

EIC Project Update

Jim Yeck

EIC Project Director

EIC User Group Meeting

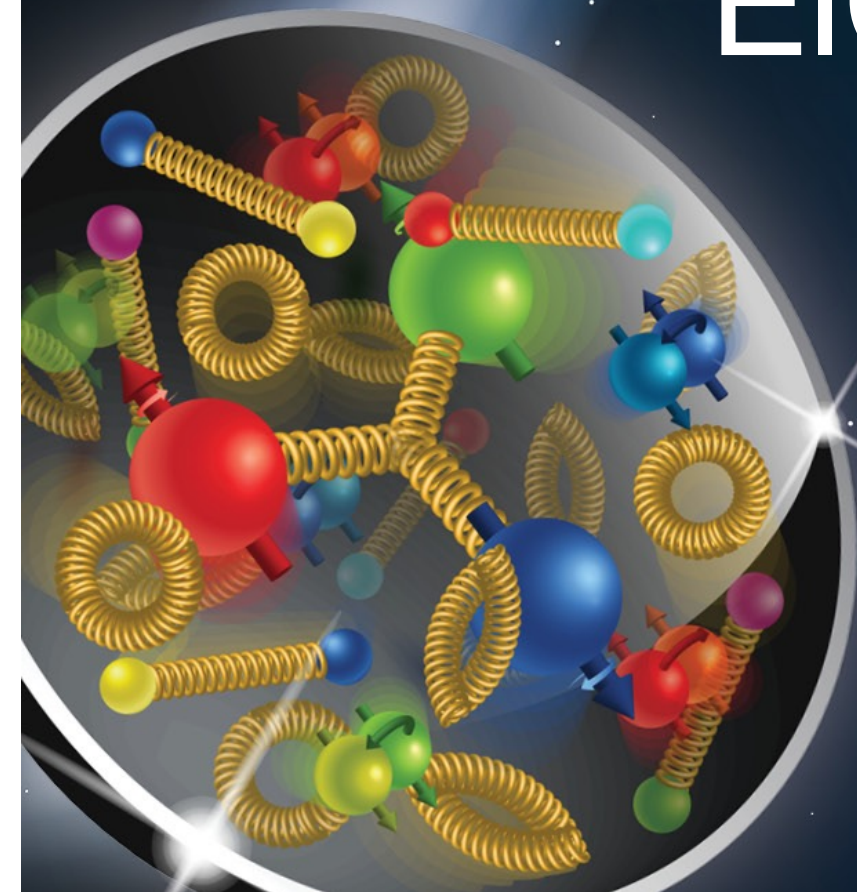
July 26, 2022

Electron-Ion Collider

BROOKHAVEN
NATIONAL LABORATORY

Jefferson Lab

U.S. DEPARTMENT OF
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Outline

- Accomplishments
 - BNL/TJNAF
 - Project Detector Selection
 - International Engagement
- Status
 - Organization
 - Safety
 - Preparing for CD-2/3A
- Funding Challenge
 - Planning Scenarios
 - Leaning Forward
 - Positioning the EIC for Success
- Summary

BNL/TJNAF

- Integrated project leadership team
 - Extensive project experience
 - Joint ownership of project strategies and plans
- TJNAF project scope
 - Scope aligned with expertise, interests, and project needs
 - ~\$500M plus partner project
- BNL and TJNAF host the EIC experimental program
 - Co-Associate Directors for the EIC Experimental Program supported by BNL NPP ALD and TJNAF Deputy Director
 - TJNAF to administer EIC generic detector R&D program in support of Detector 2 and upgrade paths for Detector 1

