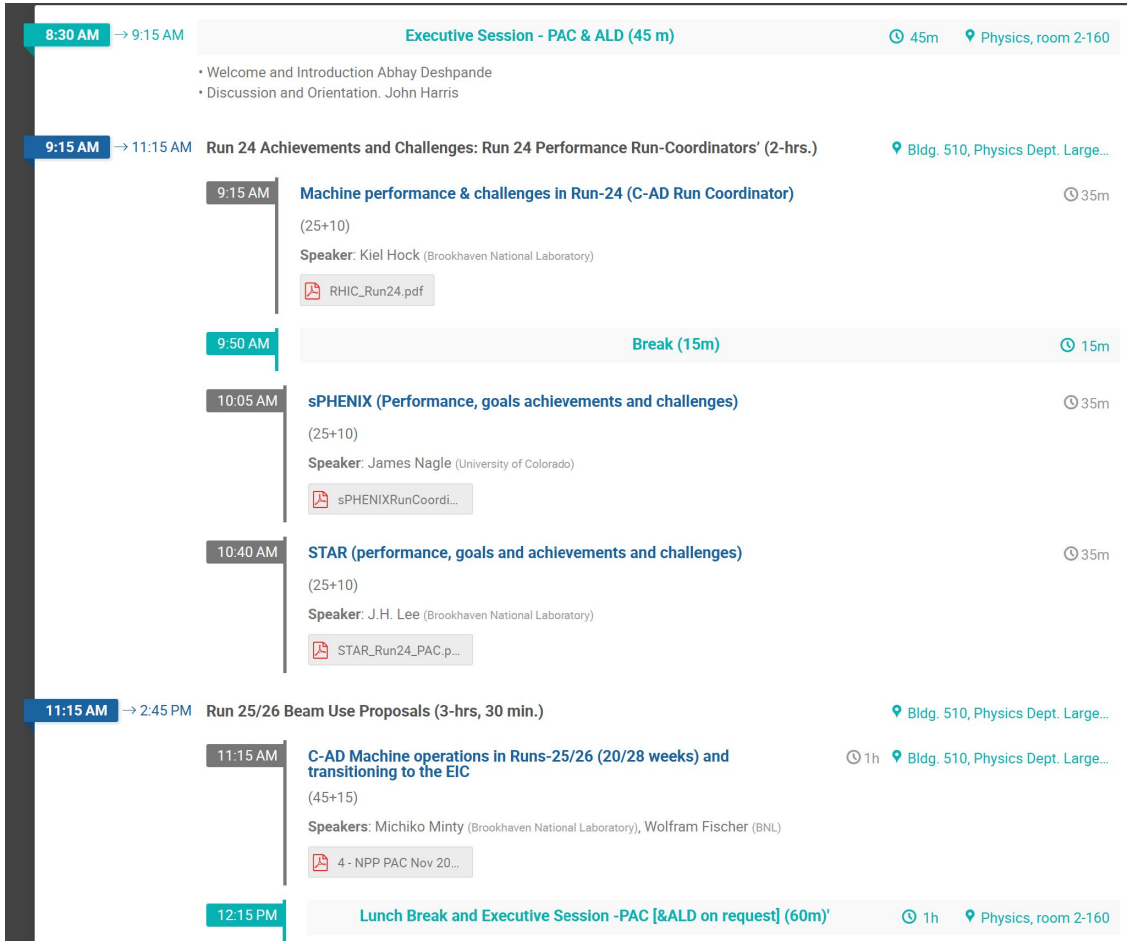
PAC Nov 2024

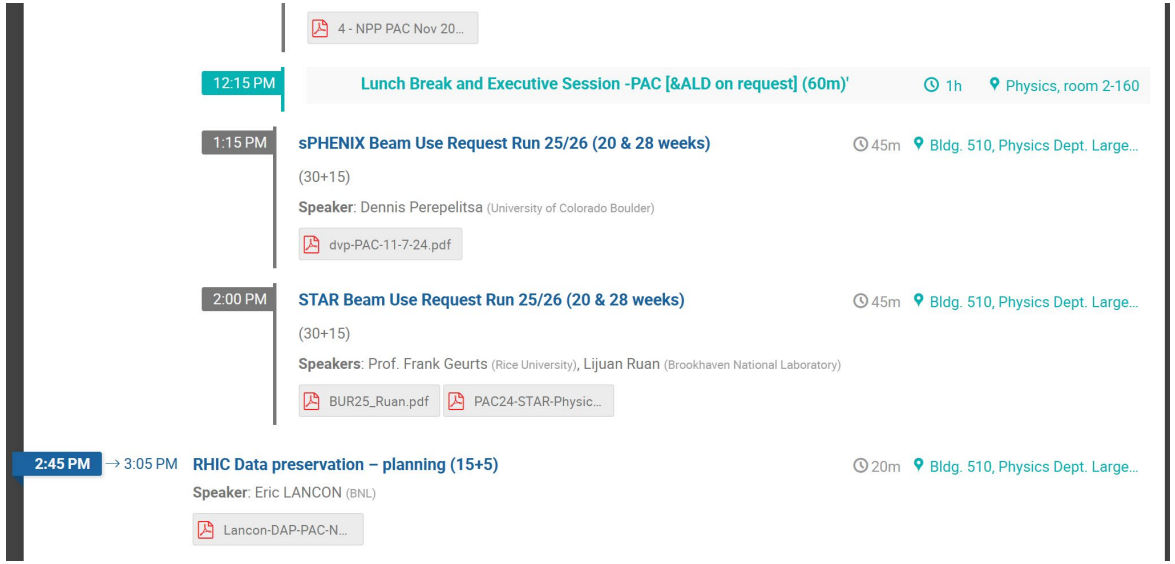
Y. Akiba

2024 November 12

PAC November 2024

- Nov 7 (presentations) – Nov 8 (homework, closeout)
- Indico: https://indico.bnl.gov/event/25236/





