sPHENIX Status
RHIC Coordination

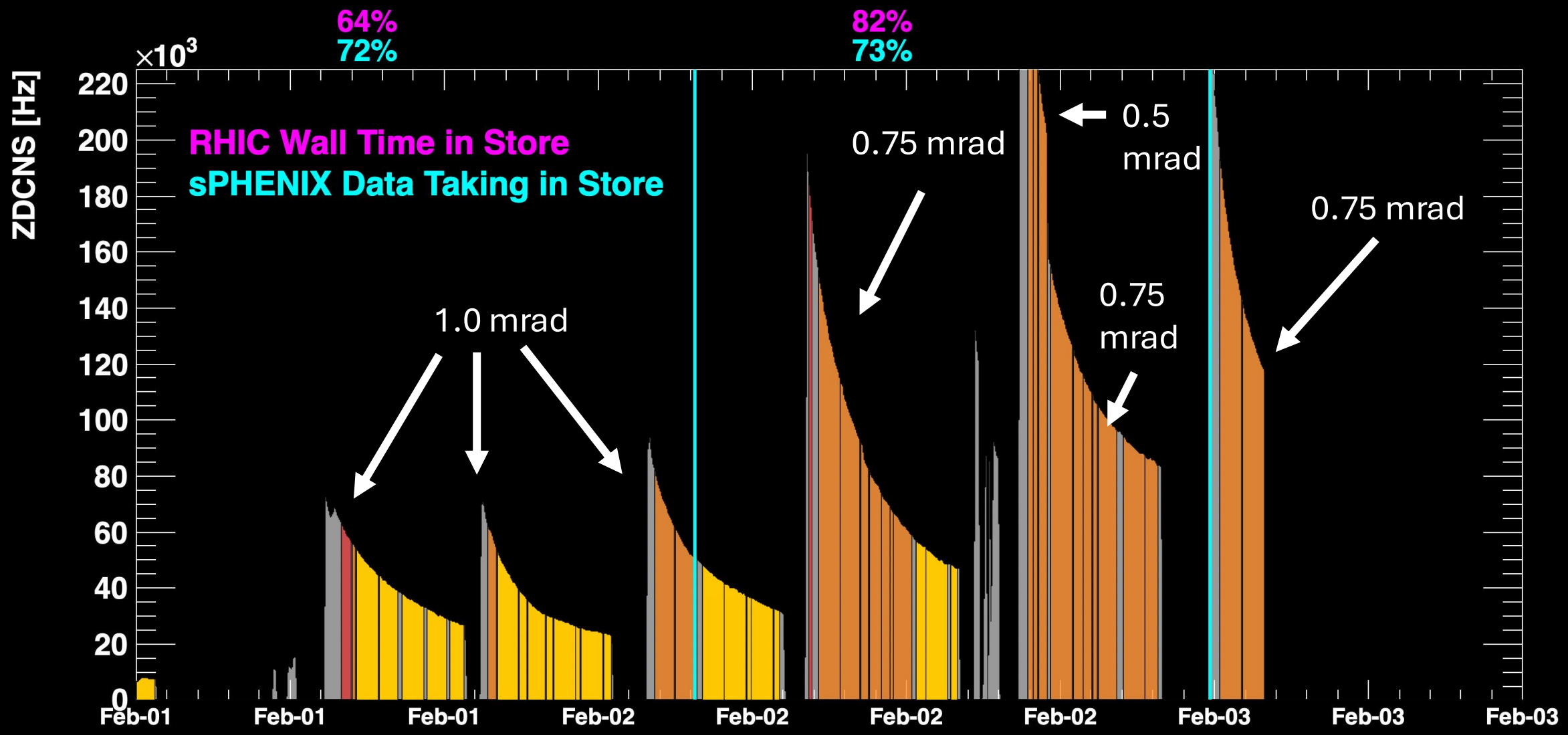
February 3rd, 2026

Rosi Reed
Lehigh University
sPHENIX Run Coordinator

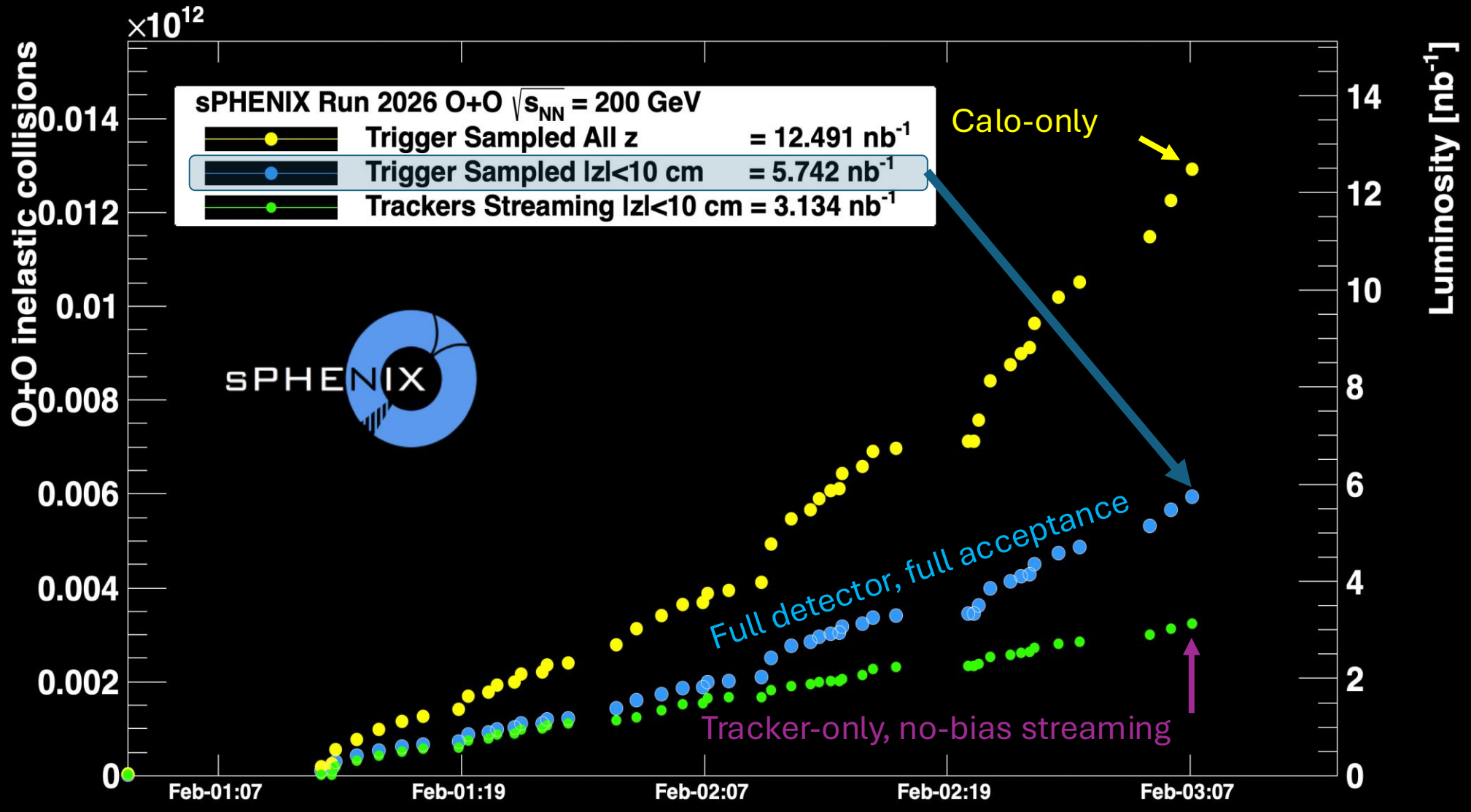
Ron Belmont
UNC Greensboro
sPHENIX Deputy Run Coordinator

