

# Towards Run24

RIKEN/RBRC

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# Towards Run24

<https://indico.bnl.gov/event/20331/>

## Beam Use Proposal : sPHENIX

Species	$\sqrt{s_{NN}}$ [GeV]	Physics Weeks	Min. Bias Rec. Lum. $ z  < 10$ cm	Calo. Trigger Lum. $ z  < 10$ cm
Run-2024, Scenario A, 6 cryo-weeks Au+Au + 20/24/28 cryo-weeks $p+p$				
Au+Au	200	n/a	n/a (Commissioning running)	
$p+p$	200	13/17/21	0.34/0.44/0.54 $\text{pb}^{-1}$ [5kHz] 2.3/3.1/3.9 $\text{pb}^{-1}$ [10%-str]	23/31/39 $\text{pb}^{-1}$
Run-2024, Scenario B, 20/24/28 cryo-weeks $p+p$ + 6 cryo-weeks Au+Au				
$p+p$	200	9/13/17	0.23/0.34/0.44 $\text{pb}^{-1}$ [5kHz] 1.5/2.3/3.1 $\text{pb}^{-1}$ [10%-str]	15/23/31 $\text{pb}^{-1}$
Au+Au	200	3	0.4 $\text{nb}^{-1}$ (3B events)	not needed
Run-2025, 24/28 cryo-weeks				
Au+Au	200	20.5/24.5	5.2/6.3 $\text{nb}^{-1}$ (35B/43B events)	not needed

No Au+Au instead of  $p+A$

## Beam Use Proposal : STAR



### Plans for Run-24

28 cryo-weeks for  $p+p$ ,  $p+Au$  in Run 24

28 cryo-weeks in Run 25 and 6 additional cryo-weeks in Run 24 for Au+Au

$\sqrt{s_{NN}}$ (GeV)	Species	Number Events/ Sampled Luminosity	Year
200	$p+p$	142 $\text{pb}^{-1}$ /12w	2024
200	$p+Au$	0.69 $\text{pb}^{-1}$ /10.5w	2024
200	Au+Au	18B / 32.7 $\text{nb}^{-1}$ /40w	2023+2025

1.2 (1.5) times the total  
luminosity in Run-15  $p+p$   
( $p+Au$ )

2.7 (1.5) times the  
transverse lumi. in Run-15

## Loss of $p+Au$ physics in 2024

- Many flagship sPHENIX measurements ( $\gamma$ -jet,  $b$ -jets, family of Upsilon states) critically rely on large integrated luminosities
- A large  $p+p$  data-set is also needed to reduce systematic uncertainties via, e.g., *in situ* detector studies (track-calorimeter response,  $\gamma$ -jet balance, etc.)
- In 2021, sPHENIX was asked to prepare a BUP under a 20 cryo-week scenario in 2024. Under that scenario, sPHENIX was forced to remove all  $p+Au$  running to preserve the needed  $p+p$  luminosity.
- The reduced projections now preclude  $p+Au$  running even in 28wk scenario
  - ➔ There is a significant cost to switching species & the projected  $p+Au$  luminosity/week has also decreased significantly (> factor of 2)
  - ➔ Splitting 2024 running between  $p+p$  and  $p+Au$  will result in not meeting the luminosity target for either system

# PAC Recommendation

- 1<sup>st</sup> priority : sPHENIX
- 2<sup>nd</sup> priority : p+A

# Towards Run24

- INTT needs to be on in December and run calibration and cosmic ray data taking prior to run.
- 1<sup>st</sup> week of January : RHIC Cooldown starts
- Middle of January : start commissioning with beam (not yet determined if Run24 is to be started p+p or Au+Au).
- Reproduce performance of Run23.
  - Unique to p+p : Collision rate, multiplicity, spin degree of freedom, etc.
  - Establish 1BCLK timing for p+p

Man Power

[illegible]

