



# RHIC Run 25 Outlook

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# Outline

Long-Range Plans for Nuclear Physics at BNL

Mission Status

Completing the RHIC Nuclear Physics Science Missions in FY25/26

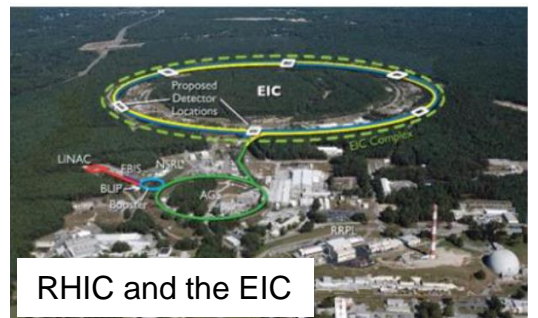
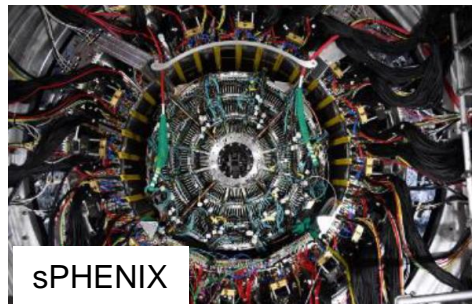
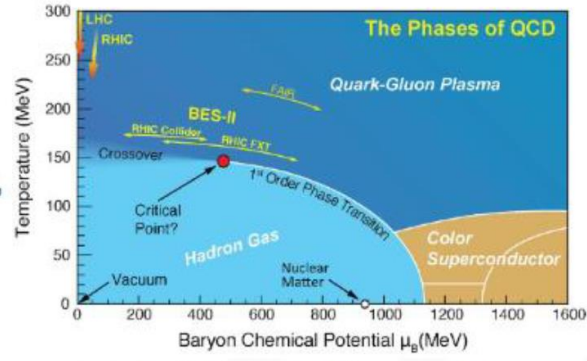
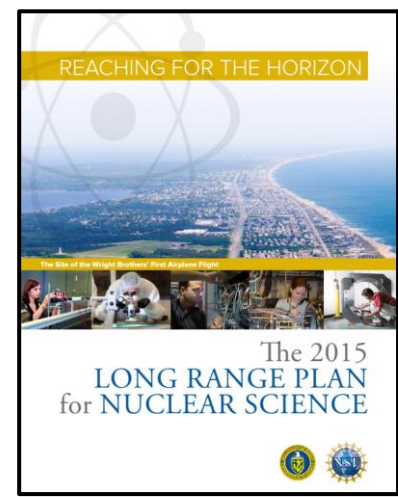
Summary and Outlook

# Long-Range Plans for Nuclear Physics at BNL

# Long Range Plans for Nuclear Science

2015 LRP

- ✓ Recommendation #1: The highest priority in this 2015 plan: to capitalize on the investments made; states the two central goals of measurements planned at RHIC:
  - 1) probe the inner workings of QGP by resolving its properties at shorter and shorter length scales...
  - 2) map the phase diagram of QCD ...
- ✓ Recommendation #3: "... a high-energy high-luminosity polarized EIC as the highest priority for new facility construction ..."



STAR Beam Energy Scan with LEReC completed

construction and installation completed, commissioning in Run-23

BNL selected as host site, CD-3A review in Nov 2023

2023 LRP

Recommendation #1: ... continued effective operation of national user facilities .... and completing the RHIC science program... **culminating in 2025**

Recommendation #3: Expeditious completion of the EIC as the highest priority for facility construction **in progress with 2025 APEX experiments to inform accelerator design and / or demonstrate challenging operating parameters**



M. Minty - APEX Workshop, 22 January 2025



# RHIC Run Scenarios FY24 – FY25 (from LMBB FY25)

Year	Scenario 1 LMBB FY25	Scenario 2 LMBB FY25	Scenario 3 (optimal RHIC Running)
2024	20 cryo-weeks with sPHENIX and STAR p↑+p↑ at 200 GeV	20 cryo-weeks with sPHENIX and STAR p↑+p↑ at 200 GeV	28 cryo-weeks with sPHENIX and STAR p↑+p↑ at 200 GeV
2025	24 cryo-weeks with sPHENIX and STAR Au+Au at 200 GeV	28 cryo-weeks with sPHENIX and STAR Au+Au at 200 GeV	28 cryo-weeks with sPHENIX and STAR Au+Au at 200 GeV

