PL Report

Workshop Agenda

16.05.2022

AM

08:00	--- Registratrion ---
09:00	Welcome and Overview - Jelena Ninkovic (MPG Halbleiterlabor) ()
09:10	Charge of the PXD workshop - Carsten Niebuhr (DESY) ()
09:30	**PXD** (until 10:20) ()
09:30	Operation at KEK - Björn Spruck (Uni Mainz) ()
09:50	ASIC monitoring and SEU correction - Simon Reiter ()
10:00	Open Issues of PXD1 and PXD2 operation - Björn Spruck (Uni Mainz) ()
10:20	--- Break ---
10:50	**PXD** (until 11:30) ()
10:50	PXD1: HV current, ASIC Currents, Noise - Björn Spruck (Uni Mainz) () 2022_05_16_radiation_effects.pdf
11:10	PXD1 dose estimation - Yannik Buch ()
11:30	**PXD** (until 12:30) ()
11:30	Lab irradiation: X-ray HV currents and future plans - Georgios Giakousticis ()
11:50	DEPFET bulk currents in PXD - Rainer Richter (MPI) ()

PM

12:30	--- Lunch ---
13:30	**PXD** (until 15:00) ()
13:30	DHH - Stefan Huber (TUM) ()
13:50	ONSEN - Matthäus Krein ()
14:10	DATCON - Bruno Deschamps (University of Bonn) ()
14:30	SlowControl - (canceled?) - Michael Ritzert (Heidelberg University) ()
15:00	--- Break ---
15:30	**PXD** (until 17:30) ()
15:30	PS status, repair and plans - Thomas Lueck ()
15:50	OVP troubles - Björn Spruck (Uni Mainz) () 2022_05_16_OVP_and_doses.pdf
16:10	PS calibration setup Bonn - Theresa Goldschmidt ()
16:25	Fast Emergency Shutdown - Matthias Hoeck Jannes Schmitz ()

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09:00	**EDET I** - Johannes Treis (MPG Semiconductor Laboratory) (until 10:30) ()
09:00	Instrument Overview - Johannes Treis (MPG Semiconductor Laboratory) ()
09:20	Wafer Production Summary - Christian Koffmane (MPI Halbleiterlabor) ()
09:40	DMC - Johannes Treis (MPG Semiconductor Laboratory) ()
10:00	Firmware Status - Mikhail Polovykh ()
09:00	**PXD** (until 10:30) ()
09:00	DCD gain, gm and gq measurements of PXD modules - Munira Khan ()
09:20	Lab framework - Georgios Giakousticis ()
09:40	DEPFET IV and ADC scan ()
10:00	Offset correction ()
10:30	--- Break ---
11:00	**EDET II** - Johannes Treis (MPG Semiconductor Laboratory) (until 12:30) ()
11:00	DAQ Software - Andrey Vostrukhin ()
11:20	HK Software/Infrastructure - Martin Hensel (HLL) () EDet_2022_05_17_Housekeeping.pdf EDet_2022_05_17_Housekeeping.ppsx EDet_2022_05_17_Housekeeping.pptx
11:40	Lessons learned from test campaigns - Thomas Selle ()
11:00	**PXD** - Maiko Takahashi (DESY) (until 12:30) ()
11:00	Alignment - Tadeas Bilka (Charles University in Prague) ()
11:20	Recent performance of PXD - Daniel Pitzl ()
11:40	Calibration and validation - Qingyuan LIU (DESY) ()
12:30	--- Lunch ---
13:30	**EDET III** - Johannes Treis (MPG Semiconductor Laboratory) (until 15:05) ()
13:30	Irradiation Results - to be determined ()
13:50	5 key findings in my thesis - Mitja Predikaka (HLL MPG) ()
14:05	5 key findings in my thesis - Eduard Prinker (Max-Planck-Institute) ()
14:20	Discussion - Johannes Treis (MPG Semiconductor Laboratory) ()
13:30	**PXD** - Botho Paschen (University of Bonn) (until 15:05) ()
13:30	HLL module production - Laci Andricek (MPG Halbleiterlabor) ()
13:45	MPP module, ladder, half-shell production - Hans-Günther Moser (Max-Planck-Institut für Physik) ()
14:05	PXD2 production schedule - Botho Paschen (University of Bonn) ()
14:15	Half-Shell Testing at DESY - Anselm Baur ()
14:35	PXD2 installation - Arthur Bolz ()
15:05	--- Break ---
16:00	**PXD** - Ariane Frey (Max Planck Institute for Physics, Munich) (until 18:00) ()
19:00	--- Dinner at "Perlacher Hof" ---