No TPC
Triggered data
Streaming data

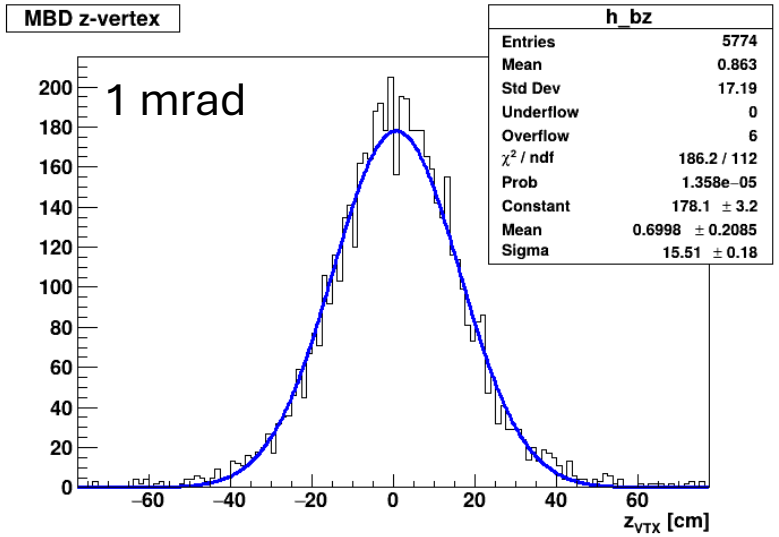
sPHENIX Performance

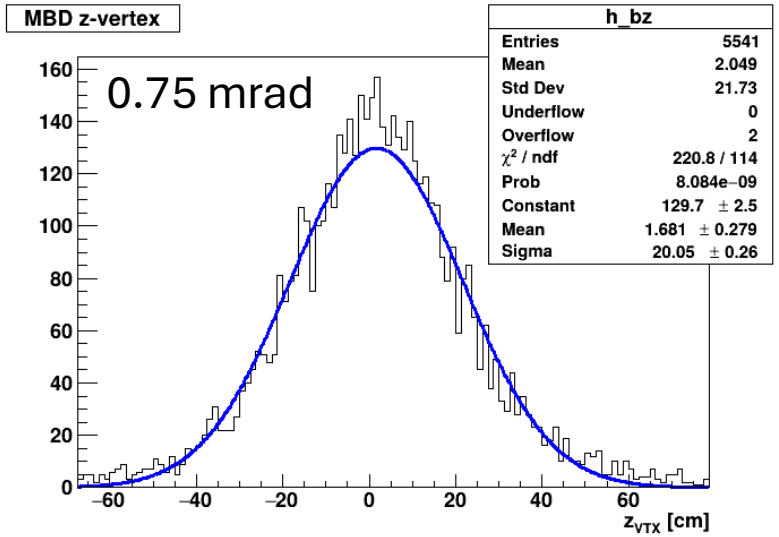


sPHENIX Luminosity



sPHENIX MBD

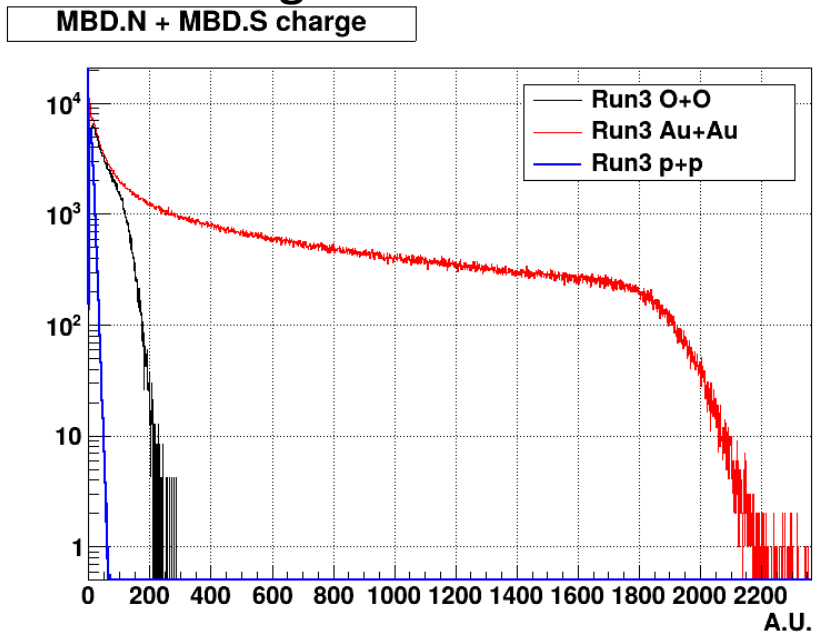




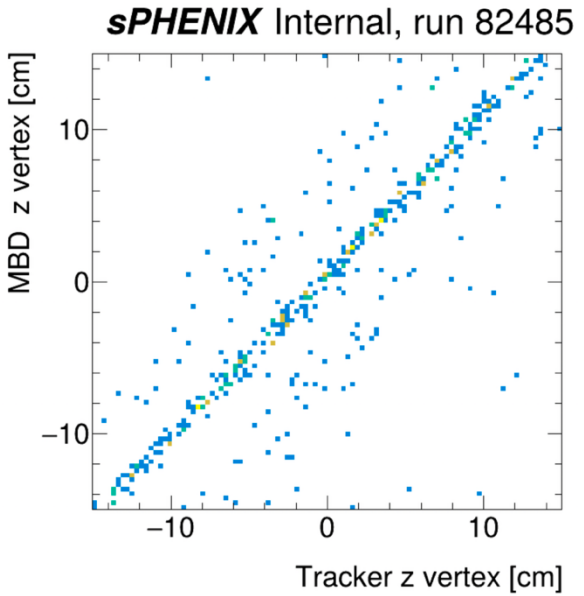
MBD timing started out perfectly, and it correlates well with the silicon trackers (running in streaming mode)

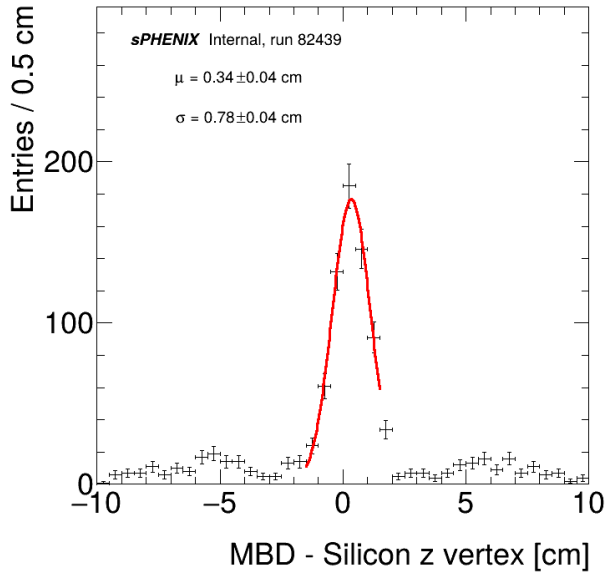
We can compare charge-sum distributions across 3 systems!

