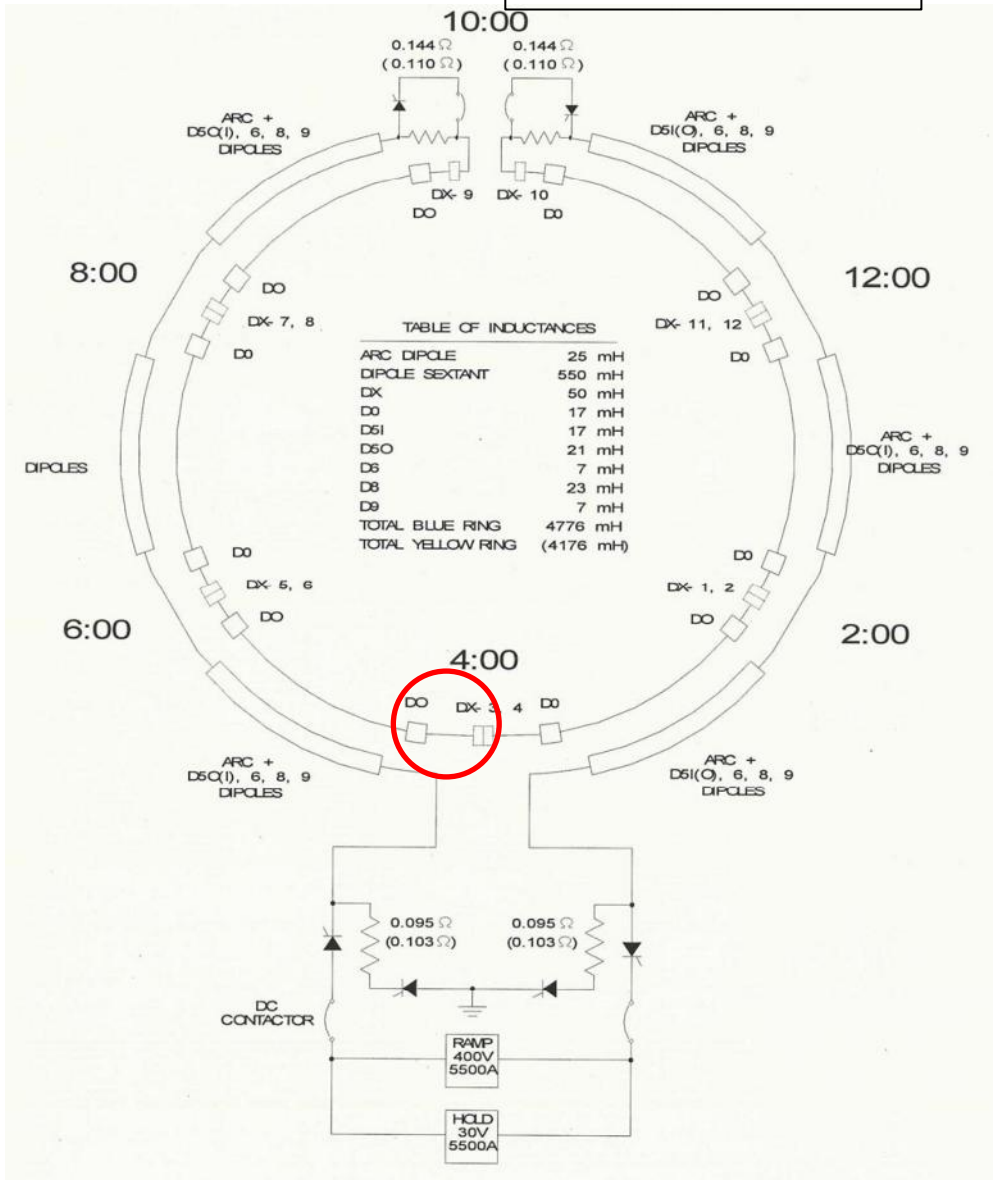
sPHENIX Run25 and INTT status

Akitomo Enokizono

Run25 startup issue

Kiel @ short PAC

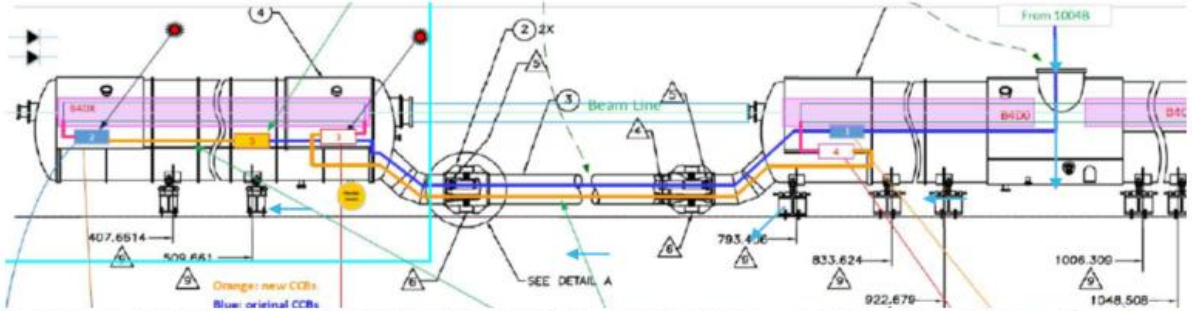
- Originally Run25 first beam was expected to come around the end of March but...
  - After initial cooldown to 4k, the hi-pot at ~650 V revealed low resistance.
  - Short found on the blue main dipole return bus in sector 4.
  - A warmup was required to diagnose further and repair.
  - Eventually narrowed to the DX.
- First beam injection delayed from March 30th to May 31st.



Details on short repair

Kiel @ short PAC

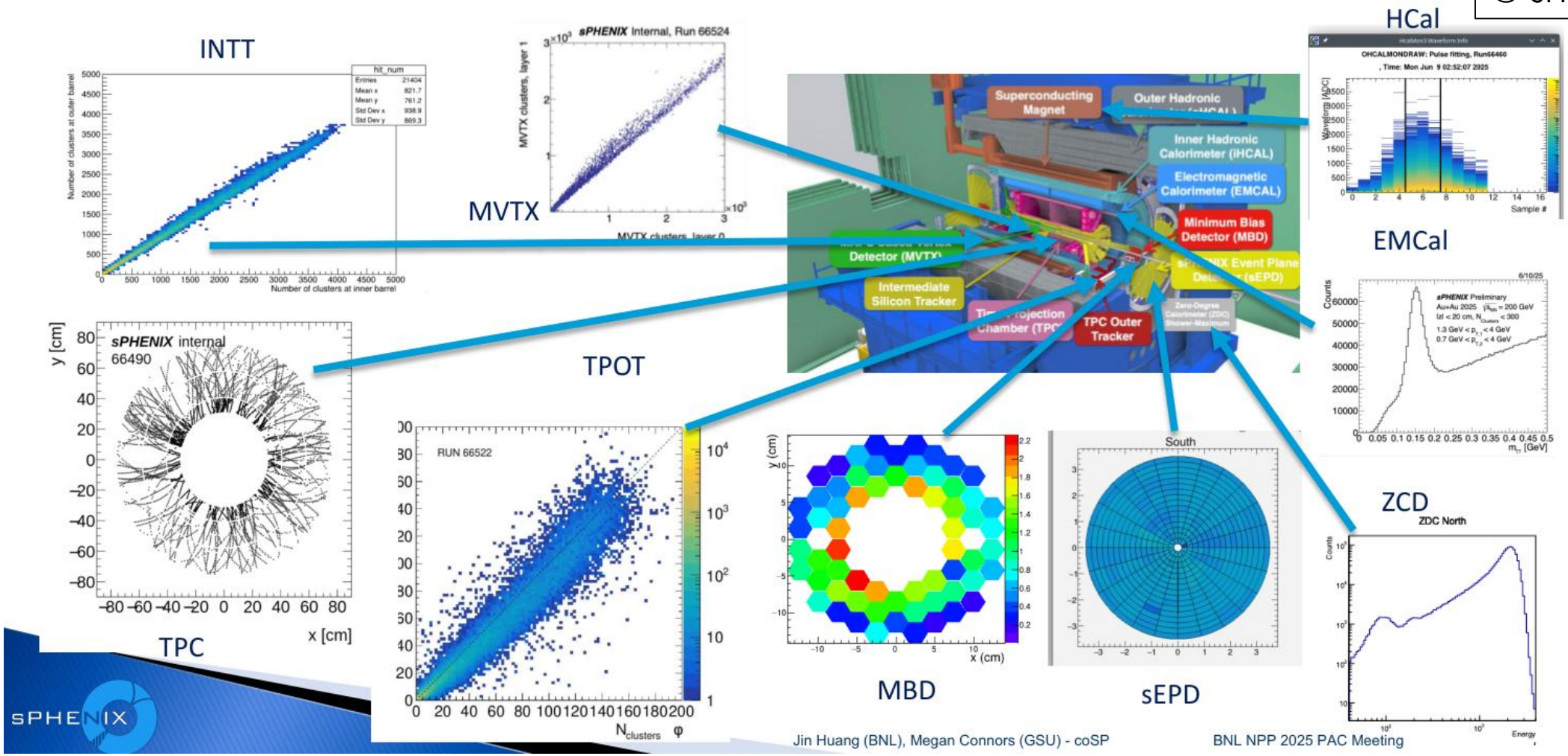
- Diagram showing crystats and splice can locations.
- Wrapped splice after the repair (lower left).
- cryostat ready to be welded (lower middle).
- Other end of DX with cryo return lines, ready to be welded (right).



