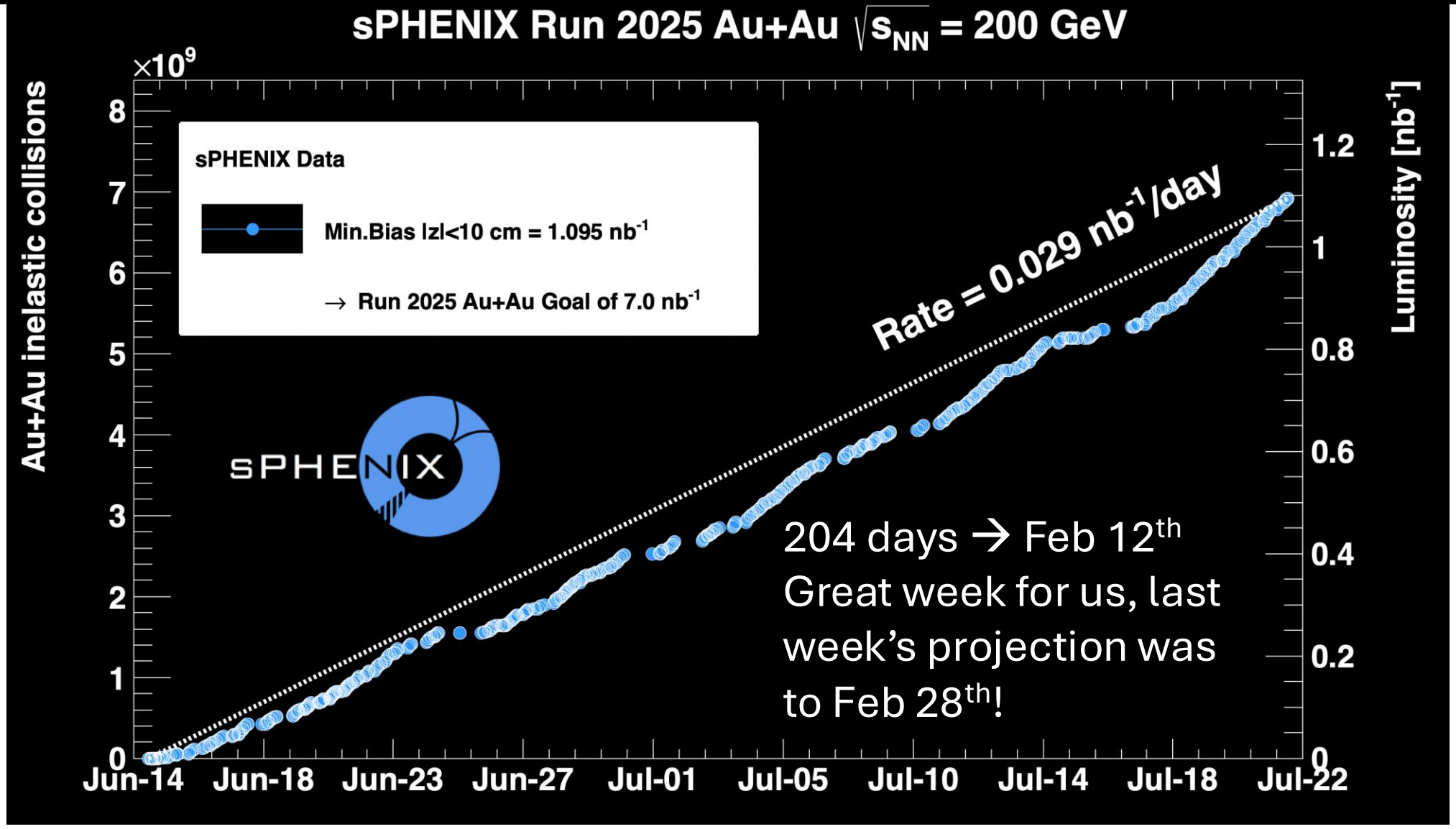
sPHENIX Status
RHIC Coordination

July 22nd, 2025