MBD Charge Distributions



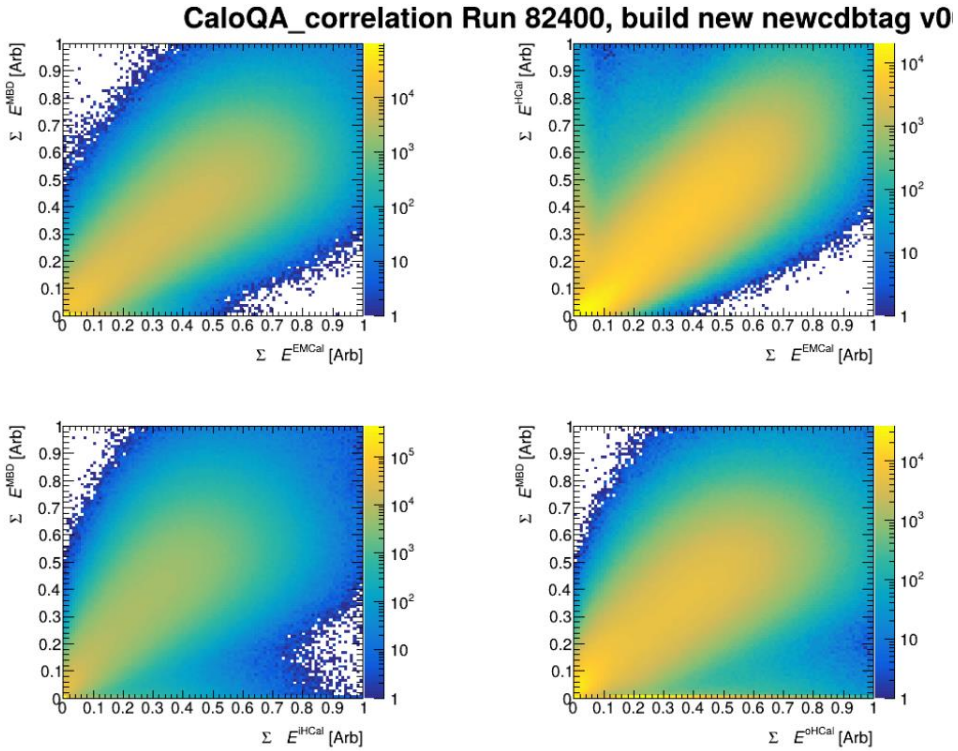
MBD Vertex Comparison to SVX Vertex

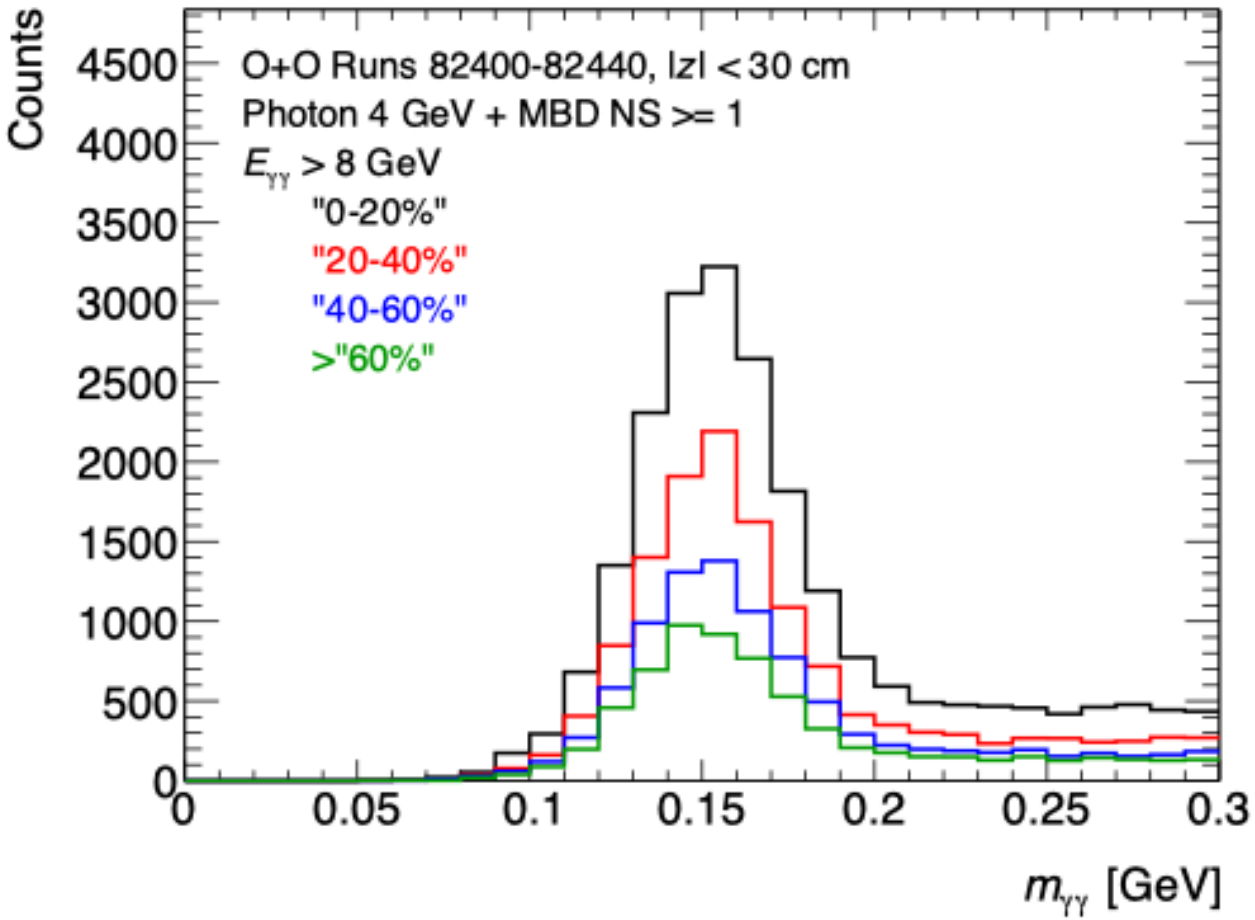




Calorimeter Systems in O+O

- IHCAL/OHCAL and EMCAL were all timed in very quickly
- All subsystems show good correlation to the MBD
- π^0 peak clear in EMCAL

