

TC-office Report

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ePIC General Meeting, April 5, 2024

OUTLOOK


- **TIC meetings**
 - **News from the joint ePIC/EIC R&D day**
- **Medium term goals**
 - **A reminder**
- **Highlights from March 21 PM Report**


TIC, report from the R&D day – 3/25


- Joint ePIC/EIC project R&D day on Monday March 25 (organized by Thomas Ullrich)
 - All the eRD efforts presented
 - See slides at <https://indico.bnl.gov/event/22388/>
 - Next slides are copied from Thomas's introduction and include some key considerations


ePIC / EIC Project Detector R&D Day


Monday 25 Mar 2024, 09:00 → 16:00 US/Eastern

Description	Zoom Link
 Progress Reports	




09:00 → 09:15 **Welcome & Introduction**
Speaker: Thomas Ullrich (BNL)
 WelcomeMessage...


09:15 → 09:45 **eRD103 (hpDIRC)**
Speaker: Grzegorz Kalicy (CUA)
 20240325-eRD103...


09:45 → 10:15 **eRD112 (ToF/AC-LGAD)**
Speakers: Zhenyu Ye (Lawrence Berkeley National Laboratory/University of Illinois at Chicago), Zhenyu Ye (University of Illinois at Chicago)
 eRD112_20240325...

10:15 → 10:45 **eRD102 (dRICH)**
Speaker: Marco Contalbrigo (INFN Ferrara)
 dRICH_240325.pdf


10:45 → 11:05 **Coffee Break**


11:05 → 11:35 **eRD108 (MPGDs)**
Speakers: Audrey Francisco (CEA-Saclay), FRANCESCO BOSSU (CEA-Saclay), Francesco Bossù (CEA), Kondo Gnanvo (Jefferson Lab)
 EICR&DDaysERD10...  eRD108-20240325...  eRD108-20240325...


11:35 → 12:05 **eRD109 (ASICs/FEEs)**
Speaker: Fernando Barbosa (JLab)
 ePIC EIC Project R&...


12:05 → 13:05 **eRD104, eRD111, eRD113 (SVT)**
Speaker: Ernst Sichtermann (Lawrence Berkeley National Laboratory)
 20240325 - SVT R&...

13:05 → 13:35 **Lunch Break**

13:35 → 14:05 **eRD110 (Photosensors)**
Speaker: Alexander Kiselev (BNL)
 ayk-2024-03-25-rd-d...

14:05 → 14:35 **eRD106 (Fwd EMCAL)**
Speaker: oleg tsal (ucla)
 pECAL_03252024.p...

14:35 → 15:05 **eRD107 (Fwd HCal)**
Speaker: Friederike Bock (ORNL)
 erd107_ProgressRe...

15:05 → 15:35 **eRD115 (Barrel EMCAL)**
Speaker: Maria Zurek (Argonne National Laboratory)
 eRD115_ImagingCa...

Project R&D FY22-FY24

Covering several (near all) areas

FY22	
ID	R&D Subject
eRD101	mRICH
eRD102	dRICH
eRD103	hpDIRC
eRD104	Service reduction
eRD105	SciGlass
eRD108	Cylindrical MPGD Planar MPGD
eRD110	Photosensors
eRD111	Si-Tracker/no sensors
eRD112	AC-LGAD

9 projects \$1,300,800
27 institutions

FY23	
ID	R&D Subject
eRD101	mRICH
eRD102	dRICH
eRD103	hpDIRC
eRD104	Service reduction
eRD105	SciGlass
eRD106	Forward EMCAL
eRD107	Forward HCAL
eRD108	MPGDs
eRD109	ASICs/Electronics
eRD110	Photosensors
eRD111	Si-Tracker/no sensors
eRD112	AC-LGAD
eRD113	MAPS sensors (ITS3)

