


sPHENIX Status RHIC Coordination Meeting July 2, 2024

Jamie Nagle
University of Colorado Boulder
sPHENIX Run Coordinator



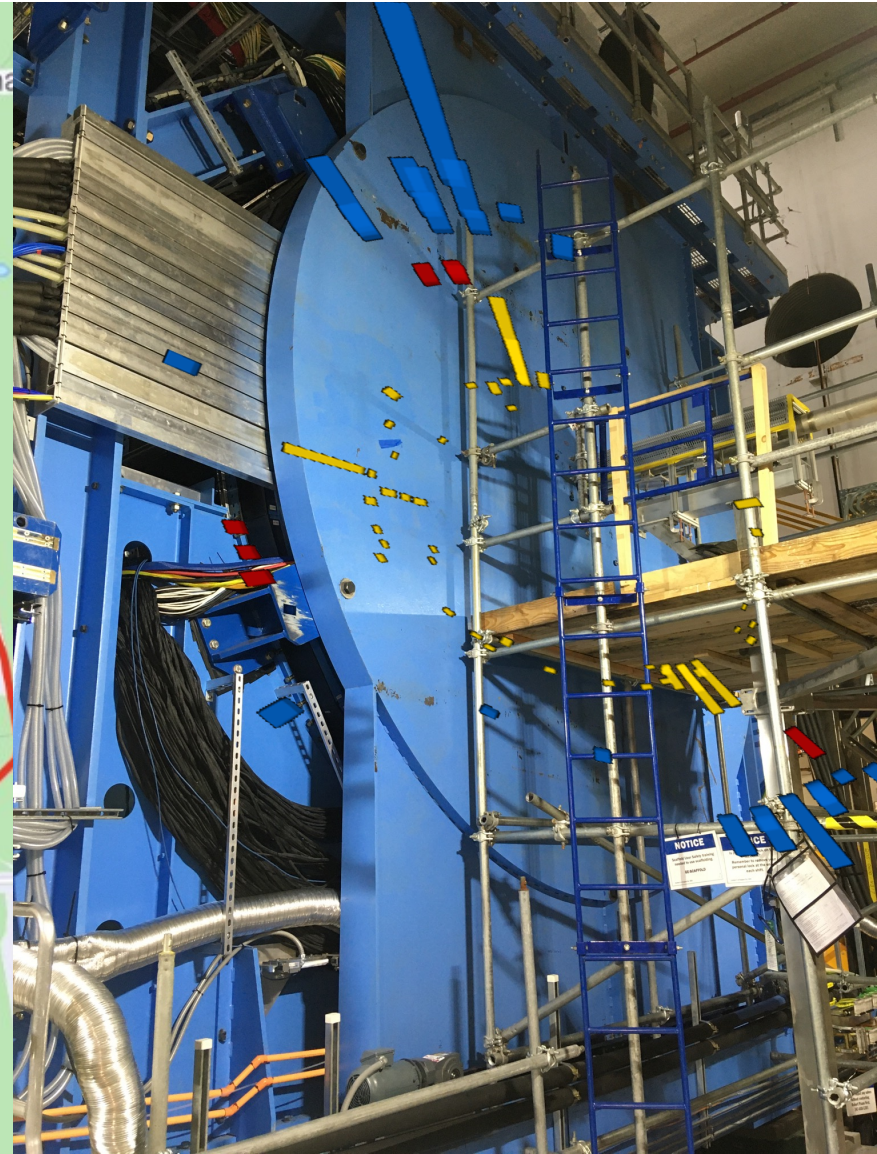
STRAVA

You're the new Local Legend in town!

You just claimed the title of Local Legend on Yale Rd..

7/2/24

sPHENIX 2024





SPHENIX Collaboration

Recognizing the critical role of RHIC Operations

Highlighting early career collaborators

sPHENIX Hero: Mina Mazeikis

How long have you been working at Brookhaven and in what capacity?

I started as an operator in the CA-D main control room in January of 2023. We are responsible for handling all communication regarding the safety, operation, and day to day function of the particle accelerators at BNL, which include the Relativistic Heavy Ion Collider (RHIC), the Alternating Gradient Synchrotron (AGS), and the AGS Booster. Operation of the accelerators involves using magnets and radiofrequency cavities to guide and accelerate particle bunches through the accelerator rings, where the beam is either sent toward fixed targets or steered into collisions for research at the sPHENIX and STAR experiments.