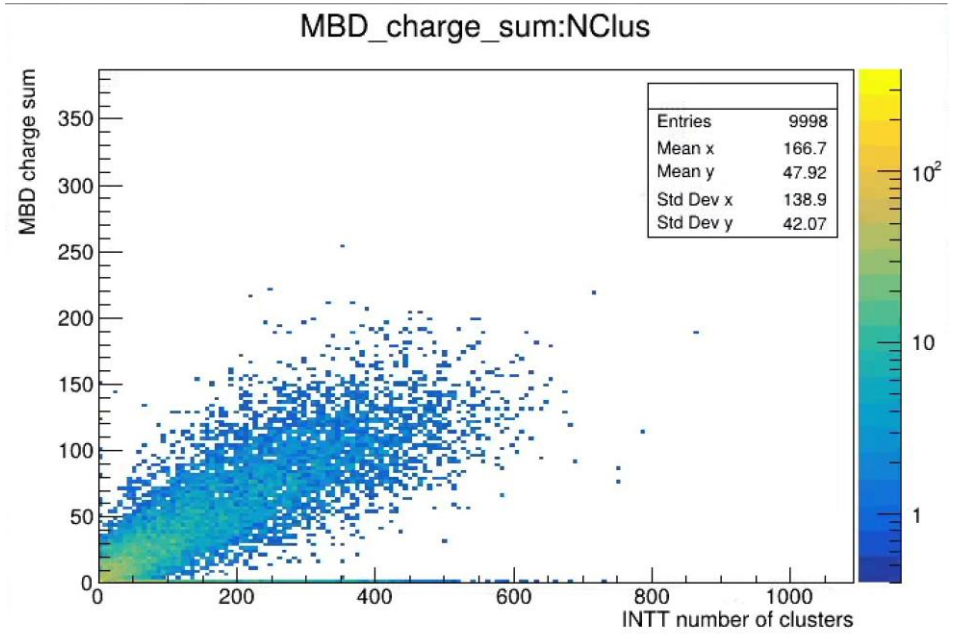


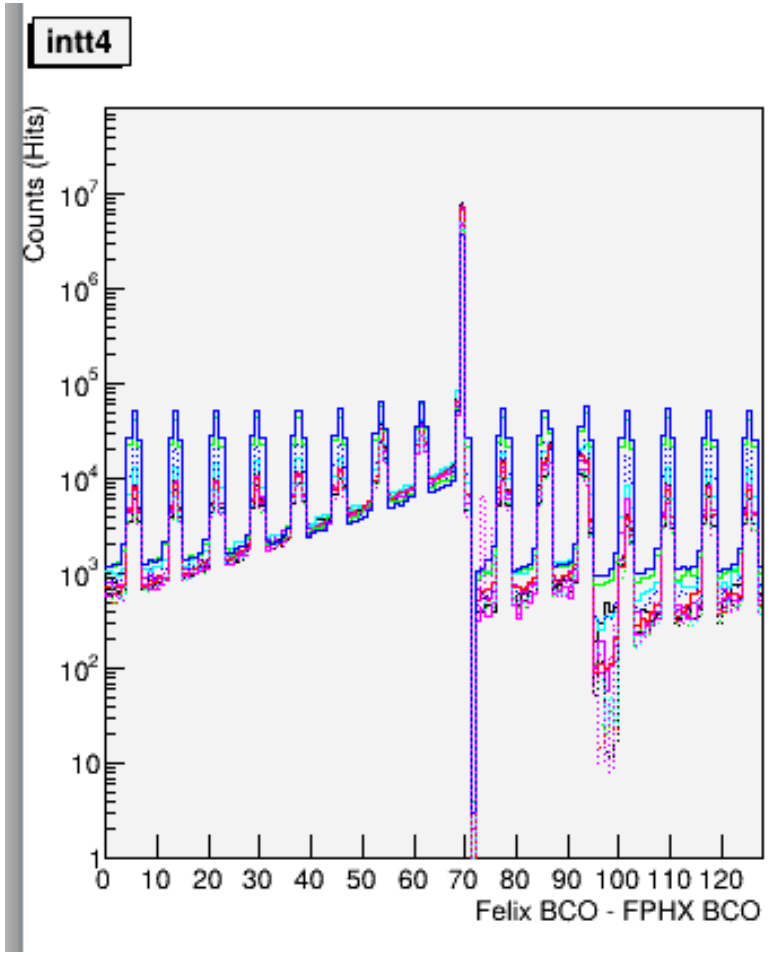


INTT Commissioning

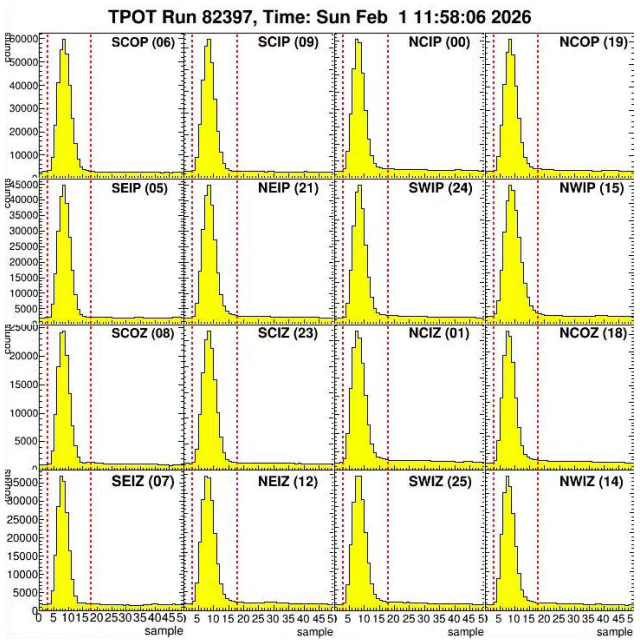
- Checked INTT timing with triggered mode
  - Critical timing detector for tracking
  - Switched to streaming for next fill

