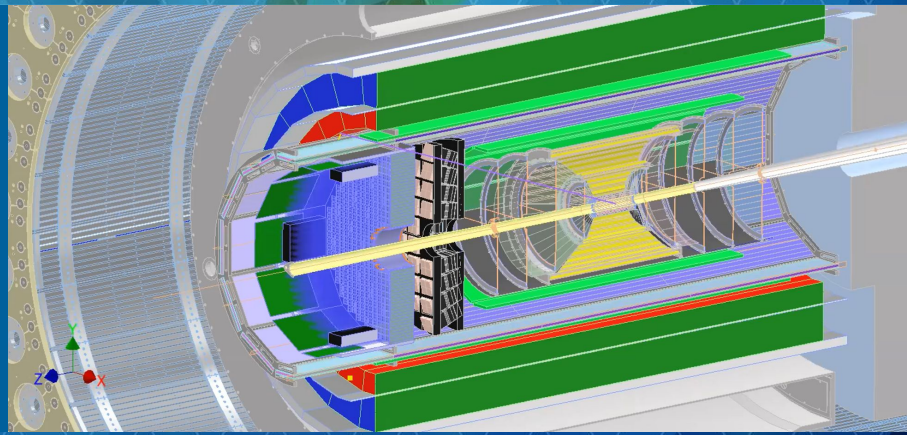
BECal Meeting

Barrel Electromagnetic Calorimeter

Updates



08/22/2023

M. Żurek

SiPM Review

Final Design Review for SiPM applications in ePCI detector sub-systems.

Charge to the Committee:

The scope of this review is an assessment of the readiness to proceed to the procurement phase of SiPMs. The committee is asked to respond to the following charge questions:

1. Are the technical performance requirements complete for all detector systems that employ SiPMs, documented, and understood?

2. Are the plans for achieving detector performance and construction sufficiently developed and documented for the present phase of the project? (I.e., are they commensurate with the initiation of the SiPM procurement?)

3. Do the present detector system designs and the resulting SiPM specifications meet the performance requirements with a low risk of cost increases, schedule delays, and technical problems?

4. Are the fabrication and assembly plans for the detector systems consistent with the overall project and detector schedule and sufficiently developed to initiate the SiPM procurement?

5. Are the plans for detector integration in the EIC detector appropriately developed to initiate the SiPM procurement?

6. Have previous review recommendations been adequately addressed to initiate the SiPM procurement?

7. Have ES&H and QA considerations been adequately incorporated in the SiPM procurement planning? (This includes a quality assurance plan for receipt of material meeting specifications.)

8. Is the procurement approach sound and the procurement schedule credible?

SiPM Review

Date: September 14th 8am to 1pm EDT

Page Turner: September 5th or 6th

Conveners: Elke Aschenauer, Rolf Ent

Agenda: Note each talk assumes 1/3 of the time for question/answers

8:00 (20 min) Executive Session (Closed Session)

8:20 (20 min) Detector Overview and Requirements - Beni Zihlmann

8:40 (60 min) Hadronic Calorimeters – TBD: DSTL

9:40 (20) break

10:00 (60 min) Electromagnetic Calorimeters -TBD: DSTL

11:00 (10 min) break

11:10 (30 min) dual-RICH – TBD: DSTL

11:40 (120 min + lunch) Executive Session

14:00 Closeout

Review Committee:

Elton Smith (elton@jlab.org)

Stephan Stepanyan (stepanya@jlab.org)

Follow up on recent ePIC technology choices

The path to integrate the recent technology changes, Barrel Ecal and backward RICH, by ePIC into the EIC Project baseline

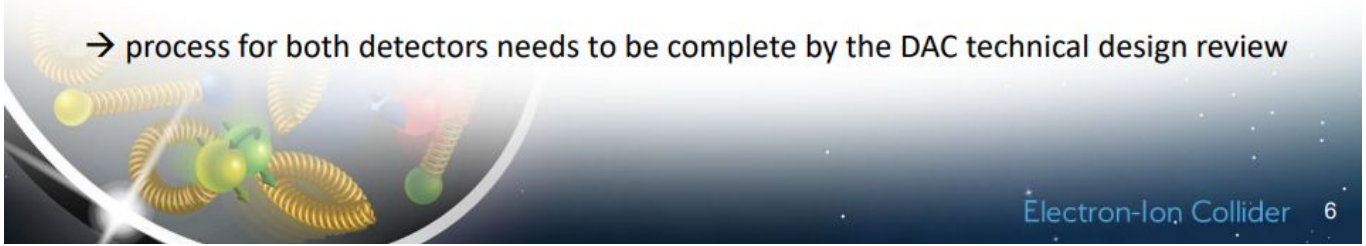
Remember: five-step change control process