13 projects \$2,999,805
29 institutions

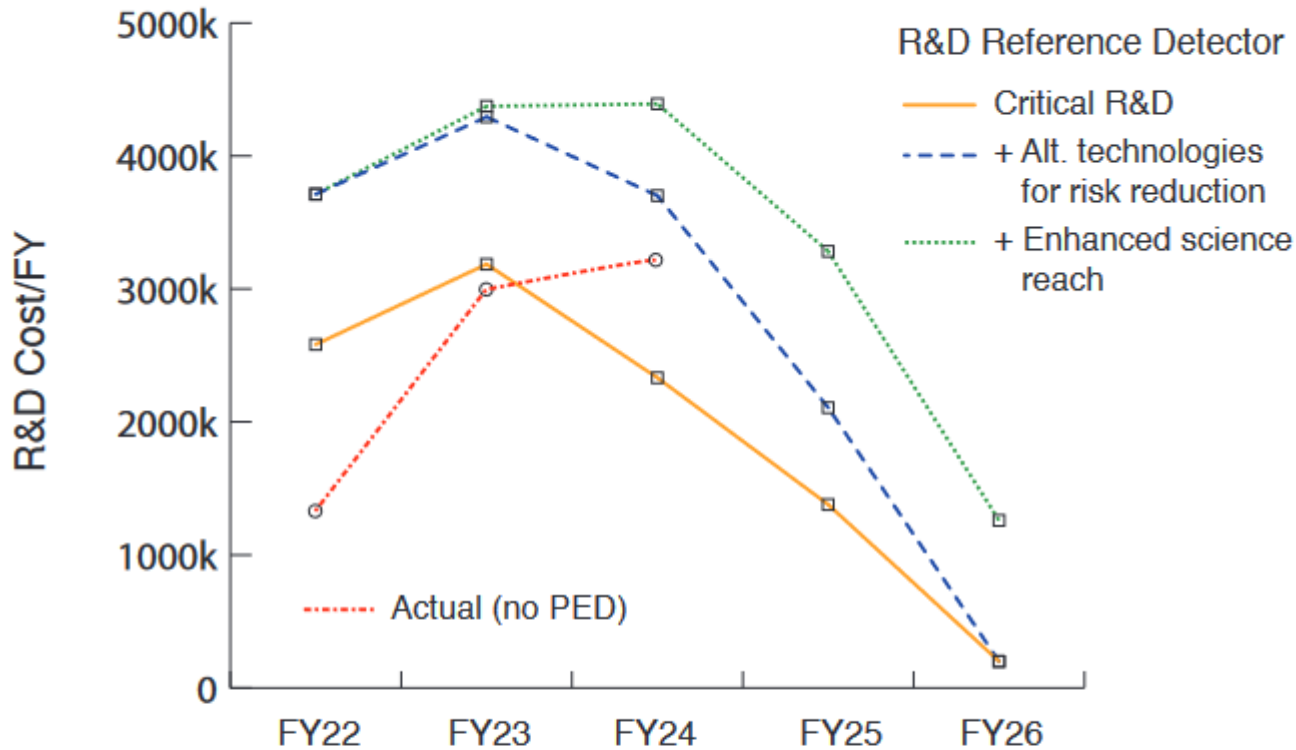
FY24	
ID	R&D Subject
eRD102	dRICH
eRD103	hpDIRC
eRD104	Service reduction
eRD107	Forward HCAL
eRD108	MPGDs
eRD109	ASICs/Electronics
eRD110	Photosensors
eRD111	Si-Tracker/no sensors
eRD112	AC-LGAD
eRD113	MAPS sensors (ITS3)
eRD114	pfRICH
eRD115	Imaging Calorimeter

11 projects \$3,207,900
25 institutions

Looking Back and Forward

- For many years the R&D program was for many groups the sole source of funding and played an important role in engaging the community and drawing them into the EIC project. Even if limited in their funding capabilities they have been instrumental to get where we are now.
 - ▶ 2011 - 2021 Generic R&D
 - ▶ 2022 - 2025 Project R&D
- We are now looking at a transition from R&D to PED funding and then construction. This requires close collaborations of ePIC DSCs with project management but especially with L3/CAMs for the daily business.
- The 2nd generic R&D Program will take care of looking at alternative technologies or improvements to technologies used in ePIC for future upgrades to reduce risk and enhance our science reach.