INTT vs MBD





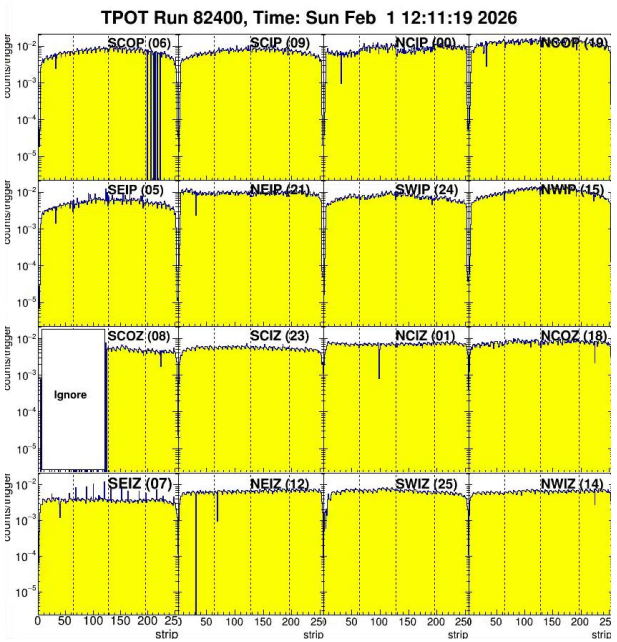
TPOT status



Per detector time distribution wrt trigger

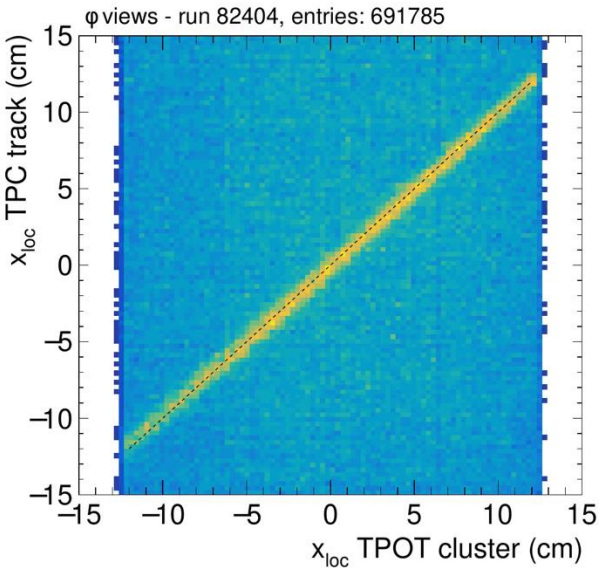
Detector is timed

Very little pile-up/background below main peak



Per detector hit profile

No new dead area/channel with respect to p+p, Au+Au

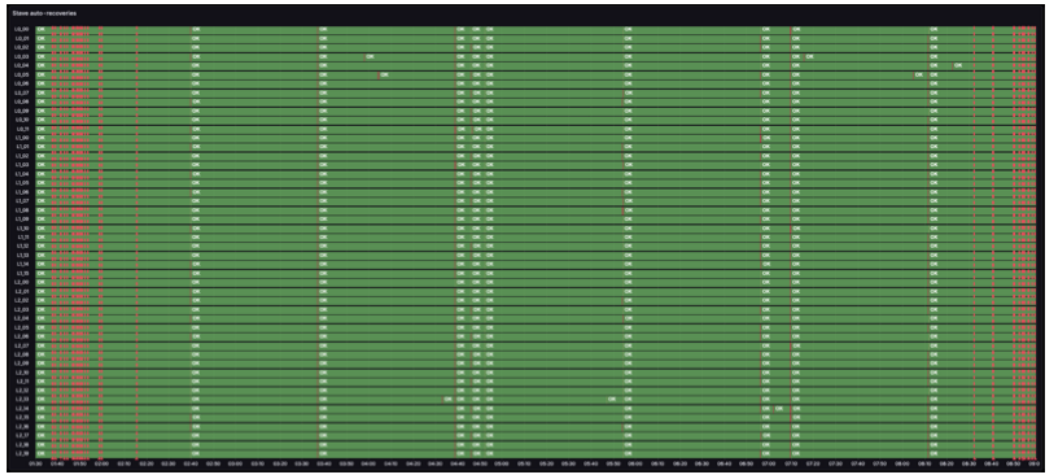


Correlation between TPC tracks and TPOT clusters,

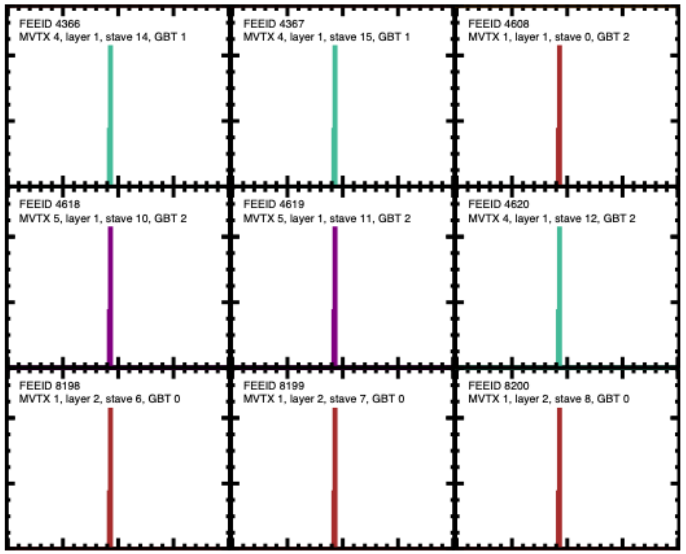
Offline reconstruction works as expected for runs taken on 2/1/2026

MVTX O+O Operation and Data Check Summary

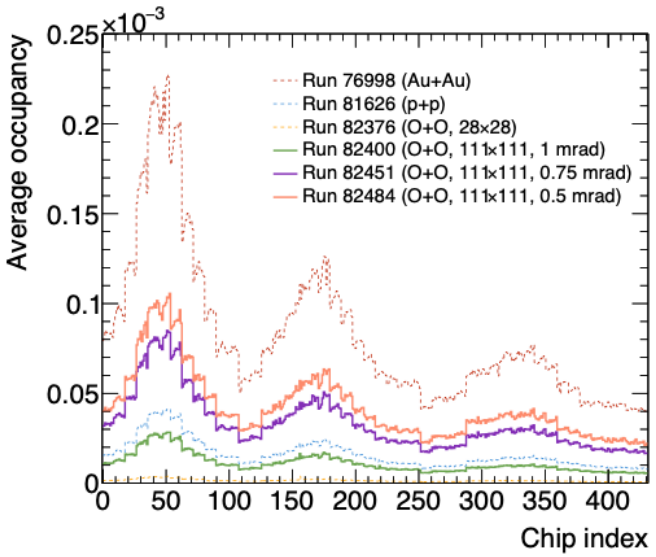
- Very few autorecoveries triggered by backgrounds



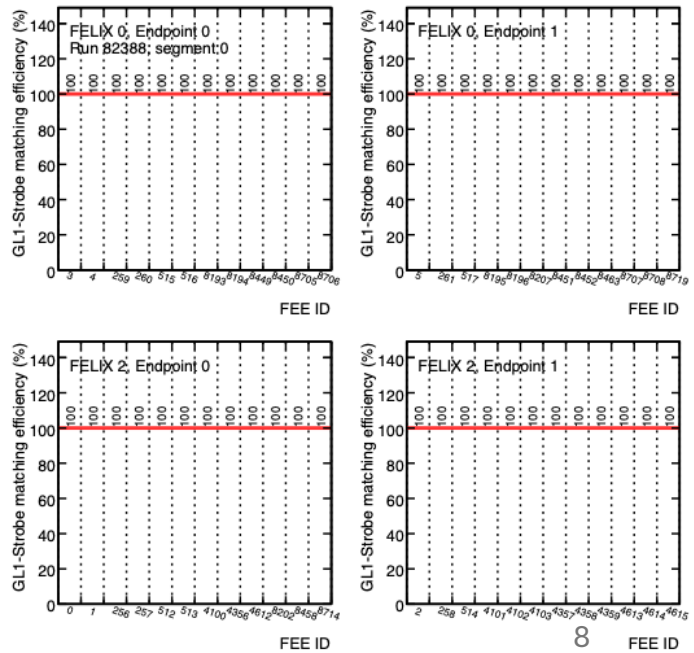
- MVTX operates in streaming mode: verified by BCO difference between adjacent strobes on different front-ends
  - Note: default streaming strobe length is 9.9 μs



