INTT Overflow Flag Analysis

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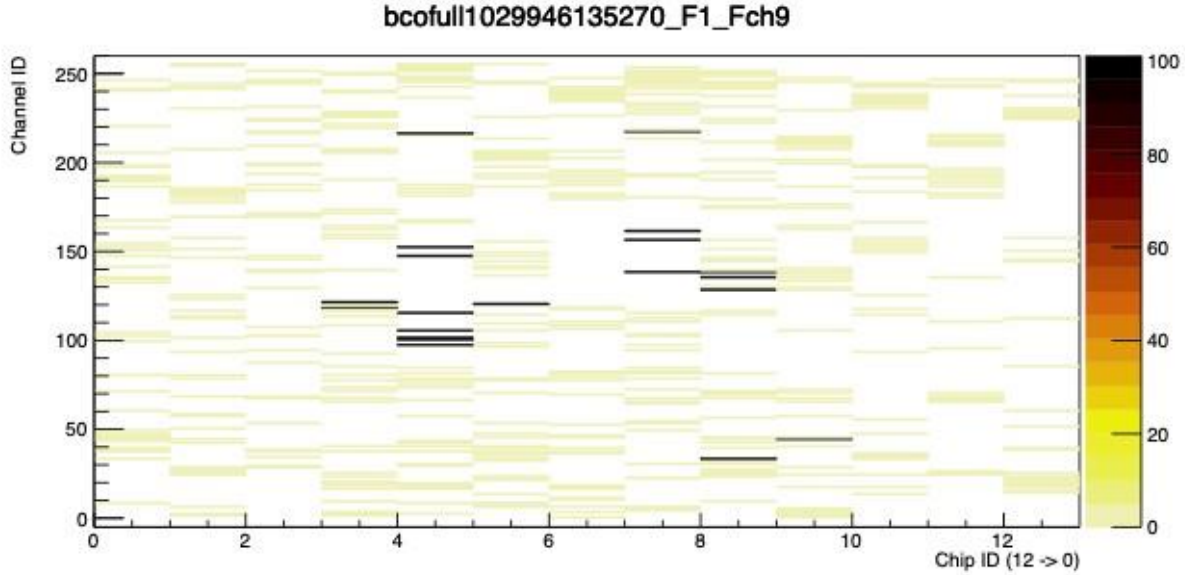
About me

- I am Shan-Yu Chen, third year student from National Central University
- Joined Ming's group in last summer

- An additional things is that…
  I am a fan of Los Angeles Dodgers!

Overview

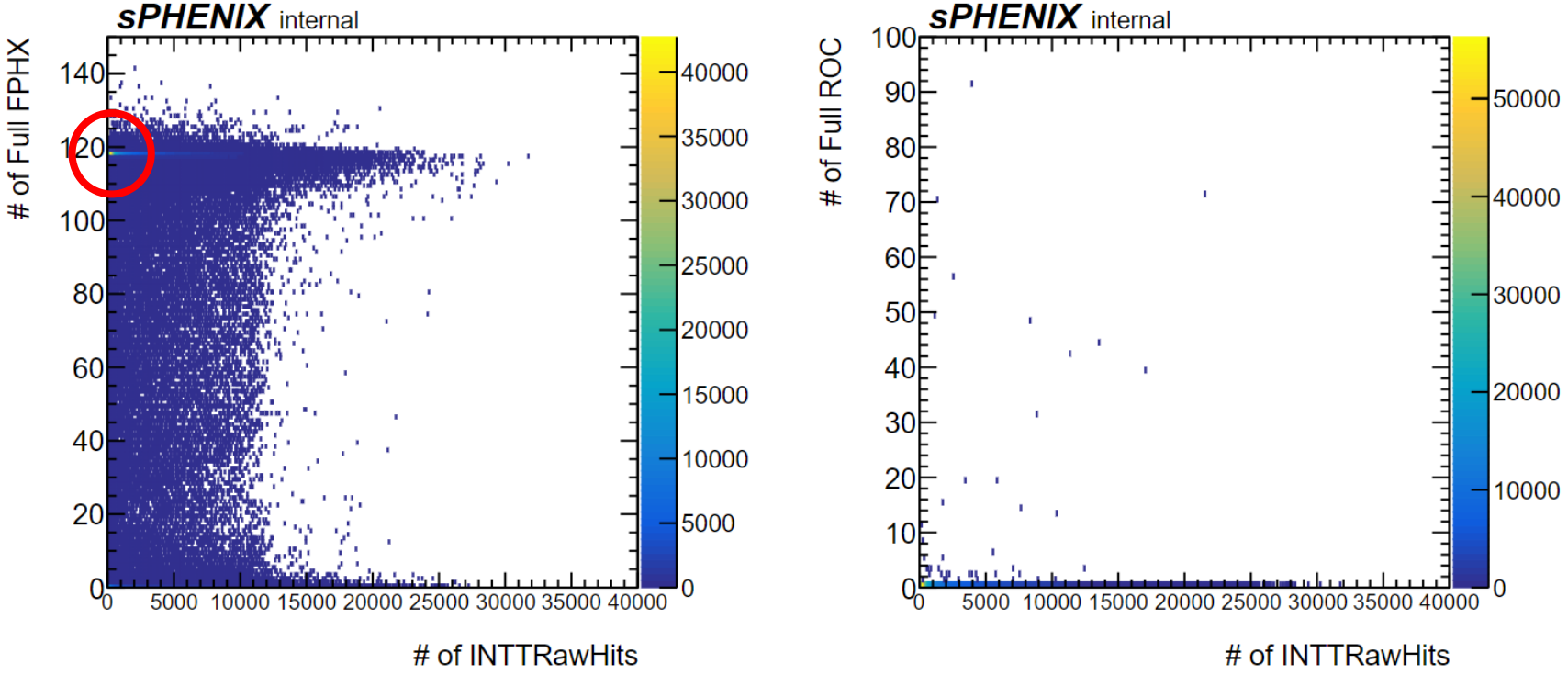
- There are overflow flags found in current INTT data as shown by Cheng-Wei
- We aim to understand which part of our detector it happened, how often it happened and under what conditions it happened
- The final goal is to understand whether it is an “issue” or not. If it is, what is the cause?
- Data of Run 54280 taken in 2024 Au+Au collisions is used (1.63M/10M analyzed)
  - Triggered readout mode, ncollision = 100
  - No bad channel masked -> study the chip performance



