

pfRICH-related R&D / PED “proposals” in FY24

- pfRICH prototype in its part addressing risks to the project: R&D proposal
 - July 7 deadline applies
- pfRICH “full chain prototype test” in its no-risk part: P6 -> PED funding request

R&D Milestones & Timeline

February 26, 2023

Particle ID

eRD101 (mRICH)

- Validate production readiness of a Ring-Imaging Cherenkov Detector as matched with photosensors and readout electronics on the electron-side end cap of the EIC detector, including validation by prototypes that the EIC requirements can be met. [March 2025]

- Complementary efforts:
 - HRPPD R&D under ~~eRD109~~ / eRD110 proposals
 - HRPPD QA station setup at Yale (PED funding request)
 - Aerogel QA station at Temple (PED funding request)

Other considerations

- R&D proposal cannot address new (pfRICH-related) risks
 - Like mirror manufacturing
- It better does not focus on no-risk items
 - Like vessel design
- R&D money comes from OPC funds and will be limited in FY24
- PED money can become available earlier
- eRD109 falls off the list
 - Just because there is no *ASIC development* component for pfRICH in FY24

HRPPD part of the eRD110 R&D FY24 proposal

- (1) “Basic” evaluation of the first five “EIC HRPPD” tiles
 - 5x [3D printed enclosure + Samtec interposers + passive board with 16x 64-channel connectors] sets
 - Lab evaluation by 4+1 groups (Argonne, BNL, Glasgow, INFN Trieste / Genova, Yale)
 - Single photon timing resolution
 - HV setting tuning, etc
 - Ageing studies
 - Magnetic field resilience verification
 - Beam test at Fermilab in early 2024
 - Verification as a timing reference (multi-photon mode)
- (2) Full surface scan of all five sensors (QE)
 - Argonne
- (3) Gain uniformity scan & Co
 - Design of a 16x HGCROC ASIC backplane (-> eRD109 ?)-
 - A single pilot set for BNL (Glasgow)
- (4) Evaluation of a Photonis and a Photek MCP-PMTs
 - Planacon & Photek Auratek MCP-PMTs
 - Passive board kits sufficient for a “basic” evaluation

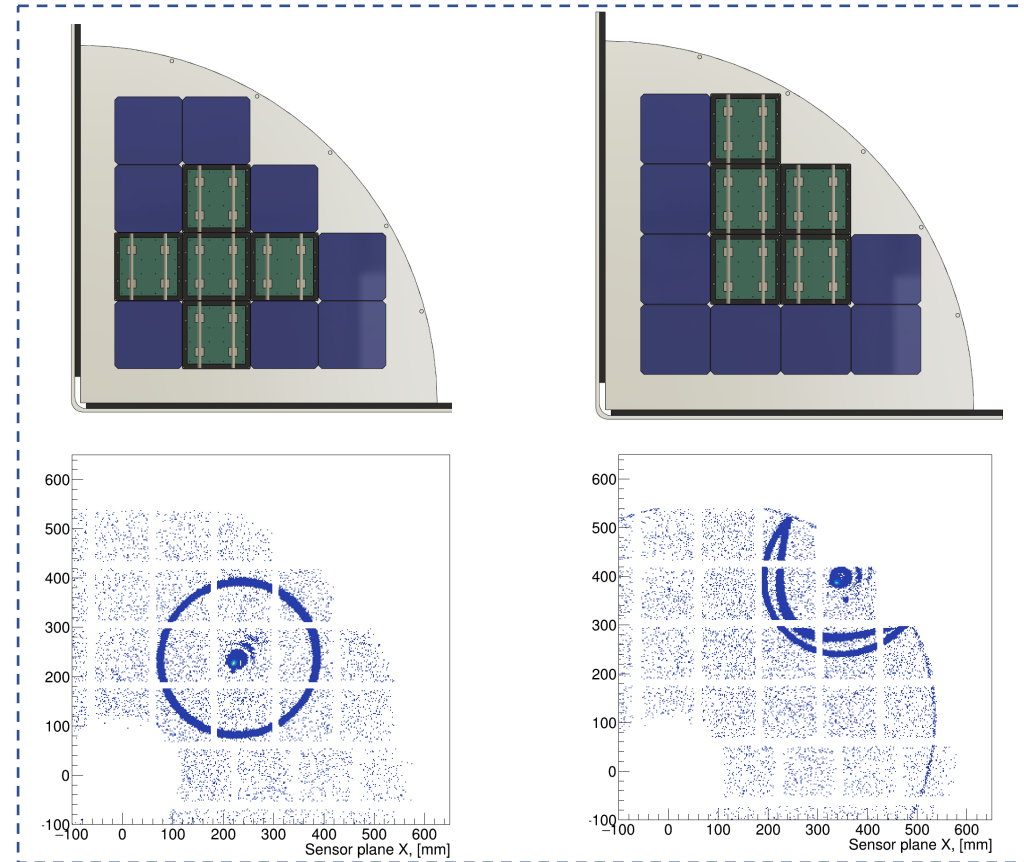
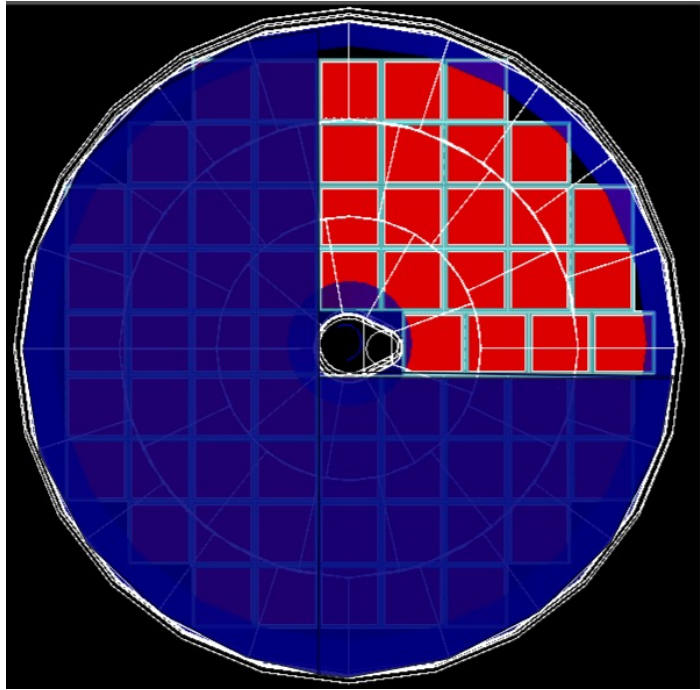
eRD110 (photosensors)