Plans and Evolution



Note that the **Generic R&D Program** takes care of alt. technologies for risk reduction and enhanced science reach

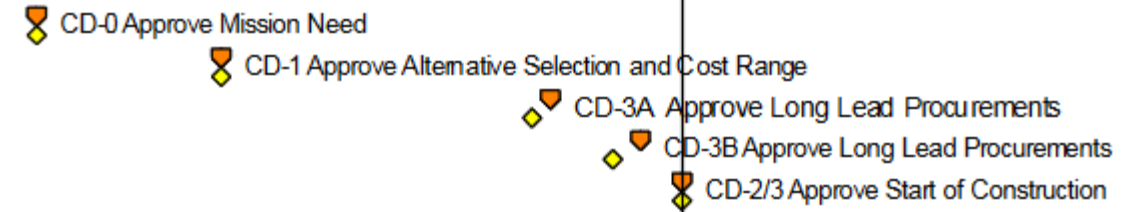
Original R&D Planning (8/2021)

- **FY22**
 - ▶ delays due to CR for 1/2 y
 - ▶ shortcoming in funding
- **FY23**
 - ▶ play catchup
 - ▶ add eRD113 (MAPS) and eRD106, eRD107 (Fwd Cal)
 - ▶ start to inject PED
- **FY24**
 - ▶ eRD101, eRD105, eRD106 completed
 - ▶ eRD114 (bEMCal) added
 - ▶ Recent: Shortcoming in R&D funding will require more PED

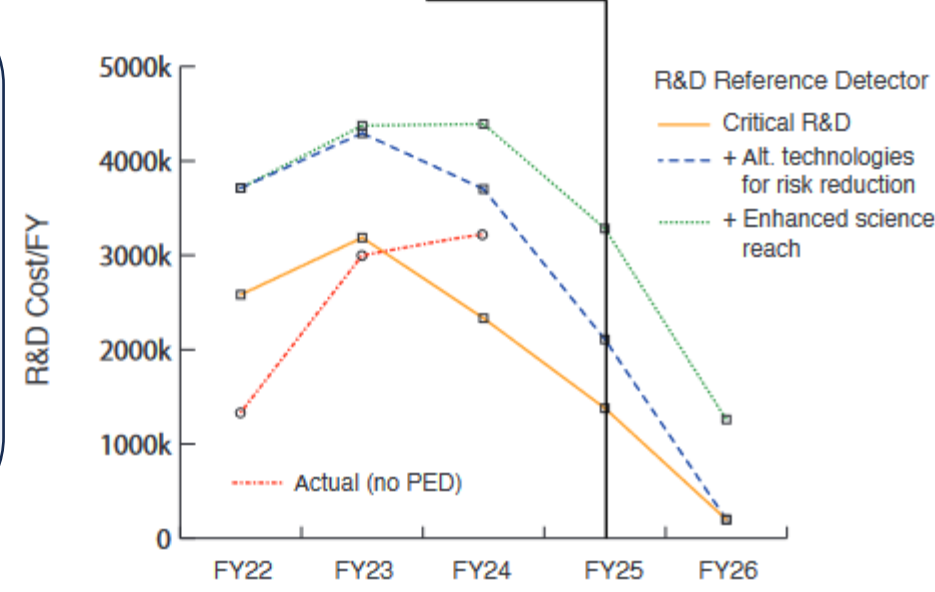
What's Next?

EIC Full Detail Schedule - 03.08.2024

	Start	Finish	19	2020	2021	2022	2023	2024	2025	2026	2027	2028
				FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
6.L1 Level 1 Milestones	19-Dec-2019	17-Dec-2035										
L1_010	CD-0 Approve Mission Need	19-Dec-2019 A										
L1_020	CD-1 Approve Alternative Selection and Cost Range	29-Jun-2021 A										
L1_030	CD-3A Approve Long Lead Procurements	29-Mar-2024										
L1_040	CD-3B Approve Long Lead Procurements	23-Dec-2024										
L1_050	CD-2/3 Approve Start of Construction	30-Apr-2025										
L1_090	CD-4 Approval Early Completion	16-Nov-2033										
L1_100	CD-4 Approve Start of Operations or Project Completion	17-Dec-2035*										



- R&D will wind down by the end of this FY and it is essential we complete the required milestones **before Critical Decision-2** ("Approve Performance Baseline") which we anticipate in 2025. The recent President's Budget only has minimal *Other Project Cost* funds indicated for FY25 which signals the completion of the R&D phase.



- We understand some of the Si- and ASICs-related engineering readiness runs may go longer and we will seek paths to accommodate.

