



RUN25 EXPERIMENTS & PRIORITIES

Haixin Huang

2025 RHIC APEX Workshop

Snyder Seminar Room, Building 911, BNL

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RHIC APEX Program

- **Accelerator Physics EXperiment (APEX) program** is about beam experiments related to Accelerator Physics.
- APEX experiments are performed at Relativistic Heavy Ion Collider (RHIC), Collider-Accelerator Department, BNL
- **The goals of APEX program are:**
 - Improve current RHIC machine performance
 - Support near-future machine upgrade
 - General academic research, such as inter-lab collaborations

APEX Steering Committee & Coordinator

- APEX program is supervised by the C-AD APEX Steering Committee.
 - Chair: Haixin Huang
 - Members: Michael Blaskiewicz (EIC), Alexei Fedotov
Yun Luo (EIC), Michiko Minty
 - Ex-Officio: W. Fischer (CAD chair), Abhay Deshpande(ALD)
- APEX Steering Committee will review, grade, and prioritize APEX proposals and guide the routine operation of APEX program.
- APEX Coordinator: Yun Luo
- Role of APEX Coordinator: to coordinate APEX routine work, such collecting proposals, planning APEX schedules, running APEX bi-weekly meetings, etc.

APEX Proposal Gratings

RHIC should be replaced by RHIC and EIC design and operation
EIC design is more critical than EIC operation



Class:

- 0:** likely to immediately benefit RHIC machine performance, or crucial to RHIC hardware decision-making
- 1:** directly benefiting RHIC machine performance
- 2:** benefiting general accelerator community

Priority:

- A:** a) benefiting RHIC operation; b) well prepared; and c) likely to succeed → **Must do**
- B:** has at least two of the above three → **Recommended**
- C:** has at least one of the above three → **Considered for inclusion**
- D:** none of the above → **Declined**

Current proposals

22-05	Studies of electron-ion heating effect	Sergei Seletskiy	28	0	1B	Au	3.85 GeV	No
22-06	Studies of ions lifetime in the presence of electron beam	Sergei Seletskiy	23	0	1B	Au	3.85 GeV	No
23-02	IP8 optics tuning with crossing angle and short vertex	Xiaofeng Gu	12	6	1A	Au	100GeV	No
23-05	Radial shift in RHIC using a dipole field offset	GRD	16	0	1A	Au	100GeV	No
23-10	Transition Jump with Reduced Number of Jump Quadrupoles	Henry L., Steve, GRD	8	0	1B	Au	ramp	Yes
24-02	Global coupling measurement and correction based on TBT orbit	Chuyu Liu, Yun Luo	6	4.5	1B	p/Au	inj. & store	No
24-03	Accelerating flat gold ion beams from 31GeV to 100GeV	Yun Luo	48	0	0A	Au	31, 100GeV	Yes
24-08	Beam Based Alignment for RHIC rings	Medani, Chuyu, Joanne	6	2	1B	p	injection	No
24-11	Study on IBS growth in presence of crab dispersion for flat beam	Derong Xu	12	0	1B	Au	100GeV	Yes
24-12	Investigate beam-beam impact on hadron beam flatness	Derong Xu	24	0	1B	Au	100GeV	Yes
25-01	Maximize beam-beam parameter with flat beam collision in RHIC	Yun Luo	12		0A	Au	100GeV	No
25-02	Coherent electron Cooling Experiment	Vladimir Litvinenko	168		1B	Au	19.57 GeV	Yes
25-03	Light from C targets	Frank Rathmann	12		1A	p	100GeV	No
25-04	RF transient beam loading studies	Freddy Severino	2		0A	Au	injection	No
25-05	Improving Optics Meas. and Ctrl. for EIC Diagnostics via Stat. Modeling	Xiaofeng Gu	3		1B	Au	100GeV	No
25-06	Resonance Island Jump Phase II	Henry Lovelace III	20		2B	Au	ramp	No
25-07	Effect of Various Ramp Rates on Transition Crossing	Henry Lovelace III	6		2B	Au	ramp	No
25-08	Exploring Sext. Settings to Reduce Vert. Emit. Growth in Flat Beam Collision	Derong Xu	12		1A	Au	store	No
Total			418					

183 hours for proposals carried over from run24. Total of 235 hours for new proposals. Total hours of 418 hours.
Five still need ramp development.

Current proposals in the order of Grades

Index	Proposal title	Spokesperson	time asked	time used	Grade	Specie	Energy	new ramp?
24-03	Accelerating flat gold ion beams from 31GeV to 100GeV	Yun Luo	48	0	0A	Au	31, 100GeV	Yes
25-01	Maximize beam-beam parameter with flat beam collision in RHIC	Yun Luo	12		0A	Au	100GeV	No
25-04	RF transient beam loading studies	Freddy Severino	2		0A	Au	injection	No
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25-07	Effect of Various Ramp Rates on Transtion Crossing	Henry Lovelace III	6		2B	Au	ramp	No
Total			418					

114 hours for proposals with 0A and 1A. Total of 278 hours for proposals with 1B grade and 26 hours with 2B.

Total Beam Time Requested for Run 25

- Total beam time requested: 418 hours
 - with proton beams: 12 hours, 2.9%
 - with gold ion beams: 406 hours, 97.1%
- Total of 114 hours for proposals with 0A and 1A. Total of 278 hours for proposals with 1B grade and 26 hours with 2B.
- 32 cryo weeks -> 28 weeks physics -> 14 APEX sessions.
- $14 \text{ sessions} \times 15 \text{ hours} \times 0.9 (\text{efficiency}) = 189 \text{ hours}$.
- We are short of 200+ hours of APEX time.
- *If the special request of bulk APEX session (2 weeks in the end) is approved, there will be additional ~300 hours. Then we can run all APEX listed.*
- A question to EIC people: what consequence will it be, if we could not run all these APEX?

Planning and Preparation of APEXs

- This is the last calendar year for RHIC operation. It is critical to carry out EIC-critical APEX in the last RHIC run.
- The priorities of experiments are set by the rating.
- To ensure the efficient use of APEX time, readiness is the key to stream out the planned APEX.
- Although we had a skeleton weekly schedule for APEX last year, we still faced the same old issue: many APEX were not ready in the early part of run24.
- We will layout the overall APEX schedule for FY25 before run starts, with some fine tuning several weeks ahead of actual APEX to give enough time for preparation.
- An MCR OC will be assigned to each APEX to make sure no neglected issue.
- The readiness of each APEX is still in the hands of the spokesperson.

How can we improve the APEX schedule and preparation?

Summary

- APEX program played an important role to RHIC operation improvements and upgrades in the past.
- APEX program in run25 plays a crucial role to the EIC design and its future operation.
- In the last run of RHIC, our goal is to make a good use of available APEX beam time to answer critical questions related to the EIC design.
- The APEX readiness early in run25 is critical to fulfill our goal to carry out these APEX efficiently during the assigned time.