Report of the December 2023 and May 2024 EIC RRB Meetings

Haiyan Gao

Duke University

Also, on behalf of Diego Bettoni (RRB Co-Chair, INFN)

and David Dean (JLab)

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Inaugural EIC Resource Review Board (RRB) Meeting

DOE and the host labs promoting the EIC as a facility "fully international in character."

Initial RRB Co-Chairs:

- Haiyan Gao (BNL)*
- Diego Bettoni (INFN)

https://www.bnl.gov/eic-rrbmeeting/

➢ 1st RRB meeting on April 3-4, 2023, Stony Brook University (reported last July by Diego Bettoni)

* Alternate between BNL and JLab

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2nd EIC Resource Review Board Meeting

➢2nd RRB meeting on December 7-8, Catholic University of America.

Hosts:

Haiyan Gao, Co-Chair, Associate Laboratory Director, Nuclear and Particle Physics, BNL

Diego Bettoni, Co-Chair, Vice President, INFN

David Dean, Deputy Director for Science, TJNAF

Tanja Horn, Professor of Physics, The Catholic University of America

Jim Yeck, EIC Project Director, Associate Laboratory Director, BNL(Remote)

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EIC RRB Participants:

Jaroslav Adam, Czech Technical University in Prague, Czech Republic
Pietro Antonioli, INFN Bologna, Italy
Helen Beadman, UKRI-STFC, UK
Maurizio Biasini, Embassy of Italy, Italy
Francesco Bossù, CEA, Italy (Remote)
Carlos Munoz Camacho, IJCLab, France (Remote)
Wouter Deconinck, University of Manitoba, Canada
Yuji Goto, RIKEN, Japan
Marcella Grasso, IN2P3/CNRS, France
Taku Gunji, Center for Nuclear Study, University of Tokyo, Japan
Tim Hallman, Associate Director of the Office of Science for Nuclear Physics, DOE
Peter Jones, University of Birmingham, United Kingdom
Kyungseon Joo, University of Connecticut, South Korea
Oumar Ka, Cheikh Anta Diop University, Senegal (Remote)
Chia Ming Kuo, National Central University, Taiwan
Mark Lagacé, Canada Foundation for Innovation, Canada
Arnaud Lucotte, IN2P3/CNRS, France
Rosario Nania, INFN, Italy
Keisuke Okamura, Embassy of Japan in the USA, Japan
Mariusz Przybycien, AGH University of Krakow, Poland
Franck Sabatie, CEA Saclay, France
Kyu Chul Song, Embassy of Republic of Korea, South Korea
Yahya Tayalati, University Mohammed V in Rabat, Morocco (Remote)
Marek Vyšinka, Ministry of Education, Youth and Sports, Czech Republic

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EIC Project, BNL & TJNAF Participants:

Elke Aschenauer, Co-Associate Director for the Experimental Program, BNL
Paolo Berrutti, In-Kind Contributions Engineer, BNL
Maria Chamizo-Llatas, EIC Advisory Board Scientific Secretary/Deputy Associate Lab Director/NPP, BNL
Abhay Deshpande, EIC Science Director, BNL/SBU
Rolf Ent, Co-Associate Director for the Experimental Program
James Fast, EIC Associate Project Manager, TJNAF
Luisella Lari, EIC Project Manager, BNL
Alyssa Petrone, EIC Chief of Staff to the Associate Laboratory Director/Project Director, BNL (Remote)

U.S. Department of Energy Participants:

Corey Cohn, DOE Office of Science
Latifa Elouadrhiri, DOE Office of Science, Nuclear Physics
Michael Famiano, DOE Office of Science, Nuclear Physics
Tim Hallman, DOE Office of Science, Nuclear Physics
Paul Mantica, DOE Office of Science, Nuclear Physics

Other attendants:

Amber Boehnlein (TJNAF, presenter)
Silvia Dalla Torre (INFN Trieste, ePIC Deputy Spokesperson, presenter)
Markus Diefenthaler (TJNAF, ePIC Software & Computing Coordinator, presenter)
Stuart Henderson (TJNAF, Laboratory Director, presenter)
JoAnne Hewett (BNL, Laboratory Director)
John Hill (BNL, Deputy Director for Science and Technology)
Ed Kinney (University of Colorado at Boulder, EIC DAC Chair, presenter)
John Lajoie (ORNL, ePIC Spokesperson, presenter)
Eric Lancon (BNL, presenter)
Allison Lung (TJNAF, Chief Planning Officer)

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Day 1- Thursday, December 7, 2023

Ralph Albano (CUA Vice Provost for Sponsored Research, Research Compliance, and Technology Transfer) and Tanja Horn (CUA Professor of Physics) welcomed the participants to CUA and provided an overview on CUA's history and science program for the EIC.

John Hill (BNL Deputy for Science and Technology) and Stuart Henderson (JLAB Director) welcomed the participants on behalf of the host labs.

A moment of remembrance was held for Professor Yongseok Oh, who participated in the April 2023 RRB meeting.

The goals of the December 2023 meeting were presented by RRB Co-Chair, Haiyan Gao :

- Address questions/requests from the April 2023 meeting
- Next EIC major EIC milestone CD-2
  - In-Kind contributions
  - Agreements and timeline
- EIC: new facility international in character
- Common Funds
- RRB: members and observers

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EIC Project Update and In-Kind Path to CD-2/3 presented by Luisella Lari (EIC Project Manager) on behalf of Jim Yeck (EIC Project Director):

- The 2023 NSAC Long Range Plan recommends “the expeditious completion of the EIC as the highest priority for facility construction.”
- The project recently completed a successful DOE OPA CD-3A Long Lead Procurement/Status Review in November 2023. ESSAB approval for CD-3A was anticipated for late January or early February 2024.
- Other upcoming milestones include a CD-3B, Long Procurement Approval in October 2024, and CD-2/3, Performance Baseline/Construction Start Approval in April 2025.
- In-Kind contribution goals remain at 30% for the Detector and 5% for the Accelerator.
- To baseline the project, appropriate binding and non-binding agreements for significant/critical in-kind contributions need to be signed before CD-2. The Project & In-kind Support Office provide support to EIC Partners to develop the Lab level documentation.

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Other presentations included:

- Report from the EIC Advisory Board by Stuart Henderson
- Report from the EIC Detector Advisory Committee (DAC) by Edward Kinney
- Short Reports on the Nuclear Physics LRP (US, Japan, and Europe) by Haiyan Gao, Taku Gunji and Diego Bettoni
- EIC Project Detector Overview by Elke Aschenauer and Rolf Ent
- Report from the ePIC Collaboration Spokesperson by John Lajoie
- Report from the ePIC Technical Coordinator by Silvia Dalla Torre

Day 2- Friday, December 8, 2023

RRB Co-Chair, Diego Bettoni led a discussion on the threshold for RRB Members vs Observer countries. At this stage, flexibility will be applied to membership in the RRB. There is currently no set timeline for distinguishing between members and observers. However, it would make sense for it to align with the CD2/3 milestones. To remain inclusive, some ideas on a possible two-tier system or holding open meetings with some closed sessions were mentioned.

Presentations included:

- Report from the ePIC Computing Coordinator by Markus Diefenthaler
- Host Labs' Computing Support and Partner Expectations by Amber Boehnlein and Eric Lancon
- Commons Funds by Elke Aschenauer and Rolf Ent

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A further discussion on Commons Fund and Agreements was led by David Dean, Luisella Lari and Maria Chamizo Llatas. Updates were given by funding agencies and/or PIs for the following countries.

- Canada
- Czech Republic
- France
- Italy
- Japan
- South Korea
- Senegal
- Taiwan
- United Kingdom
- USA

The 3rd RRB Meeting will be held in Italy on May 6-7, 2024. Topics will include:

- A more complete proposal on common funds
- Computing and Software
- Timeline for distinguishing between RRB Members vs Observers

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3rd EIC Resource Review Board Meeting

- 3rd EIC RRB meeting
May 6-7, 2024,
Rome, Italy
- First one held outside the U.S.