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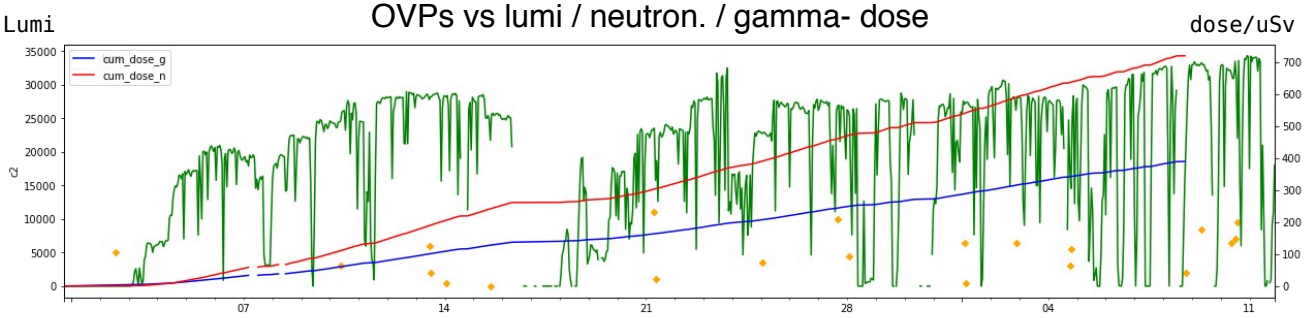
09:00	**Non-HEP Applications** (until 11:10) ()
09:00	ATHENA WFI - Alexander Baehr ()
09:30	pnCCDs with DEPFET readout - Rainer Richter (MPI) ()
09:55	DANAE - Wolfgang Treberspurg ()
10:25	EDET80k - Johannes Treis (MPG Semiconductor Laboratory) ()
11:10	--- Break ---
11:30	**DEPFET Generic** (until 13:00) ()
11:30	Super gain DEPFETs - Alexander Baehr ()
11:55	Radiation hardness - technology - Rainer Richter (MPI) ()
12:15	Radiation hardness - experimental results - Thomas Selle Christian Koffmane (MPI Halbleiterlabor) ()
13:00	--- Lunch ---
14:00	Lab Tour ()

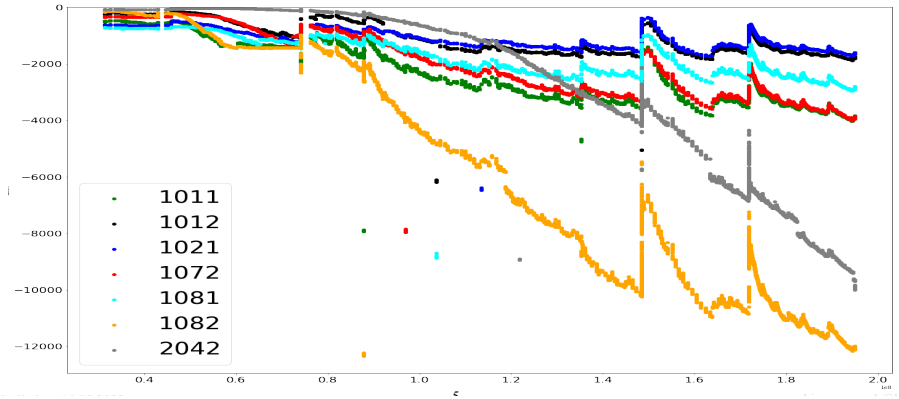
Irradiation-related Operational Issues

- OVP trips clearly correlated with neutron rate (luminosity)
  - reproduced at MAMI
  - need to prepare for higher luminosity
- No saturation of the HV current rise seen so far
  - thanks to modified PSUs not an issue for 2022b run, but we should understand the underlying mechanism
  - new PS limits appearing
    - DCD-AVDD regulator voltage limit
    - solved by programming step-down converter?
- Increasing pedestal noise
  - much stronger than during pxd9 X-ray irradiation
  - dependence on particle type or dose rate?