First collision at sPHENIX on June 9

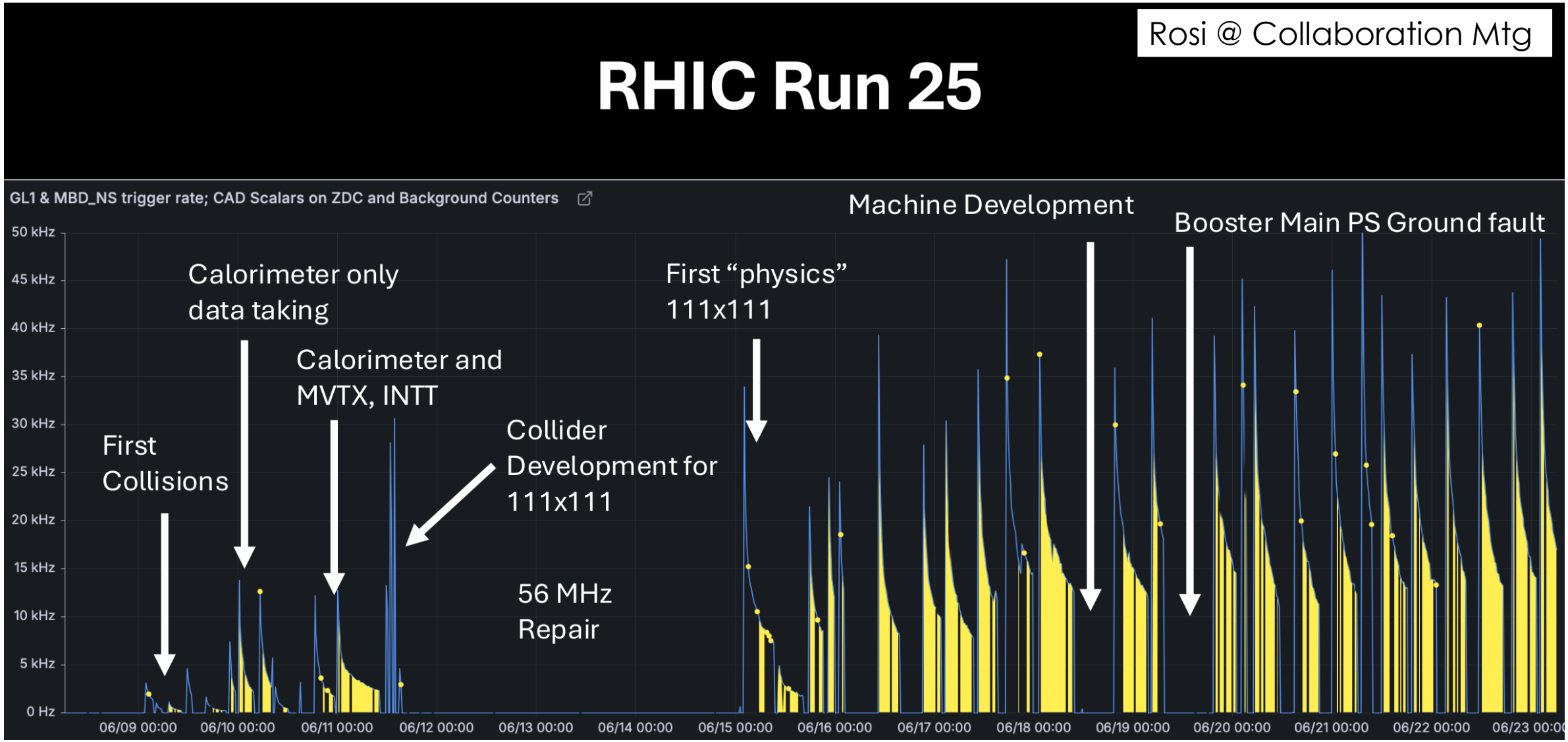
Data checks immediately following collisions!