- Focused on RUN25/26 BUR
- No PHENIX nor STAR publication talks
- Closeout Nov 8th at 2PM

PAC November 2024

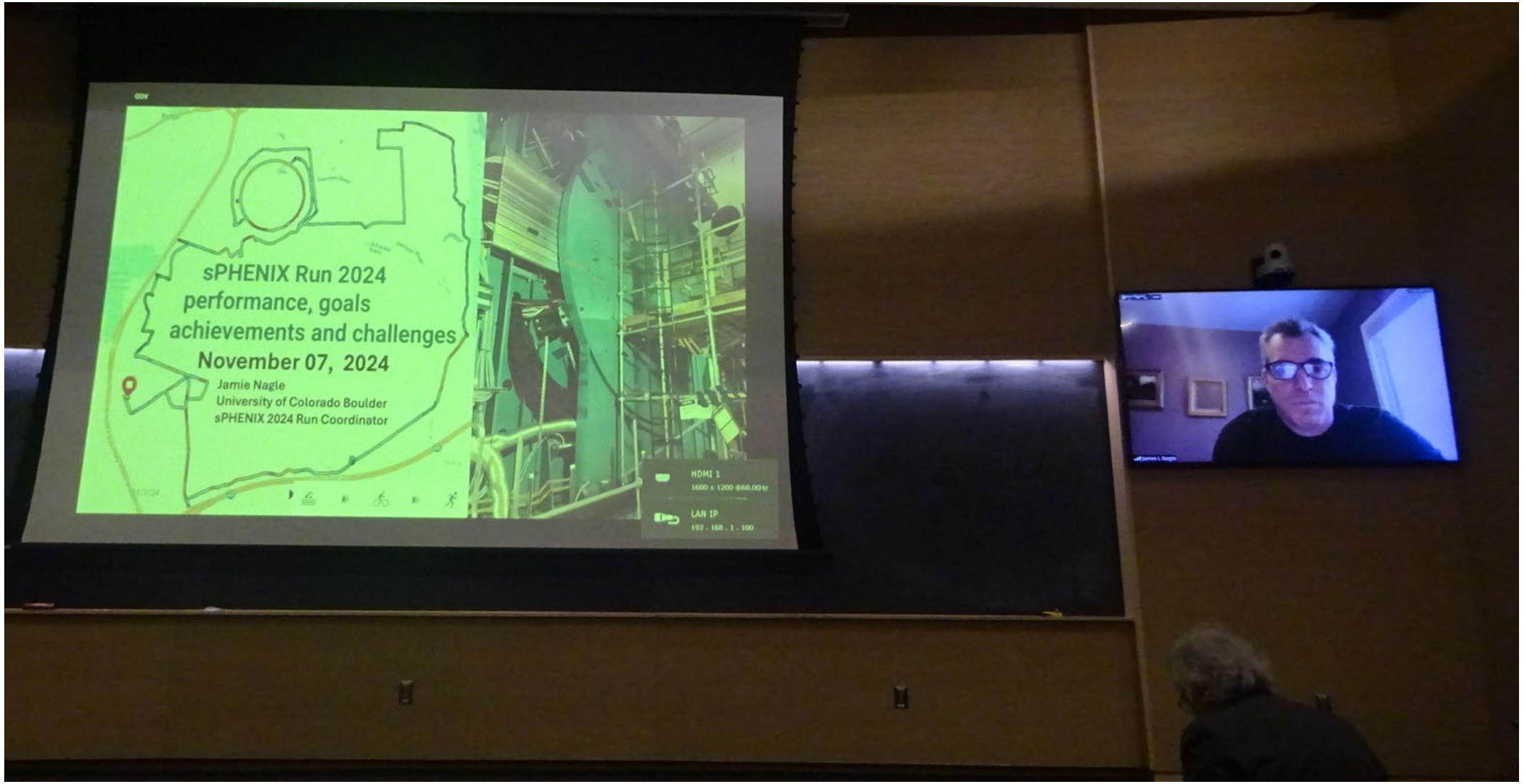
Indico: https://indico.bnl.gov/event/25236/