Hosts:

Diego Bettoni, Co-Chair, Vice President, INFN

Haiyan Gao, Co-Chair*, Associate Laboratory Director, Nuclear and Particle Physics, BNL

David Dean, Deputy Director for Science, TJNAF

Jim Yeck, EIC Project Director, Associate Laboratory Director, BNL

*Haiyan Gao completed her co-Chair role at the end of June 2024 and returned to Duke University full time

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EIC RRB Participants:

Pietro Antonioli, Research Director, INFN
Jaroslav Bielcik, Professor of Physics, Czech Technical University in Prague
Francesco Bossù, Head of the Nucleon Structure Laboratory, CEA- Saclay
Carlos Munoz Camacho, Staff Scientist, IN2P3, CNRS
Gianpaolo Carlino, Director of Research, INFN
Kai-Feng Chen, Professor, National Taiwan University
Zvi Citron, Associate Professor, Ben Gurion University of the Negev
Paolo Guibellino, President of Third Scientific Committee, INFN
Yuji Goto, Senior Scientist, RIKEN
Marcella Grasso, Scientific Director for Nuclear Physics, IN2P3, CNRS
Taku Gunji, Professor, University of Tokyo
Peter Jones, Professor, University of Birmingham
Kyungseon Joo, Professor, University of Connecticut
Rajiv Kumar, Scientist-F, Department of Science & Technology, Govt. of India
Kyounglim Lee, Director, Division of International Cooperation with Americas and Asian Countries, Ministry of Science and ICT
Chia Ming Kuo, Professor, National Central University
Arnaud Lucotte, Scientific Director for Accelerator and Technologies, IN2P3, CNRS
Rosario Nania, Director of Research, Chair of Commission for Nuclear Physics Experiments, INFN
Nigel Smith, Executive Director, TRIUMF
Praveenkumar Somasundaram, International Cooperation Head, Department of S&T
Marek Vyšinka, Head of Unit, Ministry of Education, Youth and Sports
Hwidong Yoo, Professor, Yonsei University

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EIC Project, BNL & TJNAF Participants:

Elke Aschenauer, Co-Associate Director for the Experimental Program, BNL
Paolo Berrutti, In-Kind Contributions Engineer, BNL
Maria Chamizo-Llatas, Deputy Associate Lab Director for Engagement & Development, Nuclear and Particle Physics, BNL
Abhay Deshpande, Distinguished Professor, SBU & EIC Science Director, Nuclear and Particle Physics, BNL
Rolf Ent, Co-Associate Director for the Experimental Program, TJNAF
James Fast, EIC Associate Project Manager, TJNAF
Luisella Lari, EIC Project Manager, BNL
Alyssa Petrone, EIC Chief of Staff, BNL

U.S. Department of Energy Participants:

Harriet Kung, Acting Director, Office of Science
Michael Famiano, International Cooperation & Outreach, Office of Nuclear Physics
Paul Mantica, Facilities & Project Management Division Director, Office of Nuclear Physics

Other Attendees:

Amber Boehnlein, Chief Information Officer, TJNAF
Silvia Dalla Torre, ePIC Deputy Spokesperson and Technical Coordinator, Associate Scientist, INFN
Markus Diefenthaler, ePIC Computing Coordinator, Staff Scientist, TJNAF
Stuart Henderson, Director, TJNAF
JoAnne Hewett, Director, BNL
John Hill, Deputy Director for Science and Technology, BNL
Alexei Klimentov, Interim SDCC Director, BNL
John Lajoie, ePIC Collaboration Spokesperson, RNP Group Leader, ORNL
Rachel Montgomery, Research Fellow, University of Glasgow

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Welcoming Remarks: Diego Bettoni

The RRB participants were welcomed to Rome on behalf of the National Institute of Nuclear Physics (INFN) President, Antonio Zoccoli. INFN is the first international host of the EIC RRB meeting.