Jin & Megan
@ short PAC

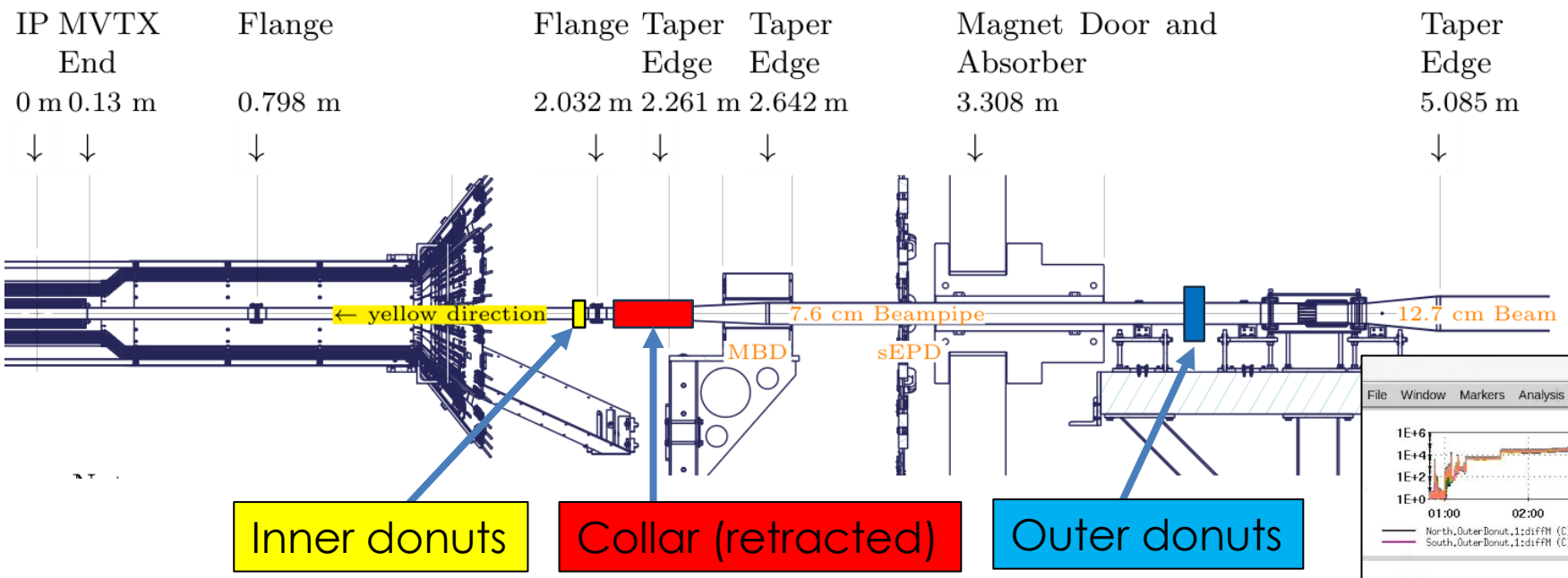


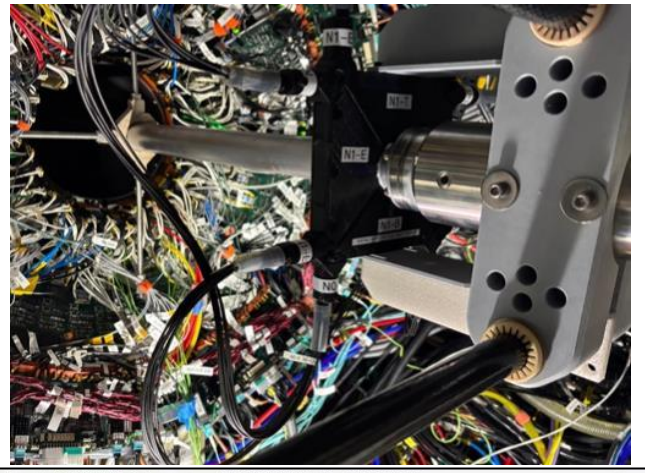
RHIC Scaler since the first collision

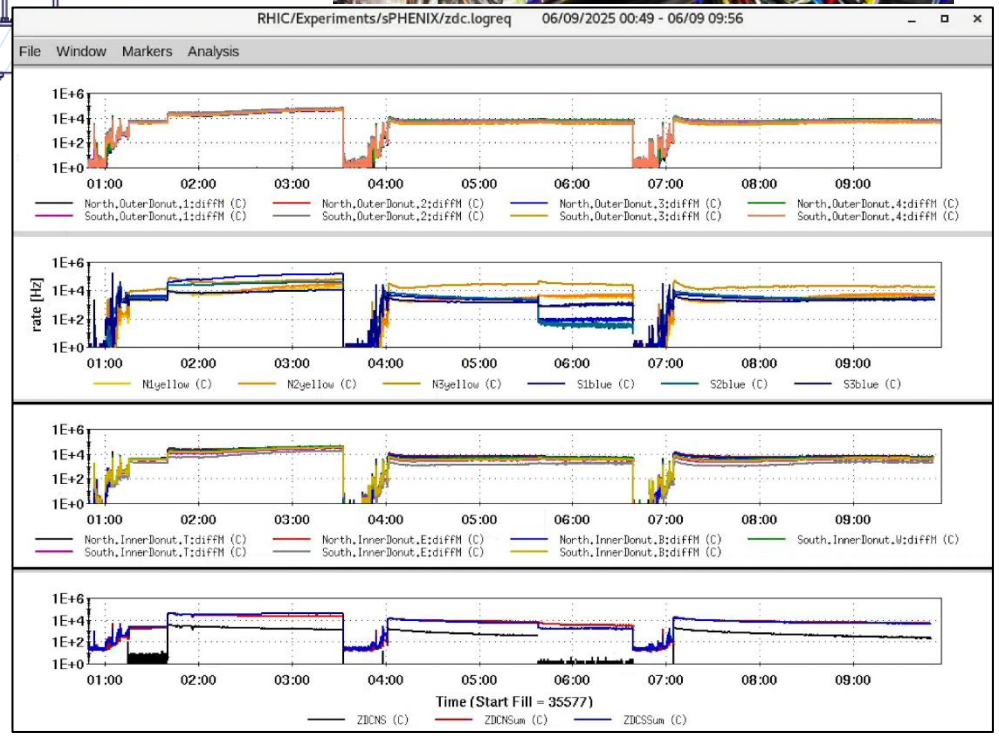
Rosi @ Collaboration Mtg



Inner/Outer donuts counters

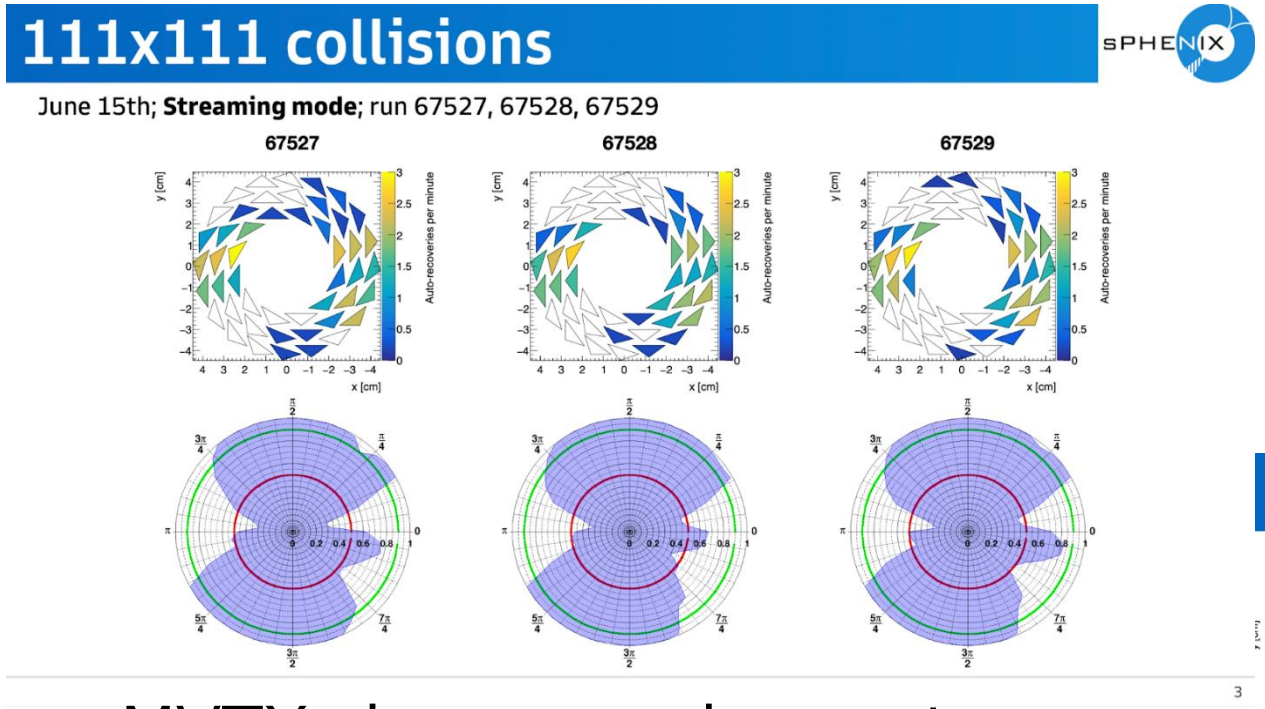




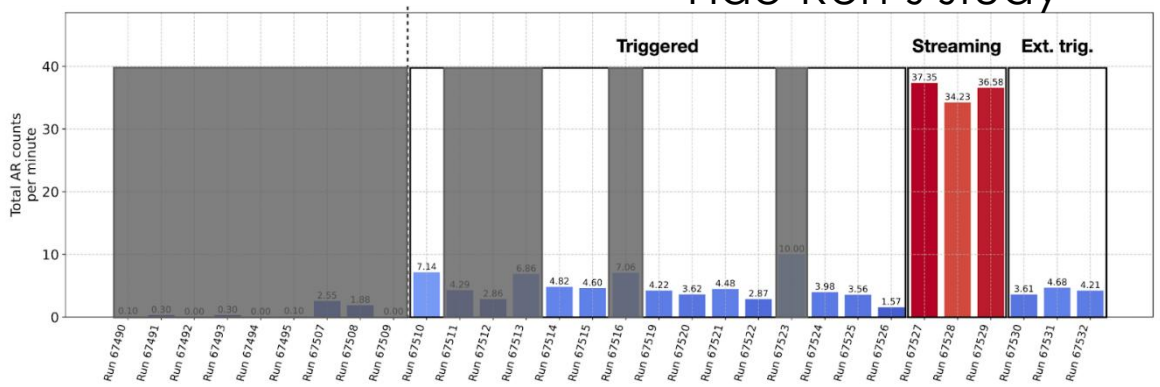


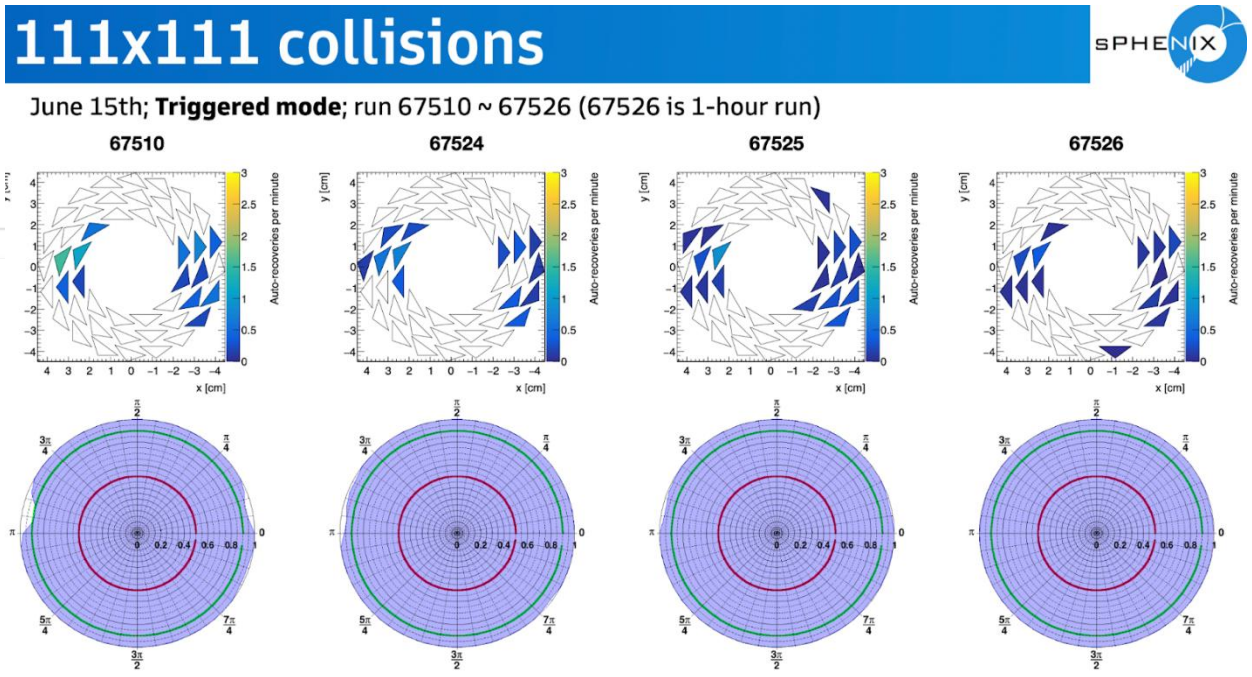
- Inner/Outer donuts counter are working well and provide some beam position information N1,2,3 and S1,2,3 counters.

MVTX background study



Hao-Ren's study

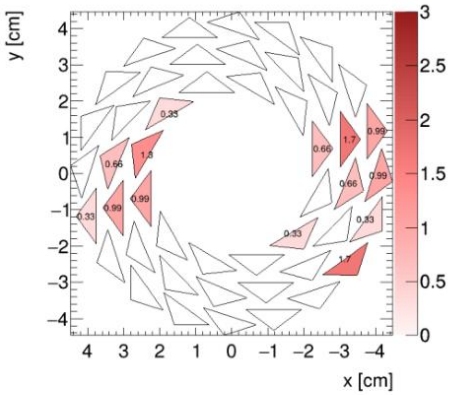


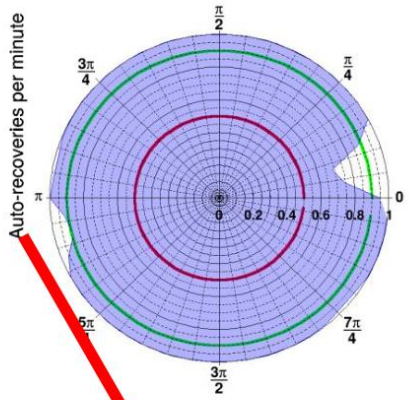


- MVTX shows good acceptances (track efficiency) in the trigger mode.
  - 111x111 fill, w/ZDC coin at 20 kHz
  - Triggered at 12 kHz