- Keil Hock RHIC performance in RUN24
- J. Nagle sPHENIX performance in RUN24
- J.H. Lee STAR performance in RUN24
- M. Minty C-AD operation in RUN25/26 and Transition to EIC

Lunch break

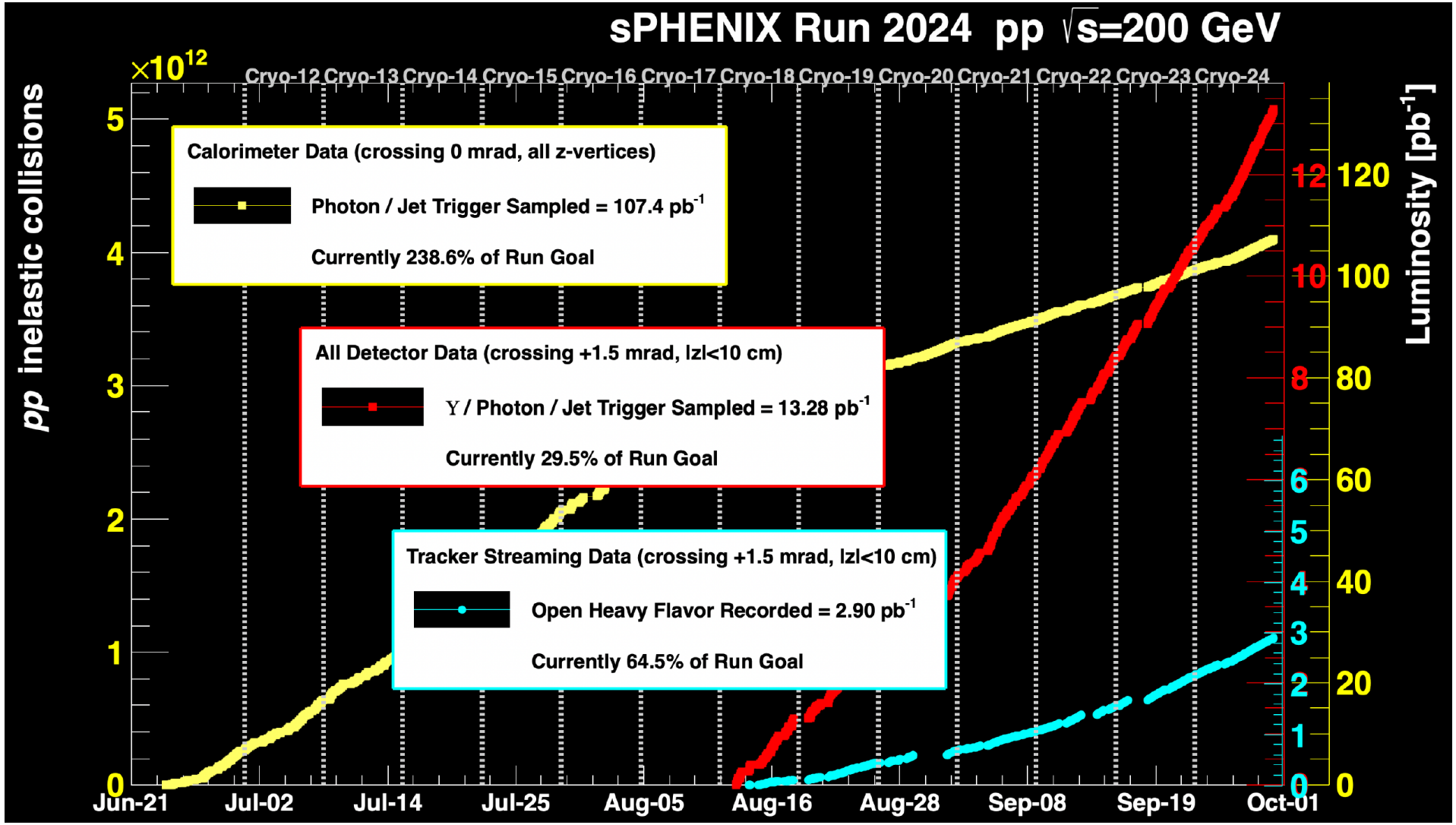
- D.V. Perepelitsa sPHENIX BUR (20 & 28 weeks)
- L. Ruan STAR BUR (20 & 28 weeks)
- E. Lancon Data and Analysis Preservation at RHIC