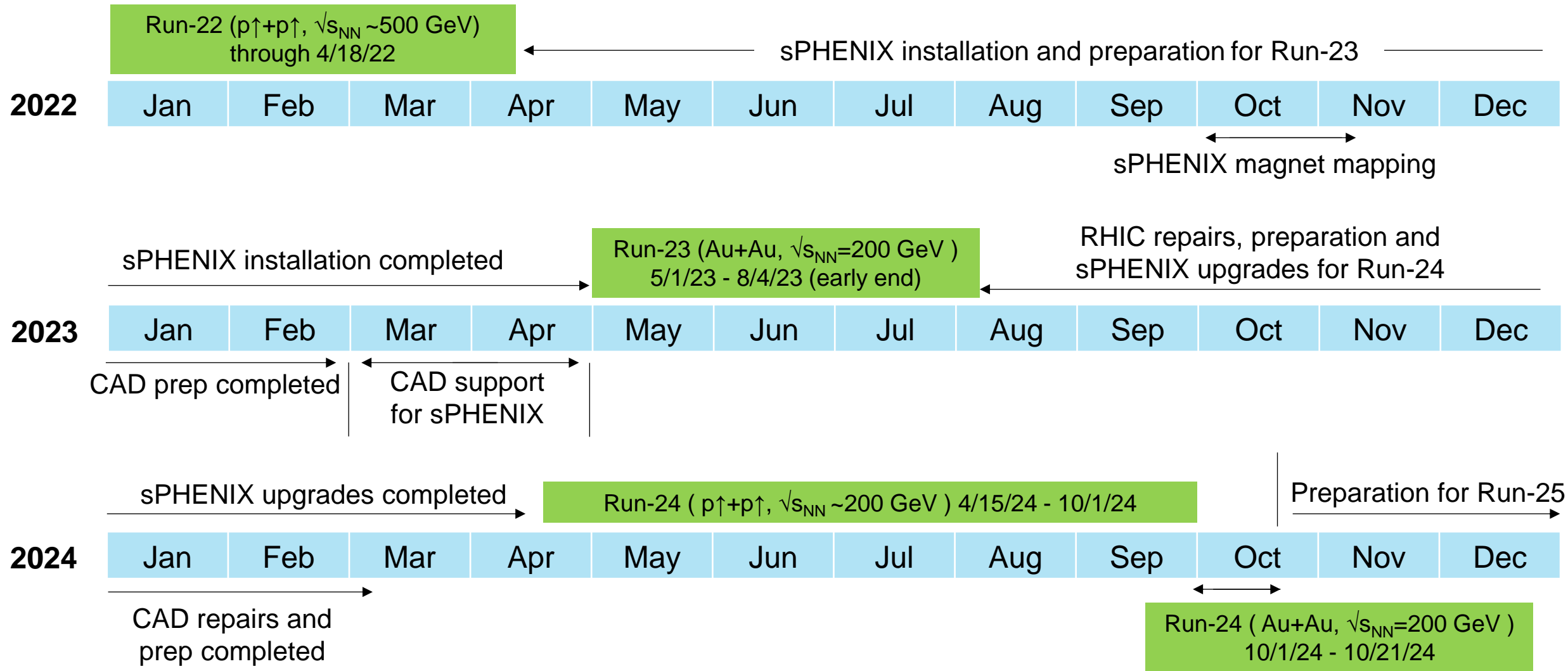
FY24 priority: p↑+p↑  
FY25 priority: Au+Au

NP Program Advisory Committee report (Sep 2023)

- The **top priority for Run24** is completing the commissioning of sPHENIX and collecting the high statistics pp dataset that is the necessary reference for all the sPHENIX hard probes Au+Au measurement to come in Run25 and that will at the same time allow STAR to make landmark polarized proton measurements using its new forward instrumentation.
- The **top priority in Run25** is collecting the marquee, high statistics, Au+Au data set that is the raison d'être for sPHENIX, essential for completion of the RHIC science mission, and that will also allow STAR to complete its scientific program.

