*Barrel Imaging Calorimeter*
**News from ePIC**
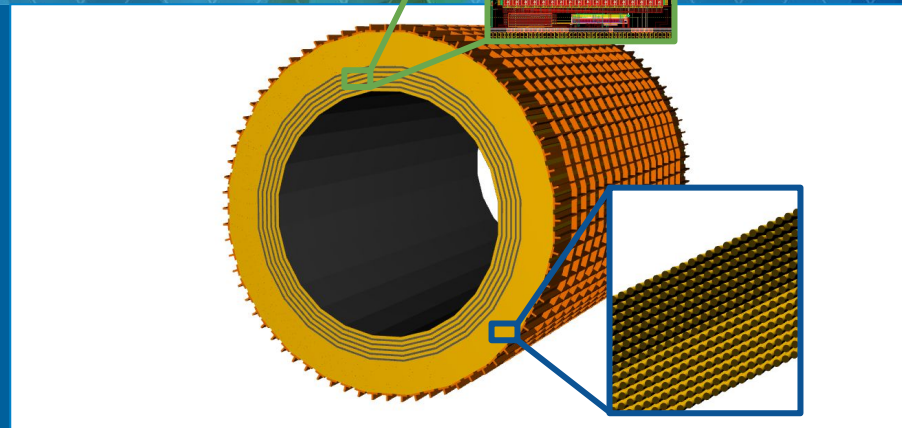
**Maria Żurek, Sylvester Joosten**
PHY, Argonne National Laboratory

# Collaboration and Project News

**ePIC General Meetings: https://indico.bnl.gov/category/411/**

**TIC Meetings: Mondays, 8 am CT,** https://indico.bnl.gov/category/480/

May 20, 2024, AstroPix Presentation during TIC

Detector database requirements:
https://indico.bnl.gov/event/23086/contributions/90436/attachments/54156/92649/TIC_DB_04292024.pdf

# *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 – Late Summer 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.

# *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

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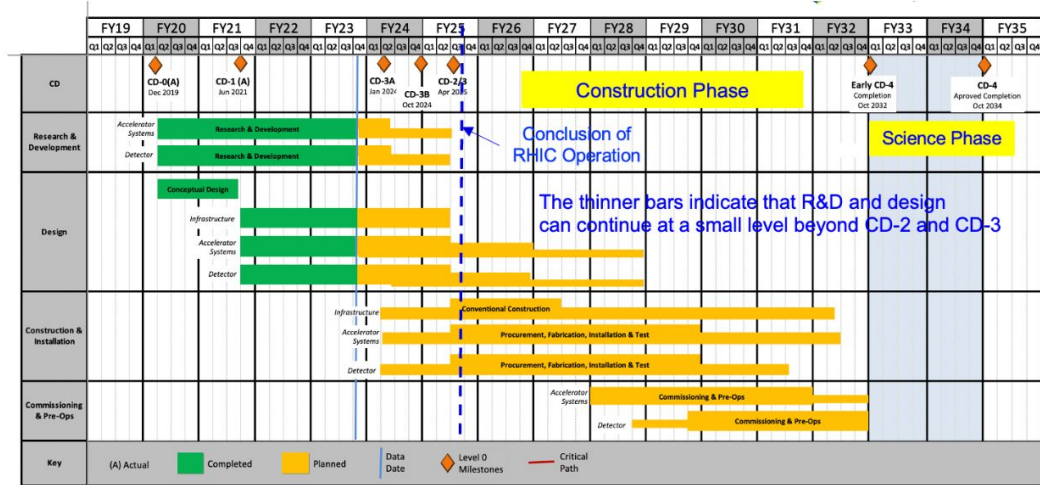


**Updated speculation** based on EIC accelerator project status, on the actual appropriated FY24 funding ($98M), on uncertain FY25 budget scenarios (President's Budget is only ~$113M) and the projected RHIC FY24 run:

- January 7 – 9, 2025 Path to CD-2/CD-3 status review, possible CD-3B Approval spring 2025?
- RHIC operations will conclude at end of FY25, in September 2025
- CD-2 Approval Late 2025?, Possibility of CD-3C as needed.
- CD-3 one year later?