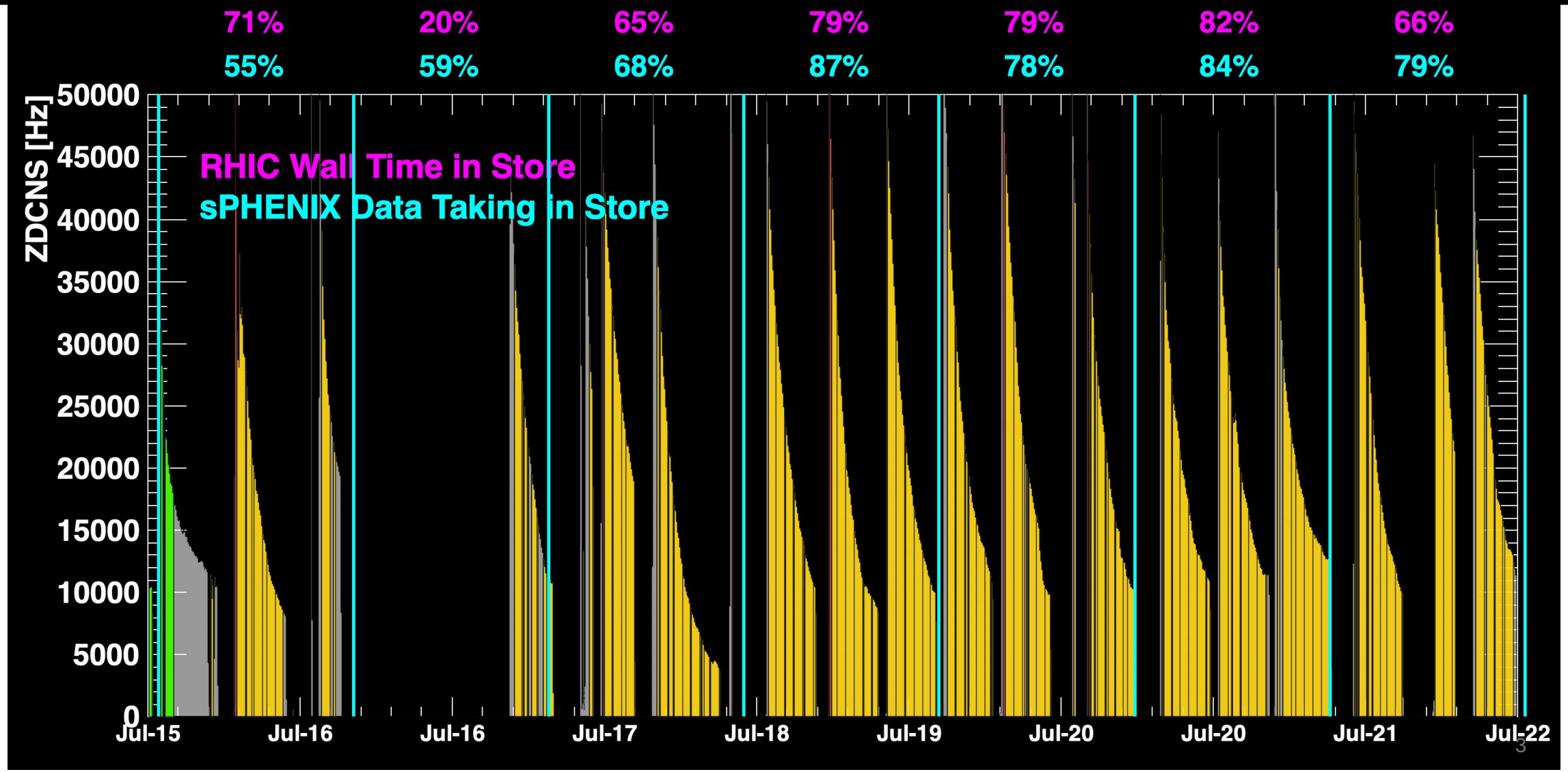
Rosi Reed
Lehigh University
sPHENIX Run Coordinator