J. Nagle present sPHENIX performance



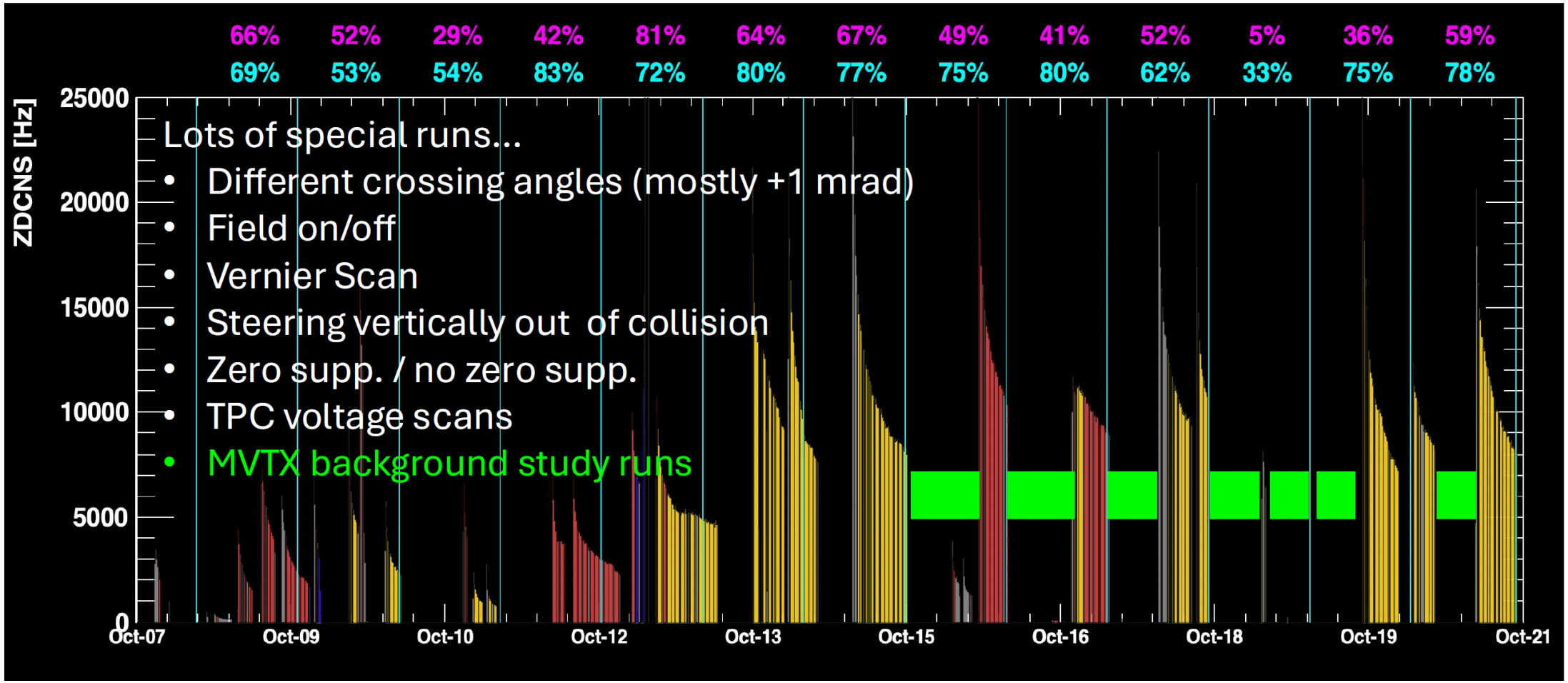
- Jamie presented sPHENIX performance (remote)