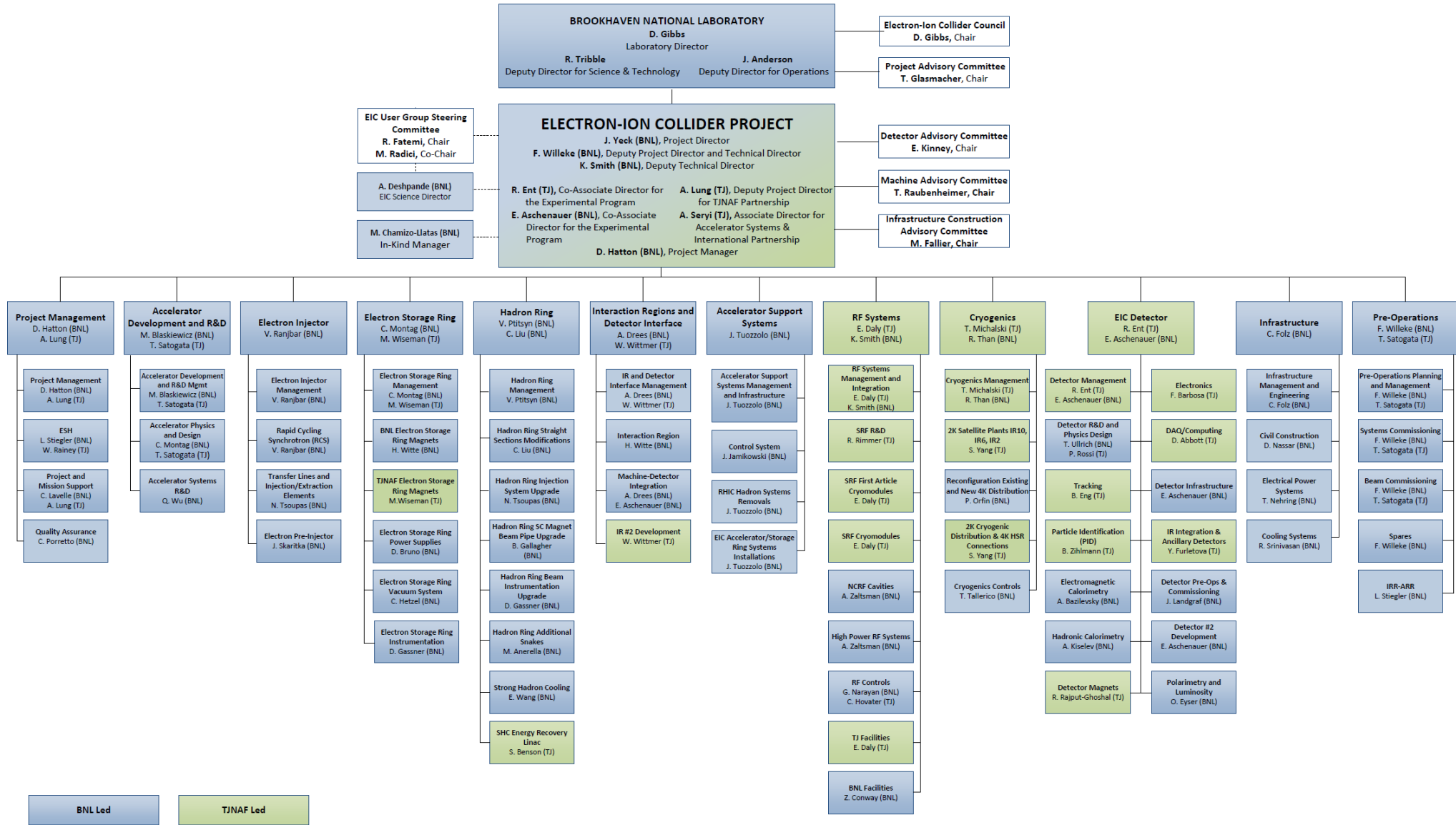
Project Detector Selection

- Two-year long process complete
 - Call for Expression of Interest for potential cooperation on experimental equipment in 2020
 - Call for Collaboration Proposals for Detectors at the Electron-Ion Collider in 2021
 - Detector Proposal Advisory Panel (DPAP) Recommendations in March 2022
- ECCE and ATHENA leadership working together to address DPAP recommendations
 - Leadership team encouraging participation of additional groups
 - By-Laws, Institutional Board, and elected leadership “spokesperson” before the end of this year

International Engagement

- EIC Council (BNL and TJNAF Directors) will become the “EIC Advisory Board” with international and domestic partners joining
 - Solicited input from leaders of international and domestic labs at Council meetings in April and June
 - BNL Director inviting new members
 - EIC Advisory Board meeting in the fall
 - TRIUMF and INFN ready to proceed with bi-lateral agreements for initial design work on accelerator design topics
- Ready to take steps to establish a Resource Review Board (RRB) for the EIC experiments
 - Preparatory discussion meeting in late September/October
 - 1st RRB meeting planned for Spring 2023
 - Assuming a single MoU for the project detector capturing contributions by all participating institutions

TJ/BNL Scope Integration



Organization Changes

- Engineering experience and capabilities
 - Deputy Technical Director – Kevin Smith
 - TJNAF Project Engineer – Katherine Wilson
 - Systems engineers
 - Engineers
- Project Manager
 - Diane Hatton retired July 15
 - Cathy Lavelle serving as Interim PM, Kelly Krug interim Project Controls and Support lead
 - Luisella Lari (FNAL PIP-II) starts on October 1
- Enhancements
 - Increased benefits of the BNL/TJNAF partnership and collaboration
 - Increased coordination with NPP (C-AD, Physics) and ATRO (SMD, Instrumentation)
 - Increased efforts on securing domestic and international partners