Ron Belmont
UNC Greensboro
sPHENIX Deputy Run Coordinator

sPHENIX Luminosity



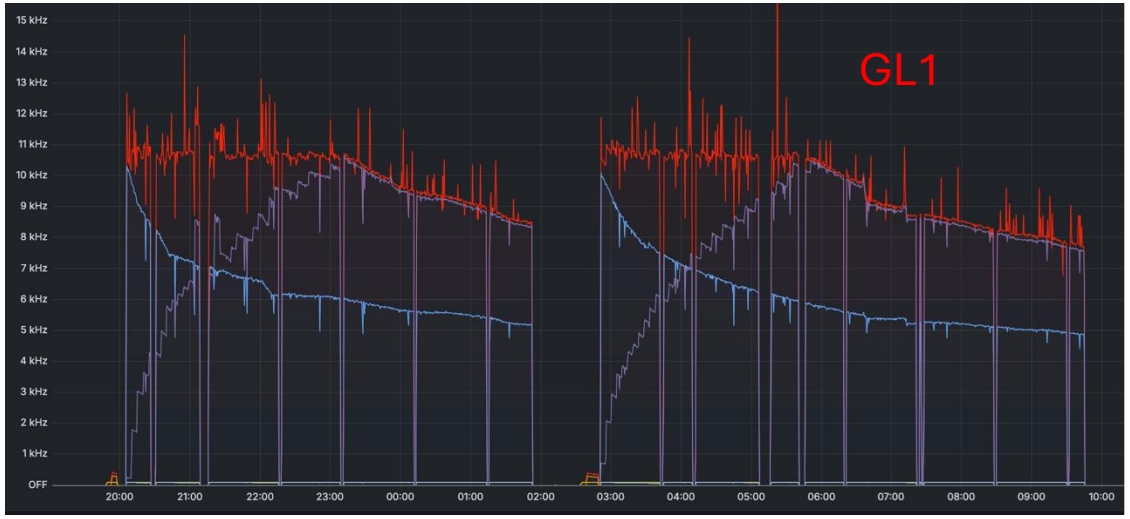
sPHENIX Uptime



Data Transfer Rate

Bbox → HPSS

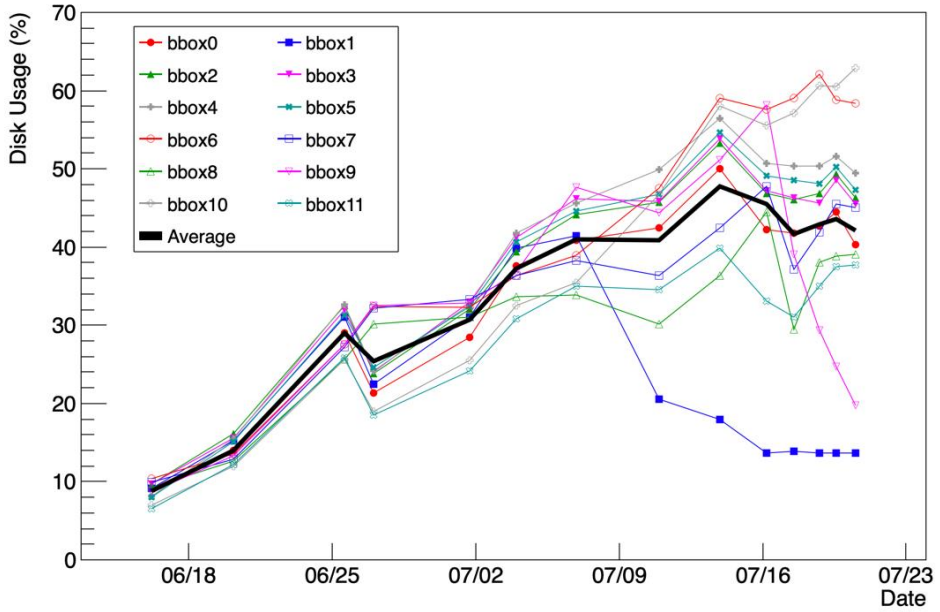
Bbox → HPSS+Lustre



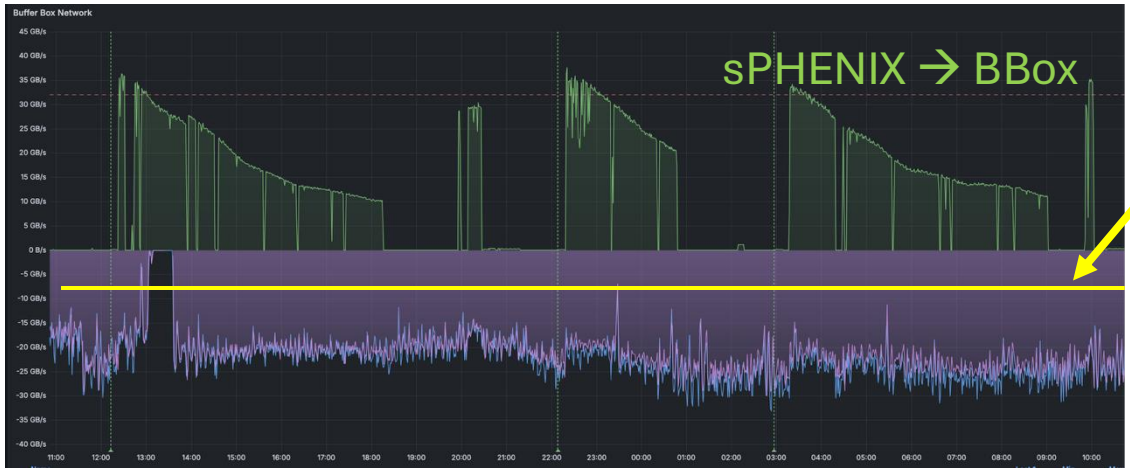
MBD Wide Opportunistic

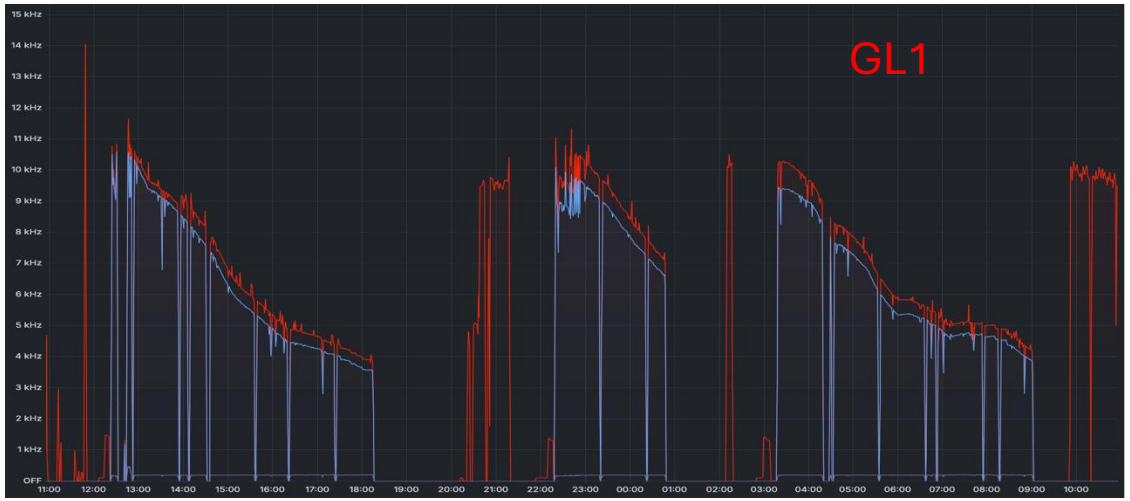
MBD Narrow Physics Program

- Needed to repair 2 (out of 12) bbox
- Throughput to HPSS had decreased
- Removed wide trigger temporarily