(back entries: hits with FullROC fired)

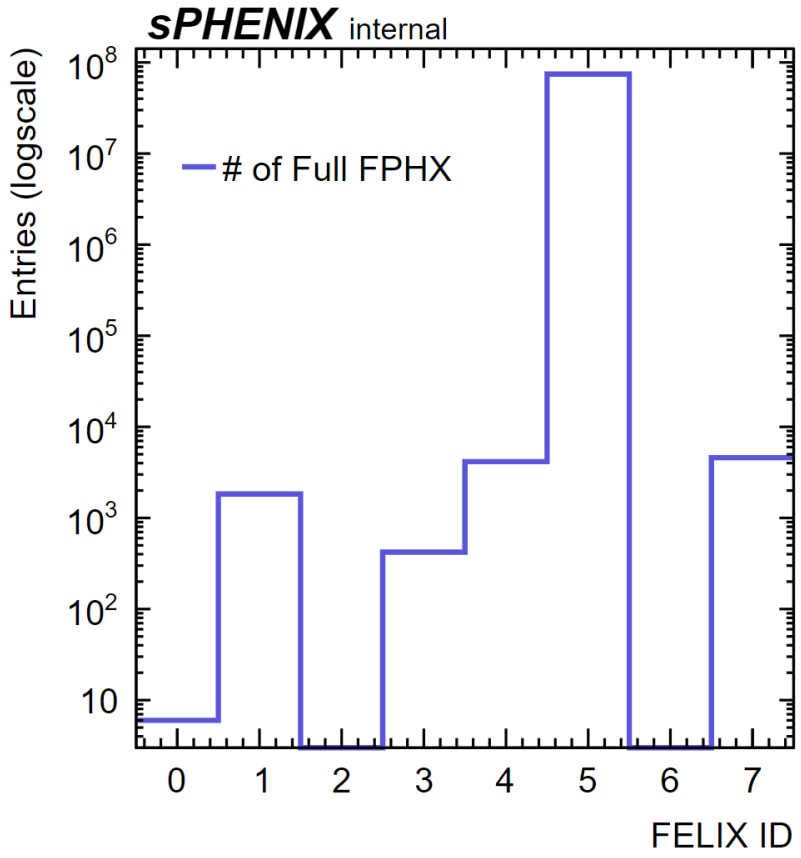
Overflow vs. total hits

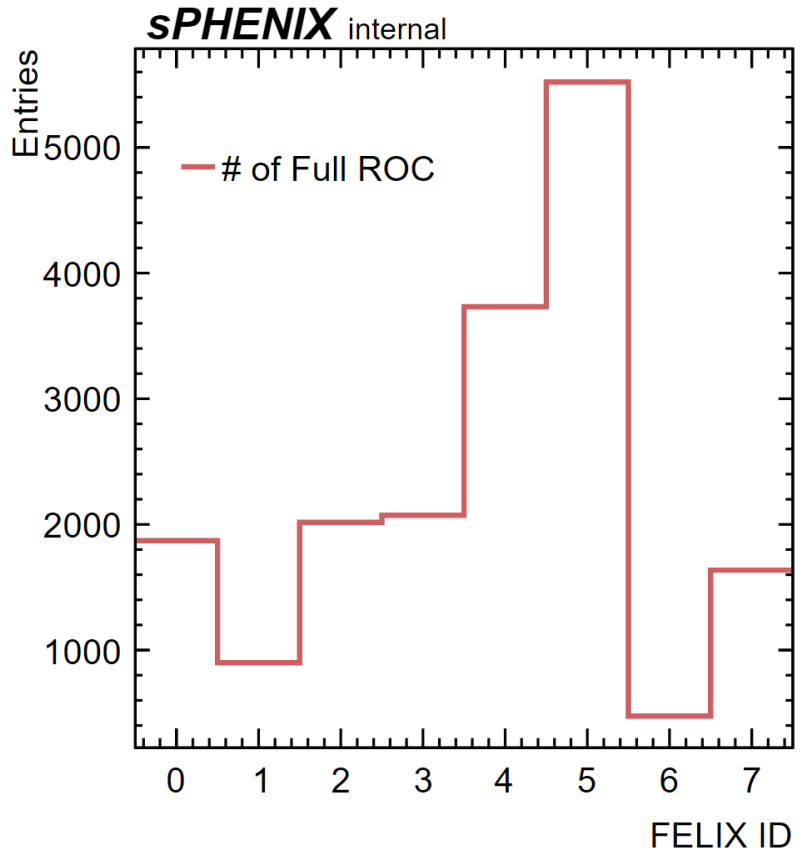
- Full FPHX: a hit with the flag issued by FPHX chip
- Full ROC: a hit with the flag issued by ROC
- Peak appears at 118 of # of Full FPHX, could be due to hot channels
- Full FPHX: no clearly linear correlation of overflow vs. total hits
- Full ROC: seems to have positive correlation, cannot conclude due to low entries, which is good!



