On	plot	35	108	100	80
2025/6/15 13:33	67547	beam	On	plot	35	108	100	60
2025/6/15 13:39	67548	beam	On	plot	35	108	100	40
2025/6/15 13:45	67549	beam	On	plot	35	108	100	25

Recall

N_coll = 100, diff. open_time

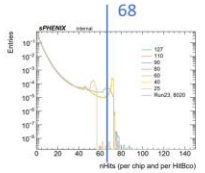
- Same result as Ryotaro's for the nHits part: open_time = 25 has diff. shape
- Cluster size -> all the same with diff. open_time

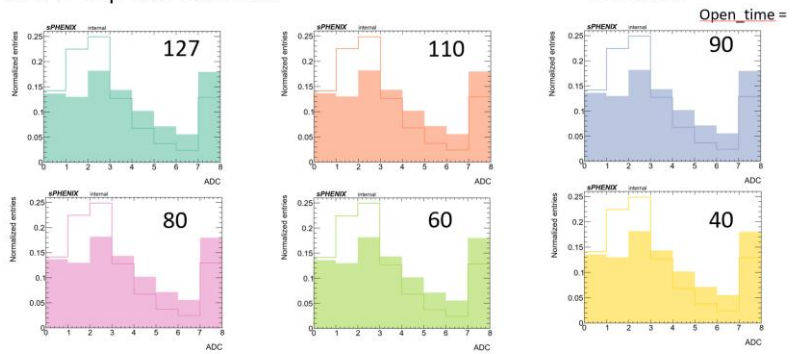
Stack all chips



ADC distribution

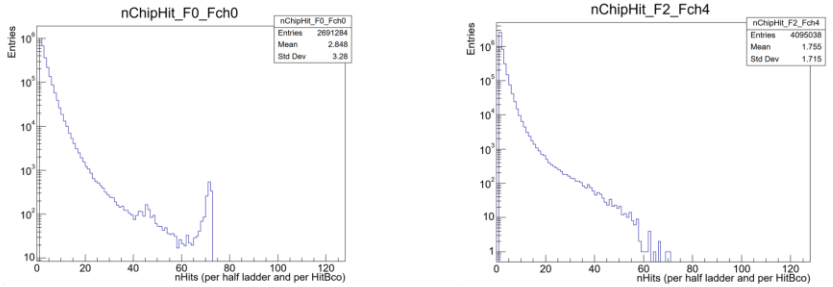
- Filled → chip total hits < 68
- Line → chip total hits >= 68





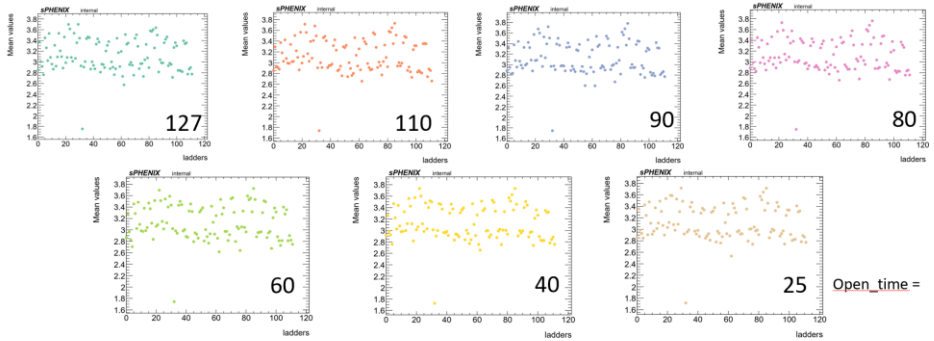
Chip Hits per ladders

- Stack 26 chip total hit distributions → half-ladder level
- All of them have similar distributions, except F2_Fch4
  - We now mask this ladder in the online map



Chip Hits mean values per ladders

- Ladders = Felix_ID * 14 + Felix_channel_ID
- Similar tendency for all of the ladders, except F2_Fch4 (ladder = 32)



Diff. n_coll and open_time

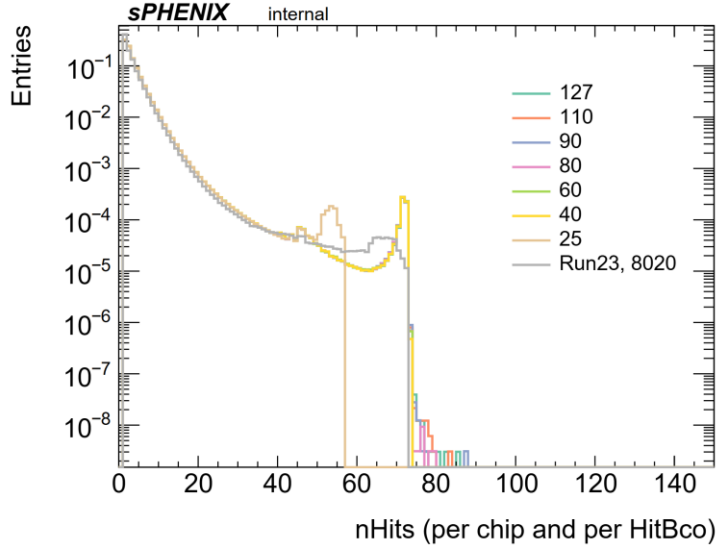
- ☐: n_coll = 2, diff. open_time
- ☐: n_coll = 50, diff. open_time