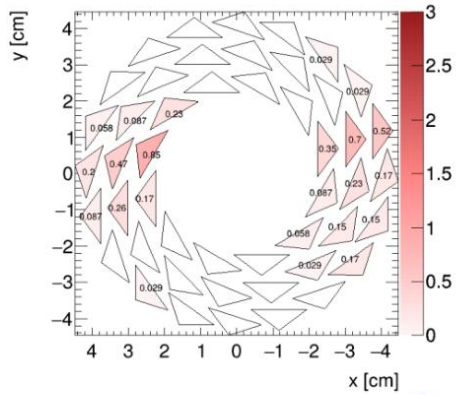
MVTX background today

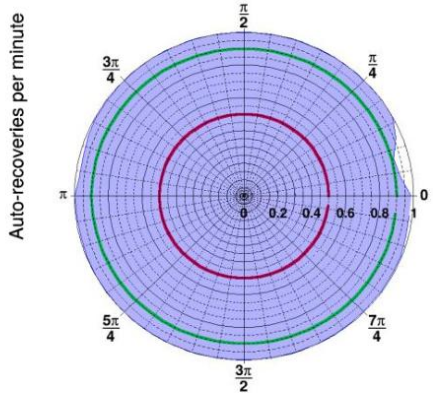
Run 68151



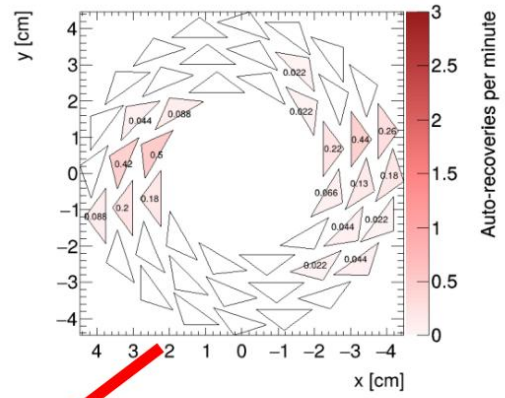


Run 68156 → ZDC 20 kHz

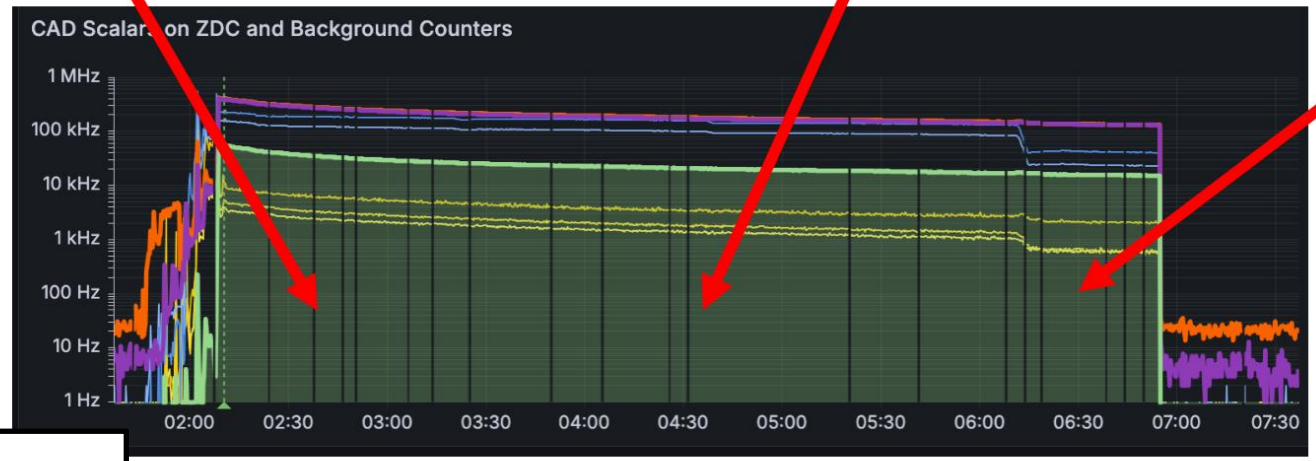


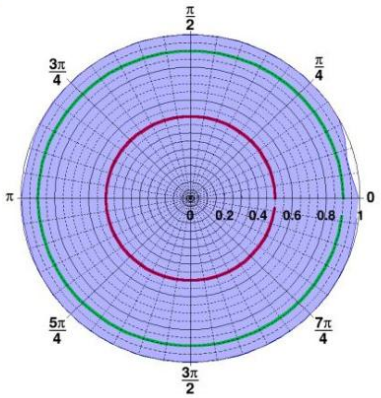


Run 68160 → 16 kHz



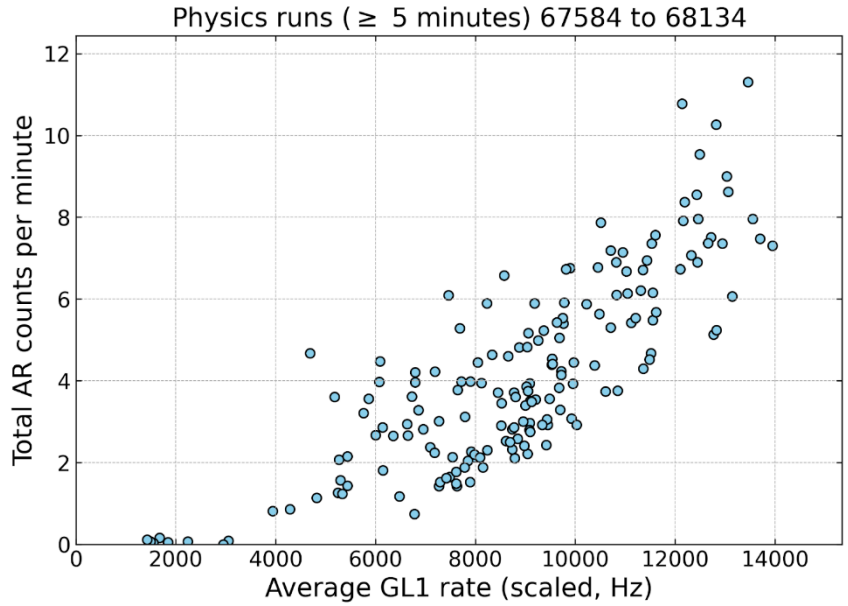
ZDC 40.7 kHz!



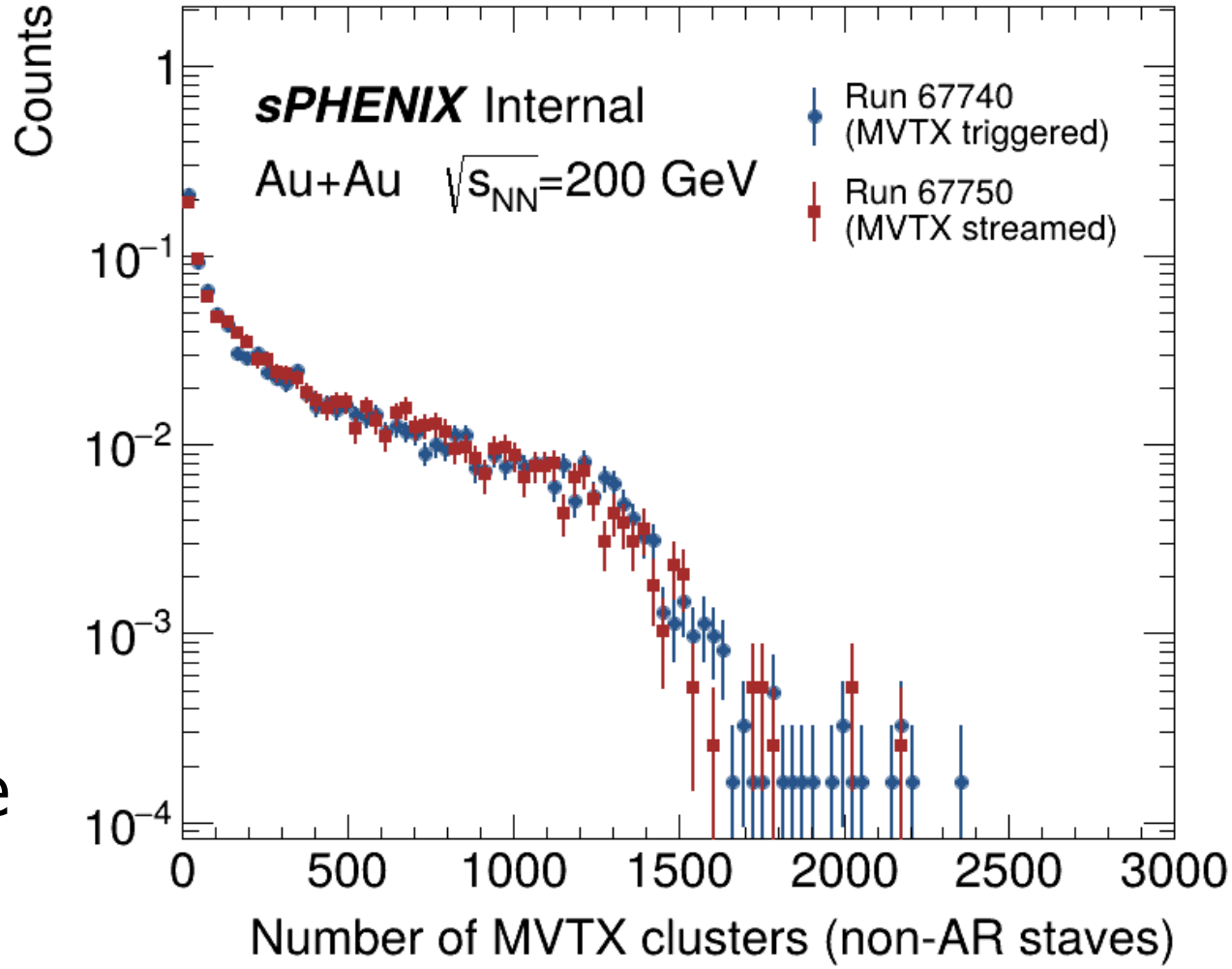


Rosi
@ Collaboration meeting

MVTX figure of merit studies

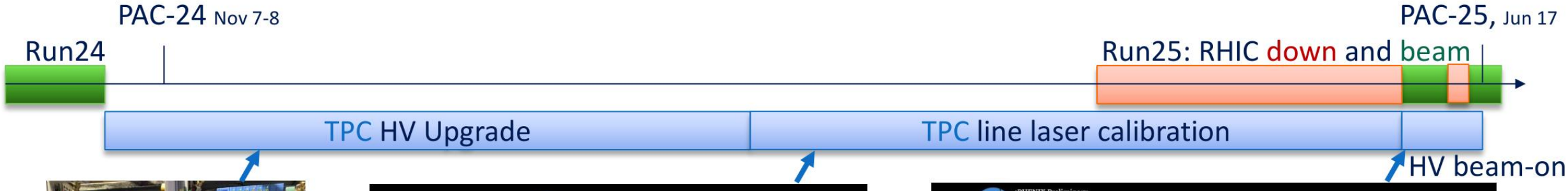


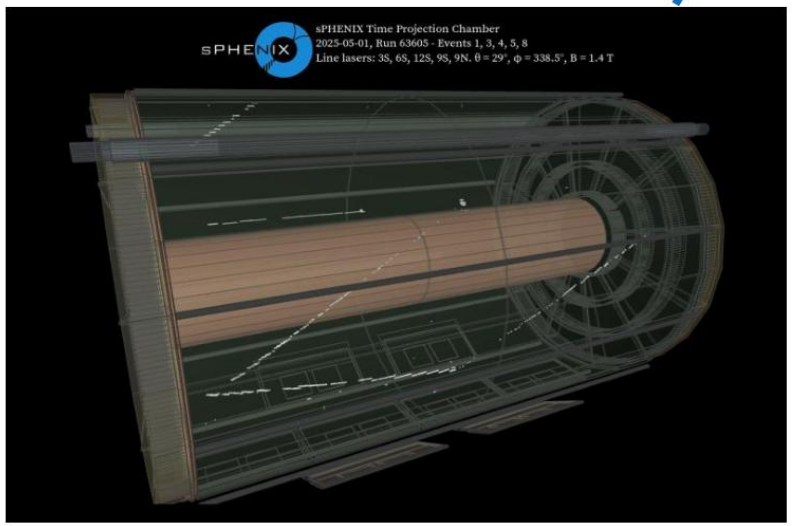
- MVTX shows consistent count rate between streaming and trigger mode (using non-AR staves)