Data Transfer Rate





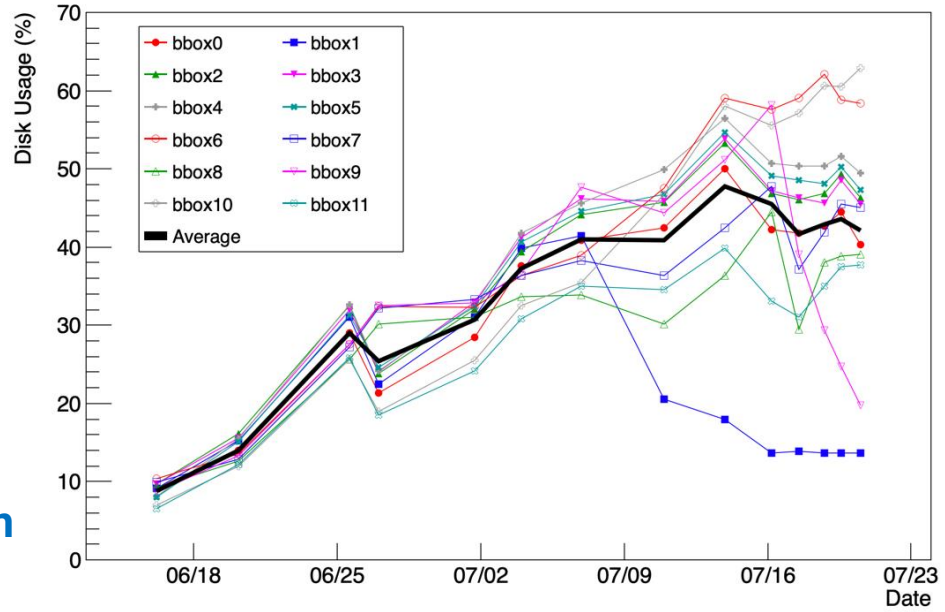
Bbox → HPSS

Bbox → HPSS+Lustre

MBD Wide Opportunistic

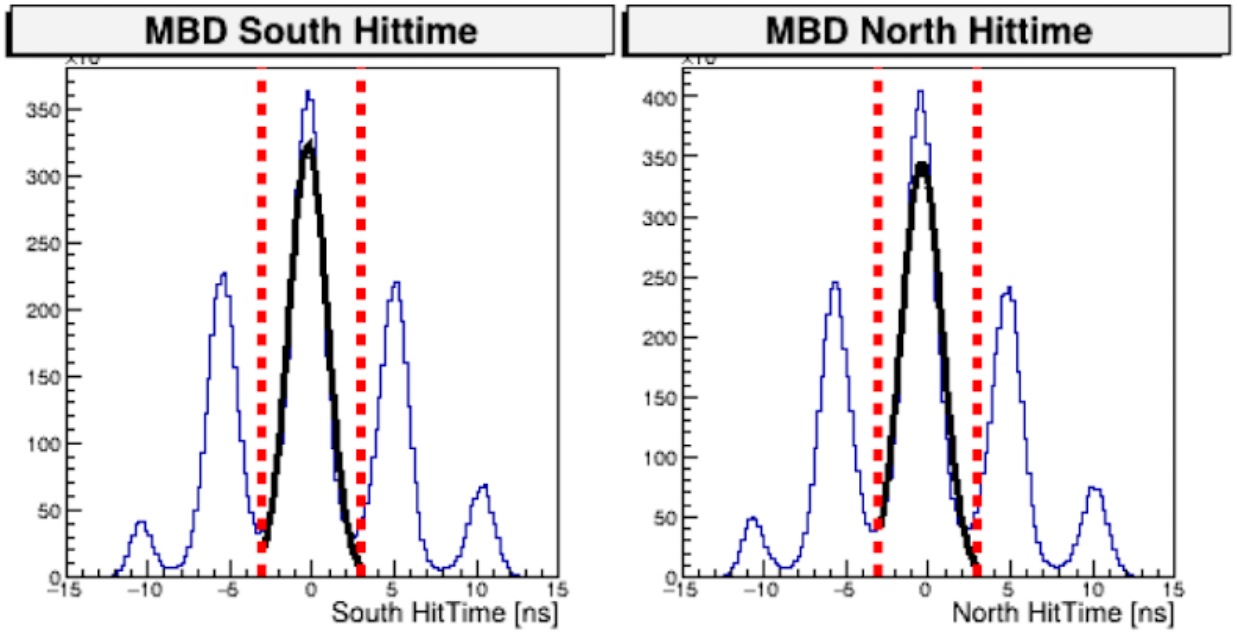
MBD Narrow Physics Program

- Comfortably sending more data to HPSS than recording
- After APEX we will reintroduce the wide trigger
- No hit to our physics program