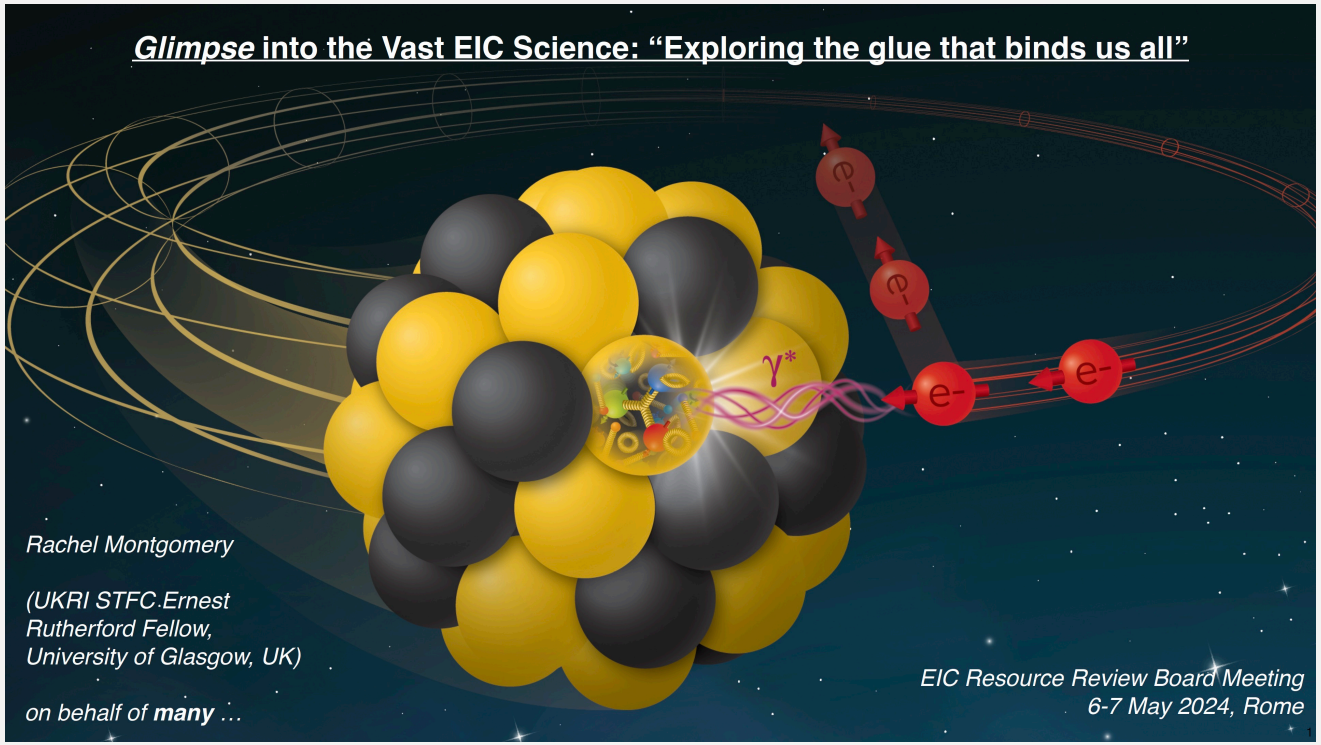
Meeting Goals: Haiyan Gao

The goals of the May 2024 meeting were presented:

- Address questions/requests from the December 2023 meeting
- Next EIC major EIC milestone CD-3B
  - In-Kind contributions
  - Agreements and timelines
- International engagement and contributions
- Proposal for common funds
- Draft proposal for computing (in-kind) contribution
- RRB: members and observers (continuing topic)
- Emerging topics
- Next RRB Meeting: dates and location

EIC Science: Rachel Montgomery

Rachel presented an engaging science overview talk



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EIC Project Status: Jim Yeck

- Achieved CD-3A Long-Lead Procurement (LLP) in March 2024
- Plan for CD-3B LLP in 2025.
- The in-kind goals for the project remain at 5% for the Machine and 30% for the Detector.
- FY 25 US President's Budget Request is $113M, much less than anticipated
- The $138M funds from the Inflation Reduction Act (IRA) will support CD-3A and the future CD-3B.
- The DOE is working with the project on its plans. As of today, there is a total commitment of ~$500M between DOE, NYS, and IRA funds.
- Project priorities this year include: the execution of the CD-3A scope; clarifying the technical baseline, cost, schedule, partnerships and project organization; preparing the CD-3B procurements for approval; preliminary design (final design for CD-3A) and preparation for CD-2.