What is the focus of your work on the sPHENIX experiment?

The electromagnetic calorimeter! Throughout my undergrad I worked with a wonderful small team of professors, technicians, and fellow students to assemble the tungsten absorber blocks which make up the ring of the detector. Each block was handcrafted and tested multiple times, and later shipped to BNL for cosmic ray calibrations. Once hired at BNL, I was lucky enough to take part in cabling of the sPHENIX TPC, so I have seen the sPHENIX detector in many stages of its life!

Where were you born and what is your background before your current position?

I grew up in Hoffman Estates, Illinois, and then attended the University of Illinois at Urbana-Champaign where I received my B.S in Engineering Physics.

What was the most exciting/challenging project you have worked on?

Coming into BNL for the last few years of RHIC operations has been a whirlwind of challenges and excitement. I work with a strong and enthusiastic team of physicists and machine specialists who have taught me the hands-on applications of accelerator physics. Successfully creating circulating particle beams can feel like a puzzle at times, but it is very rewarding to witness the operations of such a large and intricate accelerator complex.



sPHENIX Hero: Rachel Terheide

How long have you been working at Brookhaven and in what capacity?

I've been working at Brookhaven since 2018. I started out as an operator in the main control room, and as of January 2024 have been promoted to an operations coordinator. This work involves doing projects for different groups, as well as keeping the machines running and doing failure diagnosis.

What is the focus of your work on the sPHENIX experiment?

For sPHENIX my contributions are a bit more in the background. I set up and steward the analysis for operations that gives us information on our performance run to run. I also am a part of the team that is responsible for getting beam set up for physics in RHIC and attempting to keep it there.

Where were you born and what is your background before your current position?

I'm originally from Indiana, not far from a town called Greenfield. I took up the position as operator about two months after I graduated from Butler University, a university in Indianapolis, with a bachelor in physics and astrophysics.

What was the most exciting/challenging project you have worked on?

For BNL, the most exciting project I've worked on has been the luminosity accounting that we do to work with STAR and sPHENIX. I've learned a lot while doing it and continue to find myself challenged as it evolves.

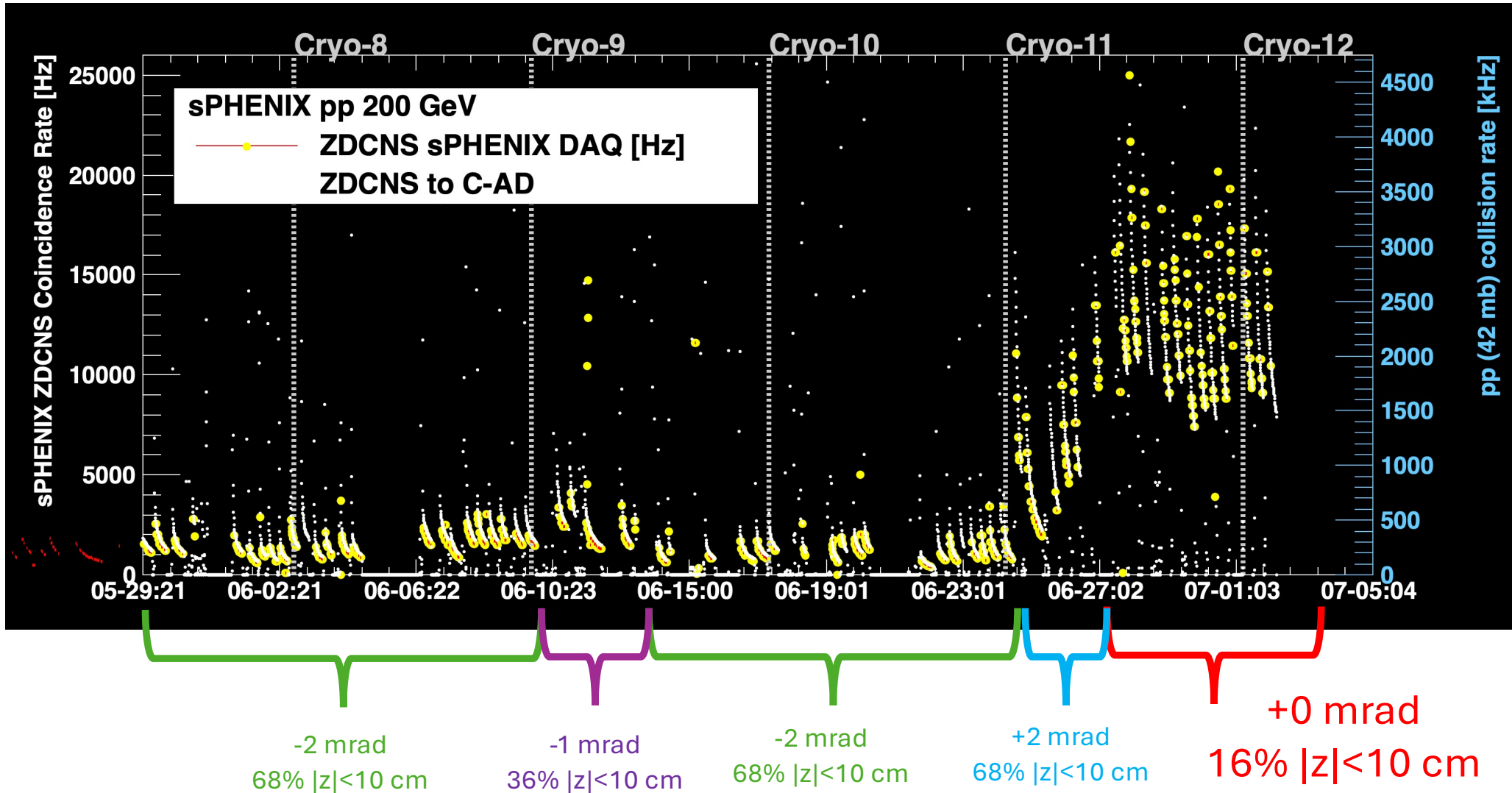
How did you decide to go into your profession??