Safety

- BNL
 - Experience over the last two years of the pandemic - not great with increased rate of electrical incidents
 - BNL refreshing commitment to safety, reviewing practices, and acting on recommendations from investigations and assessments
- EIC Opportunities
 - Wake up call in terms of adequacy of work planning efforts, relationship with C-AD, and preparing for ramp up in on-site activities
 - Opportunity to benefit from partnership with TJNAF
- Safety Culture
 - Experienced safety professional and managers leading EIC efforts with understanding of what is required
 - New organization – early behaviors begin to establish the safety culture

Perspective on DOE CD-2/3A

- Priority is to secure CD-2/3A, Project Performance Baseline/Long Lead Procurement (LLP), at the earliest achievable date that funding permits
 - Enables a more secure funding plan
 - LLP authority improves overall schedule and supply chain risks
 - Optimum alignment with conclusion of RHIC OPS and ONP redirection plans
 - Promotes engagement of users, international partners, NSF, and DOE.
- Funding increase in FY2023 is essential for timely CD-2/3A
 - Increase pace of technical progress and restore momentum lost after CD-1
 - Increase design maturity and viability of CD-2/3A goals
 - Improve accuracy of cost and schedule uncertainty estimates, reduce risk
 - Bolster stakeholder confidence in EIC construction schedules
 - Strengthen partner engagement and secure commitments
- DOE CD-2/3A reviews will be requested when ready, following:
 - Preliminary Design Review – assessment of design maturity and technical risk
 - “Director’s Review” – comprehensive assessment of mgmt., TPC, CD-4, etc.
 - DOE Federal Project Director assessment of readiness to proceed

CD-2/3A Planning Dates

- DOE OPA Status Review (Remote) October 19-21, 2021(A)
- Funding Discussion at DOE ONP (In-Person) April 26, 2022 (A)
- FPD Status Update at BNL (Hybrid) June 28, 29, 30 2022
- Cost and Schedule Scrutiny Meetings July - August 2022
- Project Detector Meetings Fall 2022
- DOE OPA Status Review - Confirm CD-2/3A Plans January 2023
- Preliminary Design and Director's Reviews June 2023
- DOE CD 2/3A OPA Review and ICR October 2023
- DOE CD 2/3A ESAAB Approval January 2024

Funding Challenges

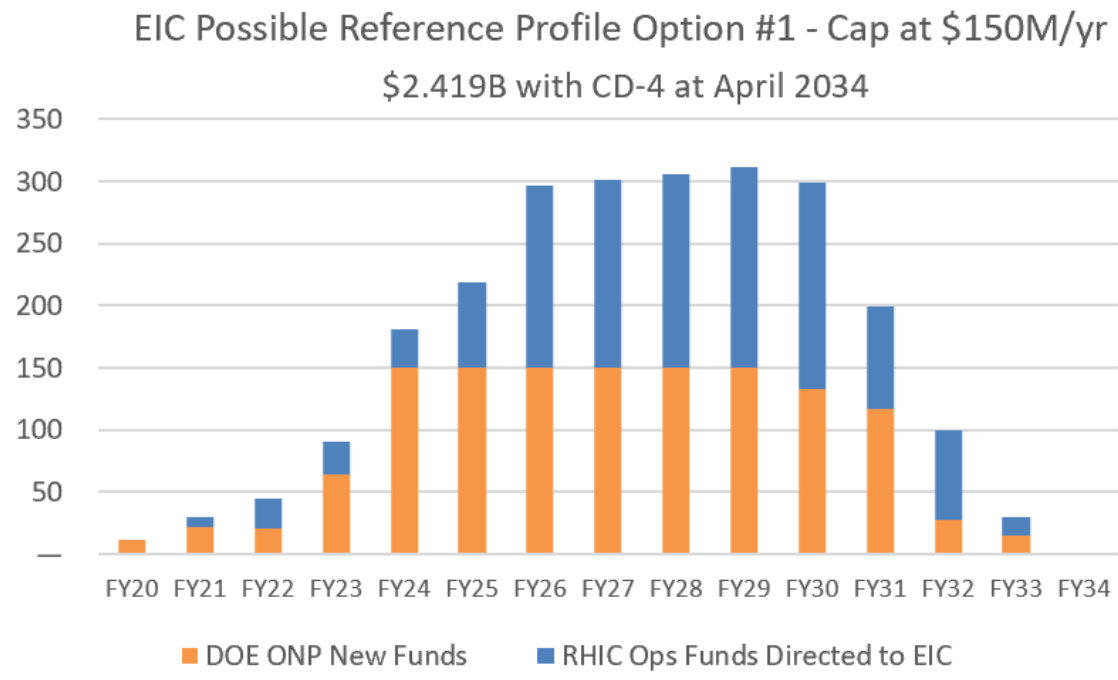
- EIC project progress and pace severely constrained by current funding
- Project positioned to obligate and efficiently expend roughly twice the amount of available funds
- Funding uncertainties also result in challenges
 - DOE Budget Request for FY2023 not workable
 - CD-2/3A date and scope of Long Lead Procurement highly dependent on actual funding
 - Reduced pressure on international partners to engage
- Continued support of host labs required
 - HR, Infrastructure, Procurement, IT Help Desk/Deskside Support, ESH Directorate, and PPQM, NPP Directorate, ATRO.