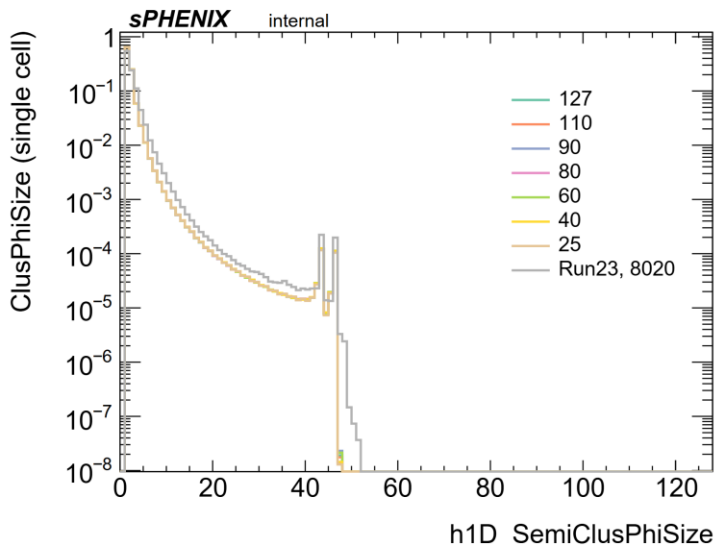
Run#	Run Type	Mag	Link	n_coll	open time	Comments
67550	beam	On	plot	2	127	Intt2, fee04; timing misaligned (from this run)?
67552	beam	On	plot	2	110	Global DAQ started another run between this and the previous run. Intt2, fee04; timing misaligned?
67553	beam	On	plot	2	90	Intt2, fee04; timing misaligned?
67554	beam	On	plot	2	80	Intt2, fee04; timing misaligned?
67555	beam	On	plot	2	60	Intt2, fee04; timing misaligned?
67556	beam	On	plot	2	40	Intt2, fee04; timing misaligned?
67557	beam	On	plot	2	25	Intt2, fee04; timing misaligned?
67558	beam	On	plot	50	127	Intt2, fee04; the hit map shows more hits, but not sure if it's recovered. We cannot tell by eye.
67559	beam	On	plot	50	110	
67560	beam	On	plot	50	90	
67561	beam	On	plot	50	80	junk? No signal in intt0 south
67563	beam	On	plot	50	60	Global DAQ started another run between this and the previous run. Intt0 south came back (!).
67564	beam	On	plot	50	40	
67565	beam	On	plot	50	25	
67566	beam	On	plot	50	80	retake of run 67561