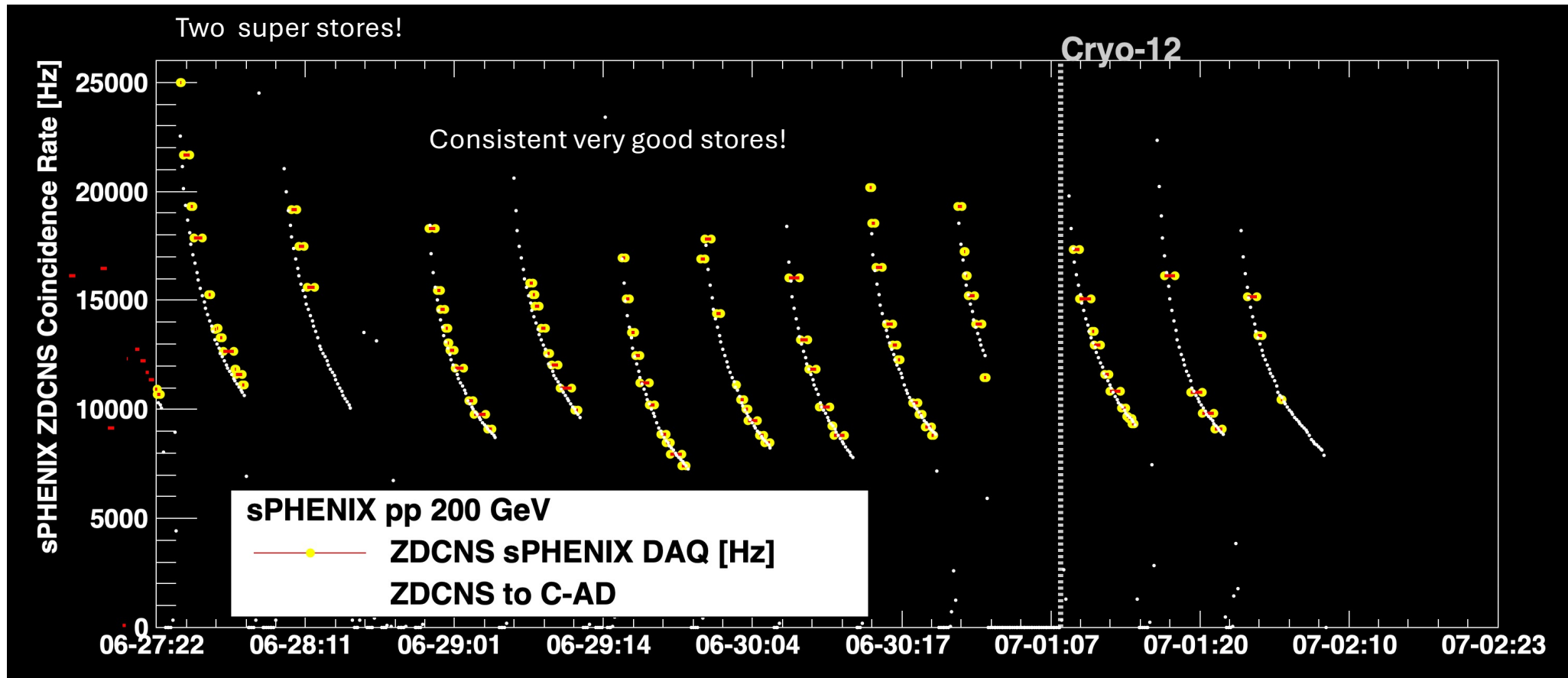
I was pulled into the physics world through my interest in astronomy and astrophysics. The more I learned about the study of physics, the more I enjoyed it. Working with BNL was a great opportunity for me to work in the scientific field with my educational background.

