

HPDIRC R&D TIMELINE

Mar 2021	hpDIRC Timeline Estimate	2021	2022	2023	2024						
			FY22	FY23	FY24						
Simulation/Reconstruction	Simulation: Prototype, beam line, cosmic ray setup (CRT)	■	■	■	■						
	Simulation: Lens characterization	■	■	■	■						
	Simulation: Explore hpDIRC design options (e/π,π/K)	■	■	■	■	■	■				
	Simulation: Cost/performance optimization	■	■	■	■	■	■				
	Reconstruction: reconstruction optimization / ML	■	■	■	■	■	■				
hpDIRC system prototype	Transfer of PANDA prototype from GSI to CUA/SBU	■	■	■	■						
	Design and construction of CRT	■	■	■	■						
	Initial protoype commissioning in cosmic ray setup (CRT)			■	■						
	Upgrade of sensors and readout electronics			■	■						
	Commissioning of upgraded prototype, CRT data analysis			■	■	■	■	■	■	■	■
	Optional beam test at Fermilab					■	■				
	Beam test data analysis					■	■	■	■	■	■
Lens evaluation	Upgrade of ODU laser setup	■	■	■	■						
	Characterization of prototype lenses	■	■	■	■						
	Neutron irradiation and analysis		■	■	■						
BaBar DIRC bar reuse	Plan, preparation				■	■	■	■	■	■	■
	Bar box disassembly, bar decoupling				■	■	■	■	■	■	■
	Validate mechanical and optical properties				■	■	■	■	■	■	■
Sensors and Electronics	collaboration effort within eRD14	■	■	■	■	■	■	■	■	■	■
TDR					■	■	■	■	■	■	■

(NB: This estimate assumes that increased funding for invest, consumables, travel, and PostDocs is available. Contingency is not included.)

MROUGH R&D TIMELINE

Mar 2021	mRICH Timeline Estimate	2021	2022	2023	2024
			FY22	FY23	FY24
Beam tests / data analysis	Complete 2nd beam test data taken with SiPM matrices	█	█	█	
	mRICH beam test at JLab with tracking	█	█		
	mRICH/LAPPD beam test at Fermilab with tracking	█	█		
	JLab and Fermilab beam tests data analysis		█	█	
	More beam tests with new photosensors and readout			█	█
mRICH simulation studies	Fine tune GEANT4 simulation of mRICH (2nd prototype)	█	█		
	mRICH array simulation study using Fun4All framework	█	█		
	Simulation studies of physics impact using mRICH		█	█	
	mRICH-based PID algorithm development	█	█	█	
mRICH engineering design	Optimizing the mechanical design of mRICH	█	█	█	
	Optimizing the design and assembly of optical components	█	█	█	
	Optical characterization of aerogel, fresnel lens and mirror	█	█	█	
	Optimizing readout integration with mRICH optical section		█	█	
mRICH optical components	Aerogel acquisition (with INFN team) and characterization		█	█	
	Fresnel lens acquisition and characterization		█	█	
	High quality mirror acquisition and characterization		█	█	
Sensors and Electronics	Collaboration effort within eRD14	█	█	█	
TDR				█	█

(NB: This estimate assumes that increased funding for invest, consumables, travel, and PostDocs is available. Contingency is not included.)