Funding Updates Since CD-1

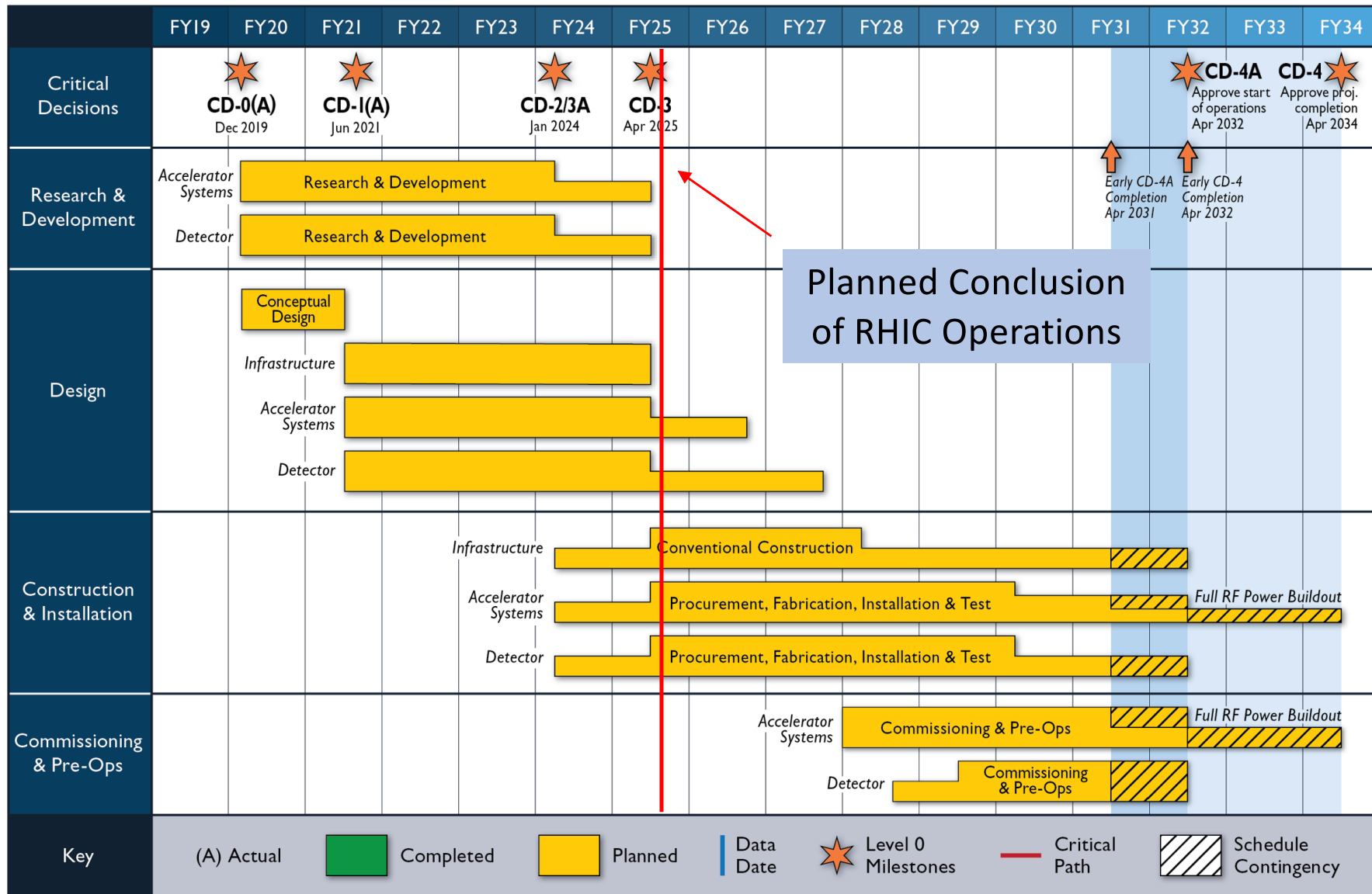
- FY20 Actual **\$11M** (TEC \$1M, OPC \$10M)
- FY21 Plan \$43M, Actual **\$30M** (TEC \$5M, OPC \$25M)
 - Full speed ahead to CD-1
 - Hiring Hold, Prioritized R&D and Design Work
- FY22 Plan \$100M, Actual **\$44.8M** (TEC \$20M, OPC \$25M)
 - President's Budget at \$30M
 - House Mark at \$15M, Senate Mark at \$30M, Infrastructure Bill - ?
- FY23 Plan \$100M
 - President's Budget TEC \$30M, OPC \$15M?
 - House Mark TEC \$35M, OPC = ? (\$15M – \$35M)
 - Senate Mark in late July
- Assumptions needed to proceed...
 - \$90M in FY2023
 - 9-month delay on all CD dates