What do you like to do in your spare time?

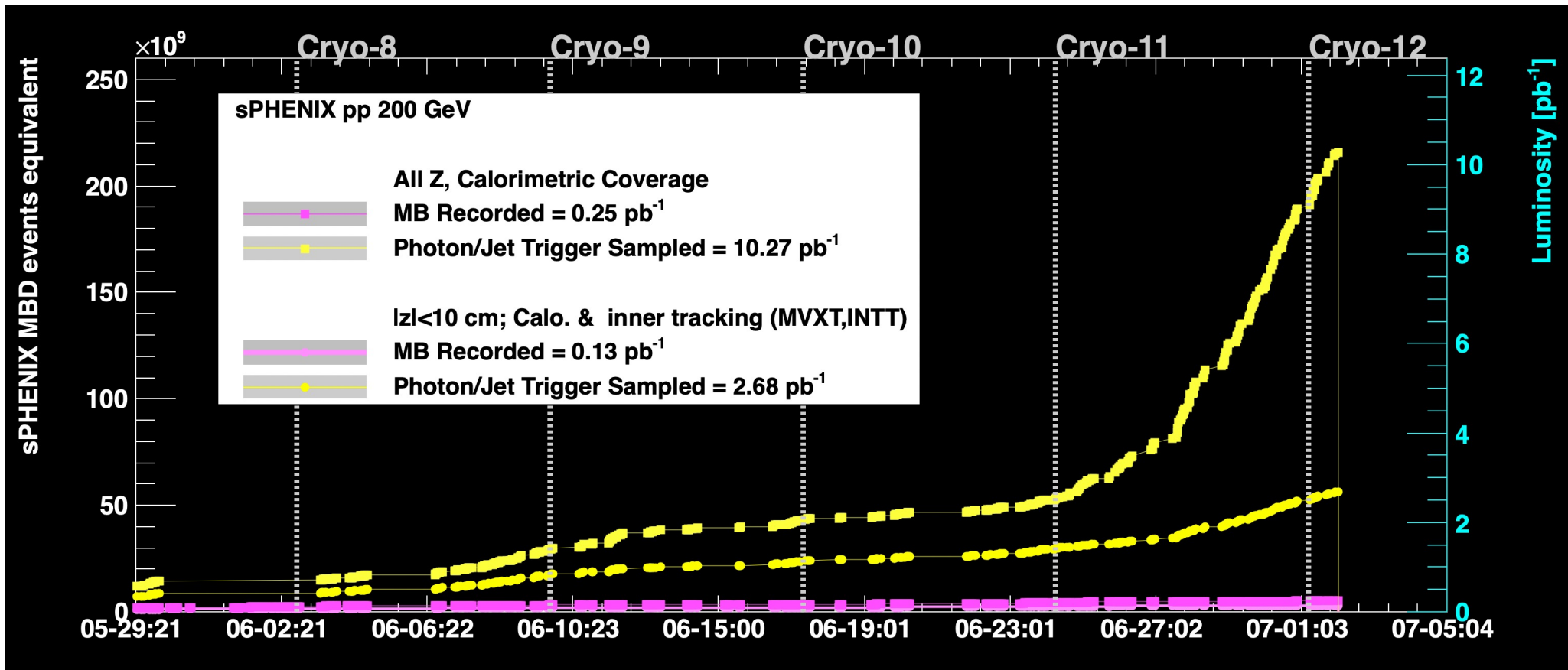


<https://www.sphenix.bnl.gov/node/1751378401>





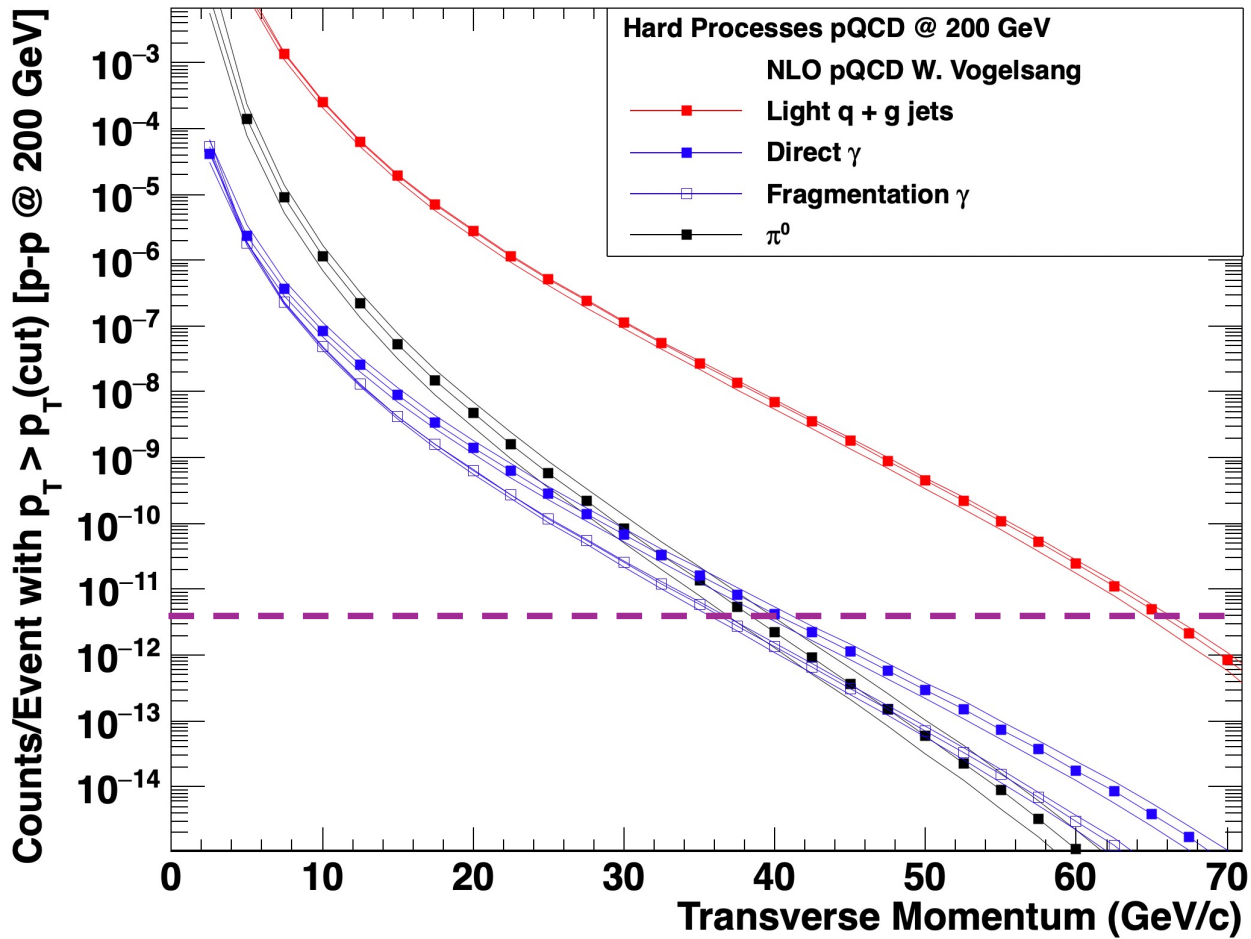
Almost all of our data in the last 5 days! Backgrounds are very low!
Rare triggers are sampling the full luminosity (and can handle more).
Working on DAQ/detector efficiency.



Integrating good statistics for purely calorimetric observables
(photon, π^0/η , jet, dijet, ...)