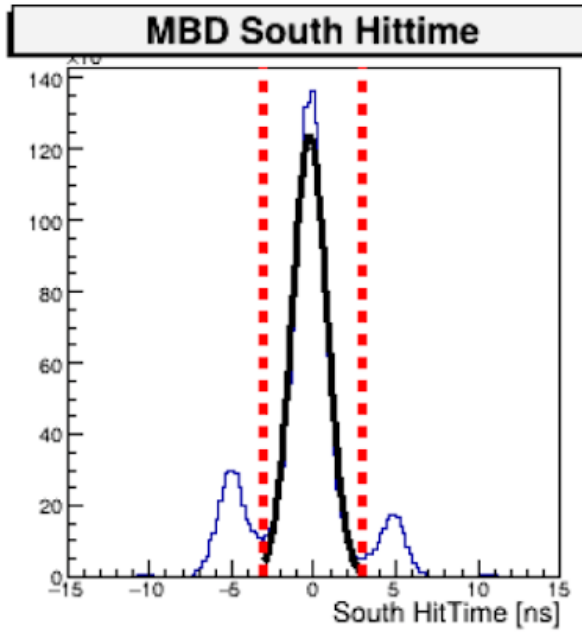


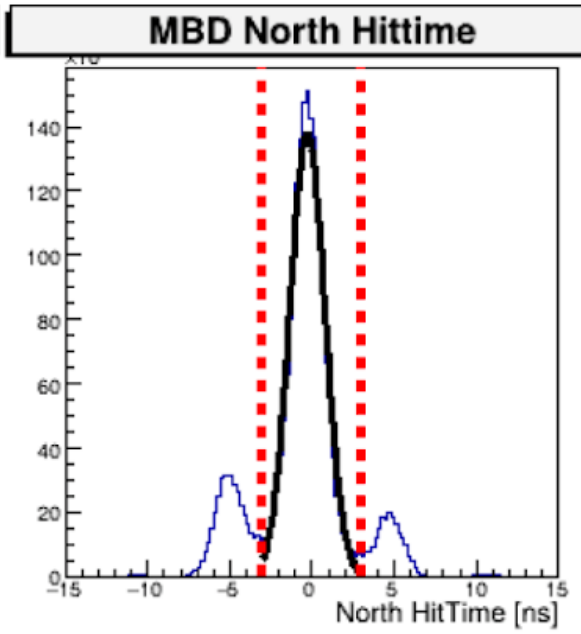
56 MHz

Run 69052 (no 56 MHz SRF)



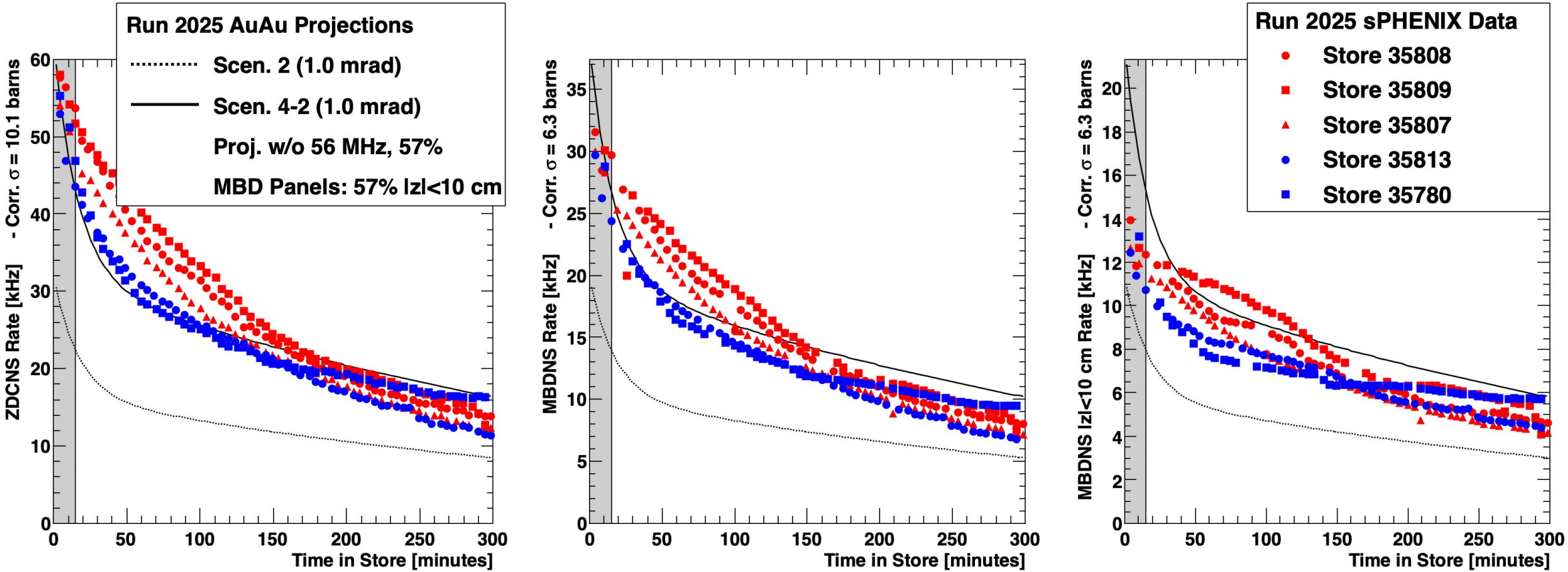
Run 69611 (56 MHz SRF at 500 kV)