Overflow vs. FELIX ID

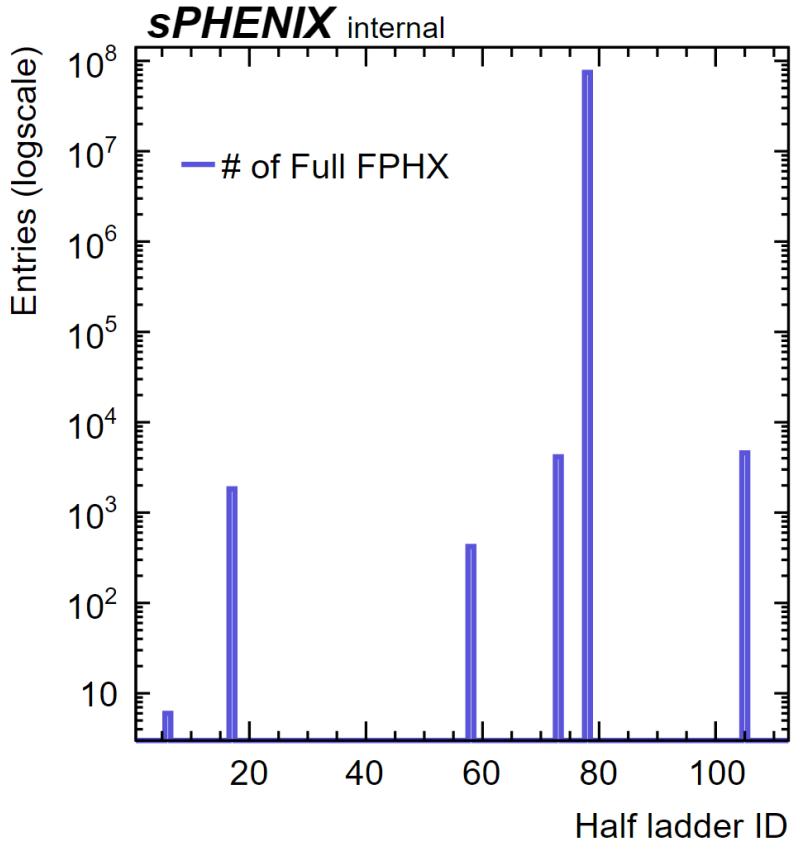
- Full FPHX: not all the FELIXs have hits with flags triggered