dRICH R&D TIMELINE

Mar 2021	dRICH Timeline Estimate	2021	2022	2023	2024
			FY22	FY23	FY24
Simulation/Reconstruction	Simulation: Prototype and beam line	■	■	■	
	Simulation: Integration into EIC simulation and analysis platforms	■	■		
	Simulation: dRICH model refinement with the beam-test results		■	■	■
	Simulation: dRICH model optimization in EIC spectrometer			■	■
	Reconstruction: reconstruction optimization / ML				■
dRICH Prototype	Basic prototype design	■	■		
	Basic prototype mechanics	■	■		
	Basic tracking and components, reference readout	■	■		
	Upgrade of sensors and readout electronics		■	■	
	Precise tracking/alignment		■	■	
	Custom components, optimized readout			■	■
	Beam test data analysis		■	■	■
Optical Components	First selection and tests	■	■		
	Refinement and cost reduction study		■	■	■
	Alternatives and optimization			■	■
Beam-Tests	Proof of principle (reference sensors and readout, ideal beam)		■		
	Performance assessment (hadron tagged beams)		■		
	Performance assessment with optimized components			■	■
EIC Integration	Cooling R&D		■	■	■
	EIC configuration engineering and integrated PID			■	■
	Engineering of cooling and ancillary services			■	■
Sensors and Electronics	Collaboration effort within eRD14	■	■	■	
TDR			■	■	■

(NB: This estimate assumes that increased funding for invest, consumables, travel, and PostDocs is available. Contingency is not included.)

PHOTOSENSORS R&D TIMELINE

Mar 2021	Photosensors Timeline Estimate	2021	2022	2023	2024
			FY22	FY23	FY24
High-B Sensor Program	Scan of 10- μ m XP85122-S, HiCE Planacon				
	Scan of 6- μ m Photek MCP PMT, MAPMT253				
	Full-area uniformity scan with UHawaii electronics				
	Incom GEN-III (HRPPD) scan				
MCP-PMT/LAPPD	Beamline test of MCP-PMT/LAPPD with pixel readout				
	mRICH-LAPPD-ToF experiment with Gen-II LAPPD				
	Magnetic field test of LAPPD prototypes				
	Fabrication of 10x10 cm MCP-PMT for prototype validation				
	Bench evaluation of MCP-PMT, LAPPD and HRPPD				
	Integration of UHawaii electronics with available sensors				
	Beamline evaluation of RICH subsystems with available MCP-PMT/LAPPD				
SiPM program	Status-of-the-art sensor selection				
	Irradiation and temperature treatment (standard sensors)				
	Post-irradiation response with dedicated readout				
	Custom sensor solutions (with manufacturers)				
	Irradiation and temperature treatment (custom sensors)				
	Engineering of cooling and services				
Sensors and Electronics	Collaboration effort within eRD14				
TDR					

(NB: This estimate assumes that increased funding for invest, consumables, travel, and personnel is available. Contingency is not included.)

ERD14: ELECTRONICS R&D TIMELINE

Mar 2021	Electronics Timeline Estimate	2021	2022	2023	2024						
			FY22	FY23	FY24						
Si-READ	Firmware completion	█	█								
	Configuration scripts	█	█								
	Acquisition software		█	█							
	Data Taking			█	█						
	Documentation of performance			█	█						
HDSoc	32-channel chip evaluation	█	█	█							
	64-channel chip design		█	█	█						
	64-channel chip evaluation			█	█	█					
	1k readout demonstrator (mRICH)			█	█	█	█				
	hpDIRC				█	█	█	█	█		
	LAPPD Gen III - demo readout				█	█	█				
	WBS system costing							█	█	█	
ToT based readout	Reference readout based on MAROC3 (F/E) + SSP (DAQ)	█	█	█	█						
	Validation of ALCOR architecture (1st production samples)	█	█								
	Basic readout chain from ALCOR+ARCADIA developments		█	█							
	Develop a portable DAQ system			█	█	█					
	Test of streaming readout					█	█	█	█	█	
	Upgraded ALCOR readout chain for dRICH				█	█	█				
	Submission of a custom ALCOR design					█	█				
	Optimize ALCOR with proper signal preconditioning						█	█	█		
	Integration of SiPM readout with sensor cooling							█	█	█	
Engineering of SiPM readout and services								█	█	█	
Sensors and Electronics	Collaboration effort within eRD14	█	█	█	█	█	█	█	█	█	
TDR						█	█	█	█	█	

(NB: This estimate assumes that increased funding for invest, consumables, travel, and PostDocs is available. Contingency is not included.)