- Establish production readiness of a LAPPD/HRPPD-based photon-sensor readout for a Ring-Imaging Cherenkov Detector on the electron-side end cap of the EIC detector, including validation by prototype beam tests. [September 2024]

pfRICH prototype part / money source matrix

	Exist	Project	eRD110	pfRICH R&D	pfRICH PED
HRPPDs		5 tiles			
Aerogel		N pieces			
ASIC interface			X		
ASIC boards			1 set	4 sets	
HRPPD enclosures			1 set	4 sets	
HGCROC chips			16+4	64+16	
KCU105 kits	2			3	
Vessel					X
Mirrors					X
HV mainframe	X				
HV modules	1				1
LV mainframe					1
LV module					1
Cooling system					
Gas system					
Beam test travel				X	

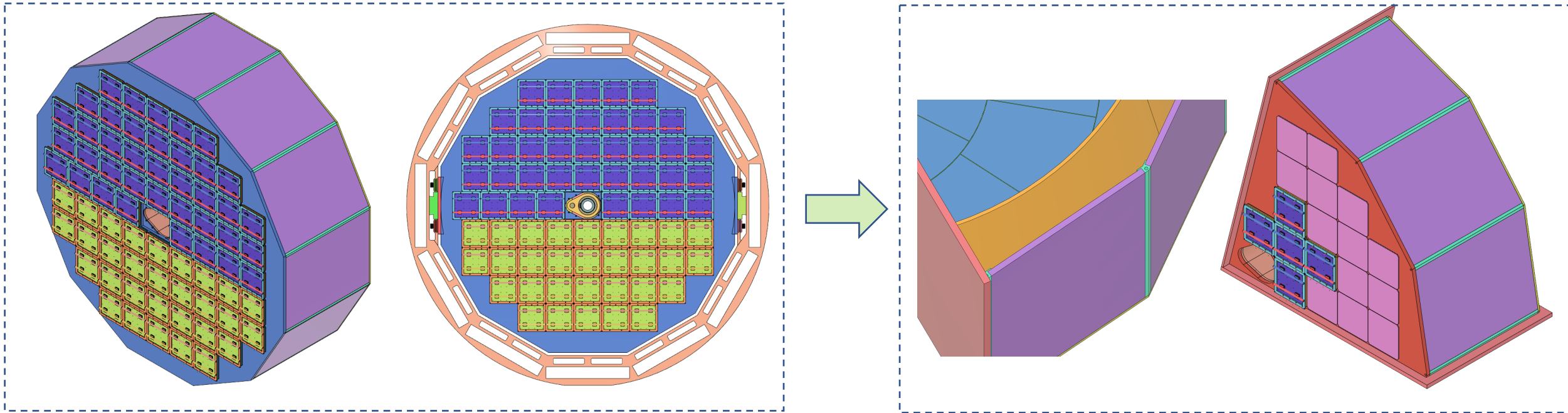
pfRICH prototype FY24 R&D proposal



- Address the technology risk
 - Namely that a combination of [Incom HRPPD + Chiba aerogel + OMEGA ***ROC family ToA/ADC ASICs] actually provides the required PID via imaging and a timing reference, all at once
- Make use of a “full chain prototype” assembly (next slide) funded via PED request

PED funding requests

- A quadrant of a full pfRICH vessel: this is our full chain prototype (also suitable for R&D work)
 - Vessel (flat outer panels are first articles)
 - Mirrors (outer mirror segment is a first article; perhaps the inner mirror mold as well)
 - HV & LV system pieces (first articles)



- HRPPD QA station setup at Yale
- Aerogel QA station at Temple