# Mission Status

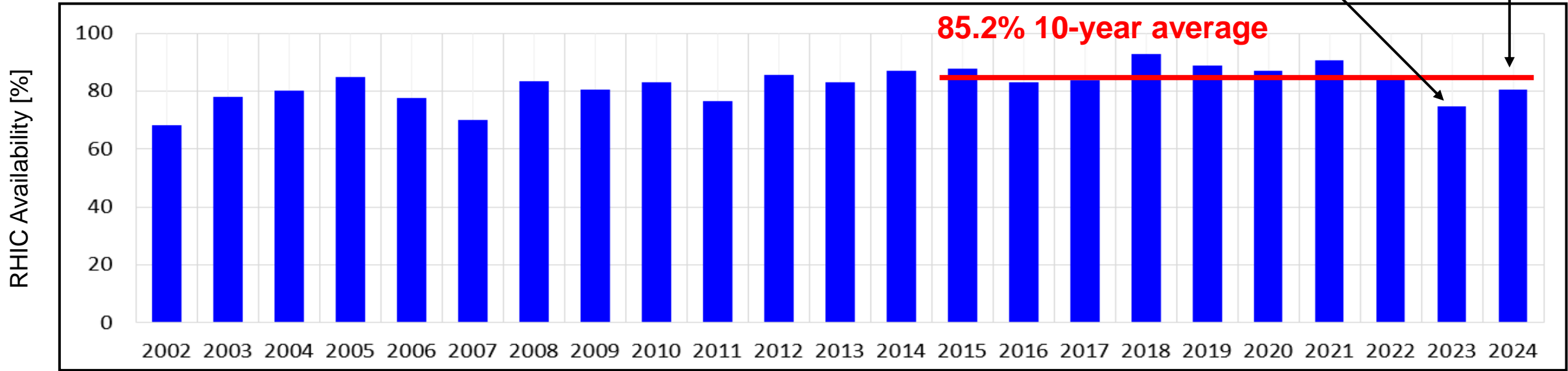
# Recent RHIC schedule



Issue (“auto-recovery events” in sPHENIX MVTX detector) discovered when running Au+Au at end of RHIC Run-24. RHIC Run-25 will include time to establish suitable operating conditions (after which time APEX sessions will be scheduled).

# RHIC Availability

Au+Au 100 GeV 74.4% FY23  
p↑+p↑, Au+Au 100 GeV 80.4% FY24



Availability = beam time / scheduled beam time

Availability goals: 82.5% (< FY20) , 85% (FY21-FY22), 82.5% (FY23), 80.0% (FY24)

RHIC Run FY24: **80.4%**  
Average over last 10 years: **85.2%**

Accelerator availability is coveted and closely monitored by the DOE.

One hour “back-to-physics” is charged to APEX for restoring operating conditions following each APEX session.