Planning Scenario

- FY2023 funding at \$90M would enable the project to mature the EIC design, start long-lead procurements (CD-3A), and prepare for CD-3 prior to June 2025, the planned conclusion of RHIC operations.



Schedule for the Preferred Scenario



Profile v3 Assumptions

- New funds capped at \$150M/year
- Assumed 9-month slip to all CD dates
 - CD-2/3A = January 2024
 - CD-3 = April 2025
 - CD-4A EF = April 2031 (Start of Operations)
 - CD-4A = April 2032 (Start of Operations)
 - CD-4 EF = April 2032
 - CD-4 = April 2034
- Total Project Cost (TPC) ~\$170M above CD-1 estimate
- Need to prioritize long lead procurements

EIC Project Recent History

Event	Date
Mission Need Statement Approved	January 22, 2019
CD-0, Mission Need Approved	December 19, 2019
DOE Site Selection Announced	January 9, 2020
BNL - TJNAF Partnership Agreement Approved	May 2020
Conceptual Design Review	November 2020
DOE Independent Cost Review (ICR)	January 2021
CD-1, Alternative Selection and Cost Range, Approved	June 29, 2021
DOE FY2022 Budget Uncertainties, Potential DOE Infrastructure Funding...	
DOE EIC FY2022 Budget Approved at \$45M	March 2022
Detector Proposal Advisory Panel Report	March 21, 2022
<i>CD-2/3A, Baseline/Long Lead Procurement</i>	<i>January 2024</i>

U.S. COMPETES Act Pending

TITLE I - DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE (Authorization, not Appropriation)

Sec. 10107. Nuclear Physics Program.

- Amends section 308 of the Department of Energy Research and Innovation Act (42 U.S.C. 18646) by authorizing a research program to discover and understand various forms of nuclear matter. It authorizes construction of the Electron-Ion Collider, including: \$90,000,000 for FY 2023; \$181,000,000 for FY 2024; \$219,000,000 for FY 2025; \$297,000,000 for FY 2026; and \$301,000,000 for FY 2027. The subsection authorizes: \$840,480,000 for FY 2023; \$976,508,800 for FY 2024; \$1,062,239,328 for FY 2025; \$1,190,838,688 for FY 2026; and \$1,248,463,709 for FY 2027 for the Nuclear Physics Program.

	Range	
	Low End (\$M)	High End (\$M)
Total Estimated Cost (TEC)		
PED	\$280	\$367
Construction	\$1,118	\$1,466
TEC Contingency	\$159	\$733
Subtotal TEC	\$1,558	\$2,566
Other Project Cost (OPC)		
OPC	\$128	\$167
OPC Contingency	\$14	\$67
Subtotal OPC	\$142	\$234
Total Project Cost (TPC)(\$M)	\$1,700	\$2,800