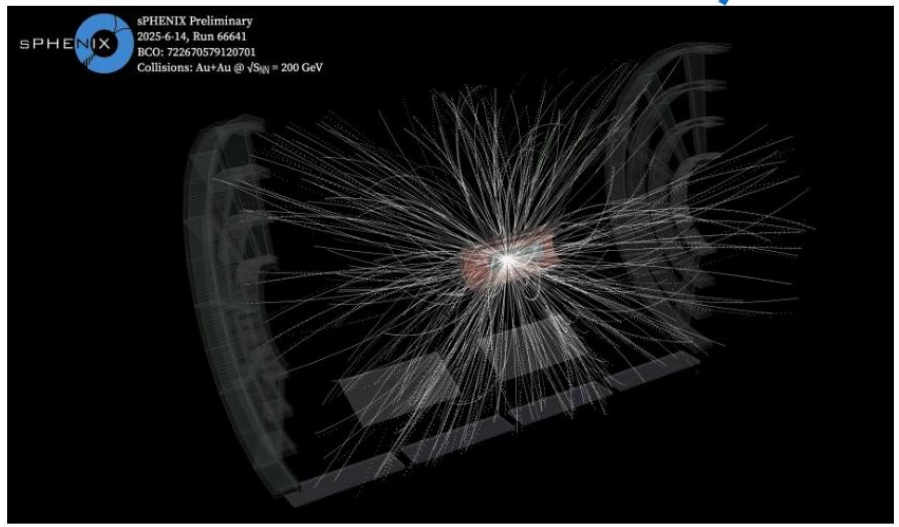


TPC work

Jin & Megan @ short PAC







HV System Upgrade

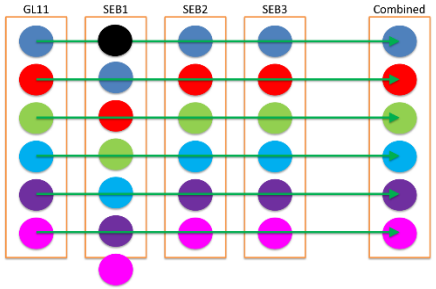
- Upgraded to Cascade power supply to address HV stability issues encountered in Run 24
- Successful operation in physics data

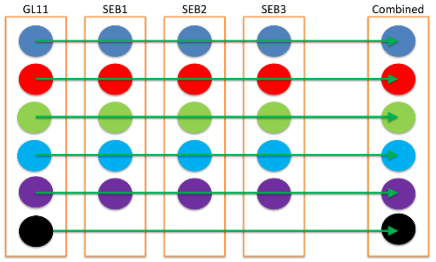
Line Laser Commissioning

- Line laser is a highly complex system, used for static distortion correction
- Fully operational
- Data taking on-going when beam is off and magnet is on

GL1-SEB mismatch

Chris @ Collaboration Mtg





Type of runs	Number of runs		Suggested treatment
Total runs	2325		
Problematic short runs & no data in raw files	34		Short, problematic runs with no data left in raw files. Run immediately stopped by shift crew because of problem found right after the run started. —> Remove these runs in the analysis run list. Negligible impact on statistics
Misaligned packet saved as non-empty packets for the first two events in the produced DSTs	104		Probably a leftover bug in writing the first couple of events. Not a major issue now because it gets empty after the first few events. Could be also recovered (Next slide) — Example : Run 53857 seb09
At least one packet completely dropped out in the run	445	EMCal only : 356 HCal only : 33 ZDC / sEPD only : 42 Multiple subsystems together : 14	Most common case. There is a strategy to recover most of these runs similar to the above 104 runs. We should focus on these runs. (See next slide)
Some FEM clocks jitter across the run	28		Known jitter on some ADC boards happening intermittently. Fortunately, no mismatch in packet clocks. Suggest to include them in golden runs.
No errors with full acceptance : Golden runs	1742 : 75% for total (2325), 76% for useful runs (2291)		

Copied from JaeBeom

- 104 runs: non issue – first two events are dropped in subsequent DSTs (means data is good - not urgent to fix)
- 445 runs → combination of remaining problems (gl1 and seb and misaligned packets)
  Skipped gl1 events lead to dropping all subsystems – seems to be surprisingly rare (14?)
- 1742+104+28 out of 2291 runs = 81% gold content - is this true? Looks high to me - this needs to be verified independently
- Needs to be verified for 2025 data where we know we have a bad GL1 problem

INTT commissioning work

Genki's report
@INTT meeting

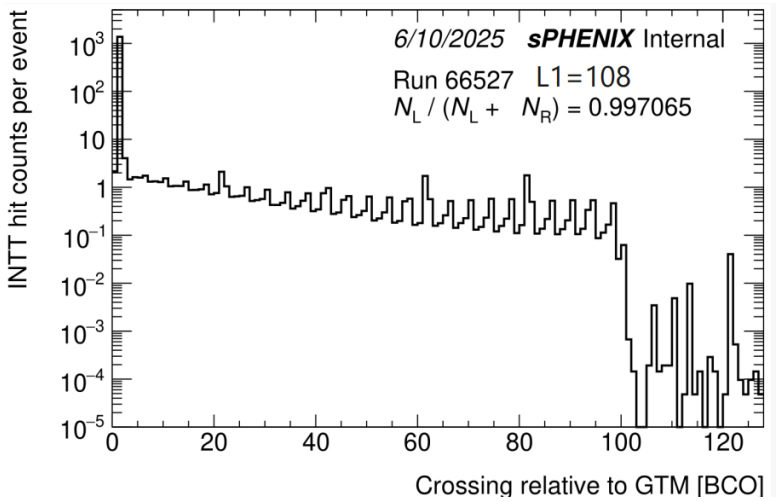
Commissioning 2025

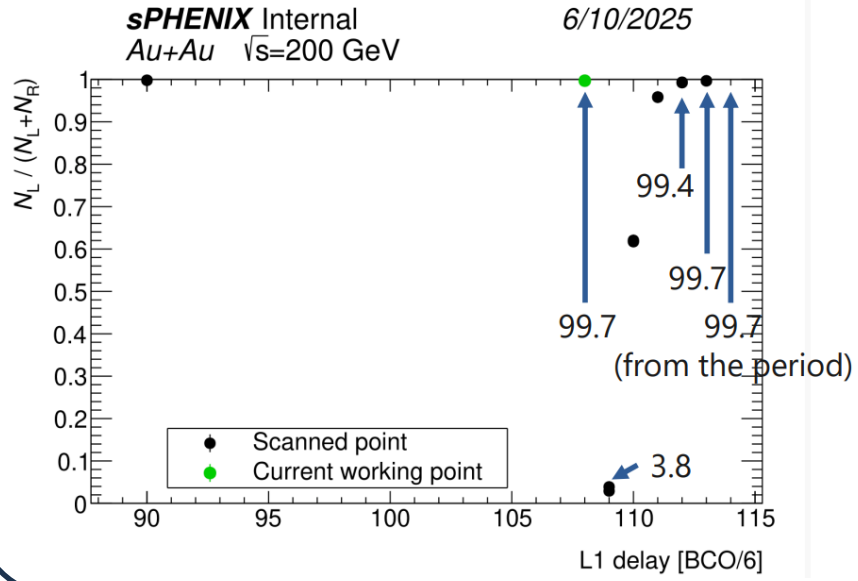
Genki on behalf of
the onsite crew

Genki (RIKEN)
Jaein (Korea Univ)
Ryotaro (Kyoto Univ)
Takahiro (Rikkyo)
Mahiro (NWU)
Itsuka (NWU)

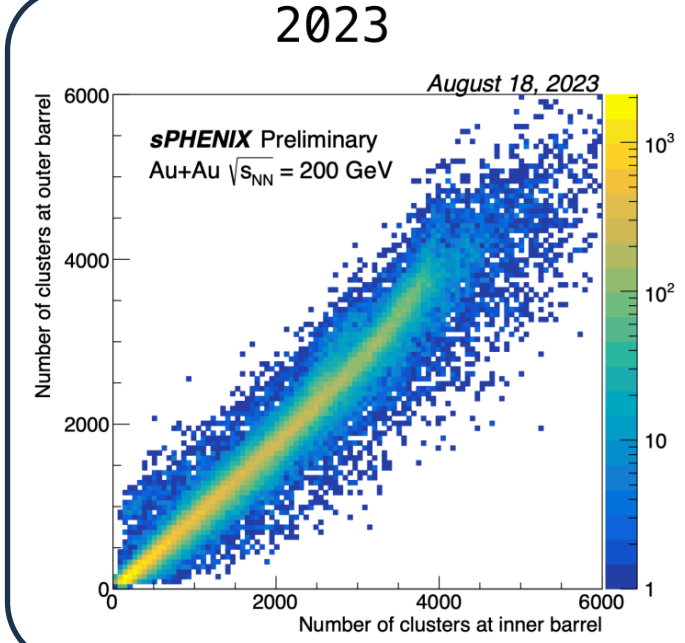
INTT status

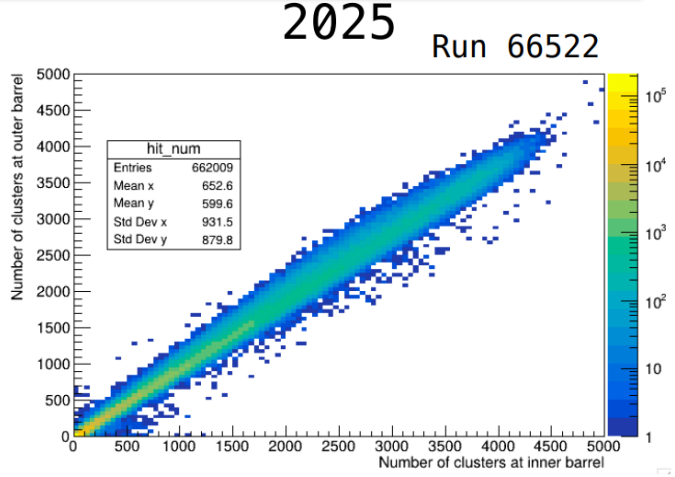
Timing scan (Ryotaro)