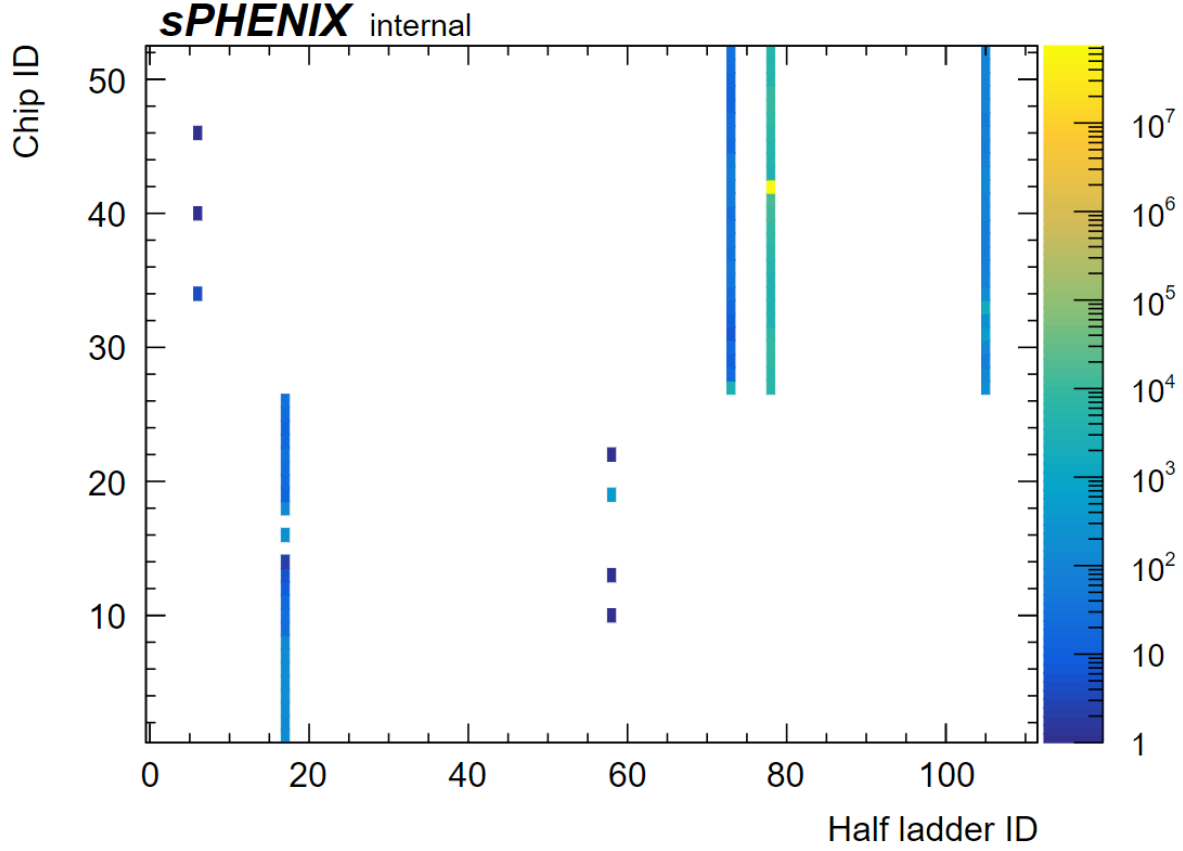




Chip overflow

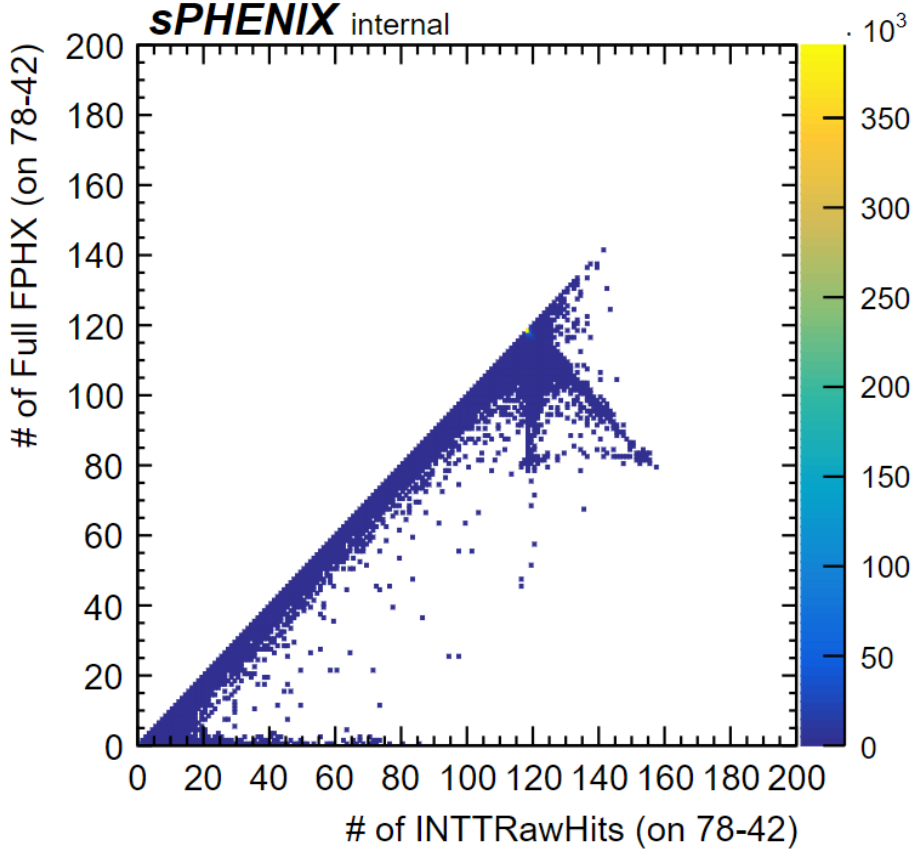
- Half ladder ID = (packet ID – 3001) * 15 + fee ID
- There is a peak at half ladder 78 and chip ID 42