Overall physics goal with tracking was 45 pb^{-1} for $|z| < 10$ cm

Excellent data taking over the past week at zero crossing angle



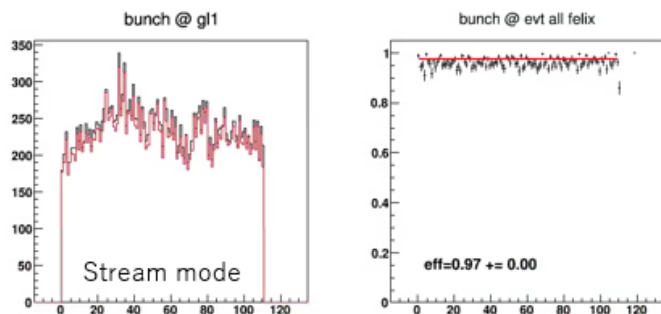
Plot made by Jamie Nagle in 2010 ☺

Additional Work

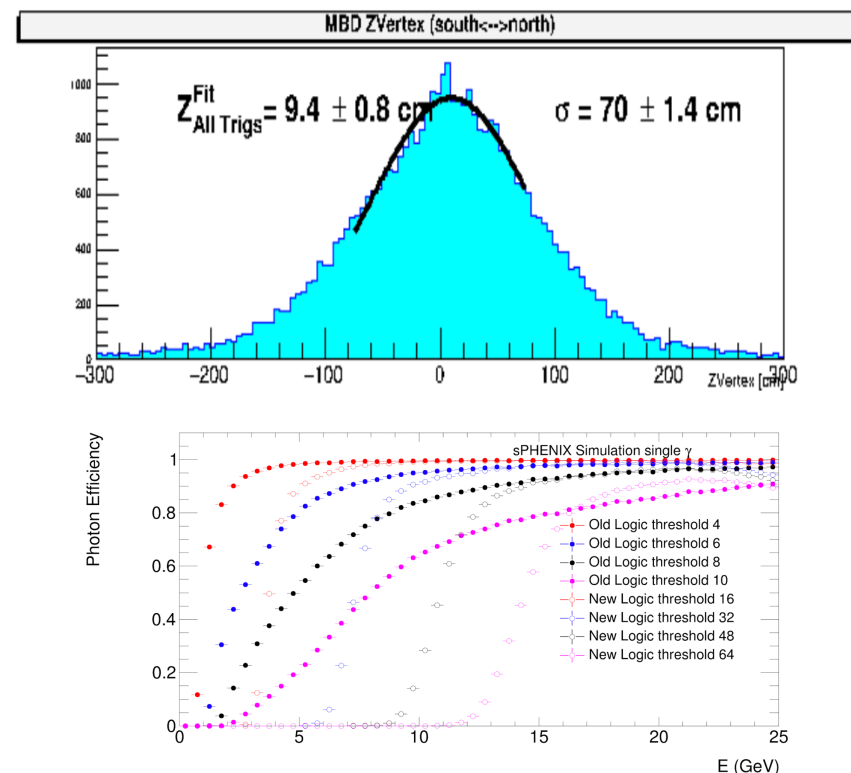
With zero crossing angle, z-vertex $\sigma \sim 50-70$ cm
 [wider than expected 40 cm – is that right?]
 Thus, refining firmware/software for sharp
 MBD vertex Level-1 trigger selection.

Uploading new Level-1 trigger firmware today.
 Non-linear energy mapping for more precision in
 turn on curves for photons and jets.

INTT near final testing for 100% streaming mode.