N_coll = 2 and 50

Stack all chips

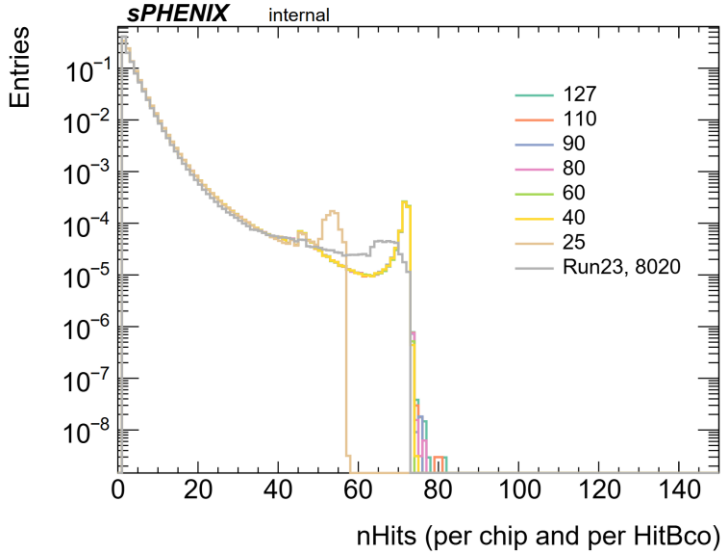
N_coll = 2 →

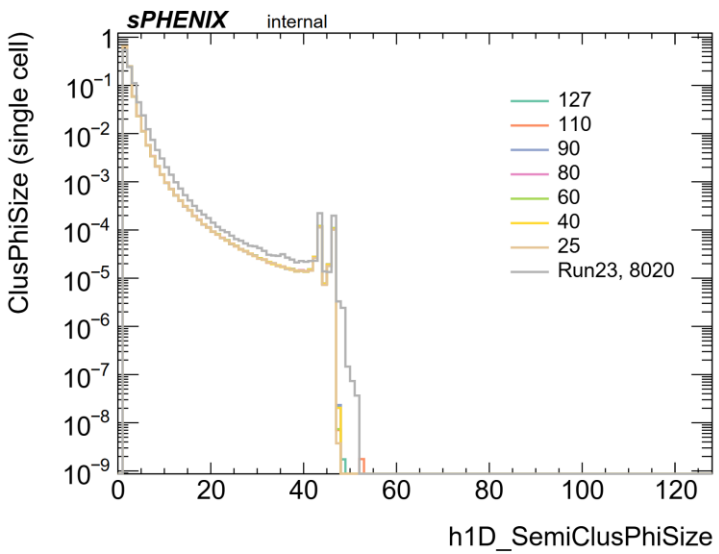




Their distributions are almost the same

N_coll = 50 →

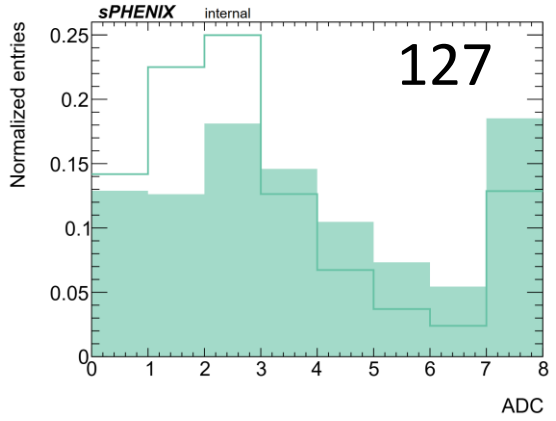


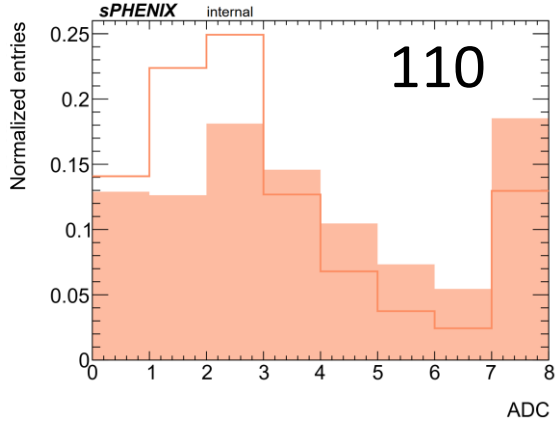


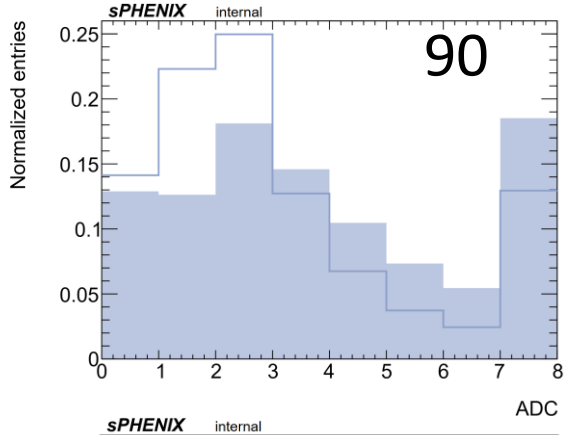
ADC distribution (n_coll = 2)

- Filled → chip total hits < 68
- Line → chip total hits >= 68

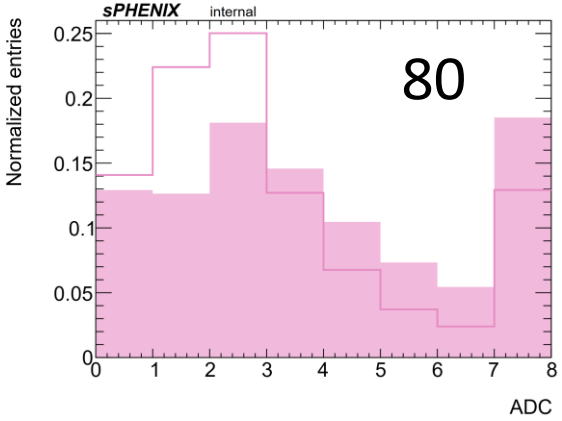
- Similar result compared to n_coll = 100

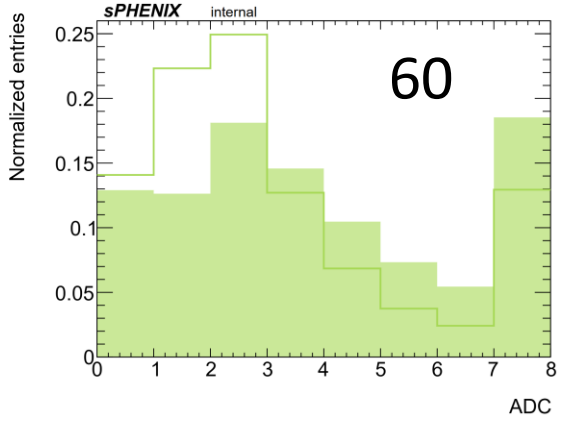


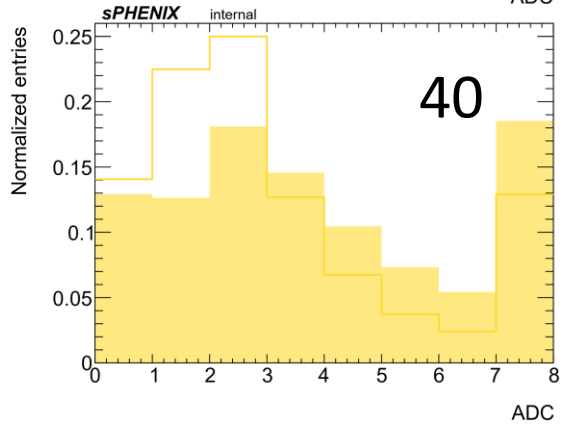




Open_time =



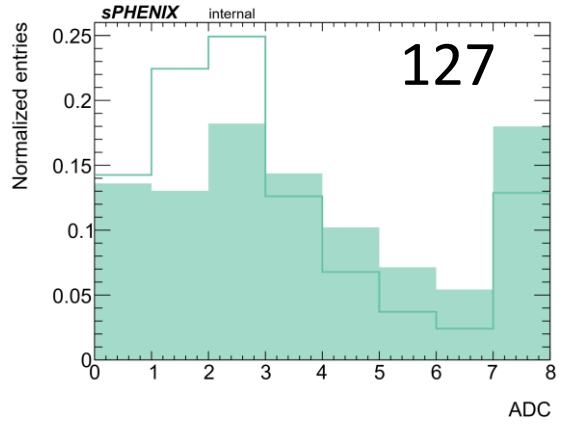


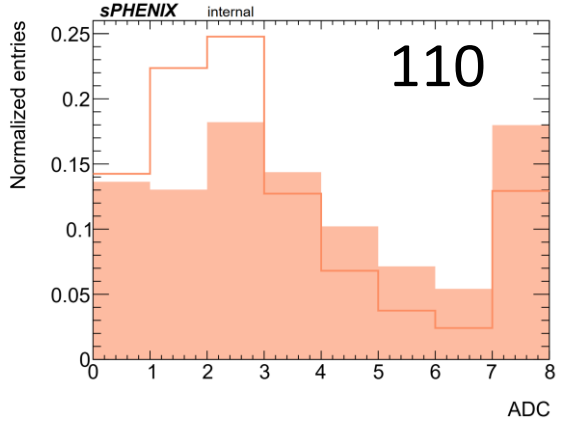


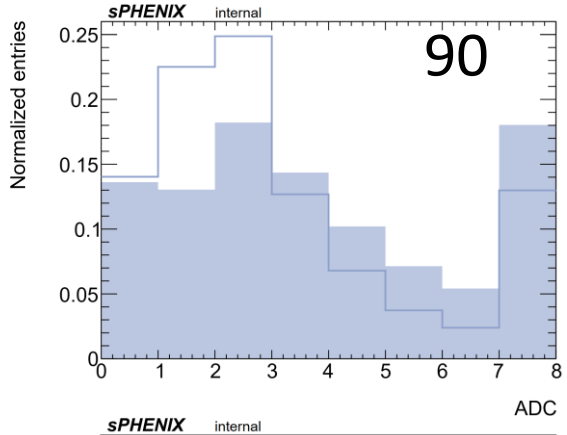
ADC distribution (n_coll = 50)

