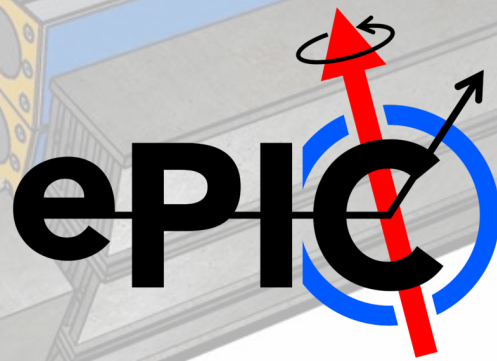




Review of CD-3A Comments and Recommendations

J. Lajoie, S. Dalla Torre

December 1, 2023



EIC CD-3A Review

- Held Nov. 14-16 at Brookhaven National Lab.
- A part of the DOE Critical Decision (CD) process
 - CD-3A allows early purchase of long lead purchases
 - Not just material – could be “equipment, service and/or materials”
- The closeout slide deck has 68 slides – here I will just focus on the detector subcommittee.
 - Most importantly, all subcommittees recommend “Proceed to CD-3A”
 - Highlights are my emphasis



Review Committee Participants

Kurt Fisher, DOE/SC, Chairperson

SC1
**Accelerator R&D; Electron Injector;
and Electron Storage Ring**
(WBS 6.02; 6.03; 6.04)

- * John Lewellen, LANL
- Anna Alexander, LANL
- Yulin Li, Cornell

SC2
**Hadron Ring and
Interaction Region**
(WBS 6.05; 6.06)

- * Jie Wei, MSU
- Fuvia Pilat, ORNL
- GianLuca Sabbi, LBNL
- Vladimir Shiltsev, FNAL
- Alexander Zlobin, FNAL

SC3
Accelerator Systems
(WBS 6.07; 6.08; 6.09)

- * Daniel Ratner, SLAC
- Peter Ostroumov, MSU
- Tom Peterson, SLAC
- Guobao Shen, ANL

SC4
Detector
(WBS 6.10)

- * Andy Lankford, UCI
- Dave Christian, FNAL

SC5
Infrastructure
(WBS 6.11)

- * Jeff Sims, MSU

SC6
Cost and Schedule
(WBS 6.01)

- * Julia Chaffin, LLNL
- Duke Hughes, ORNL

SC7
Project Management
(WBS 6.01)

- * Hanley Lee, DOE/SSO
- Adam Bihary, DOE/FSO
- Alex Bachowski, OPA
- Duane Newhart, SLAC (ESH)

Observers

- Timothy Hallman, DOE/NP
- Paul Mantica, DOE/NP
- Manouchehr Farkhondeh, DOE/NP
- Ivan Graff, DOE/NP
- Elizabeth Bartosz, DOE/NP
- Kenneth Hicks, DOE/NP

- Spyridon Margetis, DOE/NP
- Michelle Shinn, DOE/NP
- Robert Caradonna, DOE/BHSD
- Bryan Foley, DOE/TJSO
- Allena Oppen, NSF

LEGEND

- SC Subcommittee
- * Chairperson
- ITA Remote Participant

Count: 22 (excluding observers)



1. Is the project team effectively executing the work? Are technical issues appropriately and proactively being addressed?
2. Are R&D and design efforts yielding sufficiently advanced designs and mitigating technical risks, particularly in strong hadron cooling? Are the proposed CD-3A long-lead procurements appropriate and do they support project risk mitigation? Have the proposed CD-3A long-lead procurements attained final design?
3. Is the project making adequate progress developing the performance baseline? Is the project scope defined well and logically? Are the schedule and cost estimates credible? Do plans include adequate scope, schedule, and cost contingency? Are estimates for the proposed CD-3A long-lead procurements appropriate? Can these procurements be tracked properly?
4. Are ES&H and QA properly addressed given the project's current stage of development?
5. Is the project being properly managed? Are risks being effectively managed? Is a management team in place to successfully execute the project including the CD-3A scope? Are roles and responsibilities documented and understood?
6. Has the project satisfactorily addressed recommendations from previous DOE SC reviews?
7. Is the project ready for CD-3A approval?



2.4 Detector

A. Lankford, UCI / Subcommittee 4

D. Christian, FNAL

1. Is the project team effectively executing the work? Are technical issues appropriately and proactively being addressed?
YES & YES

2. Are R&D and design efforts yielding sufficiently advanced designs and mitigating technical risks?
YES
Are the proposed CD-3A long-lead procurements appropriate and do they support project risk mitigation? Have the proposed CD-3A long-lead procurements attained final design?
YES & YES

6. Has the project satisfactorily addressed recommendations from previous DOE SC reviews?
YES
 - Pursue formal commitments for IKC before CD-2. – satisfactory progress
 - **Advance detector integration and assembly planning for this review. – addressed**
 - Develop interface definitions for services for this review. – ongoing
 - **Prioritize completing R&D of all technical options. – options resolved**

7. Is the project ready for CD-3A approval?
YES



2.4 Detector

A. Lankford, UCI / Subcommittee 4

D. Christian, FNAL

- **Comments - I**
 - **The detector subproject is well-organized. It has a strong engineering team including system engineer and chief mechanical and electronics engineers. Integration of project and ePIC collaboration is very good. Final technology choices for all central detector subsystems are complete, and detector is proceeding well towards CD-2/3.**
 - **EIC physics requires a complex detector, with many subsystems. Integration of the subsystems, coordination of common elements, and management will require great attention in order to keep all the subprojects on track for CD-4.**
 - **Investment in years of EIC detector R&D and project R&D has resulted in mature detector technologies and in subdetector designs of appropriate maturity for this stage of the project. Plans for remaining detector R&D are sound. Remaining R&D followed by engineering test articles and full-chain tests should continue apace in order to allow time to resolve any unforeseen issues.**



2.4 Detector

A. Lankford, UCI / Subcommittee 4

D. Christian, FNAL

- **Comments - II**
 - **Studies of beam pipe bake-out procedure are reasonable and systematic, and should be continued to ensure safety of MAPS microvertex tracker.**
 - **Systems engineering of detector electronics now needs to advance, including development of guidance/policies for detector subsystems regarding location of electronics, grounding, shielding, and cooling.**
 - **ePIC depends on development of five ASICs. Timely development of ASICs should be followed closely. Groups developing ASICs upon which the project depends should be well aware of the project's needs and schedule. ePIC's partnership with ALICE on MAPS development could be considered as a model for working closely with ASIC development teams.**



2.4 Detector

A. Lankford, UCI / Subcommittee 4

D. Christian, FNAL

- **Comments - III**
 - **All long-lead procurements on the CD-3A list are well-motivated and have appropriately mature designs.**
 - **A set of high-level milestones for each level-4 WBS element should be prepared for presentation at future reviews. The same set should be used consistently at future reviews in order to facilitate tracking detector progress for review committees.**



2.4 Detector

A. Lankford, UCI / Subcommittee 4

D. Christian, FNAL

- **Recommendations**
 - **Proceed to CD-3A.**
 - **Advance system engineering of detector electronics subsystems. Prioritize issues that impact space requirements within ePIC detector volume for the next review, including location of electronics as well as cooling and cables.**

Summary

- Successful completion of the EIC CD-3A Review is a real milestone
 - In effect, construction of ePIC begins with these long-lead purchases
- Looking forward to formal ESAAB CD-3A approval in early 2024