J. Nagle: sPHENIX performance in pp



Jamie: Run 24 Au+Au

Au+Au 3 weeks in a nutshell

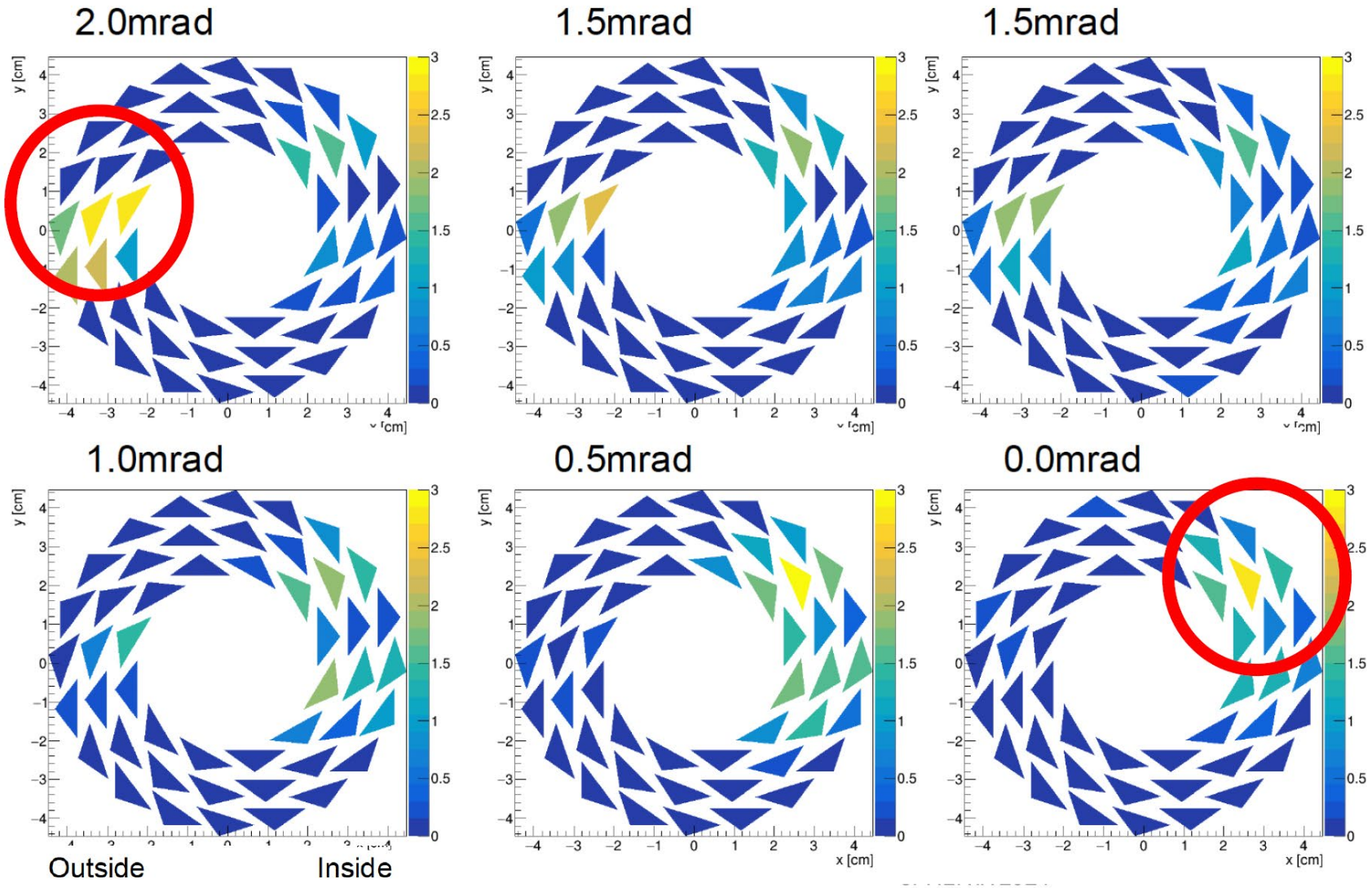


Jamie's point on sPHENIX in RUN25 Au+Au run

- TPC was stable in Au+Au run
- MVTX has beam background problem: Too frequent "autorecovery"
- Possible solution
  - With Trigger mode, autorecovery rate reduced by a factor of 30
  - In this mode, MVTX could run at 2 kHz trigger rate in RUN24 Au+Au
  - With improvement MVTX side, MVTX experts think MVTX can run at 5kHz
  - sPHENIX goal is to run at 15kHz trigger rate

  →factor of 3-4 reduction of the beam background will solve the problem
- Data with various beam condition were taken to find the source of BG and the way to reduce background
- CA-D Taskforce of beam background is formed

X-ing angle summary, 1x1 bunches



Crossing angle change completely moves where the background hits.

C-AD has many test results to develop a mitigation.

