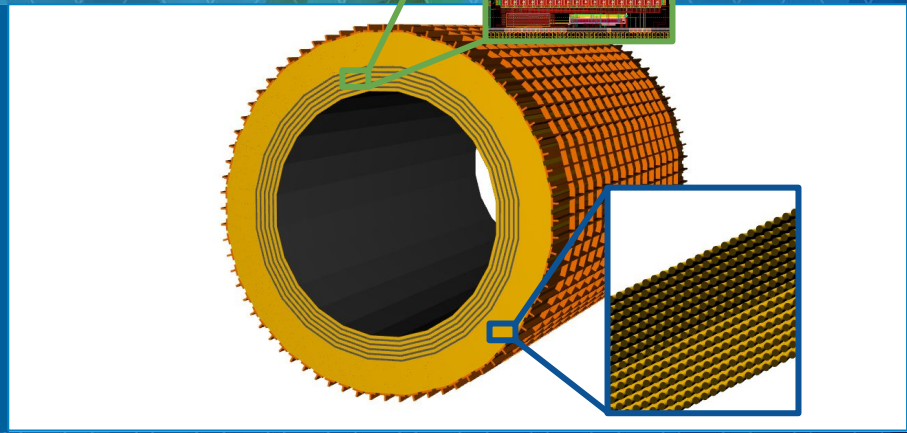
Barrel Imaging Calorimeter Meeting,
September 25, 2023



Barrel Imaging Calorimeter (BIC)
TIC Preparation and DAC Review Comments

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Preparing for the TIC meeting

9/25
- on overview talk about r-o/DAQ information from spread-sheets (as introduction to detailed reports requested from DSCs withing Electronic/r-o/DAQ meetings)
- an analysis of the critical points in evidence from the recent reviews (R&D, Detector comprehensive)

10/2
- barrel ECal, in particular Astropix and global schedule

10/9
- Far backward: comparison from IP6 and present assessment;
a more manageable scenario decreasing the number of foreseen technologies?

Feedback on draft schedule from last week

- **Intro & Status Update**
  - Duration: 15+5 minutes
  - Presenter(s): Sylvester or Maria
- **Engineering/Integration Update**
  - Duration: 10+5 minutes
  - Presenter: Dan Cacace (To Be Confirmed)
- **Summary of the SciFi Testing and the SciFi and SiPM Final Design Review**
  - Duration: 10+5 minutes
  - Presenter: Zisis Papandreou
- **AstroPix Timeline**
  - Duration: 10+5 minutes
  - Presenter: Jessica Metcalfe or Regina Caputo
- **AstroPix v3 Bench Test Update**
  - Duration: 10+5 minutes
  - Presenter: Amanda Steinhebel
- **Upcoming R&D Program at FNAL**
  - Duration: 10+5 minutes
  - Presenter: Henry Klest
- **Simulation/Reconstruction Needs and Status**
  - Duration: 10+5 minutes
  - Presenter: Wouter Deconinck

(110 minutes total)

Comments from Silvia:

- The main goal for the TIC meeting focused on barrel ECal is to comprehend the subsystem's status and plans in light of the comments from the recent DAC reviews.
- Reports should clearly address the points raised by the DAC.
- Pay special attention to:
  - Timelines
  - Integration and assembly strategies

Selected DAC comments - R&D

- Several technologies still **require significant further R&D, prototyping/production cycles** in order to confirm that they will provide the required performance
  (also with reference to test beam difficulties in the next years)
  - *Silicon Tracker*
  - *µRWELL tracker*
  - *Imaging Sci/Fi tracking calorimeter*
  - *AC-LGAD Tracker*
  - *pfRICH prototype*
- **less advanced systems**, which we nonetheless feel can be ready for CD2/3 are:
  - *the electron polarimeters*
  - *the dual RICH*
  - *the far forward and backward detectors*
  - *the TOF detectors.*

Warnings for ePIC

Selected DAC comments - R&D

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Warnings for ePIC

Selected DAC comments - Holistic

General, cont.

- There **remains concern** that **radiation hardness and background rate** issues may still affect detector performance (and design), with time-dependent rate and noise dependences. We urge the incorporation of the machine background expectations into the detector simulations as well as attempting to provide conservatively large safety margins.
- **Component failure rate requirements incorporated in evaluation of performance** would be useful for evaluating detector technology
- A comprehensive description of the **survey/alignment/monitoring and calibration strategy** for the hardware components of all detector systems is needed.
- Many of the components are already in advanced stages of design, nearly ready for a CD2/3 review (a part what already mentioned concerning design and R&d/prortotyping)
- The **overall schedule appears realistic given that the schedule does not have added contingency**, and in many cases is based on actual experience at RHIC and Jlab. It is nonetheless quite aggressive and ambitious, and will require careful monitoring of critical milestones.
- **Development of contingency plans** would be useful for understanding the effects of delays which occur in the schedule. Flexibility in the schedule should be maintained as much as possible to minimize risk to the project.