- Filled → chip total hits < 68
- Line → chip total hits >= 68

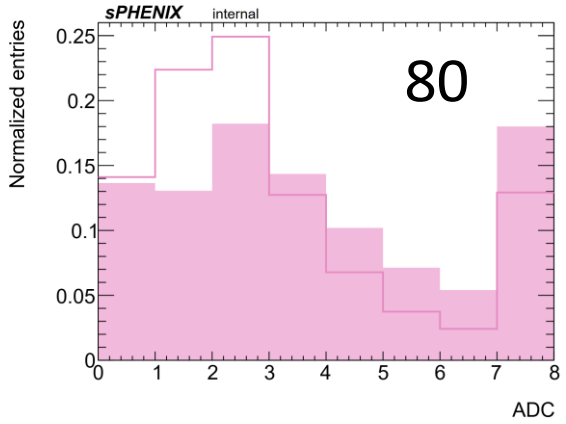
- Similar result compared to n_coll = 100

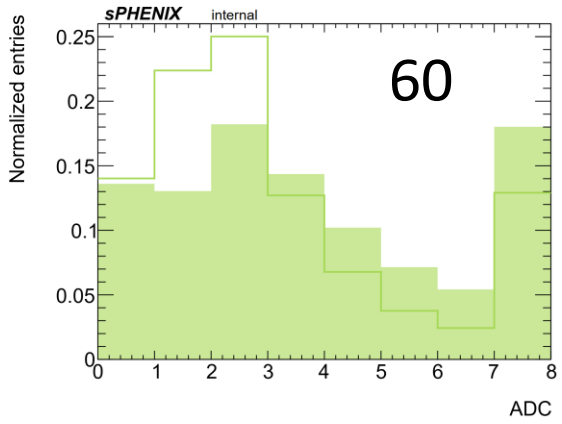


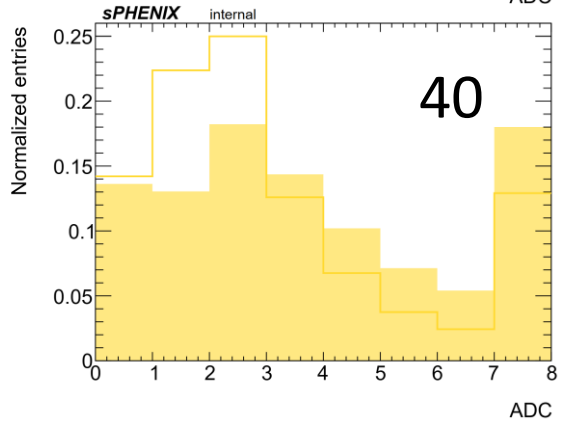




Open_time =

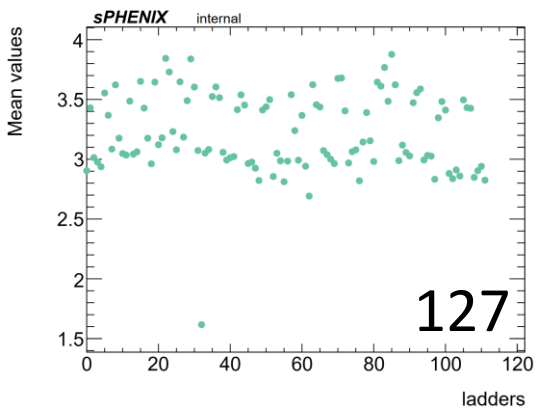


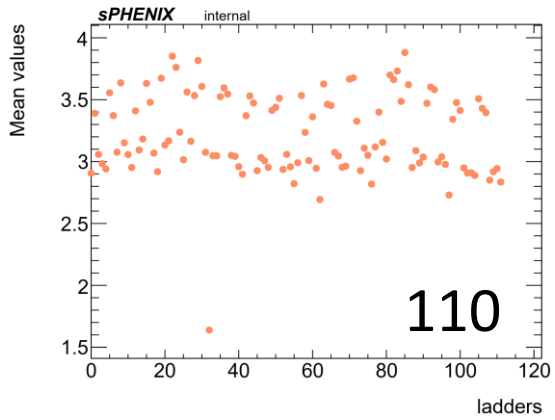


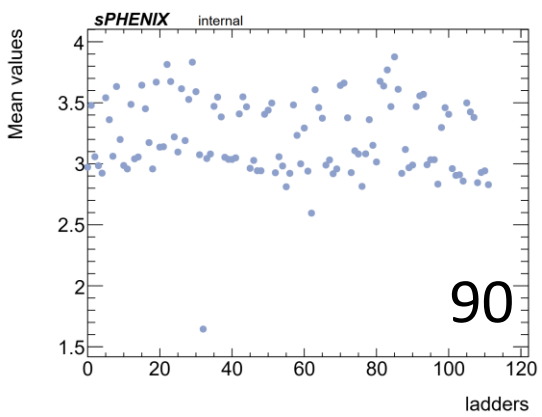


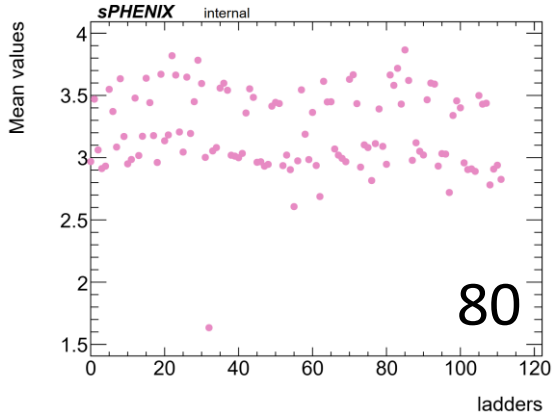
Chip Hits mean values per ladders (n_coll = 2)