Scenario 1

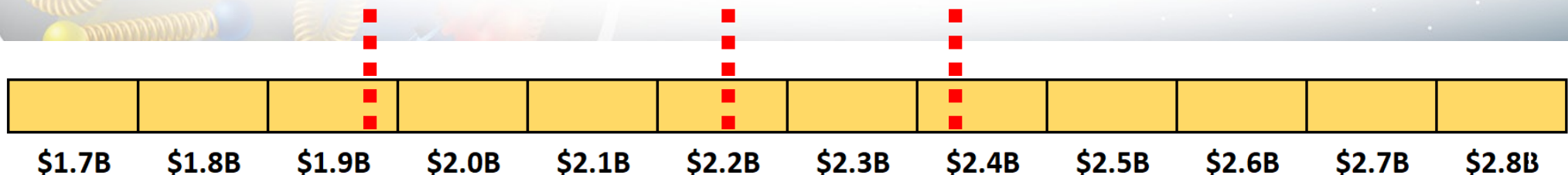
- Pre-CD-1 Profile
- Technically Driven Schedule
- Optimum Annual Funding Profile

Scenario 2

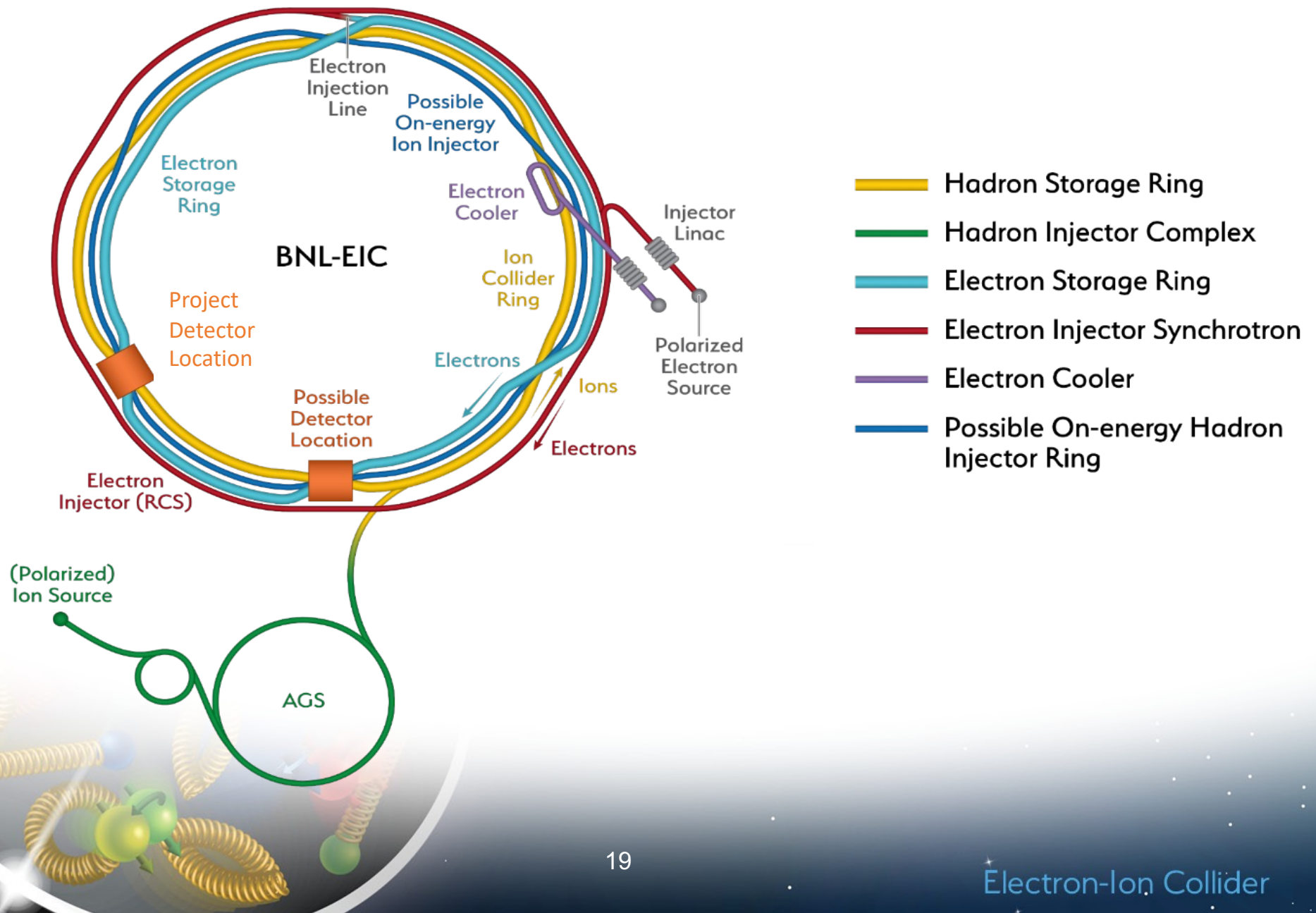
- CD-1 Approval Profile
- Constrained Peak Funding Profile
- 40% Contingency