Several indication of sector where
ur activity should be increased or started

TIC (Dalla Torre) 8

Selected DAC comments - LLP

- Magnet
  - The magnet design is nearly completed and seemed ready to advance to procurement within a few months. The specifications are clear and the design appears quite mature, with good cooling system redundancy.
- SiPMs for use in the PID/CAL detectors
  - the background conditions are varied within the detector so that close attention to the specifications are needed
  - A summary of the different types of SiPM being planned for long procurement would be useful for evaluating whether they are optimal in pixel size and environmental sensitivity *[such a table then presented at SiPM review]*
- PbWO4 crystals for the electron endcap calorimeter
- scintillating fibers for the calorimeters
- the absorber (W and steel) for the forward HCAL/insert
  - Design of the forward HCALs is quite advanced

Warnings for ePIC

Addressed for FDR but never presented to ePIC

Addressed for FDR and ongoing right now, needs to be presented

9

Selected DAC comments - BIC

Barrel ECal

- require **significant further R&D** in order to confirm the required performance
- prototype needs validation with **beam test**

- The recent choice of the imaging calorimeter technology made this **design less mature**; however, as it is based on the existing GLUE-X calorimeter, the long lead purchase of the scintillating fiber and SiPMs are specified sufficiently well.
- It was not mentioned **how long** it would take to **procure** sufficient **astropix** detectors and **what services/conditions they require** for reliable operation.

Need to directly address these (many we already covered directly with the Project)

Additional comments from DAC “Comprehensive Detector Review”

(Paraphrasing relevant comments pointed out by Silvia):

- All central detector technologies seem appropriate but some need more R&D.
- A detailed description for the survey/alignment/monitoring and calibration strategy for all detector systems is required.
- Mentioned long-lead items.
- Recent choice of the imaging calorimeter technology.
- Duration for procuring astropix detectors and their conditions for reliable operation was not mentioned.
- Several systems need prototype/production cycles.
- Clarification is needed on the production strategy for Astropix.
- The schedule is aggressive and requires monitoring of milestones.
- The magnet and SVT are considered high-risk items.

DAC comments from EIC R&D Review eRD115

(Paraphrasing relevant comments pointed out by Silvia):

- The R&D plan is comprehensive and ambitious.
- Emphasis on the Pb/Scifi and ASTROPIX aspects.
- Testing for linearity in response for electrons is crucial.
- The dynamic range of the Gluex apparatus has changed and there are questions about non-linearity.
- Testing with different sensor sizes is recommended.
- Prioritize efforts related to testing the e/pi response.
- Silicon tracker and Imaging barrel calorimeter are complex and should be a priority.

Suggested structural changes

Old draft schedule (110')

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Specific changes suggested by Silvia:

- Reduce the total time of the meeting to a maximum of 90 minutes without sacrificing discussion time.
- Present the overall timelines. This should be done towards the end after discussing the status rather than at the beginning.
- Integrate the content of the "Upcoming R&D Program at FNAL" into other relevant talks.
- Provide updates on the read-out electronics' current status and future plans. This can be incorporated into already planned talks or be discussed in a dedicated segment.
- The introductory segment should contain a table outlining "who does what." This table should also include any tasks that haven't been assigned yet.

BACKUP

REMINDER: the comprehensive review charge

1) Given the detector progress over the last two years and the status of the ePIC detector, **are the projected timelines of the Electron-Ion Collider detector feasible**? Do there **remain significant open detector technology questions**?

2) Are the **requirements for the detector and their flow down sufficiently comprehensive** for this stage of the project to complete the design of the various detector technologies?

3) Are the **interfaces between the elements of the design adequately defined** for this stage of the project and to proceed with the detector long-lead procurement items?

4) Is the design of these long-lead procurement items sufficiently advanced and mature to start procurement in 2024? Are the technical specifications complete?

5) Is the projected **design maturity of the further detector components** likely to be accomplished by the end of 2024 for CD-2 and CD-3?

6) Is the **overall schedule** for completion of the design, production, and installation of detector components **realistic**?