We can clearly see when the 56 MHz Cavity is on

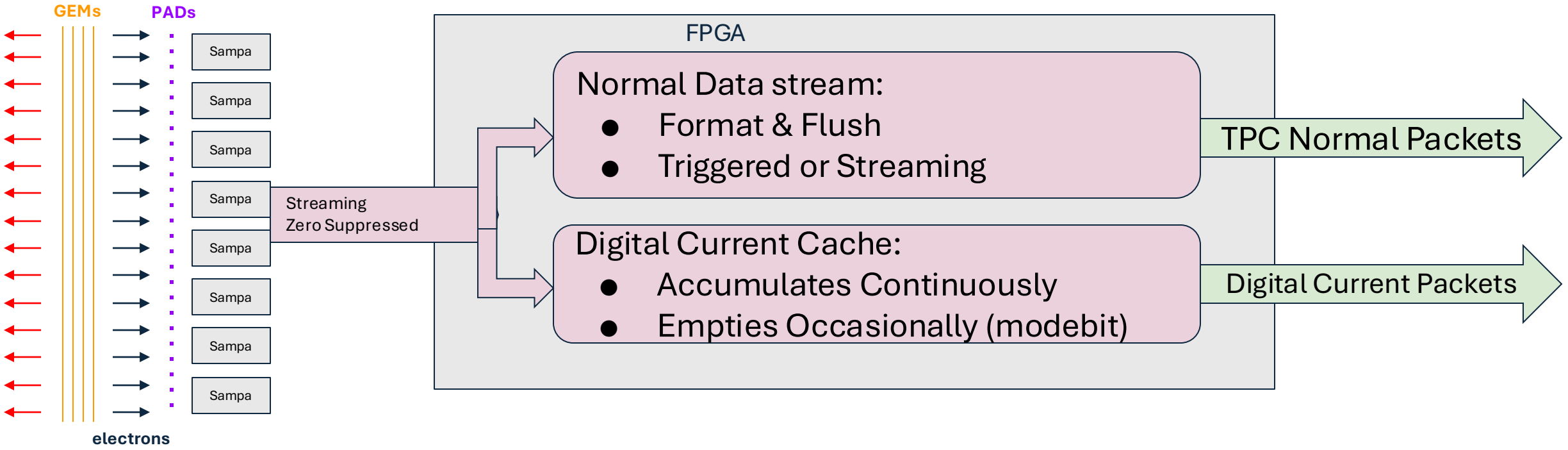
56 MHz Luminosity Comparison



~20% of increased rate at the start-of-store → With tuning it seems to drop to as good as previous stores

- Best case = 20% improvement, worst case = net neutral (potential for dropping beam, loss at end)

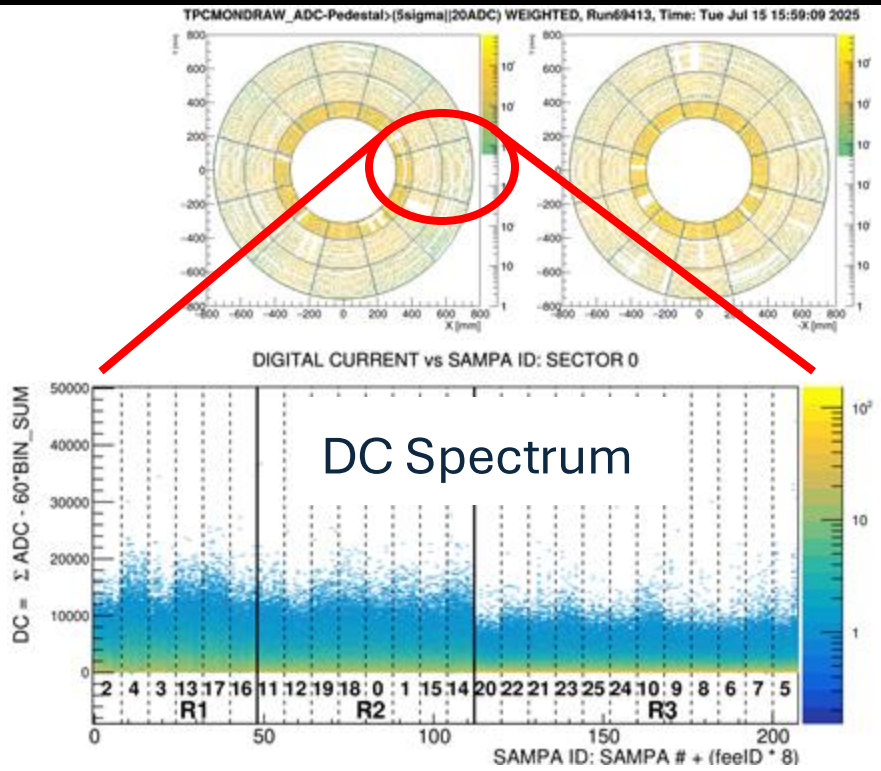
Overview of TPC Digital Current Operation



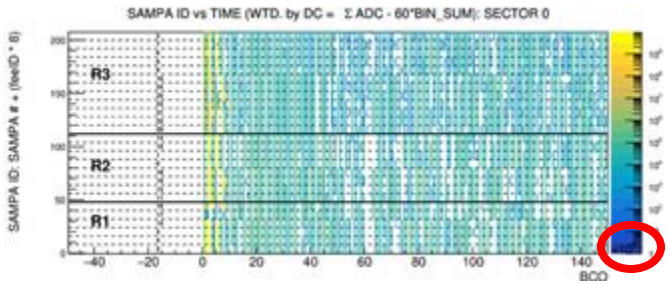
- **Ion Current** ~ 0.4% of **Electron Current** (via lab measurement)
- Continuously measure fluctuating electron current to infer ion current
- DC cache integrates pad-by-pad charge deposit over 1 ms (fraction of full ion drift time)
- Need to ensure:
  - DC data is valid (compare to streamed data at low rate)
  - Normal data is unaffected

TPC Digital Current Status as of 07/22/25

- All TPC FEEs programmed w/ v57 - DC capable (07/09/25)
- 100 % Streaming + DC enabled test (07/15/25)
  - Near end of fill, ZDC rate ~ 10 kHz
  - Taken to compare the normal stream to DC
    - Should be 1:1
- Analysis of 100 % streaming + DC enabled test (ongoing)
  - Online decoding of data is possible
    - Offline decoding is a work in progress
    - Needed for the 1:1 comparison



DC vs time (140E6 ~ 1.5 s ~ 18 ion drifts)