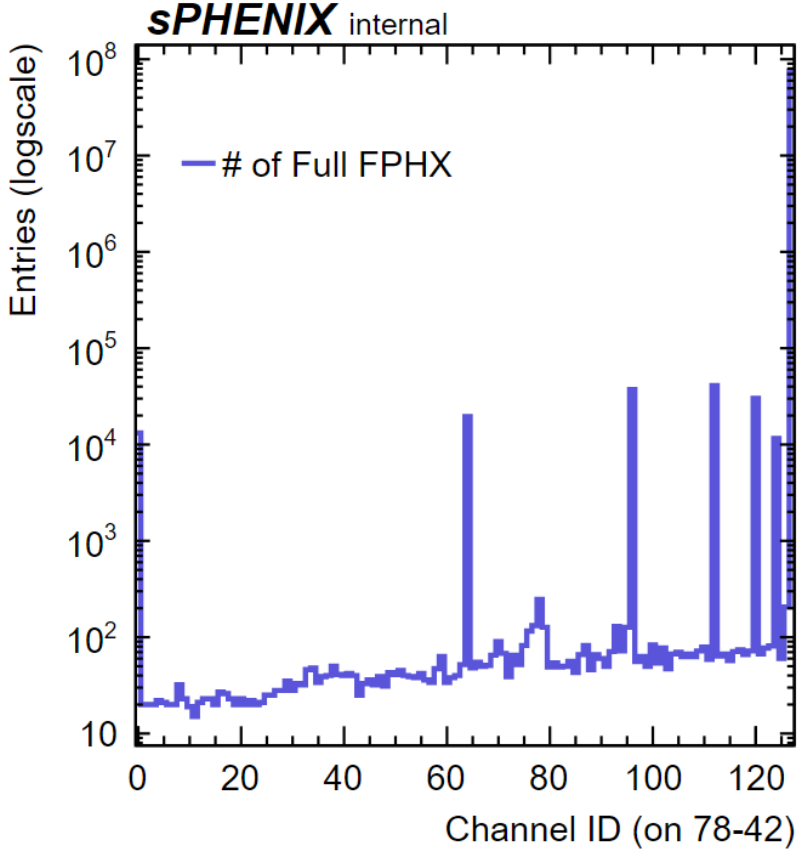




Focus on chip 42 of half ladder 78

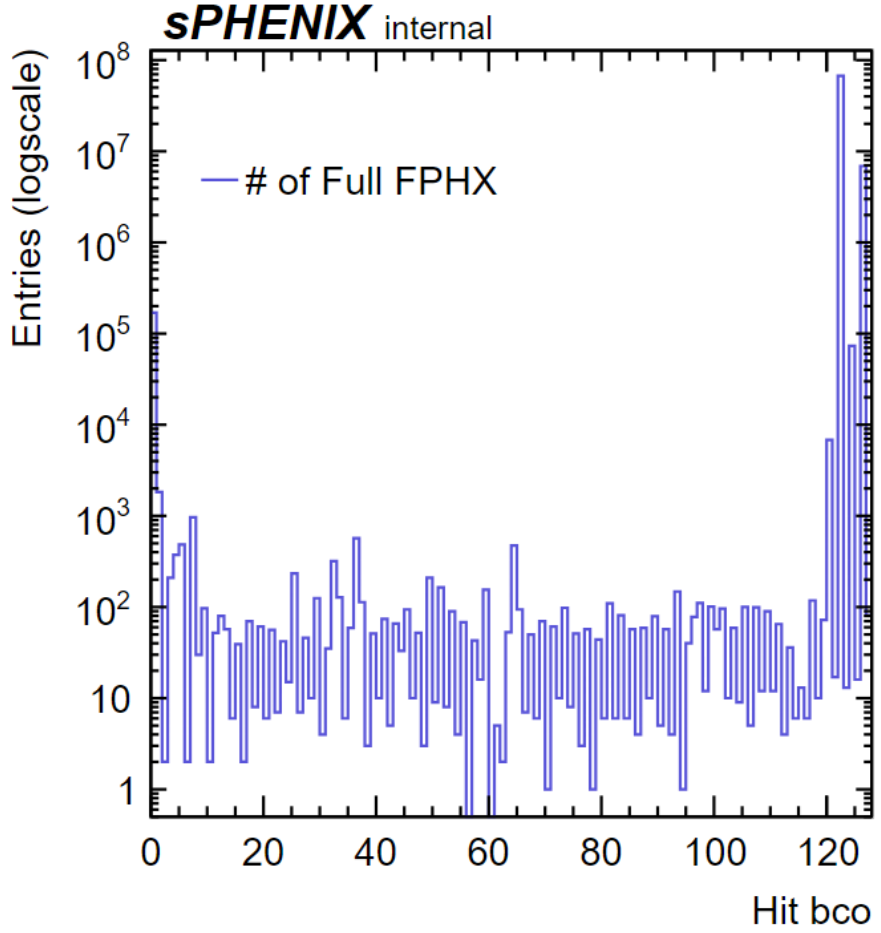
- A positive correlation between Full FPHX and total hits on that chip (called 78-42)
- Some channels on 78-42 are hot!