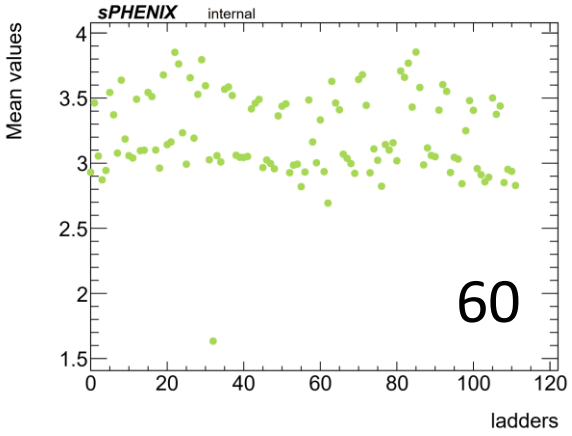
- Ladders = Felix_ID * 14 + Felix_channel_ID
- Similar result compared to n_coll = 100

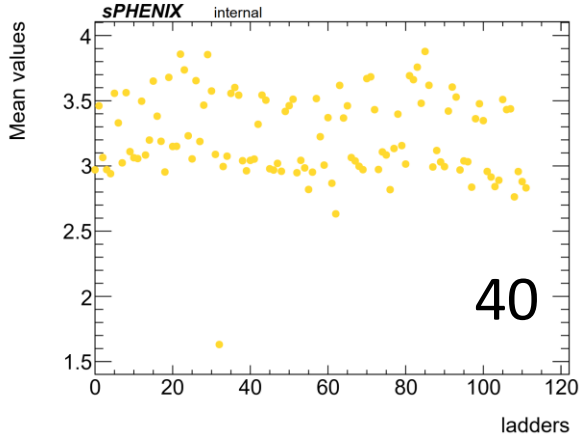


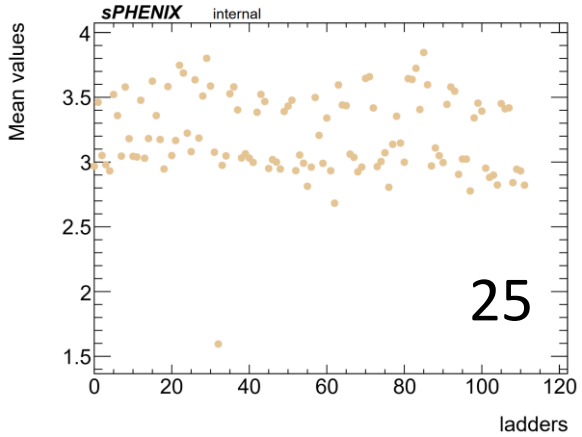








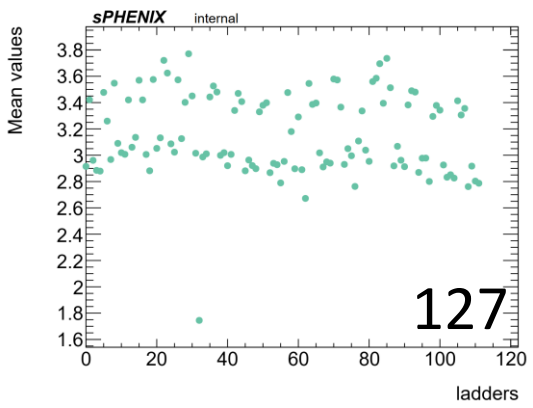


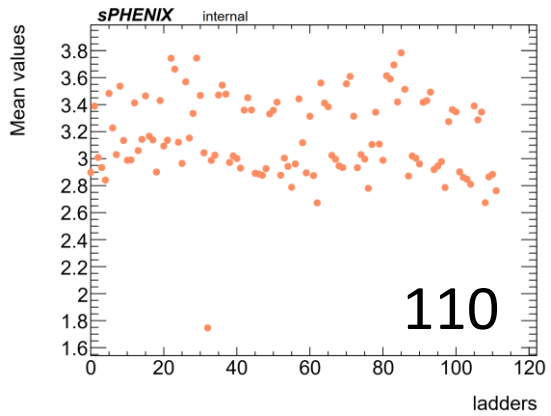


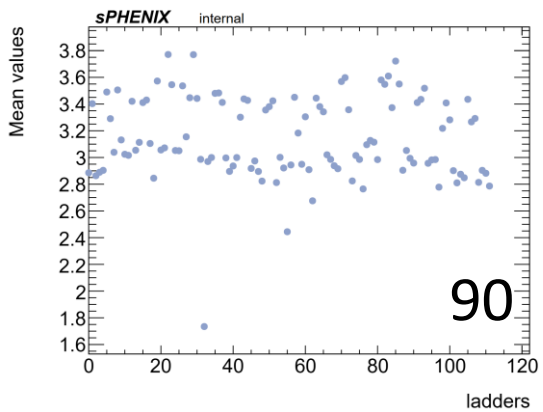
Open_time =

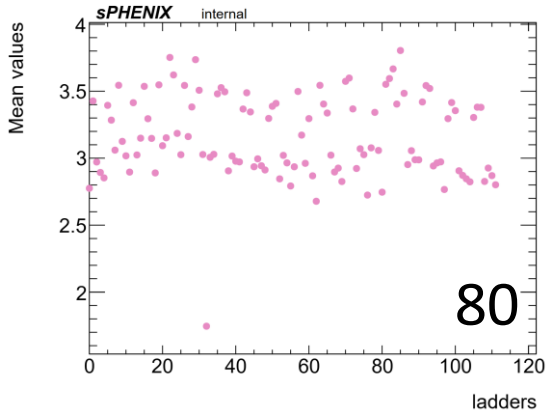
Chip Hits mean values per ladders (n_coll = 50)