WHAT'S COMING

April 2024

-  22 Apr TIC meeting - TDR effort, progress (PID); far backward detectors
-  15 Apr TIC meeting - TDR effort, progress (tracking); tracking simulations for TDR; update on LUT-PID
-  08 Apr TIC meeting - TDR effort, progress (electr/r-o/DAQ); Closeout of the tracking review; rad-hard campaigns

- **Starting in April, follow up on TDR effort at the TIC meetings:**
 - **Following the progress according to the timelines presented by each DSC by a light-load exercise.**
 - **At each TIC meeting, we will have a SHORT report (~ 5 min) by one of the CC WGs to confirm the progress and inform about discrepancies.**
 - **In case of alerting indications, a dedicated TIC session organized at a following meeting.**

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TC-office – ongoing medium-term jobs, an update

2024 test beams

- Information being collected in view of potential synergies

Needs of irradiation studies

- Information being collected to implement synergies (a must for efficiency and cost considerations)

Detector Data BASE

- Analysis of needs and expectation to build-up the model
 - a draft requirement document for the detector DB is being discussed

Detector contribution to PID-LUT

- PID DSCs running simulations to provide the input to the LUT (some completed)
- cooperation with S&C for the anticipated availability of a first version in the April simulation campaign

TDR Overleaf structure and framework for each section

- Presented and discussed at the TIC meeting on March 11
- Discussion outcome integrated in the draft proposal and posted in the meeting INDICO page (https://indico.bnl.gov/event/22417/attachments/53232/91012/TDR-subsystem_scheme.pdf)
- A second pass foreseen at the TIC meeting on April 22

THANKS TO ALL DSCs FOR CONTRIBUTIONS TO THESE EFFORTS !

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EIC Schedule

CD-3A:

Approve start of long-lead procurements
 CD-3A items passed final design review
 All interfaces related to them are frozen
 Waiting for ESAAB meeting for authorization

CD-2:

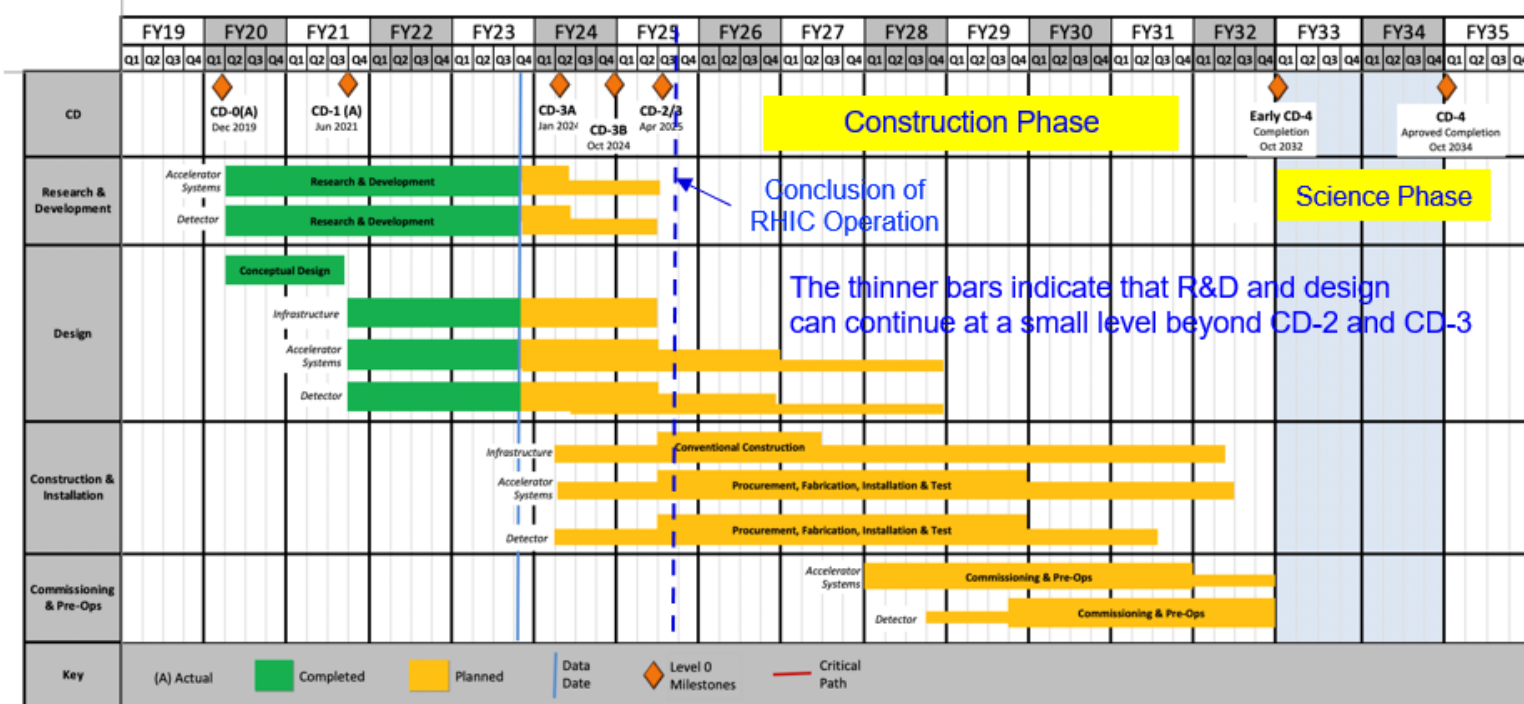
Approve prelim. design for all subdetectors
 Design Maturity: >60%
 Need “pre-”TDR (or draft TDR)
 Baseline project in scope, cost, schedule