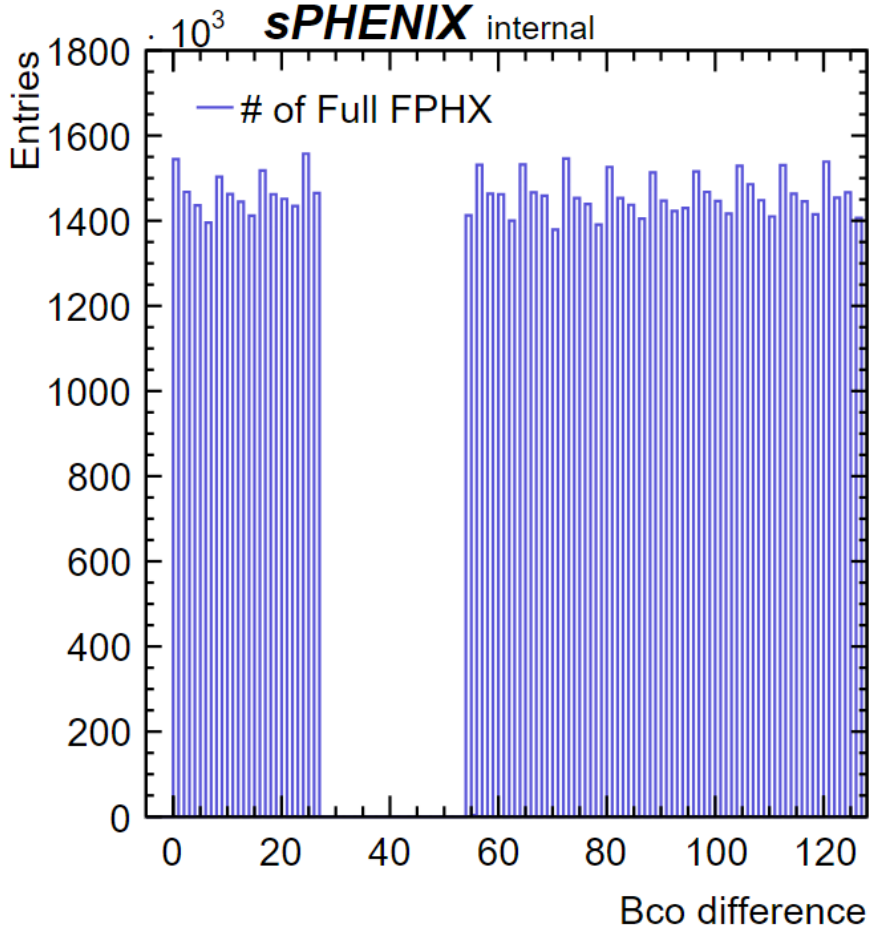




Hit bco & bco difference (FPHX)

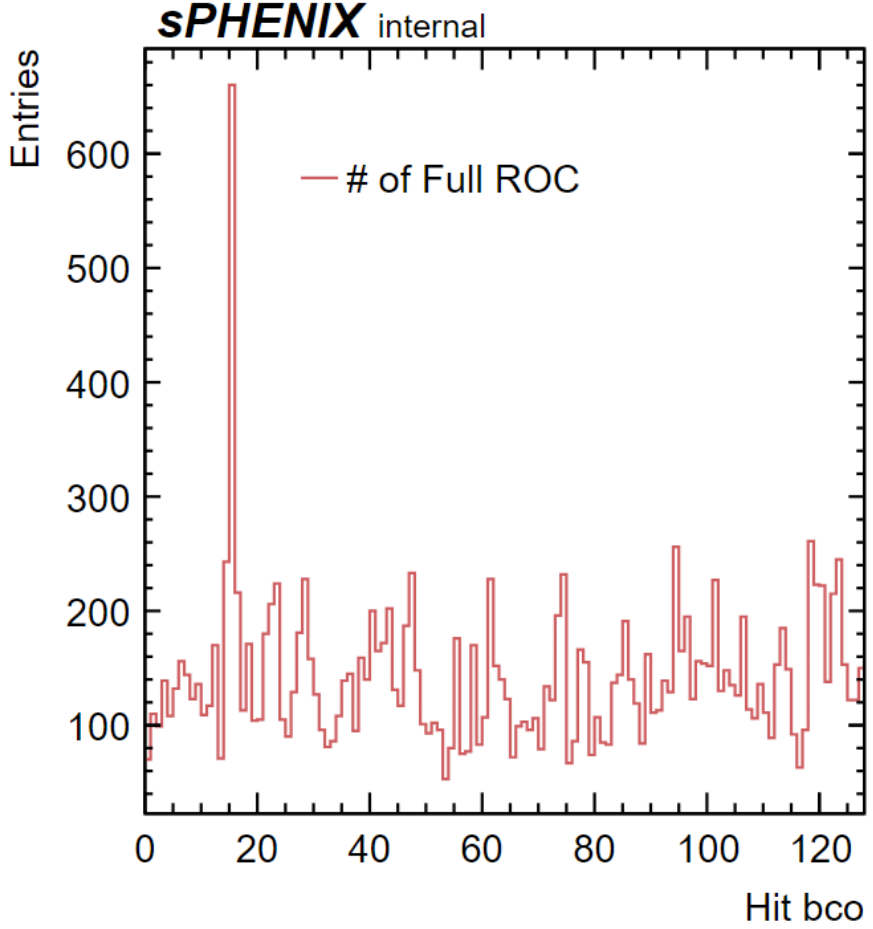
- Bco diff. = (hit bco – (full bco&0x7fU) + 128) % 128