Scenario 3

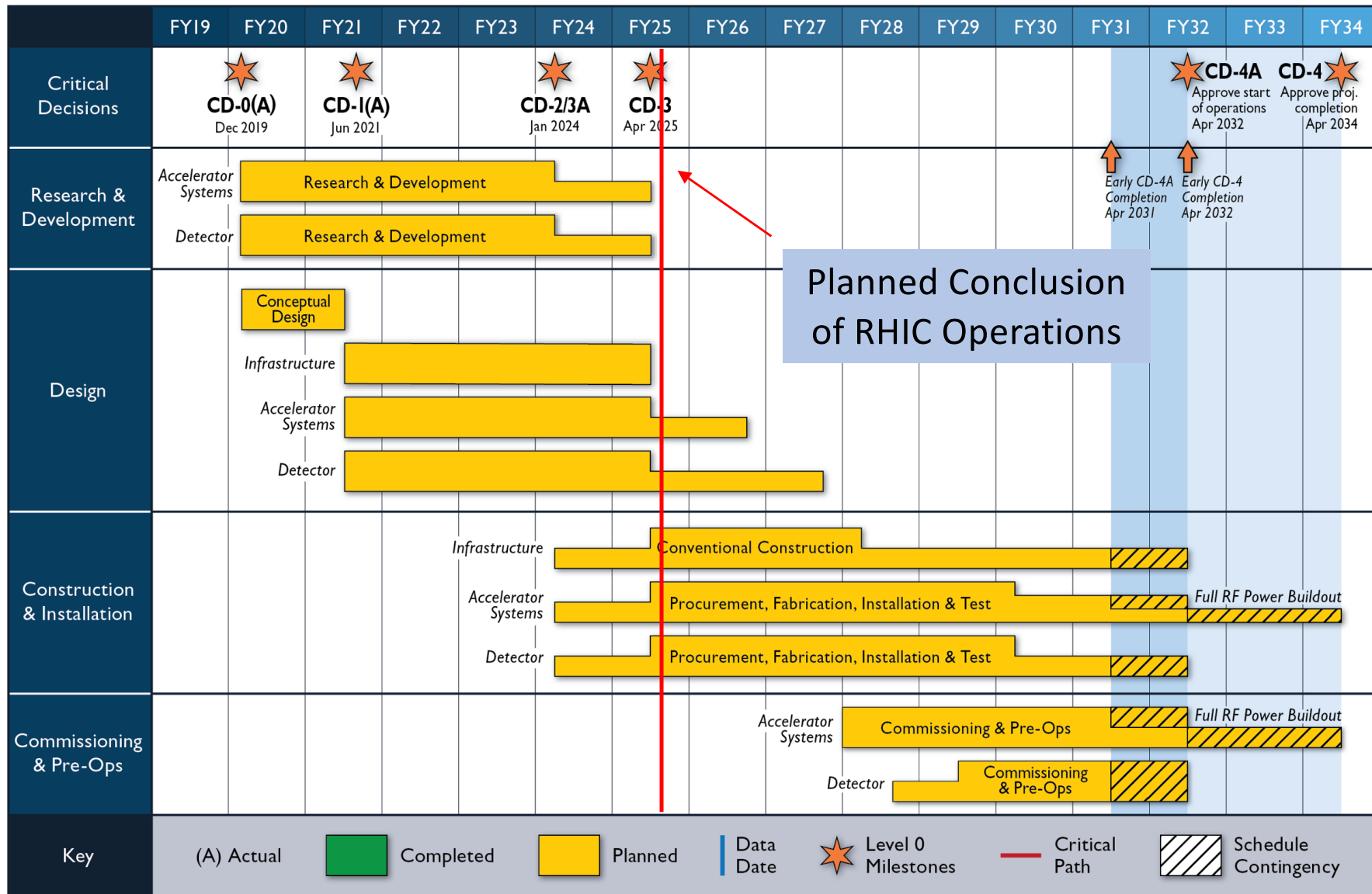
- Actual \$45M in FY2022 Funding
- Revised Annual Funding Profile
- \$90M in FY2023



Electron-Ion Collider Scope



Schedule for the Preferred Scenario



Positioning the EIC Project for Success

- EIC Project Advisory Committee preparing a report on lessons learned on conditions needed for success from recent and contemporary projects
 - Bob Wunderlich prepared draft report
 - Recent PAC meeting provided additional input and provided direction on next steps
- Next steps
 - PAC subcommittee to interview stakeholders as part of a “gap analysis”
 - Expect recommendations on actions needed to position the EIC project for success