INTT cluster correlation (Ituka)



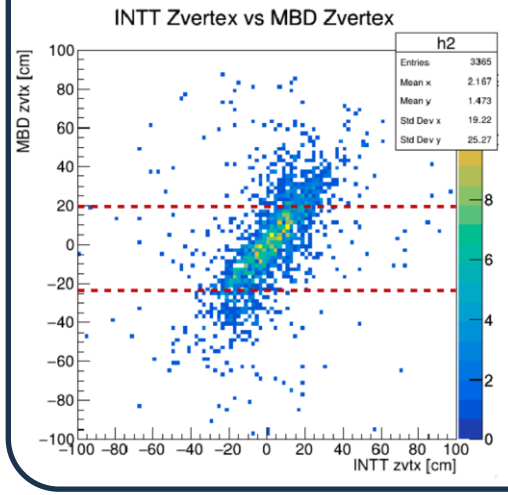


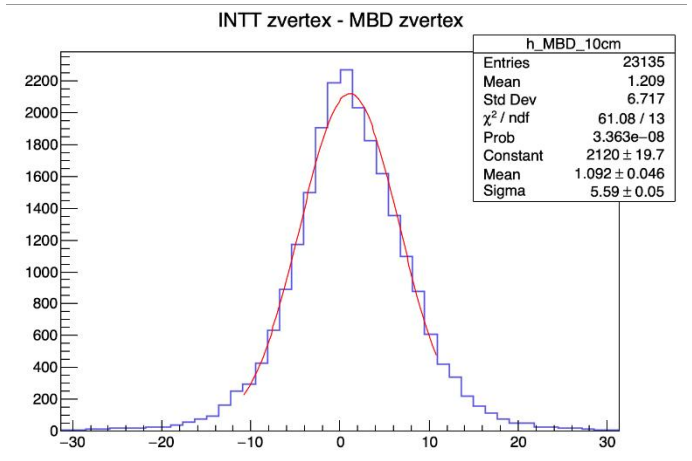
The 2025 plot has less noise than the 2023 plot.

- INTT commissioning data and physics data are quickly analyzed by students on-site (Jaein, Ryotaro, Takahiro, Mahiro, Ituka) with the help of Genki

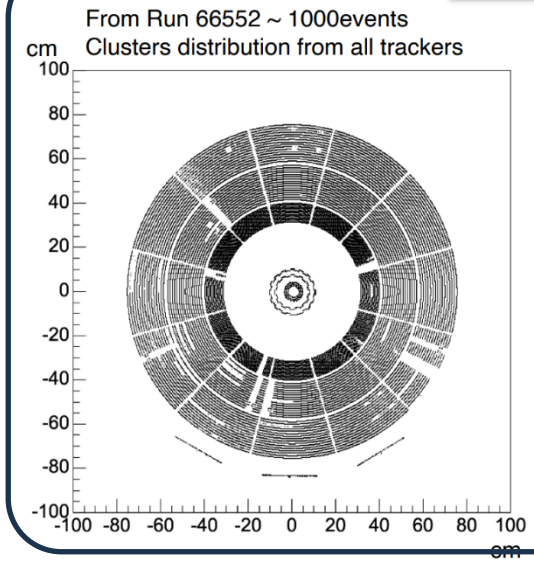
INTT status

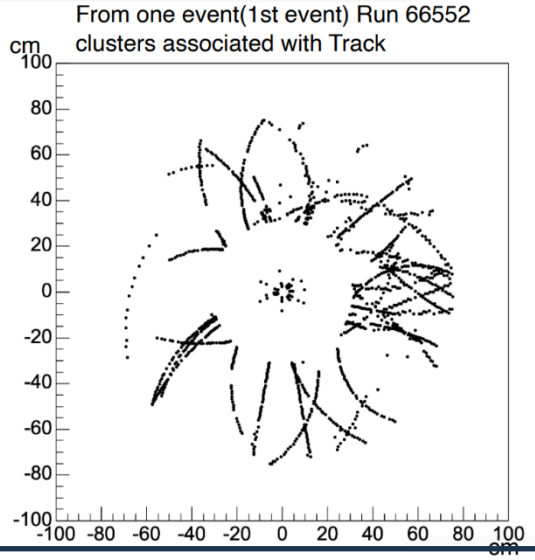
MBD – INTT Zertex correlation (Mahiro)



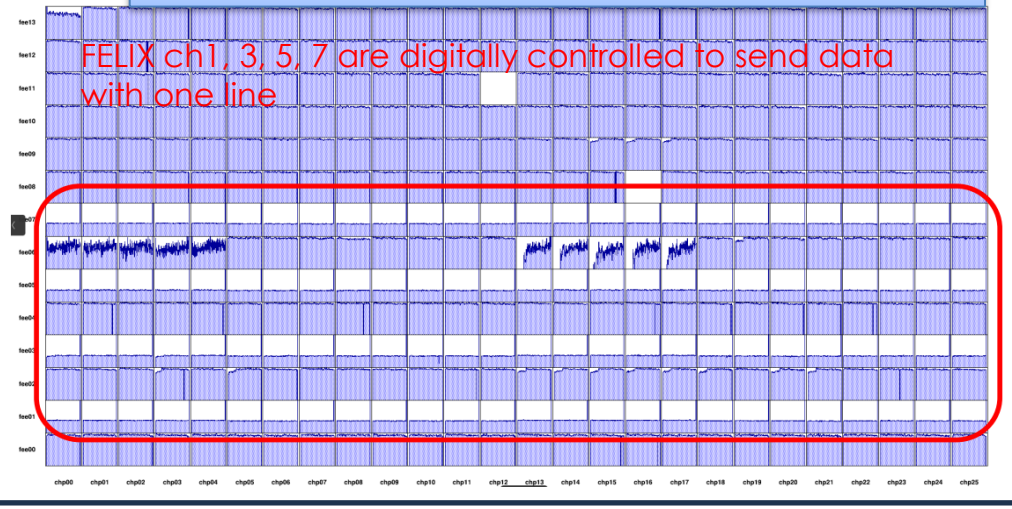


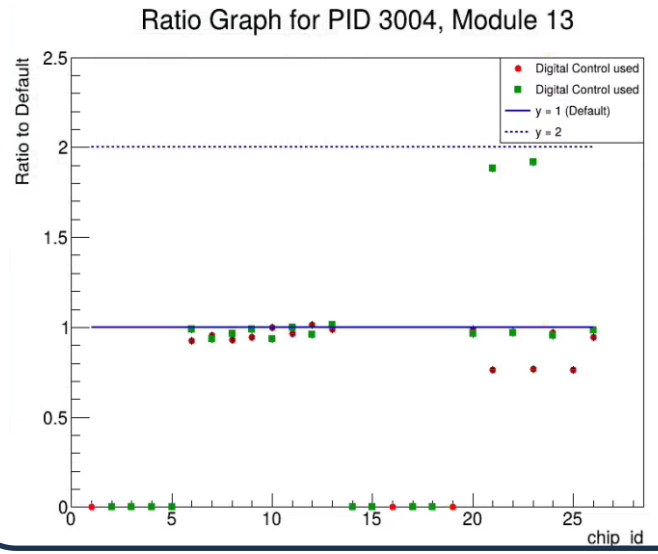
Global Tracking (Jaein)



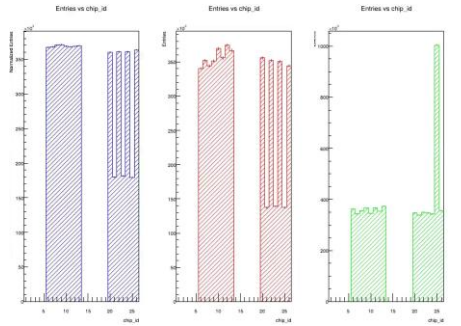


DAQ with Digital Control (Takahiro)

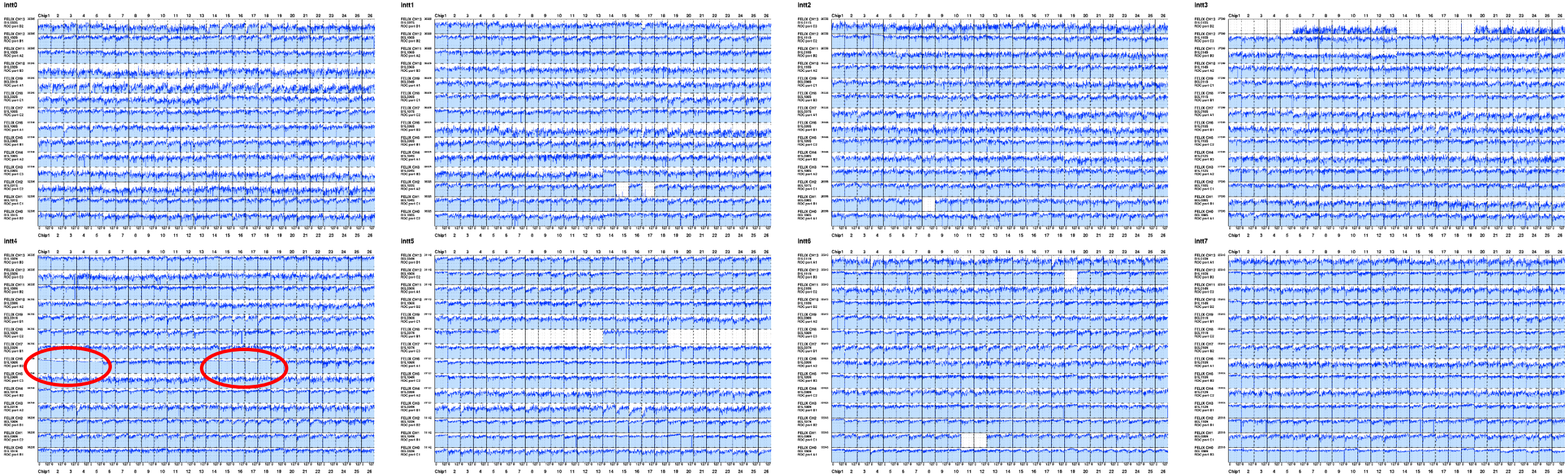




Half-Entry analysis (Tomoki)

