

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):	
<p>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.</p>	

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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(6.10.10) due to the close similarities of the two pRICH 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 pRICH 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 pRICH 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	DocuSigned by:  D0F44B58B52F46C... 8/14/2023
Reviewer	Fernando Barbosa	6.10.08 CAM	DocuSigned by:  D7B91FE2076C470... 8/15/2023
Reviewer	Elke Aschenauer	EIC Co-Associate Director for the Experimental Program	DocuSigned by:  F78CBAC47DA141D... 8/14/2023
Reviewer	Rolf Ent	EIC Co-Associate Director for the Experimental Program	DocuSigned by:  BE94565C108F4F3... 8/15/2023
Approver	Ferdinand Willeke	Deputy Project Director / Technical Director	DocuSigned by:  44DC15F43EAA4F7... 8/15/2023