1. The detector collaboration initiates a possible change in baseline scope
2. The collaboration technical board or equivalent ensures the change is consistent with the NAS science requirements and initiates the change request

→ prepare input for the TCCB
detailed changes in cost, schedule and risk → implement in P6
science and technical justification for the change ← input from ePIC
started with backward RICH as it is a less complex case

3. The detector TCCB collects wide input, discusses, and gives advise
4. The Project Technical Director gives approval
5. The EIC Management Team needs to approve the formal baseline change control

→ process for both detectors needs to be complete by the DAC technical design review



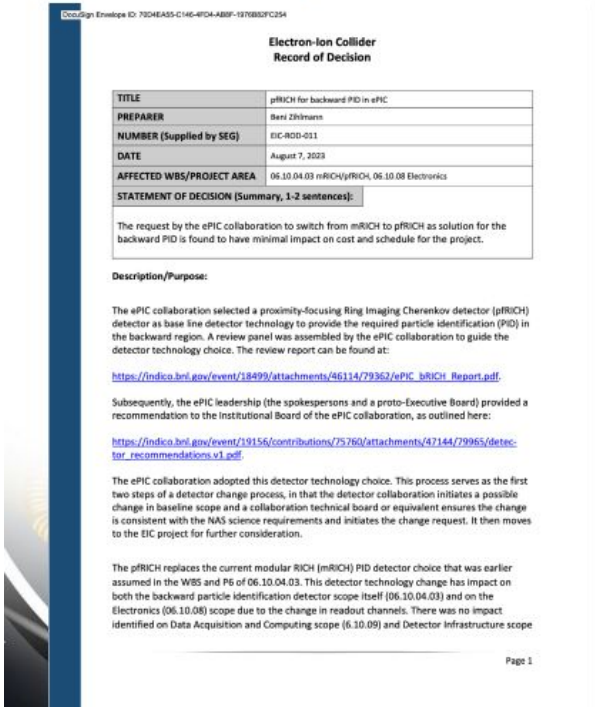
Follow up on recent ePIC technology choices

backward RICH:

- fully integrated in P6 (changes to WBS 6.10.03 and 6.10.08)
  - ➢ no changes in either cost, schedule or risk

→ no change request needed

→ documented change in detector technology through filing a record of decision



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Electron-Ion Collider
Record of Decision

TITLE	pfRICH for backward PID in ePIC
PREPARER	Beni Zihlmann
NUMBER (Supplied by SEG)	EIC-ROD-011
DATE	August 7, 2023
AFFECTED WBS/PROJECT AREA	06.10.04.03 mRICH/pfRICH, 06.10.08 Electronics
STATEMENT OF DECISION (Summary, 1-2 sentences):	
The request by the ePIC collaboration to switch from mRICH to pfRICH as solution for the backward PID is found to have minimal impact on cost and schedule for the project.	

Description/Purpose:

The ePIC collaboration selected a proximity-focusing Ring Imaging Cherenkov detector (pfRICH) detector as base line detector technology to provide the required particle identification (PID) in the backward region. A review panel was assembled by the ePIC collaboration to guide the detector technology choice. The review report can be found at:

https://indico.bnl.gov/event/18499/attachments/46114/79362/ePIC_bRICH_Report.pdf.

Subsequently, the ePIC leadership (the spokespersons and a proto-Executive Board) provided a recommendation to the Institutional Board of the ePIC collaboration, as outlined here:

https://indico.bnl.gov/event/19156/contributions/75760/attachments/47144/79965/detector_recommendations.v1.pdf.

The ePIC collaboration adopted this detector technology choice. This process serves as the first two steps of a detector change process, in that the detector collaboration initiates a possible change in baseline scope and a collaboration technical board or equivalent ensures the change is consistent with the NAS science requirements and initiates the change request. It then moves to the EIC project for further consideration.