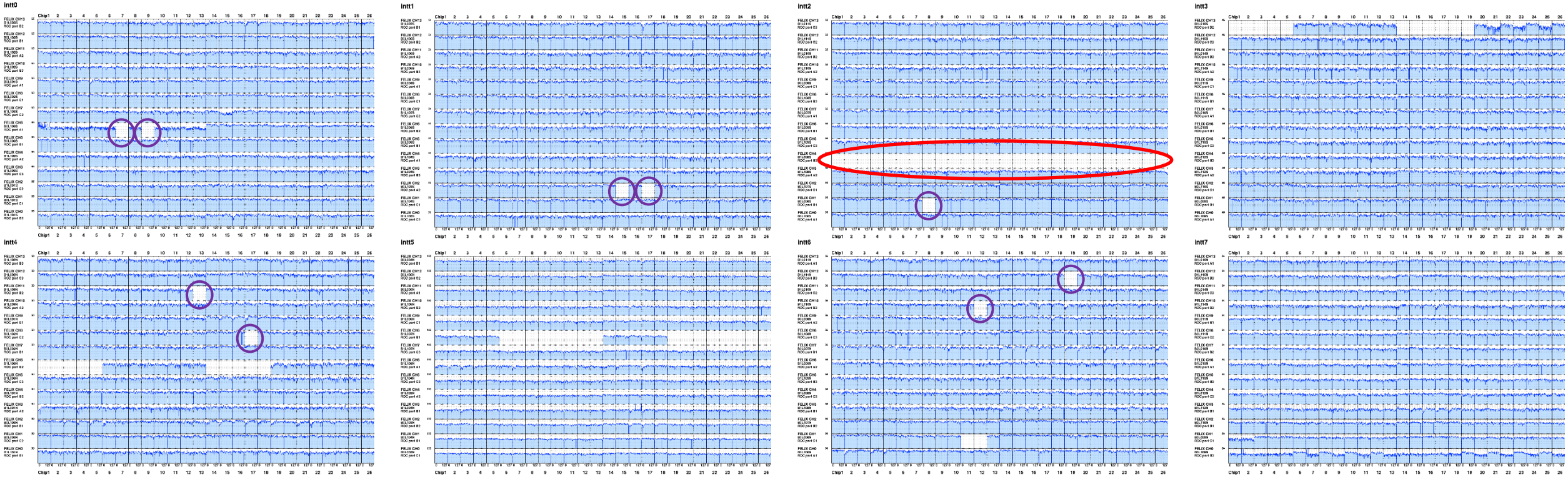


INTT status (in March)



- Pedestal data taken in March
- In total ~~33~~ 43/2912 (1.4%) chips were dead
  - 10 chips connected to one bias channel were already had problem
  - 36 chips due to bias issue, 7 chips due to sensor/FPHX-chip issue

INTT status (now)



- Beam data taken in the last week
- 74/2912 chips (2.5%) are dead
  - Mostly from a newly masked half- ladder which shows bad ADC/BCO values
  - 36 chips due to bias issue, 38 chips due to sensor/FPHX-chip issue
    - 9 out of 38 chips are masked at FELIX level because they are uncontrollable

Commissioning task

Task	Person in Charge	Duration	Points	Beam condition	Other subsystem	Priority	Field	Trigger	Comment
Chip saturation study	DAQ: 1008 guys Analysis: Ryotaro Support: Cheng-Wei	10 mins for each	INTT in trigger mode Set1-1: ncollision100, and open_time 127 Set1-2: ncollision100, and open_time 110 Set1-3: ncollision100, and open_time 90 Set1-4: ncollision100, and open_time 80 Set1-5: ncollision100, and open_time 60 Set1-6: ncollision100, and open_time 40 Set1-7: ncollision100, and open_time 25 Set2: same open_time settings, while changing ncollision to be 2 Set3: same open_time settings, while changing ncollision to be 50	with collisions (with low rate)	With MBD, in global mode	High	Any	MBD	This is to study the chip hit saturation issue discovered on Dec 10 2024. Whether we still see the cutoff in the chip nhit distribution even with the open time of 128 BCO? We also need to check the cluster phi size distribution We can also try to learn the correlation between the open_time and nhits
Carried over hit study	DAQ: 1008 guys Analysis: Ryotaro Support: Cheng-Wei	10-15 mins (~1M to 1.5M events for each)	INTT in trigger mode Set1: ncollision 3, and open_time 60 Set2: ncollision 3, and open_time 127 Set3: ncollision 127, and open_time 127 Set4: ncollision 100, and open_time 60 (nominal setting, as ref.) (Short GTM busy window for this test if possible, but maybe not possible)	with collisions (prefer high trigger rate)	Local mode should be fine	High	Any	MBDNS	As of Nov 25 2024, I think we never have the dataset with very narrow ncollision for the event-mixed-up study With the statistic approach, in the reality, we just cannot distinguish b/w mix-up hits and the hits from real collisions. So it's good to have such a dataset that we have the potential to believe that any abnomal behavior found in the data can be really came from anything other than the really collisions. In addition, by comparing with the previous dataset with ncollision 100, we can possibly learn where the event mixup happened.
Timing coarse delay scan	DAQ: 1008 guys Analysis: Ryotaro Support: Genki	5 min x 6 points x 2 sets	lvl1 = 112, 113, 114, 115, 116, 117	With collisions	With MBD, standalone	High	Any	MBD	After GTM is finalized
DAC0 scan	DAQ: 1008 guys Analysis: Nao Support: Akitomo	5 min x 6 points x 2 sets	DAC0 = 15, 20, 25, 30, 35, 40	better to be with beam	Standalone	Middle	Any	MBD	Better to take data in the same condition as Run2024 Au+Au commissioning, i.e. with Au+Au beam, with other subsystems on.
Digital control test	DAQ: Takahiro Analysis: Tomoki Support: Itaru	5 min x 2 points x 2 sets	Digital Ctrl = 2, 10	With collisions	Standalone	High	Any	Any	First try the digital control test with pedestal data with no collisions. If it's not successful, retry to take data with collisions.
Renew chip/channel mask	DAQ: 1008 guys Analysis: Jaein Support: Rachid/Raul	1 min w/ FA	Need some iterations	With collisions	Standalone	Must	Any	Any	~~Can be finished before Au beam comes.~~ This work will should be performed AFTER 1 week of stable data taking using the current mask condition. Also need Raul to unmask FELIX chip masking
Single bunch crossing	DAQ: 1008 guys Analysis: ?? Support: ??	10 mins?	one run ncollision 100 one run small ncollision	single or two bunch crossing(s) with collisions	Join the MVTX commissioning	Low	Any	Any	We never join the MVTX commissioning data taking. I think it's a good idea to take at least one run with single bunch crossing or five. We can learn the noise level and also the beam background, and also fraction of the hit moved to the next bin
Hit rate study with/without collar	DAQ: 1008 guys Analysis: ?? Support: ??	10 mins?	one run ncollision 100 one run for each configuration small ncollision	single or two bunch crossing(s) with collisions	Join the MVTX commissioning	Low	Any	Any	

Done

Done

Done

Done

Done?

RHIC Run25/26

Original RHIC Run-Plan for 2025

Abhay @ short PAC

Aim: Complete RHIC Operations mission

Run 25 in calendar year 2025 (Operations funds: FY25+FY26)

FY25: 18 weeks of Au+Au at 200 GeV: *Assumption*

FY26: 12 weeks: (Au+Au and ???) *Assumption*

} Total of 30 weeks

Original Timeline*:* March 24-June 30 → A summer break → August 18 - December 22, 2025

The PAC Report:

1. **To accumulate 7 nb^{-1} integrated Au-Au data for sPHENIX, as highest priority**
2. If there is time/money then (not an ordered list):
   p-p (~5 weeks); p-Au (~3-weeks); O-O data; Space Radiation studies @ STAR (fixed tgt)
3. **Critical need** for EIC related R&D (APEX 3-4 weeks)

RHIC PAC meeting was planned June 17-18, 2025, to discuss the late-2025 operations

RHIC Run25/26

Run 2025: Reality

Abhay @ short PAC

A short in the blue ring, sector warmed up, the elusive finally fixed Friday May 2nd. Now, RHIC on June ~10th

If total operation is still (18+12 = 30) weeks

Timeline: June 10 → without summer-break → January ~2, 2026

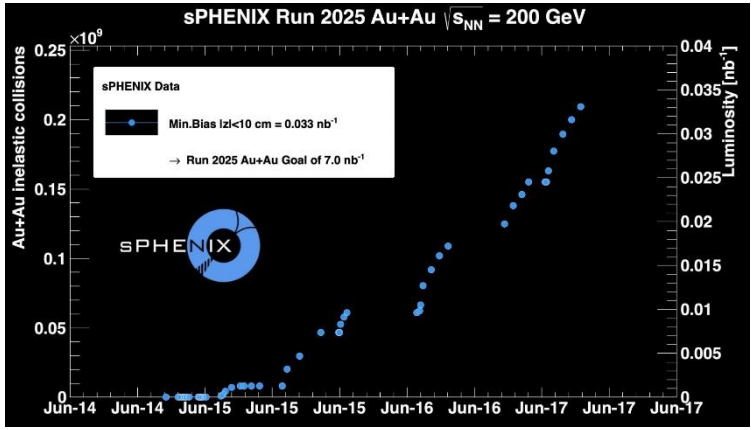
Assumes RHIC behaves well in summer (heat and humidity)