J. Nagle: Summary slide

Given many challenges,
excellent sPHENIX pp data set the result of
sPHENIX and C-AD smarts and true grit.

Run 2024 pp data set

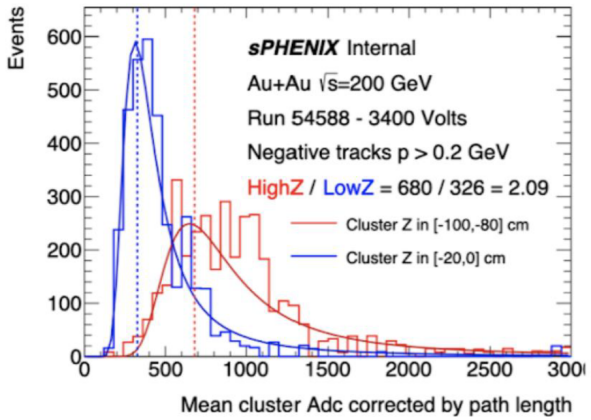
- 230% BUP jets/photons
- 65% BUP open heavy flavor
- 30% BUP Upsilon/full program

sPHENIX and C-AD have the data needed to solve remaining issues for a very successful Run 2025 Au+Au.

11/6/2024 sPHENIX 2024 29

- Jamie had an excellent presentation of RUN24 sPHENIX performance
- He presented that the TPC HV problem was fixed by isobutane
- He also make a good case that the MVTX beam background problem can be solved in RUN25
- PAC members seemed to be convinced that sPHENIX could successfully take AuAu data in RUN25/26

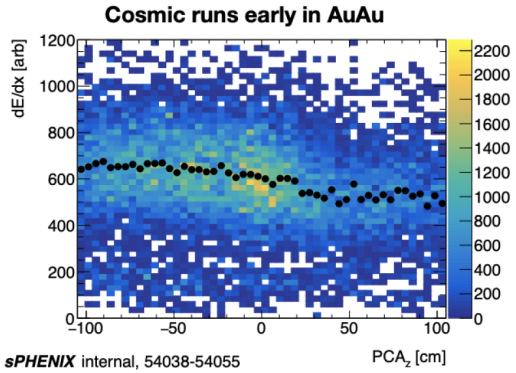
But…there are remaining issues

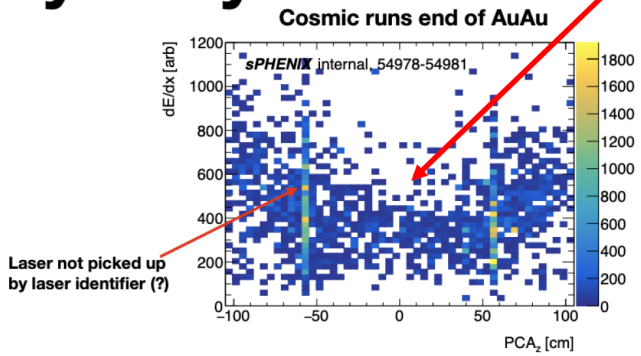


Very low charge collection from tracks near the central membrane.