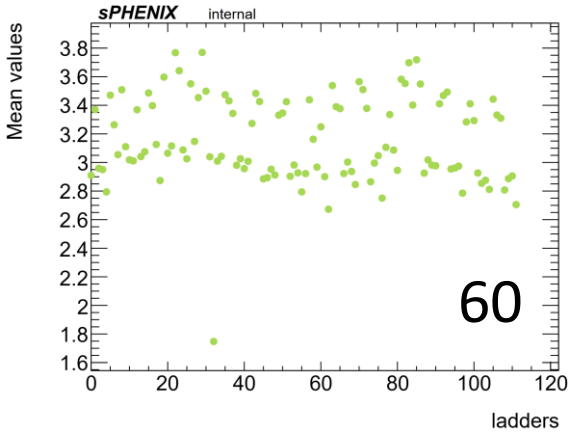
- Ladders = Felix_ID * 14 + Felix_channel_ID
- Similar result compared to n_coll = 100

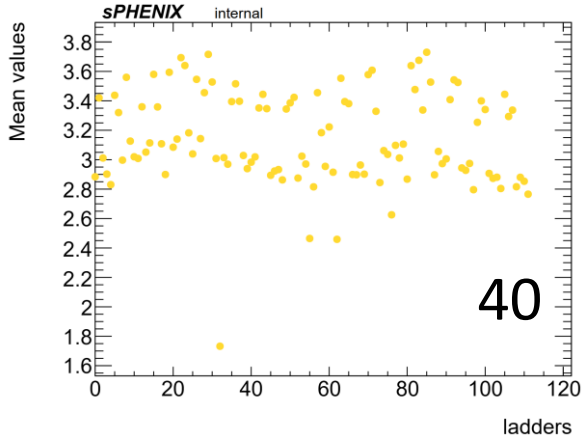


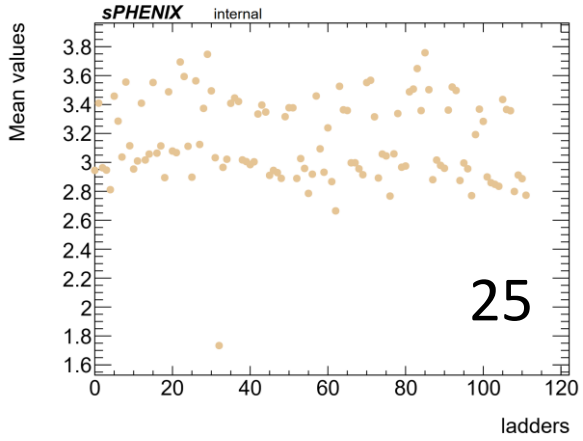












Open_time =

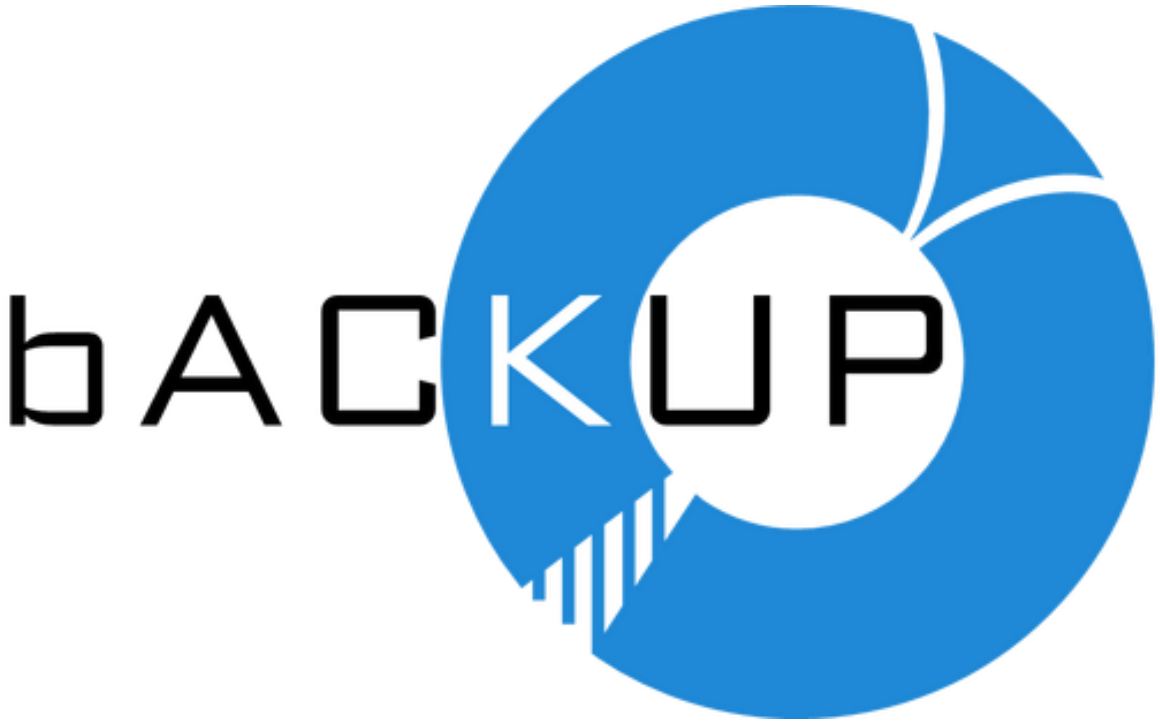
Summary

- All the plots of n_coll = 100, 2, 50 look similar
  → The problem is down to chip level. That is, the saturation issue cannot be solved by adjusting n_coll and open_time

- ADC distributions of chip total hits >= 68 are still different from that of < 68

To-do:

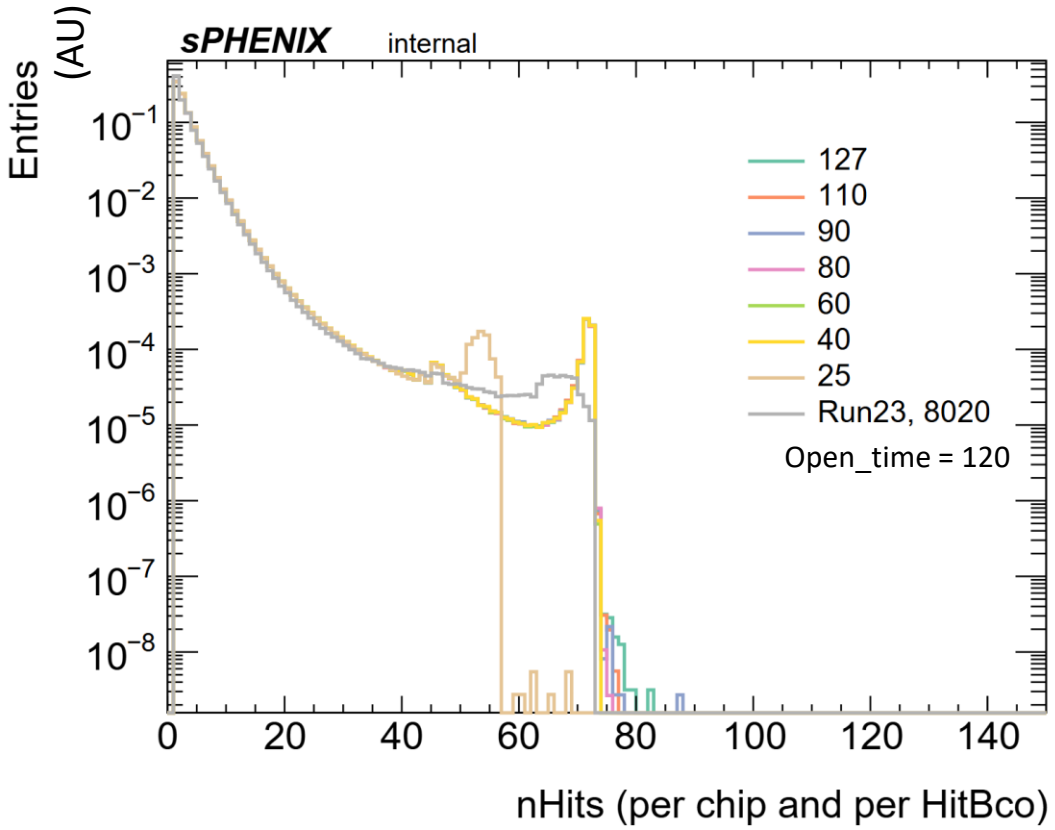
- Run pp data (after IS2025) to check the saturation as a function of multiplicity

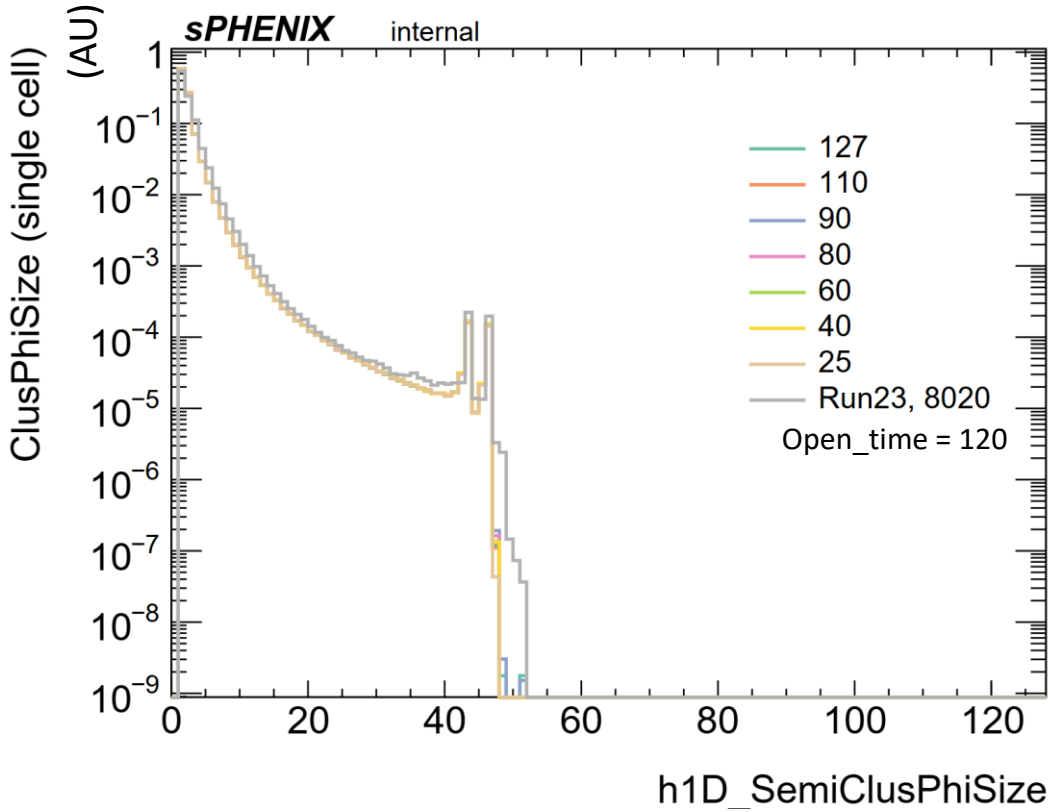

bACKUP

N_coll = 100, diff. open_time

- Same result as Ryotaro's for the nHits part: open_time = 25 has diff. shape
- Cluster size -> all the same with diff. open_time