# Completing the RHIC Nuclear Physics Missions in FY25/26

# RHIC Run-25 and Run-26 Scenarios

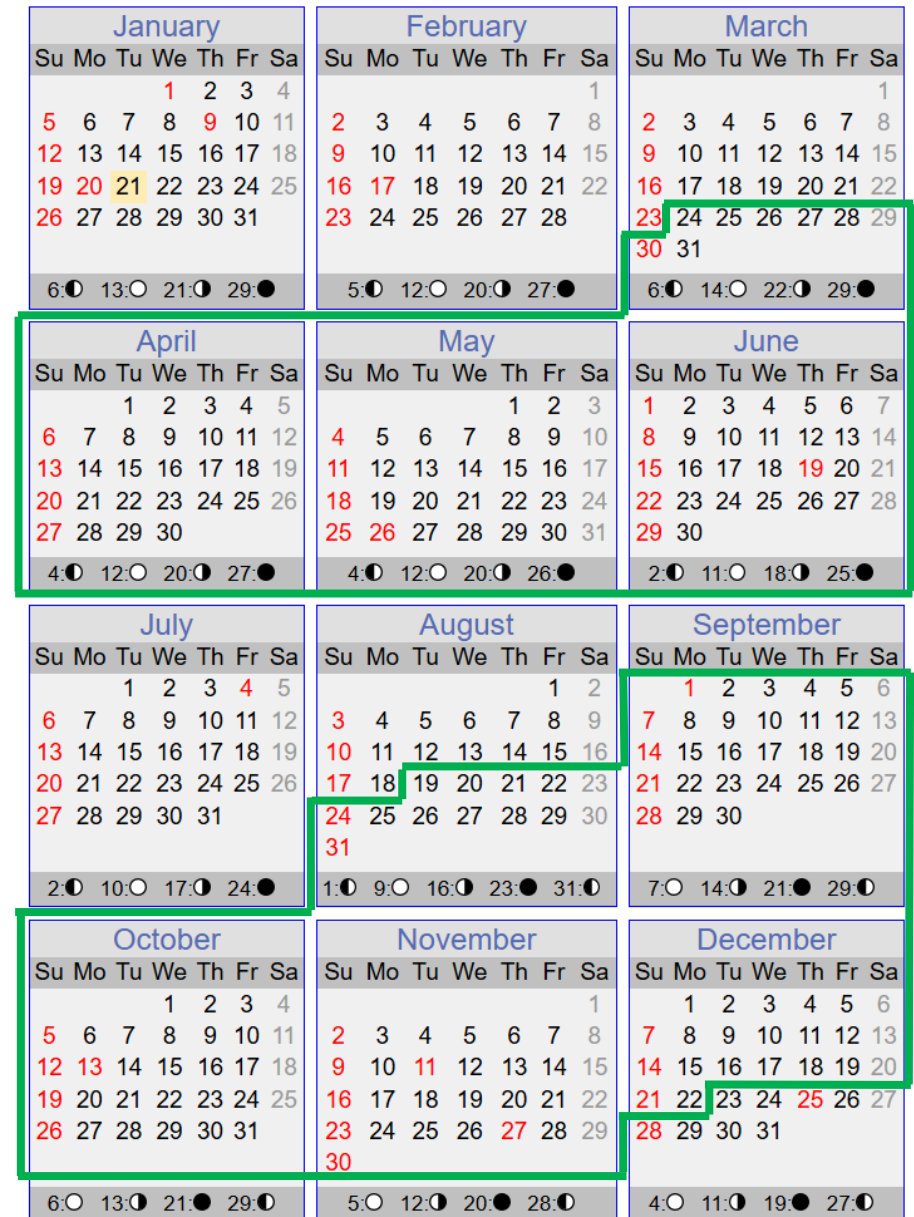
excerpts from Abhay Deshpande (1/21/25):

Planning assumptions are:

- For Run-25 we have 20 weeks (22-2 weeks)
- For Run-26 in the Q1 of FY26, we assume 12 weeks
- **Total of 32 weeks.**
- Of course, we still don't know the actual FY25 budget, nor do we know the President's budget to plan the FY26 more concretely. All this could change once we have the budget numbers. Currently the Continuing Resolution is on until March 14, 2025.

Run Plan for Calendar Year 2025:

- Start the RHIC Operations at 4k on March 24, 2025.
  - Online PAC meeting early June 2025
  - We will end 1<sup>st</sup> part of the Run on June 30, 2025 (**14 weeks**)
  - No beam from July 1 – August 18, 2025, 2<sup>nd</sup> part of the run from August 19 - December 22, 2025 (**18 weeks**)
- We will start with Au-Au operation which was given the highest priority by the PAC with the aim of acquiring 7 nb-1 of data.
  - We will consult with PAC in early June – when we have a good idea of how we are doing (machine and detectors) towards that goal, to request advice on what other collision-combination aims could be achieved during this year's RHIC operation.



# Summary and Outlook

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## Long-Range Plans for Nuclear Physics at BNL

2015 LRP – successfully completed

2023 LRP – underway with EIC construction to start in 2026 following multi-decadal operation of RHIC

## Completing the RHIC Nuclear Physics Missions in 2025

Highest priority is Au+Au at 200 GeV c.o.m. energy

Program Advisory Committee to convene (~June, 2025) to advise on physics priorities taking into account progress with sPHENIX auto-recovery event mitigation measures

Planning basis assumes 2025 RHIC operations from 24 Mar – 30 Jun, 19 Aug – 22 Dec with schedule contingent on approved operating budget

APEX experiments must be well-planned and well-executed

- to optimally use available beam time
- (potentially) to justify beam time usage competing with RHIC physics priorities