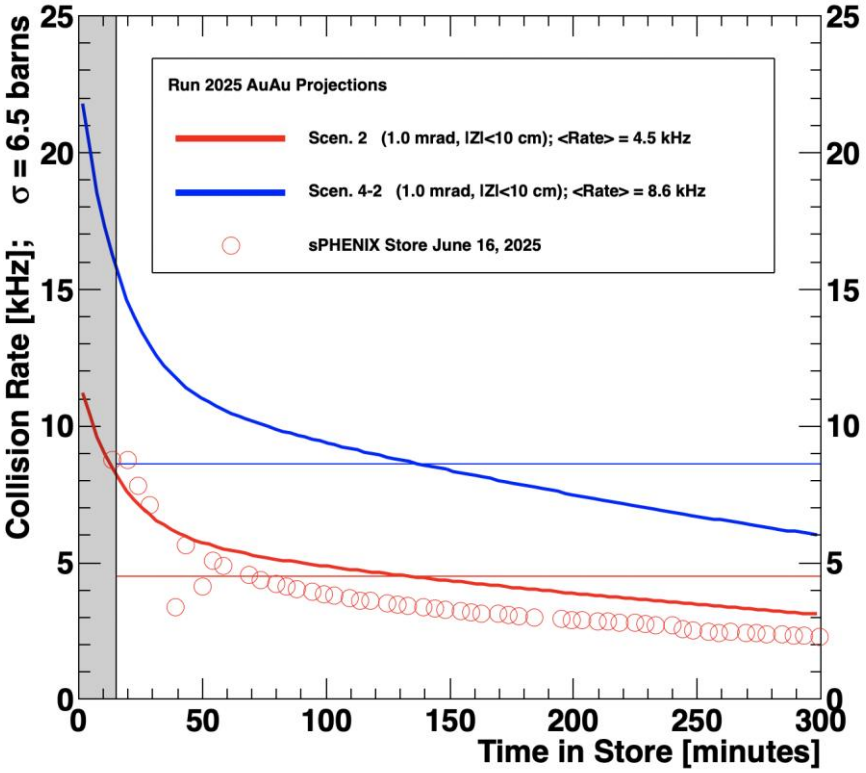
If not then, depending on the weather conditions and operations efficiency, decisions will be made daily/weekly during this time on how best to operate.

A short PAC meeting June 17th, 2025 – to be followed by a more detailed one in late July/August 2025 to plan the late-2025 RHIC operation.

Integrated luminosity goal: AuAu 7nb^{-1}

- sPHENIX BUP20 initially planned for 25 nb^{-1}
- The sPHENIX 2024 BUP describes the need for minimally 7 nb^{-1} of Au+Au data
  - Recommended by the PAC as the first priority for Run 25.
  - 1mrad running & |z| < 10 cm
  - RHIC luminosity will be improved over time
- sPHENIX would require 28 (48) physics weeks if running at the C-AD "max" ("min") projections
  - First collisions June 9th → **December 2025** (at the "max" projections) to **May 2026** ("min") to accumulate 7 nb^{-1}





CY26?

Requires extension of Accelerator Safety Envelop

Accelerator Safety Envelop (ASE) for the RHIC complex expires **December 31, 2025.** Renewal is time & effort-consuming. Out of abundance of caution, and advise from BHSO, *I have initiated the paperwork to extend the ASE*.

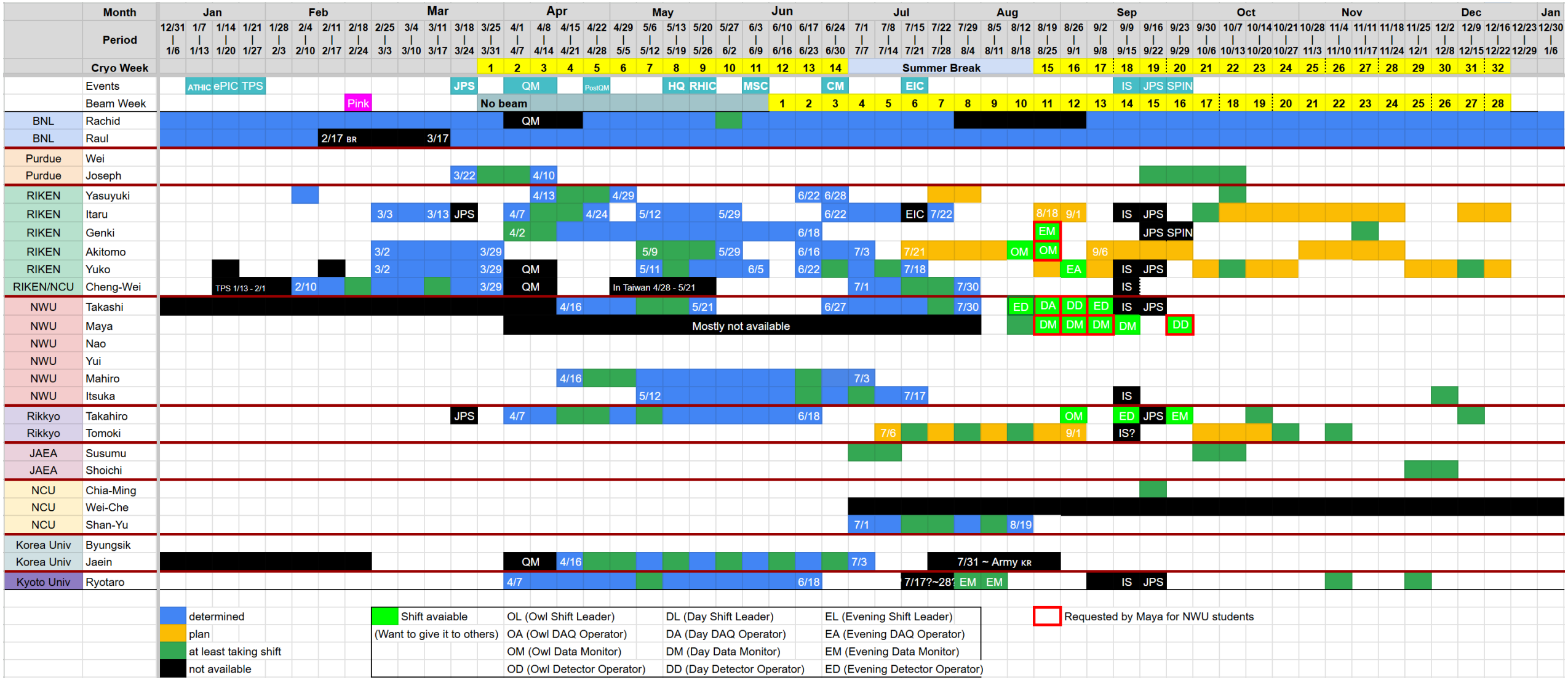
➔ *Final decision only after knowing (FY25+FY26) budget.*

If we really go beyond December 31, 2025:

Significant implications for RHIC to EIC transition. R&R (recovery and repurpose at the Collider, IR and Experiment will begin later). Will need to coordinate this with the EIC & the Lab Directorate and the DOE.

Abhay @ short PAC

BNL travel



https://docs.google.com/spreadsheets/d/19mHncED6ORXqv2N4TVZ12kvGjgqf92Ysrr8i0v4nPBM/edit?gid=177969834#gid=177969834

sPHENIX shift

Institution Name	# People	Current # of active Authors	Effective # of Authors	# total shift obligation	# Shifts Taken	Status	Member Names
RIKEN	10	6	6	18	26	+44% (OK)	**Akitomo Enokizono**, Yasuyuki Akiba, Hideto Enyo, Yuji Goto, Itaru Nakagawa, Ralf Seidl, Minho Kim, Yuko Shoji Sekiguchi, Yasushi Watanabe, Satoshi Yokkaichi
RIKEN BNL Research Center	1	1	1	3	3	Exact coverage (OK)	Genki Nukazuka
Rikkyo University	7	1	1	3	13	+333% (OK)	**Takahiro Kikuchi**, *Tomoya Kato, Ryota Shishikura*, **Tomoki Harada**, Kazuma Fujiki , Kazuyoshi Kurita, Jiro Murata

- The sign up for the fall shifts started June 17
  - 4 person shifts until Dec. 23, then 2 person watch shifts until Jan. 6
  - The quota was increased from 2.7 to 3.1

Week	Period Coord.	Shift	Shift Leader	Detector Opr.	DAQ Opr.	Data Monitor Opr
Nov 4th - Nov 11th		0:00-8:00				
		8:00-16:00		Tomoki Harada Rikkyo University		Ryotaro Koike Kyoto University
		16:00-00:00				
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Nov 11th - Nov 18th		0:00-8:00				
		8:00-16:00	Eric Mannel Brookhaven National Laboratory	Greg Ottino Lawrence Berkeley National Laboratory	Zhenyu Ye Lawrence Berkeley National Laboratory	
		16:00-00:00		Genki Nukazuka RIKEN BNL Research Center		Hideto Enyo RIKEN
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Nov 18th - Nov 25th		0:00-8:00	Skaydi Grossberndt Baruch College, CUNY			
		8:00-16:00				
		16:00-00:00				
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Nov 25th - Dec 2nd		0:00-8:00	Skaydi Grossberndt Baruch College, CUNY			Shoichi Hasegawa Japan Atomic Energy Agency
		8:00-16:00	Ralf Seidl RIKEN			Ryotaro Koike Kyoto University
		16:00-00:00				
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Dec 2nd - Dec 9th		0:00-8:00		Shoichi Hasegawa Japan Atomic Energy Agency		
		8:00-16:00	Maria Chamizo Llatas Brookhaven National Laboratory			Itsuka Omae Nara Women?s University
		16:00-00:00				
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Dec 9th - Dec 16th		0:00-8:00		Yuji Goto RIKEN		
		8:00-16:00	Yuko Shoji Sekiguchi RIKEN	Audrey Francisco CEA Saclay	Nicole D'Hose CEA Saclay	Takahiro Kikuchi Rikkyo University
		16:00-00:00			Hannah Bossi Massachusetts Institute of Technology	
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Dec 16th - Dec 23rd		0:00-8:00	Skaydi Grossberndt Baruch College, CUNY			
		8:00-16:00	Mickey Chiu Brookhaven National Laboratory			
		16:00-00:00	Bade Sayki Los Alamos National Laboratory			
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Dec 23rd - Dec 30th	Ron Belmont University of North Carolina at Greensboro	0:00-8:00	Skaydi Grossberndt Baruch College, CUNY			
		8:00-16:00				
		16:00-00:00				
Week	**Period Coord.**	**Shift**	**Shift Leader**	**Detector Opr.**	**DAQ Opr.**	**Data Monitor Opr**
Dec 30th - Jan 6th	Ron Belmont University of North Carolina at Greensboro	0:00-8:00				
		8:00-16:00				
		16:00-00:00				