Project Challenges

- Construction Funding Ramp-Up (50% vs >100% per year)
 - Funding profile and construction project affordability
 - Partner engagement and motivation of in-kind contributions
- Accelerator Science and Technology
 - Complex machine with high performance goals (luminosity, polarization, reliability, etc.) requiring a collaborative approach
 - BNL and JLab working to engage international and domestic partners in these efforts
- Infrastructure Schedule w/ NYS Support (\$100M)
 - Initial pacing scope for the project with significant NYS funding
 - Requires EIC technical teams to deliver timely requirements
- Project Detector Plans
 - Excellent progress leveraging DPAP recommendations
 - Working to support an inclusive collaboration and institutional responsibilities, scope, cost & schedule for CD-2/3A

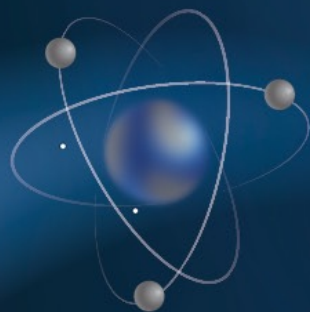
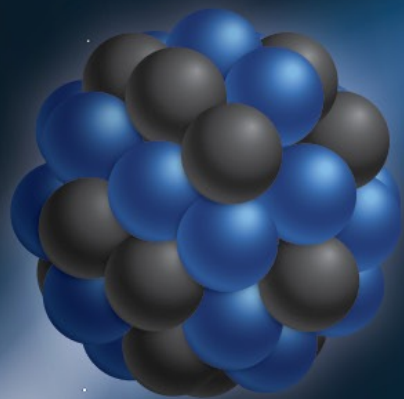
Summary

- Excellent Progress

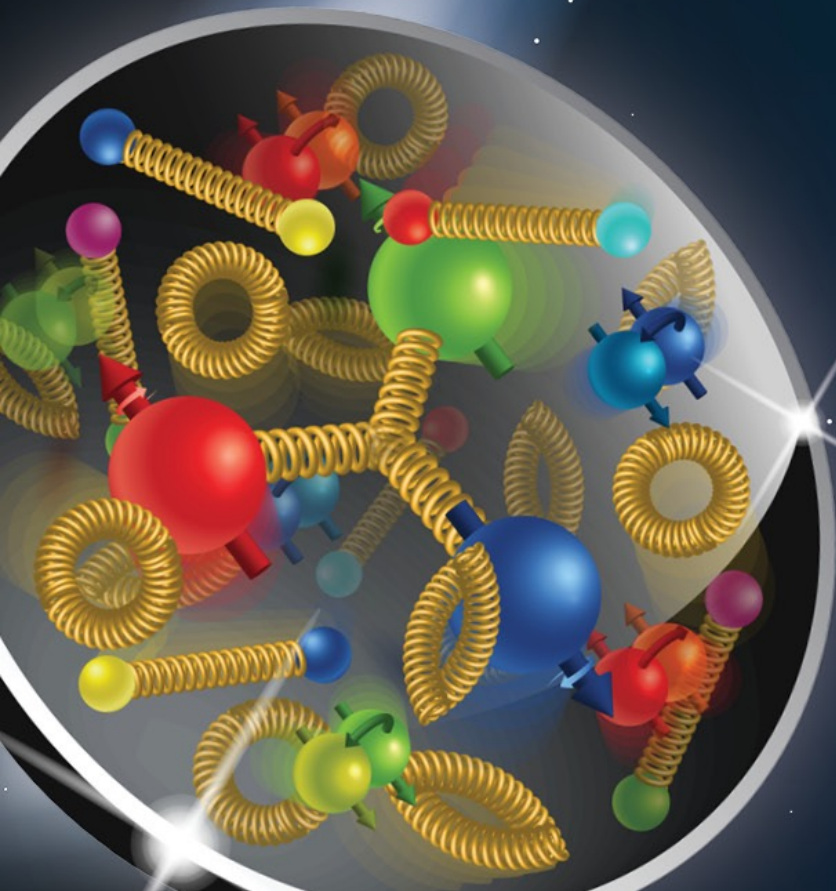
- Project foundation in place: established partnership and organization, defined scope, conceptual design, preliminary performance parameters, cost & schedule range, and planning documentation
- BNL and TJNAF actively pursuing broader collaboration and partnership in the EIC
- Clear path forward on the project detector at IP6

- Preparing for CD-2/3A

- Strong case for substantial increase in project funding established



Thank You!



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