# eRD110 FY24 proposal (HRPPDs)

Topic as formulated in V1	V3 (final)	Current status	Prospects			
Samtec interposers	Removed (were ordered using FY23 money)					
Passive interface	Moved to Yale PED proposal; partly ordered using FY23 funds	No funding granted for Yale QA station	Order as part of MCP-PMT interfaces			
ASIC backplane	Moved to eRD114 (pfRICH)	Defunded	Ask for PED money			
B field studies at Argonne	Removed; perform MCP-PMT evaluation instead		Do parasitically with MCP-PMT studies			
B field studies at INFN	Removed		Ask for PED funding			
Beam test at Fermilab	Reformulated with a focus on hpDIRC application		Need a separate DRS4 backplane?			
Ageing studies at INFN	Survived					
QE evaluation at Argonne	Removed, assuming "Yale PED"	No funding	?			
PDE evaluation at BNL	Removed, assuming "Yale PED"	No funding	?			
Timing upgrade at BNL	Survived					

# eRD110 FY24 proposal (MCP-PMTs)

	Topic as formulated in V1	V3 (final)	Current status	Prospects	
	New Photek Auratek	Removed	Ordered by JLab		
	New Photonis Planacon	Removed		Try to reanimate the existing one?	
	Test stand upgrade in Glasgow	Funded in full			
ן	Passive Photek interface	Survived	Being ordered		
	Passive Planacon interface	Survived		Needs a bit of a discussion	
		J1 <b>1</b> J2 <b>1</b> J3 <b>1</b> J4 <b>1</b>			
	Auratek stock cor	nfiguration	HRPPD w	vorld	

# Budget table (v1)

	ANL	INFN	Glasgow	BNL	JLab	USC
B-field maintenance, He consumption	\$8.0k					
B-field studies, QE scans (staff effort support)	\$18.0k					
B-field studies, QE scans (engineering support)	15.0k					
B-field studies (travel)		<del>\$16.0k</del>			4.0k	\$4.0k
Consumables for ageing studies		6.0k				
Postdocs and students		20.0k				
Beam test travel and freight		\$4.0k	\$10.0k	12.0k	4.0k	
Five HRPPD passive integration packages				\$12.0k		
HRPPD ASIC integration package				\$15.0k		
Samtee compression interposers				\$16.0k		
Photek / Photonis MCP-PMT procurement						<del>\$50.0k</del>
Photek / Photonis MCP-PMT interface				\$4.0k		
Test stand M&S and technical support	\$2.0k		\$9.0k	\$8.0k		\$16.0k
TOTAL	\$43.0k	<b>\$46.0</b> k	<b>\$19.0</b> k	\$67.0k	<b>\$8.0</b> k	<b>\$70.0</b> k

Link to a pdf file: here

# Budget table (v3)

	ANL	INFN	Glasgow	BNL	JLab	USC
B-field maintenance, He consumption	\$8.0k					
B-field studies (staff effort support)	\$18.0k					
B-field studies (engineering support)	\$15.0k					
B-field studies (travel and freight)				\$10.0k	\$4.0k	\$4.0k
Consumables for ageing studies		6.0k				
Postdocs and students		20.0k				
Beam test travel and freight		\$4.0k	\$10.0k	12.0k	\$4.0k	
Photek / Photonis MCP-PMT interface				\$4.0k		
Test stand M&S and technical support			9.0k	6.0k		16.0k
TOTAL	\$41.0k	<b>\$30.0</b> k	<b>\$19.0</b> k	<b>\$32.0</b> k	<b>\$8.0</b> k	<b>\$20.0</b> k

#### Funded in full as shown

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### HRPPD order status and expectations