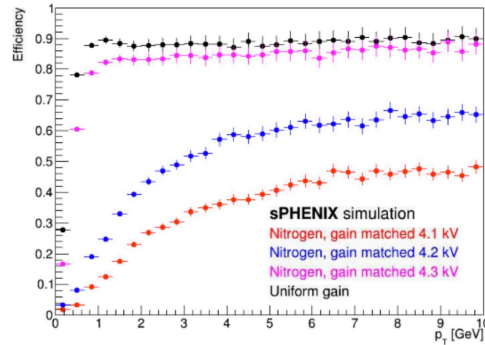
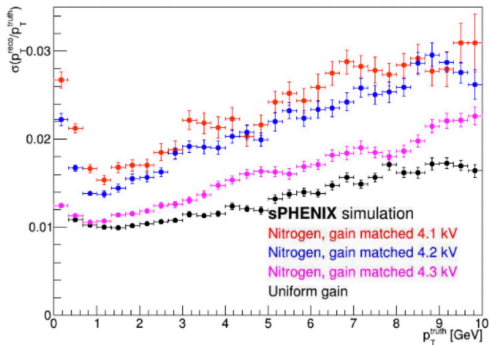
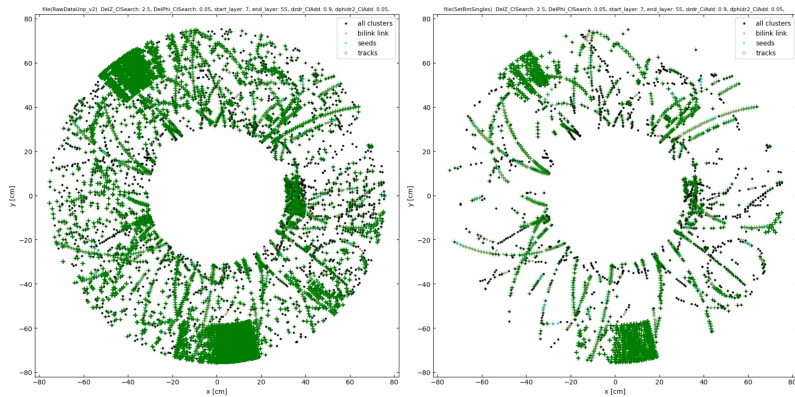


- $eff = \frac{Nevts(hitw/ HitBCO==GL1GCO)}{Nevts(GL1)}$
- Stream mode : Eff = 97.3 +/- 0.1%
- Extended mode : Eff = 97.3 +/- 0.1%
- (run46106)

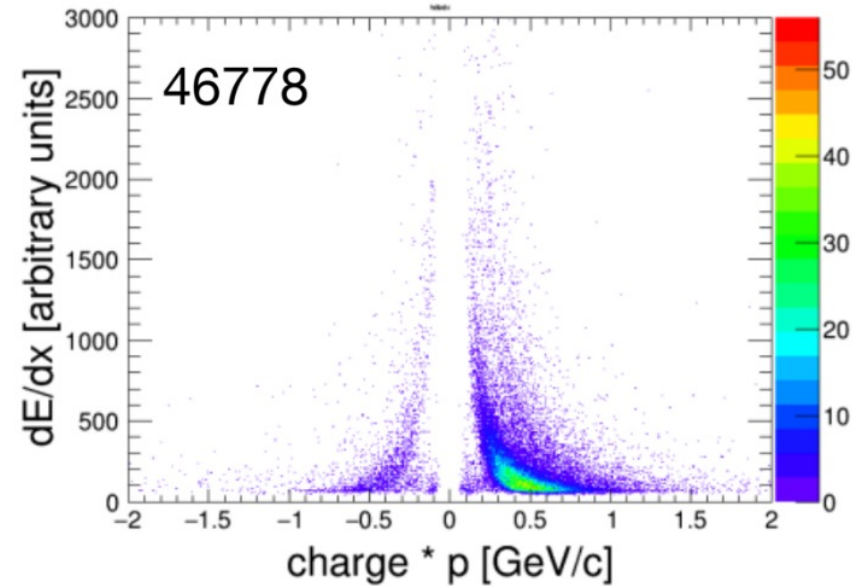


TPC Status Report

Nitrogen gas admixture helped with stability. Ran at 4.05-4.1 kV for 24 hours with data taking with all other subsystems and with and without zero suppression. Learned a great deal, and this is not a “physics capable” working point.



Non Zero suppressed (4.1 equiv)



sPHENIX has worked with ESSHQ of C-AD and BNL SME in the USI process in order to use up to 5% isobutane to get to more efficient operating voltages for the TPC in sPHENIX.

- They want to confirm with BHSO before giving us the USI approval.
- In parallel, sPHENIX is making the necessary implementation of hardware/software for the monitoring and protection systems as written for the USI review (in the IR & Gas-Mixing House) and will use N₂ to test the controls.
- Isobutane was dispatched yesterday and hopefully, sPHENIX will receive it this week.
- If there are no problems, sPHENIX expectS to have everything in place to begin flowing isobutane sometime next week and can begin the flow **if all the approvals are complete.**

sPHENIX Plans

- Continue running at 0 crossing angle and integrating high statistics with photon/jet triggers. Exciting part of sPHENIX physics program!
- Streaming readout with MVTX & INTT provides some tracking physics.
- Continue to improve data taking efficiency.
- In parallel, working to have TPC running with isobutane next week.
- Future options with regards to changing to crossing angle depends on next TPC working point evaluation.