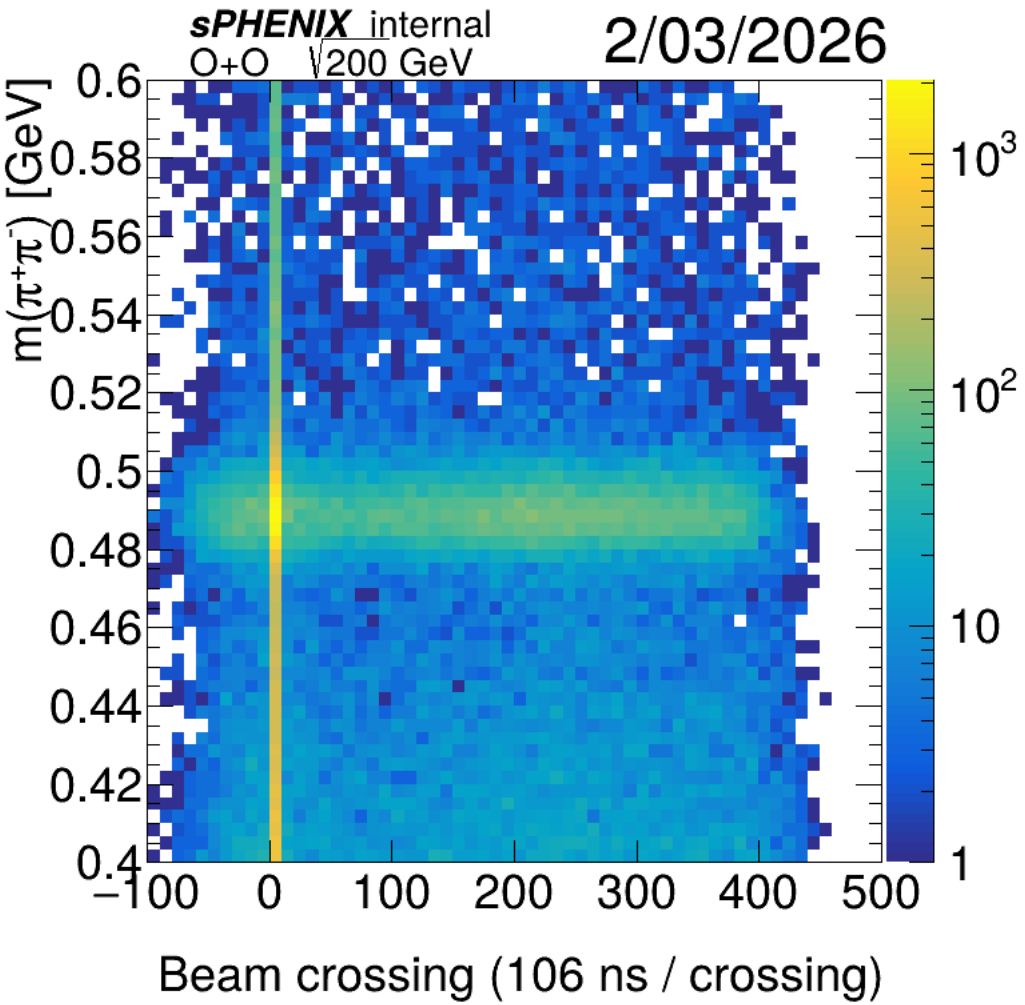
- O+O 1 mrad occupancy comparable but lower than p+p. Higher occ. for 0.75 and 0.5 mrad
  - Interplay between intensities/ luminosity/rates/ pile-up



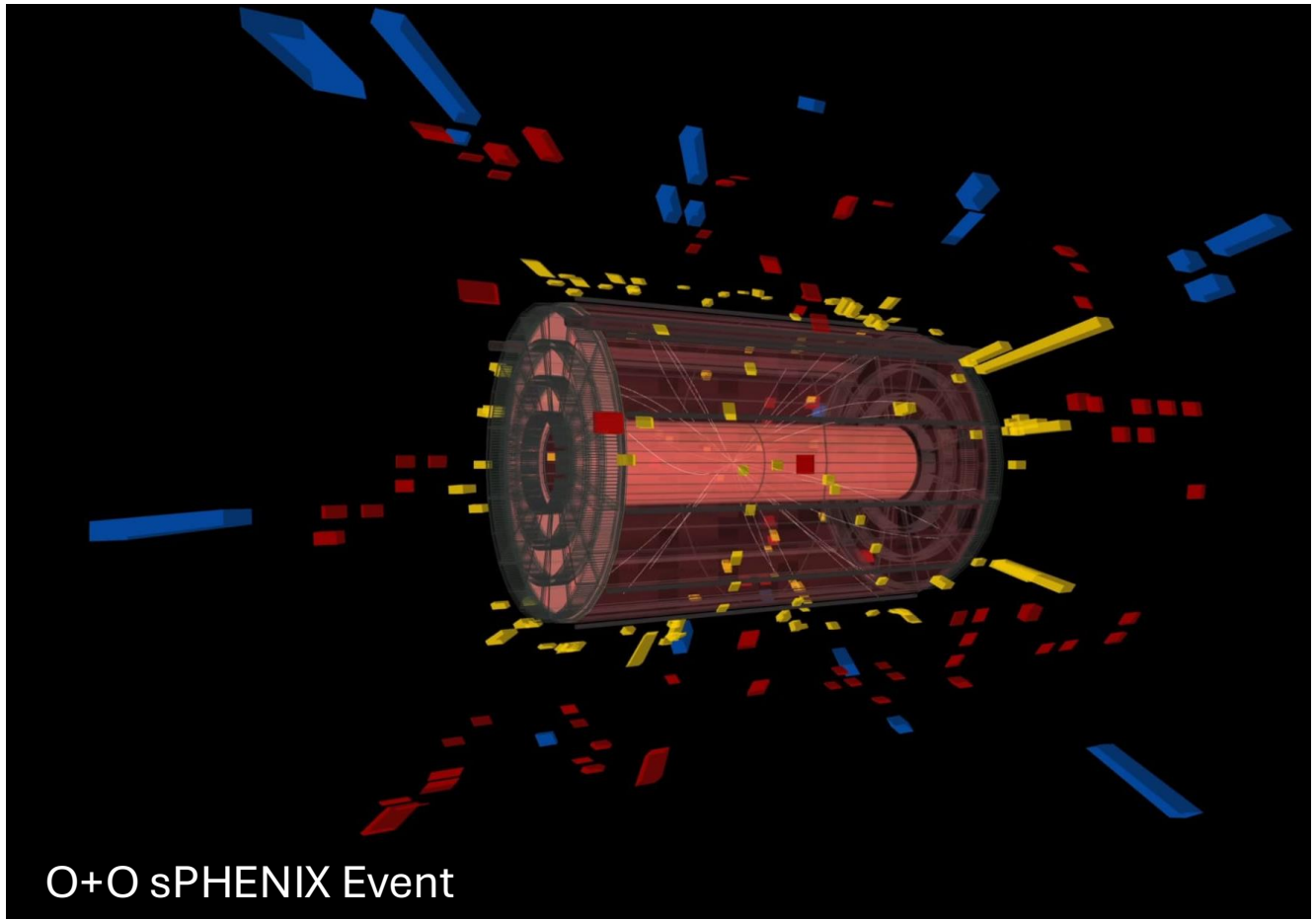
- Offline check confirmed a 100% GL1-strobe matching efficiency for all front-end links
  - No dropped data



MVTX O+O Operation – Physics!