CD-3:

Approve final design for all subdetectors
 Design Maturity: ~90%
 Need full TDR

EIC Critical Decision Plan

CD-0/Site Selection	December 2019 ✓
CD-1	June 2021 ✓
CD-3A	ESAAB March 25 th 2024
CD-3B	October 2024
CD-2/3	April 2025
early CD-4	October 2032
CD-4	October 2034



Speculation based on EIC accelerator project status, on only just appropriated FY24 funding (\$98M), on still uncertain FY25 budget scenarios (President’s Budget is ~\$110M), and projected RHIC FY24 run:

- Late 2024 Path to CD-2 review, possible CD-3B Approval Dec. 2024
- RHIC operations conclude at end of FY25, in September 2025
- CD-2/3 Approval Dec. 2025, Possibility of CD-3C as needed.

Design Review 2024 Plans – Updates *in Blue*

■ Design Reviews

- ✓ PDR2: IR Integration and Auxiliary Detectors – February 12, 2024 – main emphasis on baseline choices and progress
- ✓ **PDR1: Tracking Detectors – March 20-21, 2024** – main emphasis on baseline tracking layout, if we are on track and plans
 - PDR2: Electronics/DAQ – May 2024? – continuation of PDR1 to ensure we are on track and show progress
 - PDR: Integration, Infrastructure and Installation – Summer/Autumn 2024? – includes detector support structures
 - PDR2: Particle Identification Detectors – Summer 2024?
 - PDR2: Barrel EM Cal – Summer/Fall 2024 – emphasis on mechanical design & AstroPix readiness
 - FDR: Backward & Forward EM Calorimetry, Barrel & Forward HCAL – Fall 2024
 - PDR2: Polarimetry – timescale TBD (but before CD-2)
 - FDR for any potential CD-3B scope: Magnet Power Supply, perhaps VTRx+/lpGBT, perhaps magnet steel – see NOTE
 - FDR Magnet Power Supply – Spring 2024; Magnet Steel perhaps Summer 2024; VTRx+/lpGBT add ½ day to electronics/DAQ PDR2
- Detector R&D Day – **March 25** – check R&D progress and outlook to FY25
- **DAC-Meetings 2024 under planning:**
 - ~April 2024: Project Status, Baseline Detector, International Engagement, Detector R&D progress (expect 1+ day)
 - ~August 2024: Detector R&D annual review (expect 2 days) – deadline for submission July 1, 2024
- Next ePIC Computing & Software review by host labs – ~October 2024?

NOTE: CD-3B for detector will include continuation phases for SiPMs, SciFi, PbWO₄, Forward HCAL. Further scope has to be known essentially now and needs FDRs.

Tracking Systems Preliminary Design Review

Closeout Excerpts:

- Many, many useful comments!
- 7 recommendations (in shorthand)
 - Flowdown of requirements to detector components
 - Include calorimeters in tracking performance
 - Develop alternate tracker solutions, including potentially time-phasing installation of the silicon tracker
 - Build thermomechanical models and mockups for each silicon detector subsystem
 - Develop a fabrication and assembly plan for the silicon tracker with emphasis on institutional commitments
 - Document quality assurance procedures for each component.
 - Document requirements for qualifying each production site for deliverables distributed across multiple sites.
- *The review committee congratulates the ePIC tracking system team on its significant progress since the definition of the system in 2023. The technologies for each component of the tracker have been settled and development paths are being defined from final prototypes to pre-production and final production. The schedule is aggressive and critically dependent on the success of the ITS3 project.*