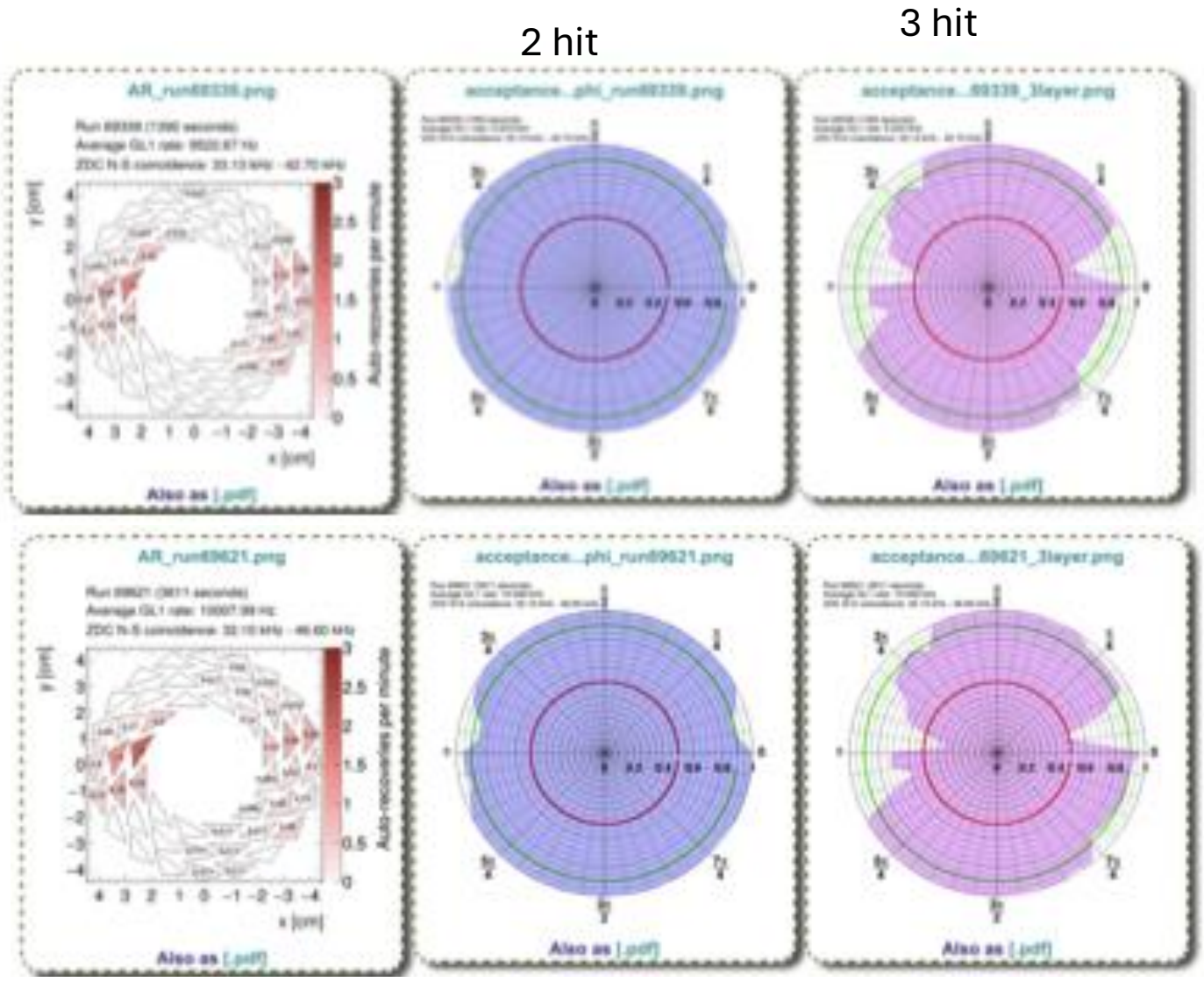
This week

- APEX → Last time we lost our phase lock, is it possible to keep it this time?
- Crossing angle scan will indicate data load versus MBD Narrow trigger rate, it will take a short while to analyze the data
- TPC Digital Current Analysis in process to confirm data integrity
- Improvements to our read-out to HPSS and repair of our errant bufferboxes decreased the total load on our bufferboxes
  - Return to opportunistic wide vertex triggers after APEX

The End

MVTX Background

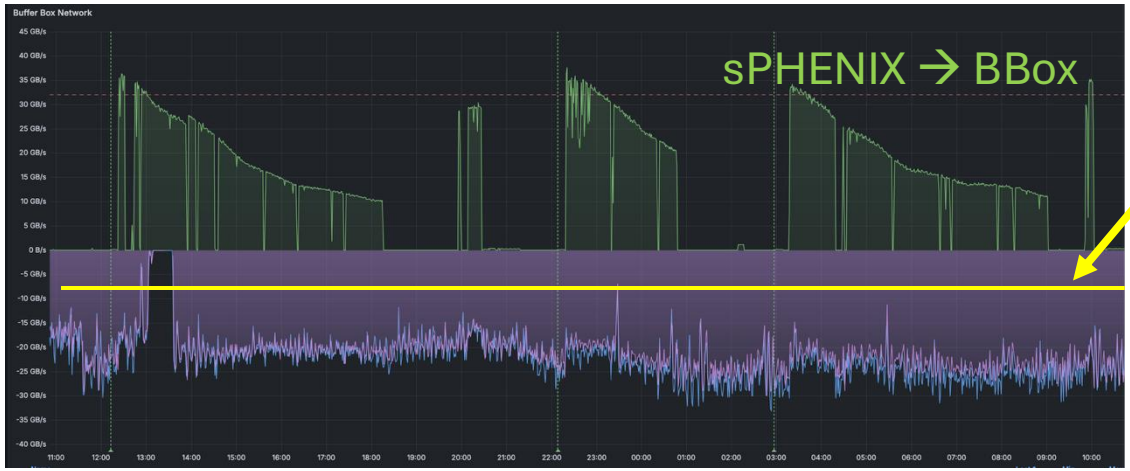
No evidence of a issue in the MVTX backgrounds