EIC Project Detector Overview:

Rolf Ent & Elke Aschenauer

- Technically baselined with the central detector baseline technologies chosen in July 2023 and the far-forward/far-backward baseline technologies chosen in February 2024
- Recent focus on CD-3A, CD-3B, and the path to CD-2 including preparing for detector CD-3A long-lead procurement contracts
- CD-3B for detector: a phase continuation for CD-3A scope and other items
- On track to reach CD-2 and required design maturity in 2025.

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Remarks by Acting Director, Office of Science: Harriet Kung

- The EIC is a very high priority within the Office of Science (SC).
- The SC is paying close attention to the schedule and coordinating with domestic and international partners to ensure we can uphold commitments.
- The SC appreciates the RRB participants' efforts to secure funding for their contributions and is thrilled to have them as partners.
- The SC is committed to delivering the EIC.
- The EIC will become a model for international collaboration within the Office of Science. Partner input was encouraged.
- A thank you was given to the EIC team for the exciting progress achieved as of today.

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Report from the EIC Advisory Board (AB): Stuart Henderson

The AB closely coordinates with the RRB and has some overlap in membership. The AB reports to the BNL Director, JoAnne Hewett. A charter was approved in June 2023. The focus is on providing guidance and advice on the construction of the EIC facility and domestic and international partnerships for the accelerator. In the report at the January 2024 meeting given by Sergei Nagaitsev, plans to form an Accelerator Collaboration were presented (a previous action item from the AB).

*There was a satellite Kick Off Meeting held at IPAC'24. The collaboration is led by co-chairs Andrei Seryi (JLAB) and Carsten Welsch (Liverpool).

Update on the NuPECC Long Range Plan (LRP) 2024: Diego Bettoni

An in-person LPR2024 Town Meeting was held on April 15-17, 2024 in Bucharest. The draft LRP2024 report and recommendations were presented and discussed. **Collaboration with EIC was included as a recommendation, particularly on the construction of ePIC.** The LRP approval would be announced in June 2024 at the Lund meeting. The official presentation will take place in November 2024.

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Status of International Agreements and Engagement: Luisella Lari

- Before CD-2, both binding agreements and non-legally binding agreements such as Project Planning Documents (PPDs), must be signed.
- DOE high-level agreements do not include all the scope.
- iCRADAs are laboratory level binding agreements for all IKC items for which PPDs are requested.
- Canada, France, Italy, and the UK are in the first phase of developing draft iCRADAs and PPDs.

In-Kind Documentation Path Forward: Paolo Berrutti

- In general, lab-level agreements contain all project-level and technical details and are most important in the project execution phase.
- The target dates for PPDs shifted to March 2025 in accordance with the updated plans for CD-2 plus an additional six months to account for required DOE approvals.
- Each PPD requires four supplementary documents: Quality Assurance Plan, Acceptance Criteria, Acceptance Plan, and Risk Management Plan. Technical Representatives should be identified as soon as possible.

IKC: In Kind Contribution
iCRADAs: international Cooperative Research and Development Agreements

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Report from the ePIC Collaboration Spokesperson: John Lajoie

The ePIC Collaboration is growing and active. Leadership focuses on welcoming new institutions and improving engagement. The overall structures of the ePIC Collaboration, ePIC Working Group Structure, and Detector Subsystems were discussed. Committees are fully formed. Membership and Conference and Talks policies expected to be approved at the July 2024 Collaboration Meeting The Collaboration Draft policies on Code of Conduct and Publication are in development. The CERN Research Board made their recommendation for EIC to be a recognized experiment at the March 2024 CERN Council Meeting. ePIC leadership is working on the next steps. The goal is to make the Technical Design Report (TDR) available by CD-2.