- First five anode base plates are (still) expected from Kyocera on November 15<sup>th</sup>
- Sapphire windows are not happening in this iteration
- Samtec interposers: the vendor managed to lose both BNL & Incom parts of the PO
  - Production will take ~5 weeks from now
- The five HRPPD production schedule looks like "mid December mid March"
- QA procedure on our side needs to be discussed / formalized (soon)
- Boundary conditions:
  - No time to ship any of the tiles to Europe and receive them back by pfRICH beam test in May 2024 (?)
    - Any work at INFN & in Glasgow can only start afterwards
  - Realistically, a primary evaluation (in spring 2024) can only happen at BNL (or Jlab? or Yale?)
  - Magnetic field tests at Argonne: summer 2024
  - AYES / NO decision is required to continue any PED activities past first five HRPPD delivery

# A dummy HRPPD readout board Y05f



Enables ASIC interface to MCP-PMTs



#### Got 4 (option #1) + 1 (option #2) sets assembled

- Connectivity for any of the sixteen 8x8 pad fields (PO was not placed yet):
  - A set of [2x Samtec ERM8 -> MMCX] adapters, 32ch (4x8) connected at a time
  - A set of ERM8-based grounding caps for all other 8x8 fields

# HGCROC3 ASIC / FPGA backplane

IN2P3 (OMEGA), Uni Debrecen, BNL, Oak Ridge

See current version of an interface document here



Bottom (HRPPD) side

Top (ASIC) side

Passive interface to a KCU105 kit

- V0: expect ASIC & passive interface board designs to be finished by November 10
- ➢ V0: FPGA board PO will be submitted with a delay of ~2 weeks
- Assume there is still enough time for a second iteration (V1) before May 2024 pfRICH beam test

### HGCROC3 ASIC / FPGA backplane schedule

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1	1	->	Vessel & mirror construction	108 days	s Mon 10/23/2	Г								1			_
4	0																
4	1	-	HRPPDs	123 days	s Wed 10/25/2		r										
5	6																
5	7	->	# HRPPD HGCROC3 ASIC interface	123 days	s Mon 10/30/2		Г								1		
5	8	*	Interface document finalized	0 days	Mon 10/30/2		10/30										
5	9	*	XCKU040 "basic" firmware development	27 days	Mon 11/6/23												
6	0	*	V0: two-ASIC board design finished	0 days	Fri 11/10/23		<b>↓</b> 11/10										
6	1	*	V0: FPGA & FMC board design finished	0 days	Fri 11/10/23		↓11/10										
6	2	->	V0: procurement (3-4 sets)	30 days	Mon 11/13/2												
6	3	*	Cooling system design finished	0 days	Fri 11/17/23		11/17										
6	4	->	Cooling system procurement (5+1 sets)	20 days	Fri 11/17/23												
6	5	*	"Basic" Linux driver development	20 days	Wed 11/22/2												
6	6	*	Multi-ASIC firmware development	27 days	Mon 12/4/23												
6	7	*	Hardware trigger firmware development	22 days	Mon 12/18/2					·							
6	8	->	V0: primary evaluation & debugging	20 days	Thu 12/28/23												
9 IAR	9	*	V0+HRPPD evaluation with a laser source	15 days	Mon 1/15/24					1							
±_7	0	*	UDP interface (firmware + driver) development	20 days	Fri 1/12/24					1							
Ę 7	1	*	V1: [ASIC] / [FPGA] board (re)design finished	0 days	Fri 2/2/24						2,	/2					
8 7.	2	->	V1: procurement (5+1 sets)	30 days	Fri 2/2/24												
7	3	*	V0: UDP / two-ASIC / hardware trigger debugging	24 days	Mon 2/12/24							)	ļ.				
7	4	->	V1: final evaluation & debugging	30 days	Mon 3/18/24					<u> </u>							
7	5																
7	6	*?	HRPPD DRS4 interface "for hpDIRC"														
7	7																
8	8	->	Aerogel	113 days	s Mon 10/16/2									1			
8	7	*	Test assembly @ Stony Brook	20 days	Mon 4/1/24					÷							
8	8	*	Ready for shipment	0 days	Mon 4/29/24											4/29	
8	9													·····			
9	0	*?	Online monitoring software & Co														