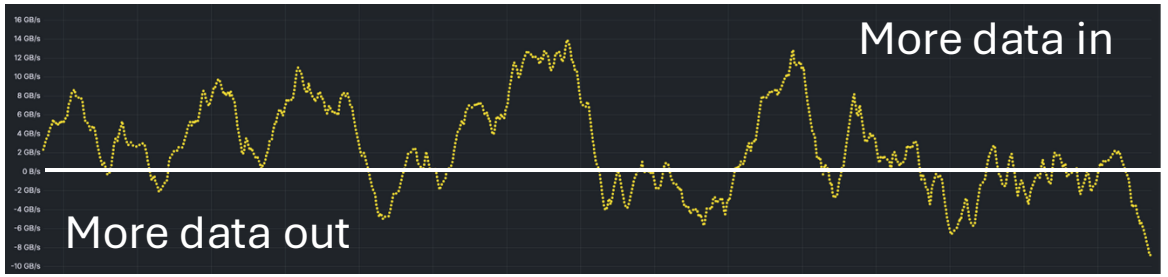
Fill 35780
56 MHz SRF off

Fill 35807
56 MHz SRF on at 500 kV

Data Transfer Rate



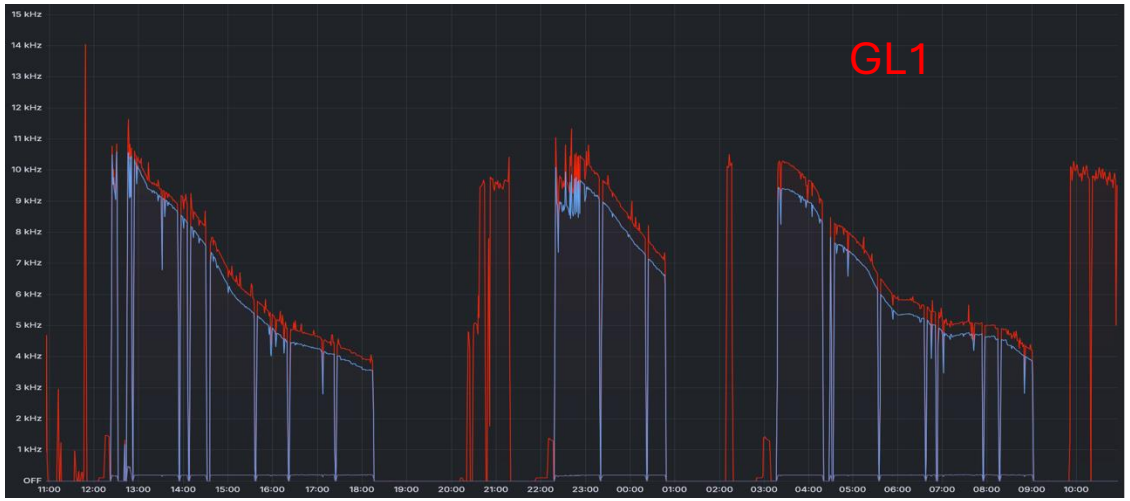
7/21 7/22



6/23 7/13 Today

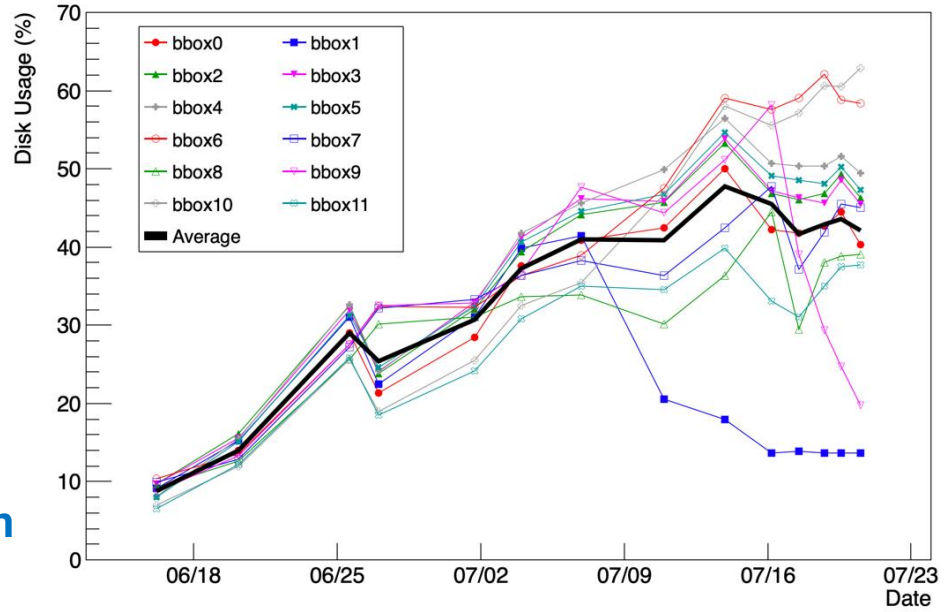
Bbox → HPSS

Bbox → HPSS+Lustre



MBD Wide Opportunistic

MBD Narrow Physics Program



Rosi Reed