The pfRICH replaces the current modular RICH (mRICH) PID detector choice that was earlier assumed in the WBS and P6 of 06.10.04.03. This detector technology change has impact on both the backward particle identification detector scope itself (06.10.04.03) and on the Electronics (06.10.08) scope due to the change in readout channels. There was no impact identified on Data Acquisition and Computing scope (6.10.09) and Detector Infrastructure scope

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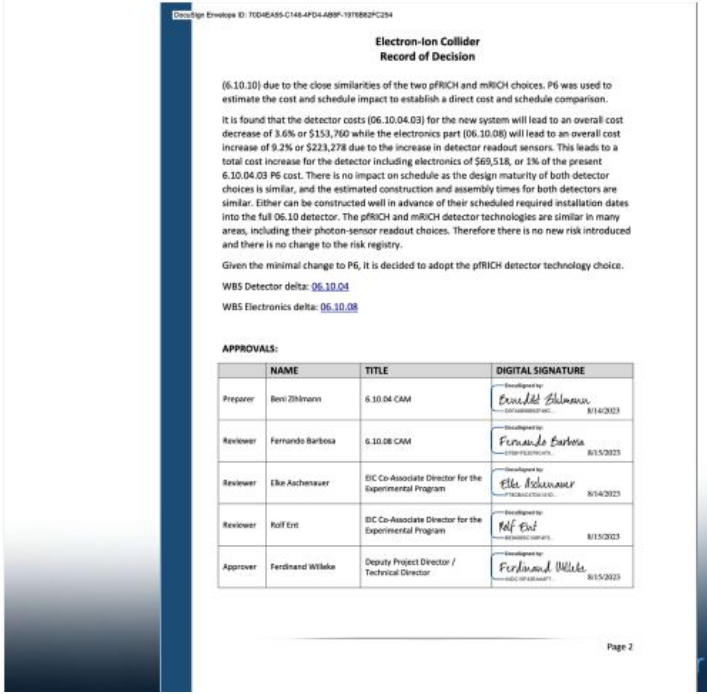

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Electron-Ion Collider
Record of Decision

(6.10.10) due to the close similarities of the two pfRICH and mRICH choices. P6 was used to estimate the cost and schedule impact to establish a direct cost and schedule comparison.

It is found that the detector costs (06.10.04.03) for the new system will lead to an overall cost decrease of 3.6% or $153,760 while the electronics part (06.10.08) will lead to an overall cost increase of 9.2% or $223,278 due to the increase in detector readout sensors. This leads to a total cost increase for the detector including electronics of $69,518, or 1% of the present 6.10.04.03 P6 cost. There is no impact on schedule as the design maturity of both detector choices is similar, and the estimated construction and assembly times for both detectors are similar. Either can be constructed well in advance of their scheduled required installation dates into the full 06.10 detector. The pfRICH and mRICH detector technologies are similar in many areas, including their photon-sensor readout choices. Therefore there is no new risk introduced and there is no change to the risk registry.

Given the minimal change to P6, it is decided to adopt the pfRICH detector technology choice.

WBS Detector delta: 06.10.04

WBS Electronics delta: 06.10.08

APPROVALS:

	NAME	TITLE	DIGITAL SIGNATURE
Preparer	Beni Zihlmann	6.10.04 CAM	Beni Zihlmann 8/14/2023
Reviewer	Fernando Barbosa	6.10.08 CAM	Fernando Barbosa 8/15/2023
Reviewer	Elke Aschenauer	EIC Co-Associate Director for the Experimental Program	Elke Aschenauer 8/14/2023
Reviewer	Rolf Ent	EIC Co-Associate Director for the Experimental Program	Rolf Ent 8/15/2023
Approver	Ferdinand Willeke	Deputy Project Director / Technical Director	Ferdinand Willeke 8/15/2023

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Follow up on recent ePIC technology choices

Barrel ECal:

- fully integrated in P6 (changes to WBS 6.10.05 and 6.10.08)
  - WBS 6.10.05 = P6 cost ($19.483M) + $2.447M
  - WBS 6.10.00 = P6 cost reduced by $0.358M

→ Expect imaging calorimeter costs to be P6 + $2.089M

→ Sci-Glass based calorimeter due to geometry change would also require P6 + $4.980M
($4.980M was already added to 11/28/22 in EIC scope cost changes list)

→ Discussed in EMT and it was decided we can do here also a Record of Decision

→ Submitted for signatures this week