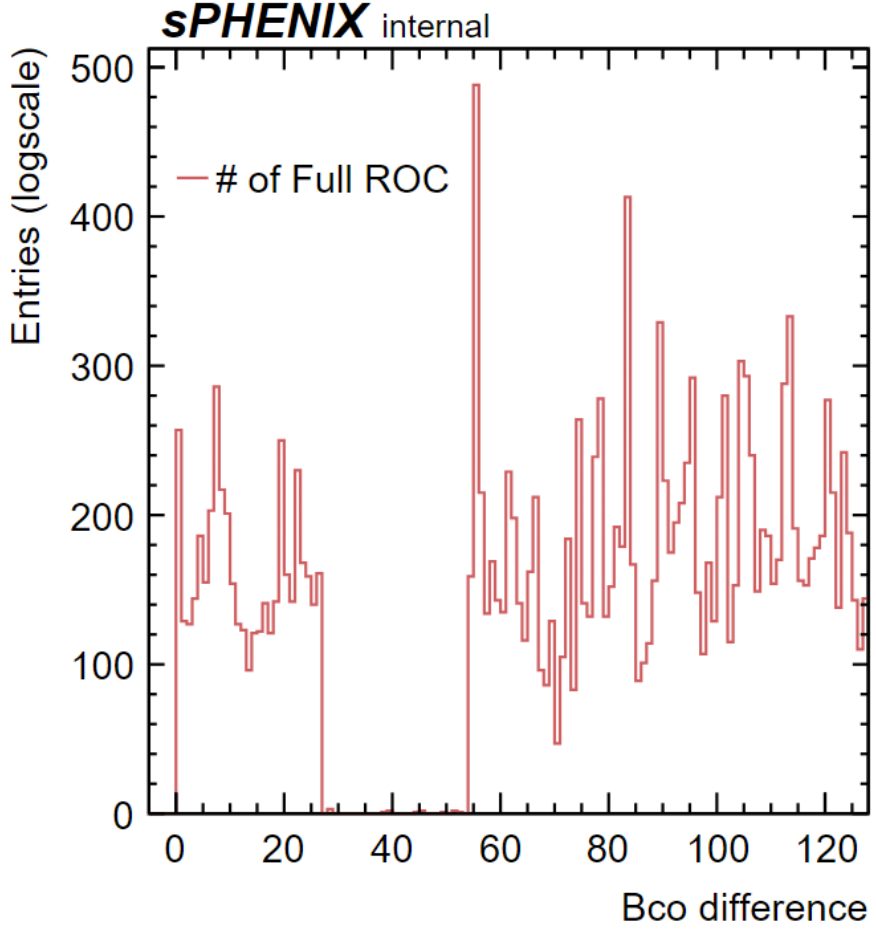




Hit bco & bco difference (ROC)

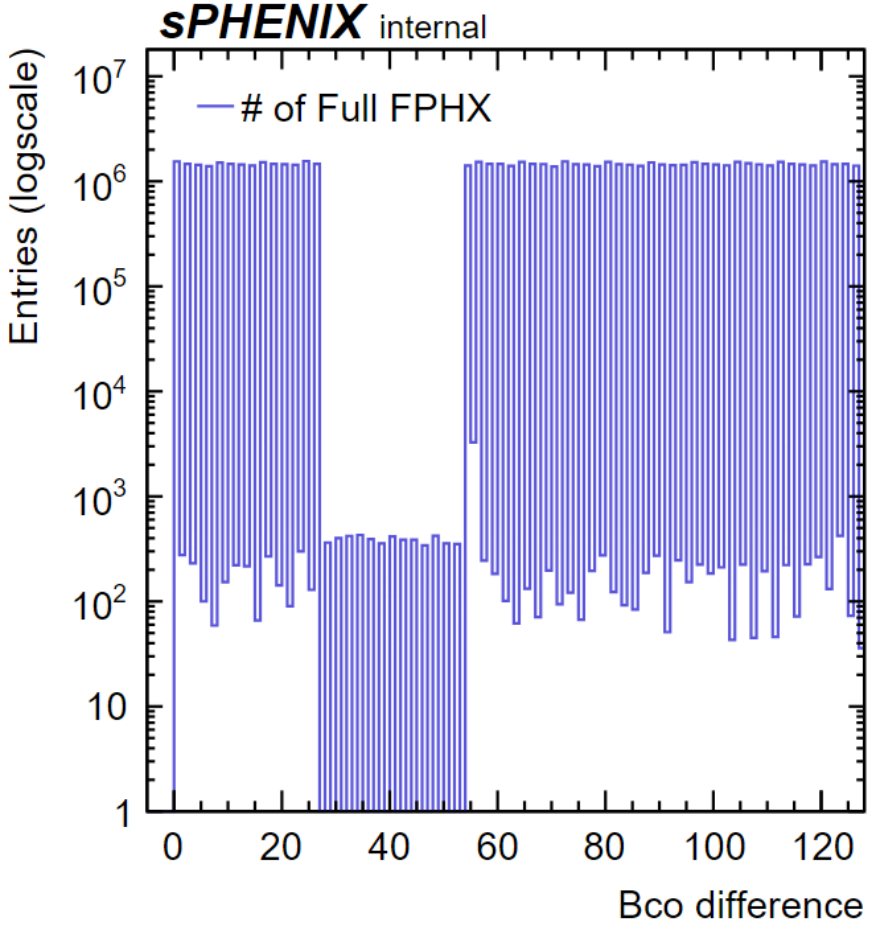
- Bco diff. = (hit bco – (full bco&0x7fU) + 128) % 128