Many tests to understand the origin. Key tests w/ cosmics after beam dropped.

TPC Mystery





Likely significantly compromised tracking performance in all AuAu data.

- In the Q/A session, one of the PAC member asked about this issue
- This issue might be caused by isobutane
- Jamie said this issue was not present in p+p part of the run, but …

sPHENIX Beam Use Propoal

Beam Use Proposal

The sPHENIX request is sufficient Au+Au running to reach the integrated luminosity target of 7 nb^{-1}

Priority-ordered list of physics-driven additional running, given sufficient available physics weeks for each item

sPHENIX Physics Target in Run-25: **7 nb^{-1} (50B events)**		
Collision Species	Cryoweeks	Projected luminosity, $\|z\| < 10$ cm
Au+Au 200 GeV	20	2.4 – 4.2 nb^{-1} recorded
Au+Au 200 GeV	28	3.6 – 6.4 nb^{-1} recorded

If Au+Au luminosity target is met, ordered priority list for additional running:		
Collision Species	Physics weeks	Projected luminosity, $\|z\| < 10$ cm
1. p+p 200 GeV	8	13 pb^{-1} sampled + 3.9 pb^{-1} streaming
2. p+Au 200 GeV	5	80 nb^{-1} sampled + 24 nb^{-1} streaming
3. O+O 200 GeV	2	13 nb^{-1} sampled + 3.9 nb^{-1} streaming

STAR Beam Use Proposal

Executive summary of plans for Run 25

Full detector capability with forward upgrades and excellent PID over an extended η coverage

Table 1: Proposed Run-25 assuming 20 or 28 cryo-weeks of running in 2025 and 2 weeks of set-up time to achieve minimum-bias running conditions. For both scenarios, we request 200 GeV Au+Au collisions. We provide the requested event count for our minimum bias (MB) trigger, and the requested sampled luminosity from our a high-p_T trigger that covers all v_z. During Runs 23 and 24, STAR collected 8 billion MB Au+Au events and achieved a sampled luminosity of 1.2 nb^{-1}.

$\sqrt{s_{NN}}$ (GeV)	Species	Number Events/ Sampled Luminosity	Year
200	Au+Au	8B+**5B** / 1.2 nb^{-1}+**20.8 nb^{-1}**	2023+2024+**2025 (20 cryo-weeks)**
200	Au+Au	8B+**9B** / 1.2 nb^{-1}+**28.6 nb^{-1}**	2023+2024+**2025 (28 cryo-weeks)**

Au+Au: probe the inner workings of the QGP;
- original goals: 20 B MB events/40 nb^{-1}

STAR requests an extension of Run-25 beyond 28 cryo-weeks, allowing 5 weeks of p+Au physics data collection to achieve a sampled luminosity of 0.22 pb^{-1}

Brookhaven National Laboratory

PAC Close Out

- Close Out at 2PM on Nov 8th in Large Seminar Room and Zoom
- PAC recommends the Au+Au is the highest priority and Ldt=7/nb of Au+Au recorded at sPHENIX
- PAC supports longer RUN25/26 to complete RHIC science mission
- The priority among the other beam requests will be discussed in the next PAC in the middle of RUN25/26.
- By the next PAC, the performance of RHIC and sPHENIX will be known, and the PAC can make recommendation of the priority of other beam request

PAC's intension

- After the close out, I talked to Krishna Rajagopal (key member of PAC) and asked how feasible a longer RUN25/26 beyond 28 weeks
- Krishna said
  - we provide Abhay the ammunition to get as much cryo-weeks as possible in RUN25/26 from FY26 budget.
  - Budget come from the EIC: Bring back RHIC operation money from the EIC budget
  - By the time of the next PAC, the budget situation will be known better.
  - If there is no extention of run, the PAC decision will be simple: only Au+Au

Other things presented in PAC

- CA-D requested for upto 2 weeks of APEX beam time in addition to usual 1 day per 2 weeks of run. They have 20 approved APEXs that is related to EIC. In 20/28 weeks of run, only 9 or 13 APEX session is possible
- 2 weeks of CeC was requested after Physics of RUN25/26. CeC is one of methods to achieve 10^34 luminosity at EIC
- RHIC Data and Analysis Preservation plan was presented
  - I later heard that 0.5M/year of budget (program development fund) for three years for this effort