**Electron-Ion Collider**

# *Detector R&D Day*

https://indico.bnl.gov/event/22388/

- Commonly organized by ePIC and EIC Project

- Many thanks to all for reports and presentations

- Good progress towards R&D milestones

- Some of the eRDxxx Si/ASICs engineering readiness runs may need to be done as PED-funded activities in FY25 due to lack of "OPC" funds in the President's Budget outlook – we plan to still follow the detector R&D plan.

- Call for updates and follow-up plans will come in about one month with due date of July 1.

**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**<br>Speaker: Thomas Ullrich (BNL) | ⏱15m |
|---|---|---|
| 09:15 → 09:45 | **eRD103 (hpDIRC)**<br>Speaker: Grzegorz Kalicy (CUA) | ⏱30m |
| 09:45 → 10:15 | **eRD112 (ToF/AC-LGAD)**<br>Speaker: Zhangbu Xu (Kent State University) | ⏱30m |
| 10:15 → 10:45 | **eRD102 (dRICH)**<br>Speaker: Marco Contalbrigo (INFN Ferrara) | ⏱30m |
| 10:45 → 11:05 | **Coffee Break** | ⏱20m |
| 11:05 → 11:35 | **eRD108 (MPGDs)**<br>Speakers: Francesco Bossu (CEA-Saclay), Francesco Bossù (CEA), Kondo Gnanvo (Jefferson Lab) | ⏱30m |
| 11:35 → 12:05 | **eRD109 (ASICs/FEEs)**<br>Speaker: Fernando Barbosa (JLab) | ⏱30m |
| 12:05 → 13:05 | **eRD104, eRD111, eRD113 (SVT)**<br>Speaker: Ernst Sichtermann (Lawrence Berkeley National Laboratory) | ⏱1h |
| 13:05 → 13:35 | **Lunch Break** | ⏱30m |
| 13:35 → 14:05 | **eRD110 (Photosensors)**<br>Speaker: Alexander Kiselev (BNL) | ⏱30m |
| 14:05 → 14:35 | **eRD106 (Fwd EMCal)**<br>Speaker: oleg tsal (ucla) | ⏱30m |
| 14:35 → 15:05 | **eRD107 (Fwd HCal)**<br>Speaker: Friederike Bock (ORNL) | ⏱30m |
| 15:05 → 15:35 | **eRD115 (Barrel EMCal)**<br>Speaker: Maria Zurek (Argonne National Laboratory) | ⏱30m |

**Electron-Ion Collider**

# Calorimetry CC Group Meetings

Irradiation studies of SiPMs in UC Davis: https://indico.bnl.gov/event/23121/

TDR Planning report: https://indico.bnl.gov/event/22959/

# TDR Structure

✅ ready to write
🚧 partially ready to write
✖ lots of to do

## Design
- Overview ✅
- Detector Requirements ✅

## Performance
- Performance with *most up to date geometry/envelopes* 🚧
  - Energy resolution, Position resolution,
  - e/pi separation, gamma/pi0 separation
- Beam test benchmarking (e resolution) 🚧
- Literature benchmarking (pion response) 🚧
- Backgrounds ✖

## Sector Design, Mechanics and Integration
- Sector design and construction 🚧
- Tracker mechanics ✖
- End-of-sector box mechanics 🚧
- Deflection studies ✖
- Barrel assembly and integration tooling 🚧

## AstroPix Wafers & Modules
- AstroPix characteristics and readiness ✅/🚧
- Automated wafer testing 🚧
- Module & stave design 🚧
- Stave bus design ✖
- Module assembly and scalability ✖

## End-of-sector Box and Readout
- SiPMs characteristics ✅/🚧
- SiPM boards and FEB 🚧/✖
- LED system ✅/🚧
- Tracker End-of-tray card (RDO) ✖
- Slow controls (temperature, humidity) 🚧

## Cooling
- Cooling system design 🚧
- Global heat load simulations ✖

## System Testing
- System Calibration ✖
- System QC ✖
- System Demonstration 🚧/✖