Stack all chips



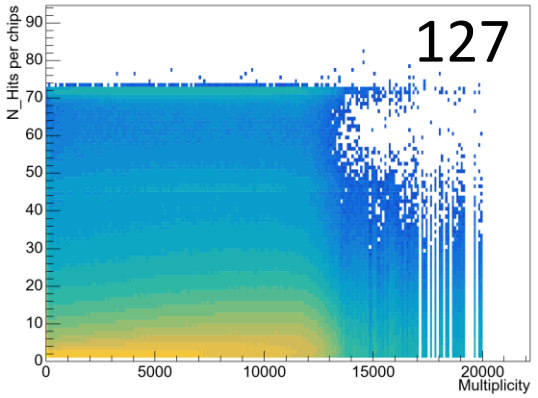


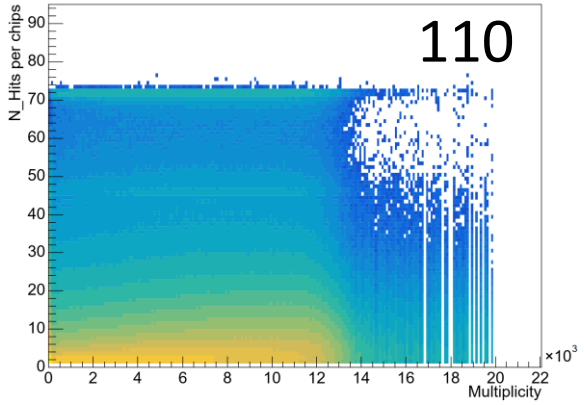
nHits vs. multiplicity

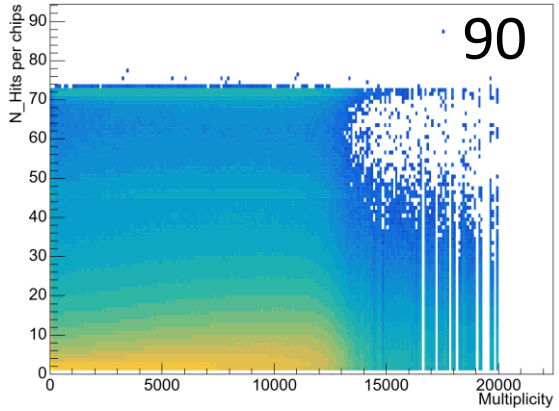
- nHits (per chips per bco) vs. multiplicity (total hits per bco)
- Multiplicity seems to be nothing to do with the saturation issue

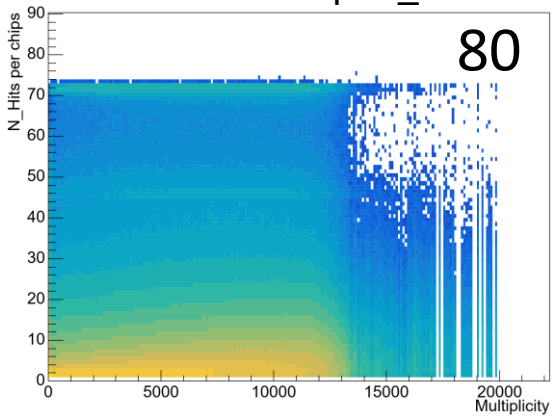
Include all chips

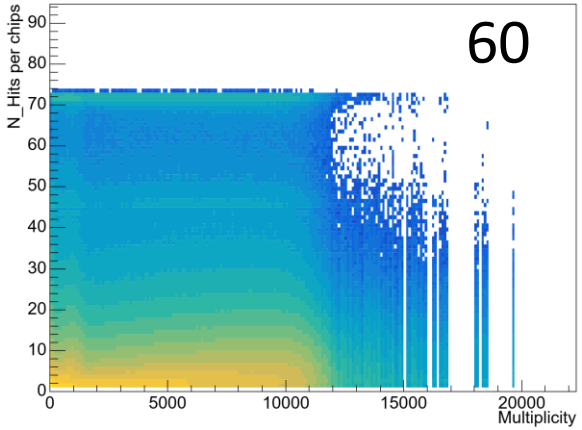
Open_time =

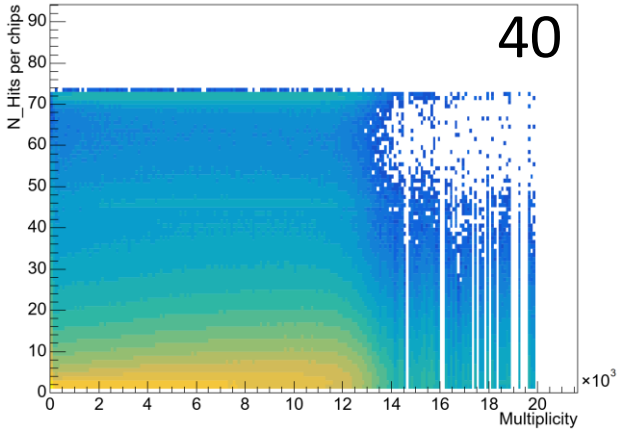


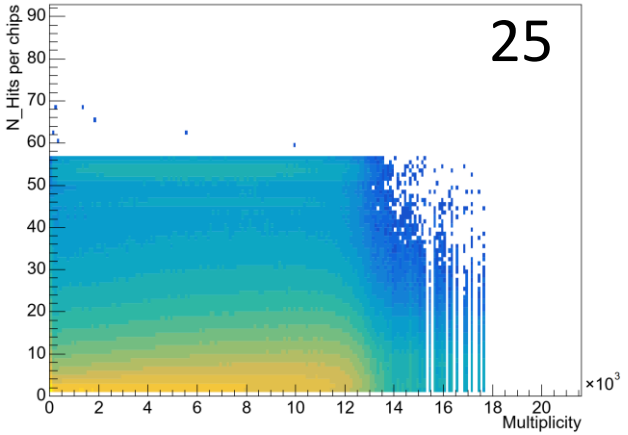












Cluster Phi size vs. multiplicity

Include all chips

- Cluster size vs. multiplicity (total hits per bco)
- Multiplicity seems to be nothing to do with the cluster phi size distribution

Open_time =