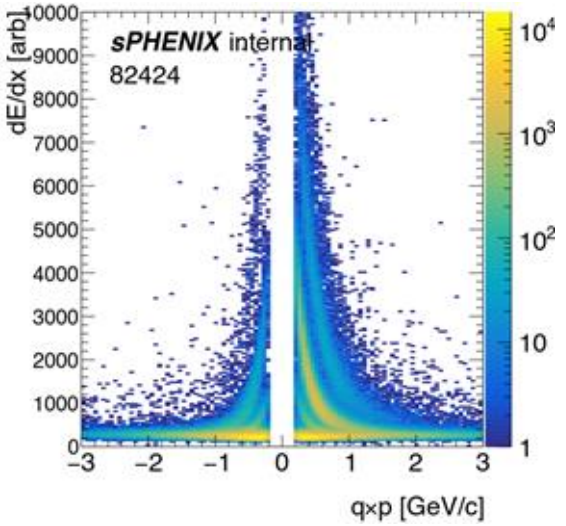


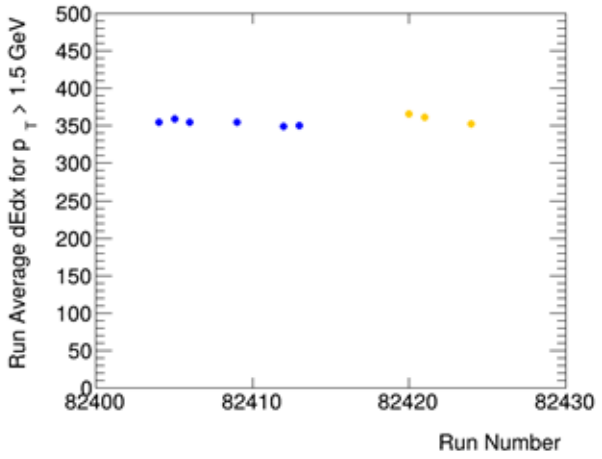
2 minutes of data

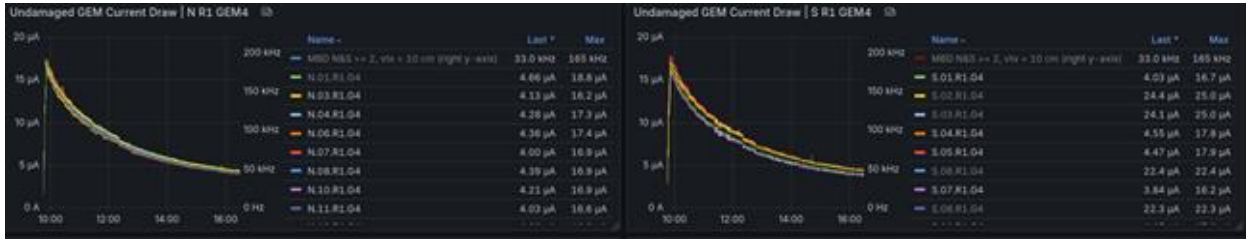


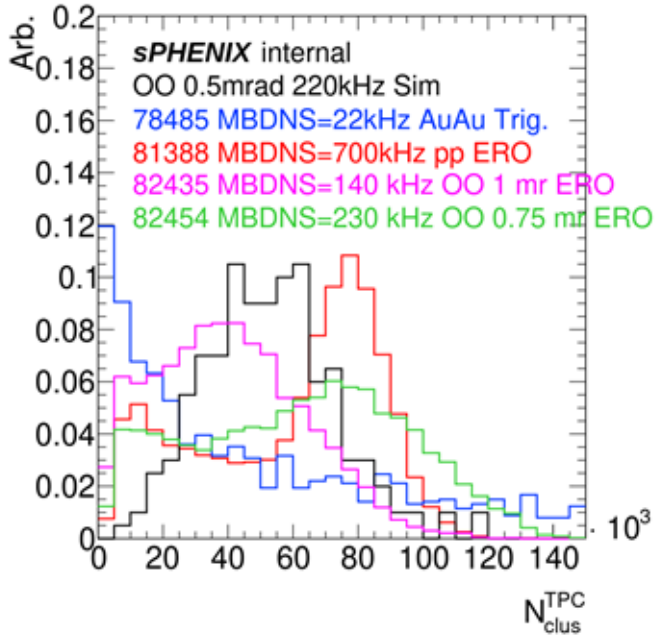
TPC performance in OO

- 111x111 1.0 mrad
  - Good gain/dE/dx
  - Constant throughout store
- 111x111 0.75 mrad
  - TPC HV stable - max current draw still allows a little headroom
  - TPC occupancy higher, but still supports tracking







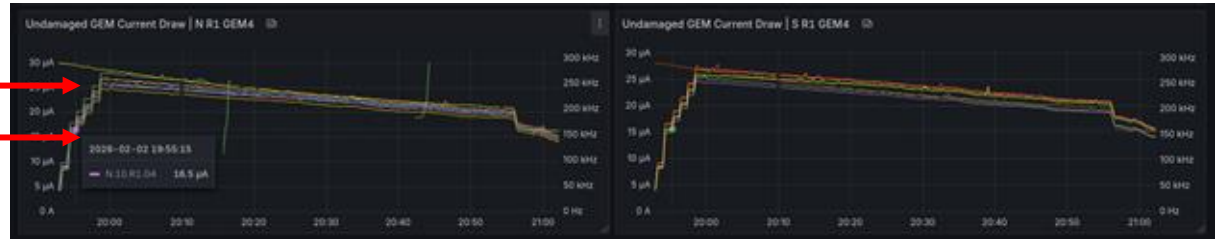


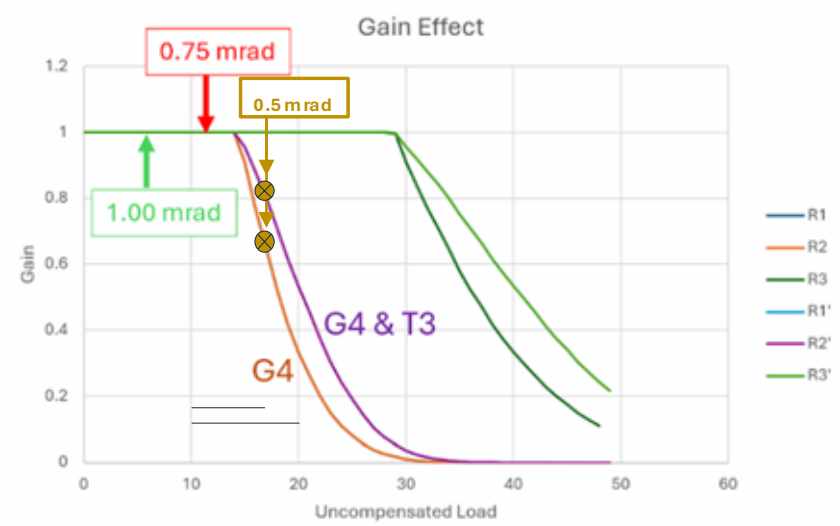
TPC HV performance in 0.5 mrad

- Current Draw
  - 16-17 uA **uncompensated**
  - 27-28 uA **compensated**
- Load Compensation
  - 16-17 uA asks for >36 V decrease of T3
  - T3 can only decrease by 36 V (48→12 V), so bottoms out
  - 48 - 36 V = 12 V -> stayed there for 35 mins
  - Likely undergain by 20-30 %
- GEMs
  - Some tripping in 2 known troublesome channels
  - But generally, did well