Report from the ePIC Technical Coordinator: Silvia Dalla Torre

The structure of the Detector Subsystem Collaboration is established, and the subsystems are progressing thanks to the expertise and efforts of the collaboration institutions. The technology selection is functional to the required performance as resulting from the physics scope.

Report on ePIC Software and Computing by the Computing Coordinator: Markus Diefenthaler

An ePIC Software and Computing Review took place in October 2023. The outcome was positive. Two meetings were held since the December 2023 RRB meeting to enable software progress, advance review preparations, and inform planning. ePIC aims for rapid data turnaround to maximize and accelerate science. The ePIC Streaming Computer Model is comprised of four tiers:

- Echelon 0: ePIC experiment and its streaming readout.
- Echelon 1: Crucial and innovative partnership between host labs.
- Echelon 2: Essential global contributions.
- Echelon 3: Full support of the analysis community.

Continuous Integration (CI) driven benchmarks and timeline-based prioritization are in place to ensure the timely completion of simulation studies needed for the TDR.

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Discussion on the ePIC Streaming Computing Model and the Host Lab Computing Support Status: Amber Boehnlein and Alexei Klimentov

BNL and JLAB established the EIC Computing and Software Joint Institute (ECSJI) in 2023 to help administer the EIC International Computing Organization (EICO), which will include all the contributors to the EIC computing efforts.

The proposed EIC Computing Organization and Governance organization chart were presented including a Computing Council (ECC), Institute Management, Computing and Software Advisory Committee (ECSAC), and EICO.

The ePIC Streaming Computing Model is the primary document for preparing agreements with international partners. External partners will be included in drafting the EICO charter. Discussions with WLCG are in progress. The first version of the ePIC Streaming Computing Model will be reviewed by the ECSJI Computing and Advisory Committee in Fall 2024. Discussions are ongoing with international partners.

The EIC RRB aims at an integrated approach between detector and computing with one single RRB providing oversight

Common Funds Proposal: Rosario Nania

The draft proposal based on past experiences at CERN and DOE requirements presented with a draft list of Maintenance and Operation (M&O) costs to operate the ePIC experiment. Another revision is expected at the end of 2024 to include the preliminary estimates. It is assumed the document will be valid starting in 2028. The costs in 2025-2027 can be handled informally. The governance model and cost categories were presented.

Draft Proposal for Global Strategy: Elke Aschenauer

This proposal included input from the EICUG and ePIC. The main ideas are to expand the experimental community, create a STEM pipeline, provide opportunities for early career scientists in developing countries, and develop a truly diverse workforce. An estimated 10% of the Common Fund money was proposed to be dedicated to outreach activities.

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Updates were given by funding agencies and/or PIs for the following countries:

- Canada
- Czech Republic
  - Proposed to be the next international host for the RRB meeting in 2025
- France
- India
- Israel
- Italy
- Japan
- South Korea
- Taiwan
- United Kingdom
- United States

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Major action items

EIC computing and software:

- Given the US siting of the EIC, DOE-NP will ensure computing be available for physics data taking, primary data processing and analysis, and data preservation. International partnerships and commitments as extraordinary and in-kind can increment the data processing, data analysis and increase physics output. Action: come with a proposal on how to make best use of the capabilities of the various partners to maximize EIC physics output within the foreseen ePIC computing model.
- RRB develops its vision for EIC computing and governance including relationship with ECSJI and EICO. More broadly, further development of an overall governance structure (RRB, ECSJI, computing, experiment, EIC project).
- Review of ePIC computing model will be scheduled by fall 2024 before the next RRB.

Common Fund:

- The action item for the next RRB is to develop the preliminary estimates of costs for the various categories.

Global Engagement:

- Develop task force to prioritize outreach action proposals and working group to develop communication strategies.

All be reported at the Next RRB Meeting

The 4th RRB Meeting will be held in the USA at Brookhaven National Laboratory on November 12-13, 2024.

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