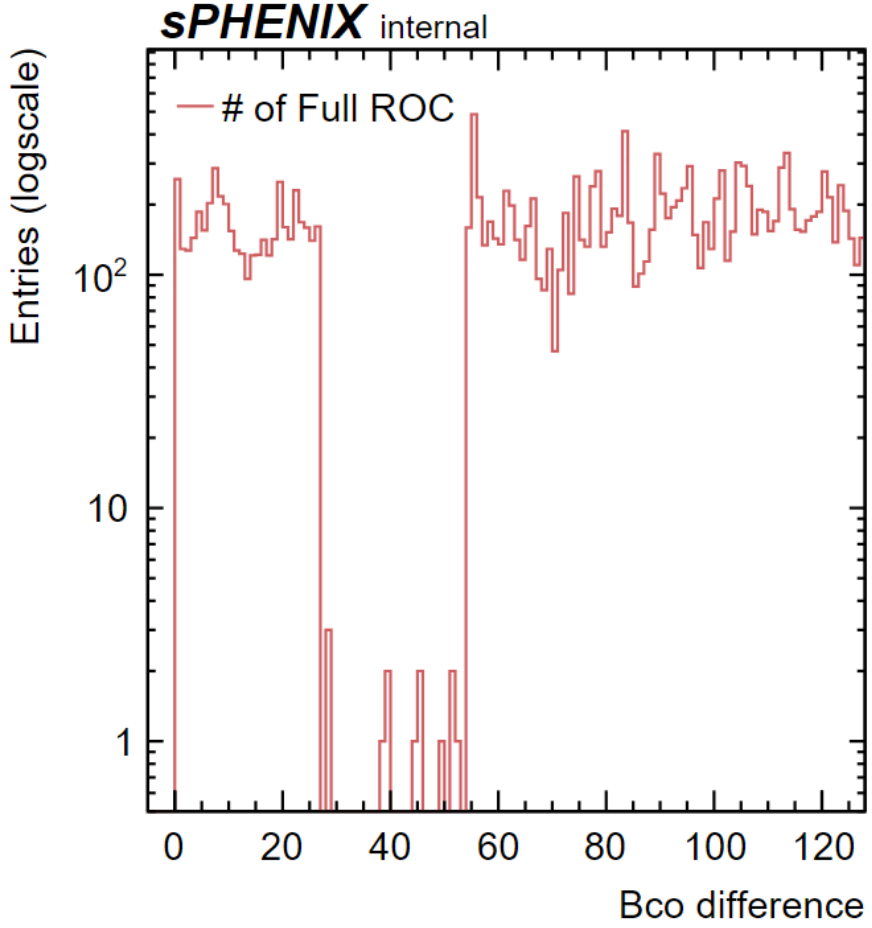




Bco difference (log)

- Also show logscale plots



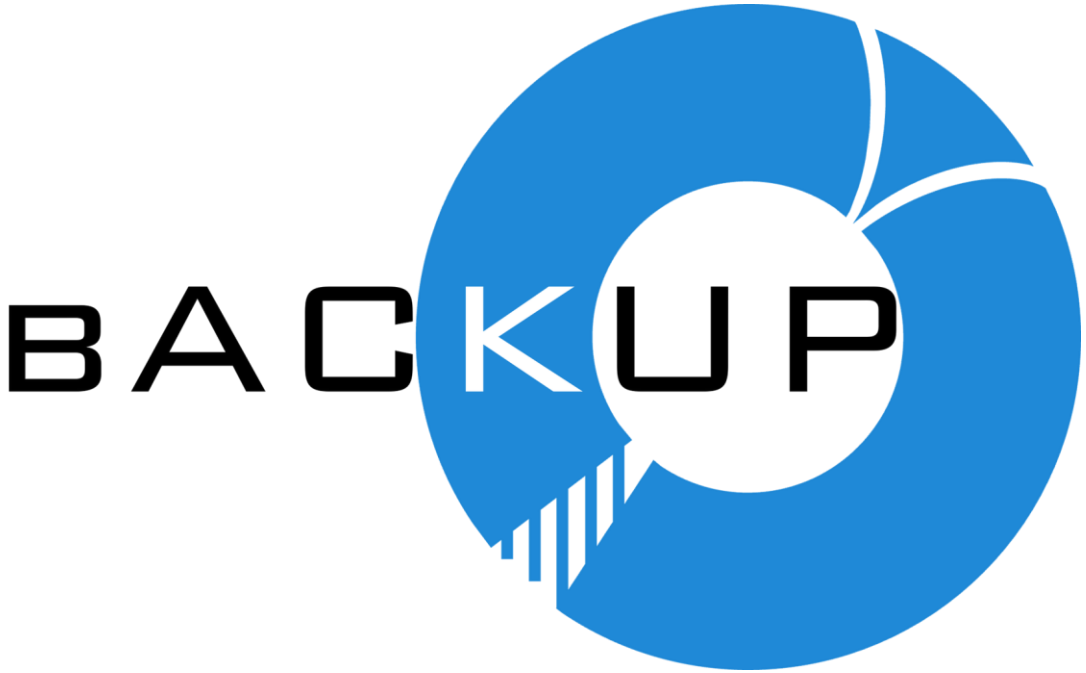


Summary

- No clear correlation observed in # of Full FPHX vs. # of INTTRawHits
- The # of Full ROC seems to have correlation with # of INTTRawHits
  - Not clear due to low entries, which is good
- The Full FPHX happens on certain half ladders, especially ID 78.
  - On half ladder 78, chip ID 42 is the hottest one, causing most of overflows.

To-do:

- Check the flag behaviors vs. event bco space


BACKUP

Overflow vs. ROC ID

- There is still a peak of Full FPHX