R1 T3 at low limit of 12 V

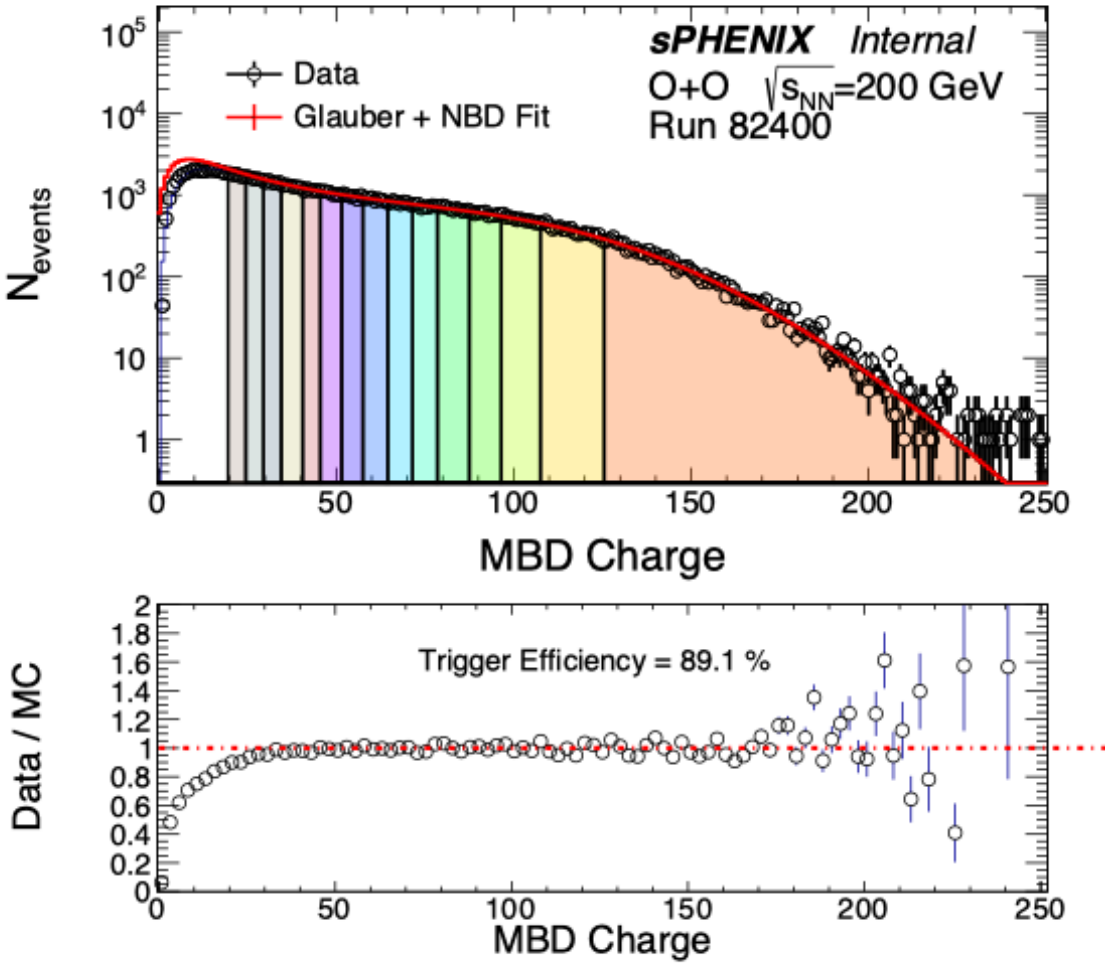
comp.
uncomp.



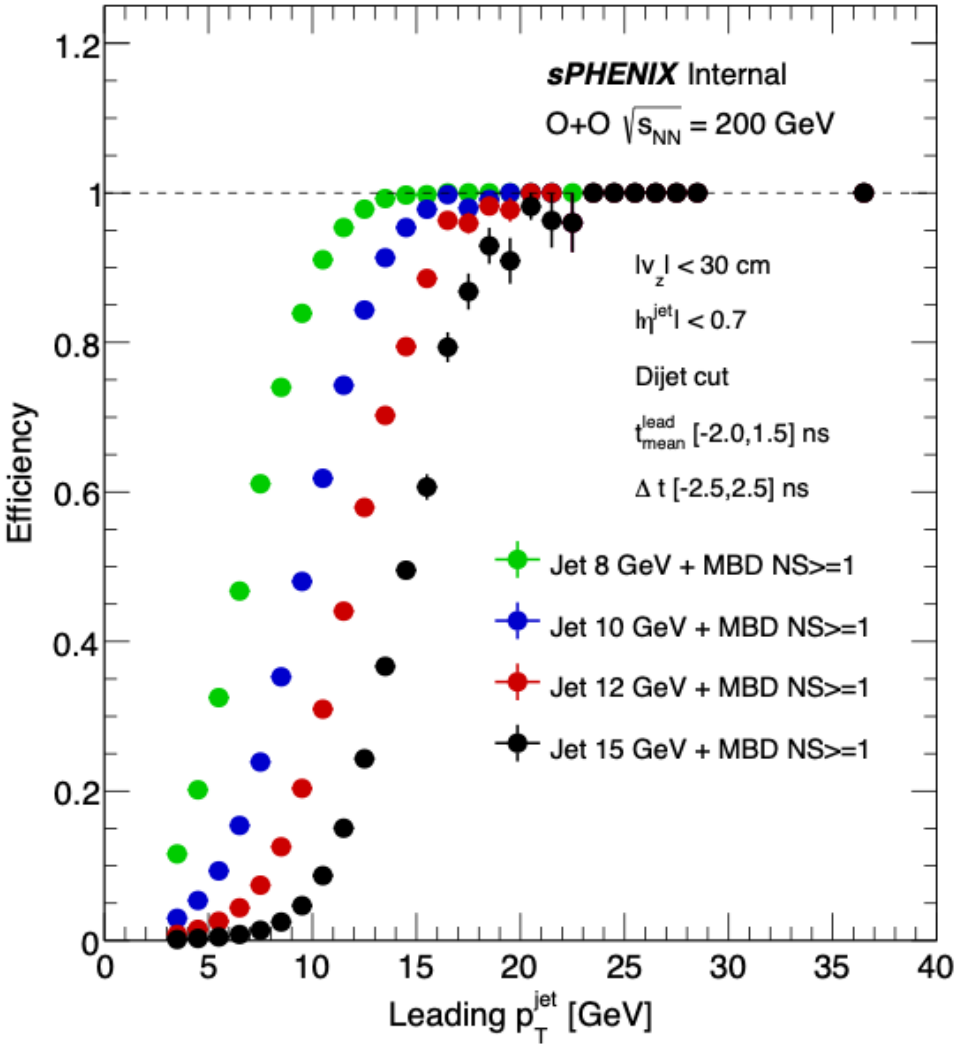


Centrality determination

- Online monitoring tells us the health of individual subsystems
- Higher level physics results indicate that sPHENIX is working well
- Comparison with the MBD charge to a Glauber model has very nice agreement
  - Trigger efficiency is 89.1%, which is the expected value



Jet Trigger Efficiency



- Jet trigger requires both EMCal and HCal information
- Data driven trigger determination
  - Jet 10 and 8 have a prescale
  - Jet 12 and 15 are not prescaled, we record all high momentum jets
- Photon trigger behaves similarly

Small Request

- At the end of a fill can we have 2 hours of data where we are leveled to have a ZDC rate of 10 kHz?
  - 4 hours into a store, so no extension needed
  - When convenient, but please let us know!
- This will give us a low luminosity data set that we can use to ensure our centrality determination is correct

Crossing Angle Scan

0.75 mrad

- Our O+O goals are hard probes driven, which are very statistics hungry
  - Calorimeter based jet measurements do not require Si Tracking Detectors → |Vz|< 60 cm
- Optimized crossing-angle for greatest amount of physics
  - Originally thought TPC FEE current was the limiting factor
  - Data through-put was our limitation at 0.5 mrad
    - More bufferboxes….
    - Complicated dance of trigger mix and calo-only versus all subsystems data
  - With a longer run, we could improve but opted for stability at 0.75 mrad

Rosi Reed

Conclusions

- O+O running is going well! Many thanks to C-AD
- Vernier scan analysis is ongoing
- We have recorded 5.7 nb^{-1} triggered data with all detectors with |z|< 10 cm
- Looking forward to a strong finish!