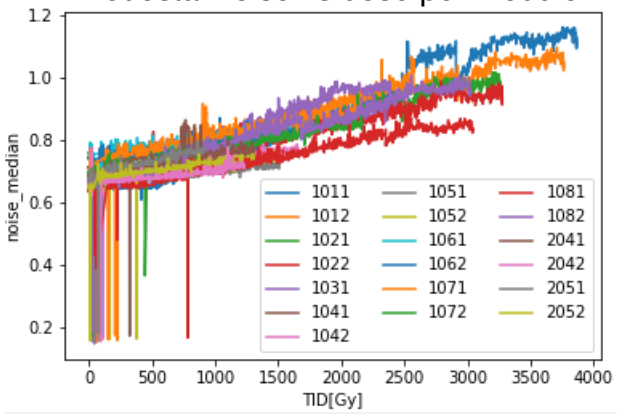
OVPs vs lumi / neutron. / gamma- dose



HV currents vs diamond dose



Pedestal noise vs dose per module



Run Plan until LS1

Y. Ohnishi, Monday meeting, May 9

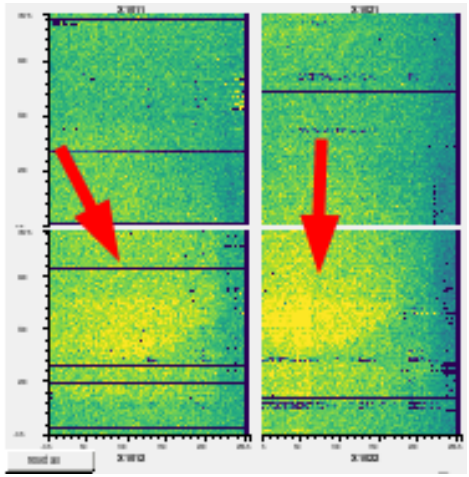
- β_y^*: squeezing down to 0.8 mm. We will try β_y^* 1 mm if 0.8 mm is difficult until the deadline.
- β_y * : 0.8 mm, LER 1.1 A / HER 0.9 A (1662 bunches) is necessary.
- β_y^*: 1.0 mm, LER 1.35 A / HER 1.1 A (1857 bunches) is necessary.
- 2-bunch injection and LER 23 Hz / HER 25 Hz repetition are required.
  - PF and PF-AR are in operation. We might negotiate with PF and PF-AR if necessary.

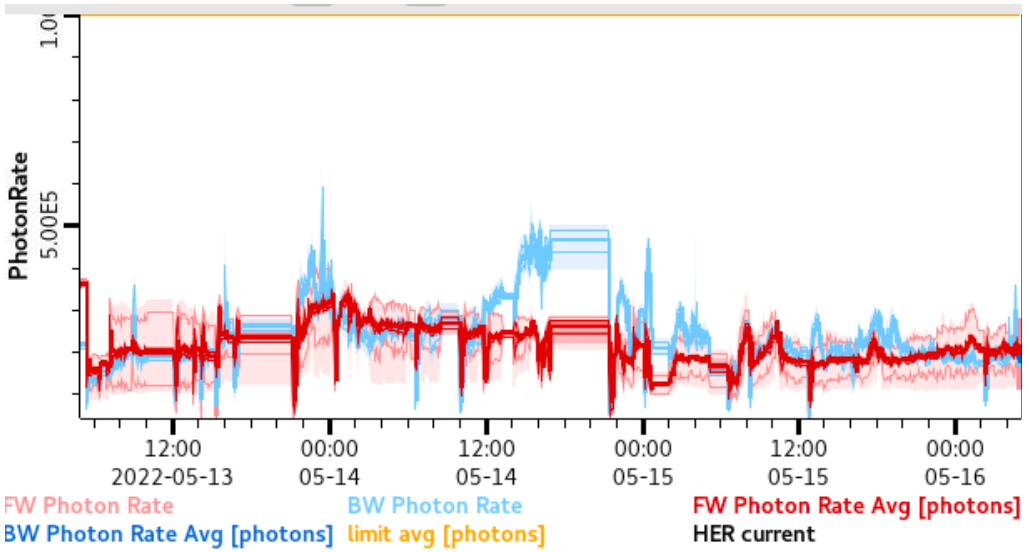
M. Tobiyama, EM meeting, May 12

- Resume on resonance (by*=1mm) after 11/May, try to achieve over 4.2e34 by increasing beam current.
  - Already exceeded 3.9e34 on 10/May (LER 1150mA/HER 920mA)
- Move to by*=0.8mm (bx*=0.8m) from 16/May
  - If this result is not very good or it seems that it will take time to adjust, withdraw and return to by * = 1mm and try to increase luminosity by increasing the current.
  - In that case, try 0.8mm after 9/Jun.
- Achieve luminosity more than 5x10^34 by 9/Jun
- Final target before end of 2022b runs will be 3.8x1.5 ~ >5.7e34

Priority shifted from integrated to peak luminosity

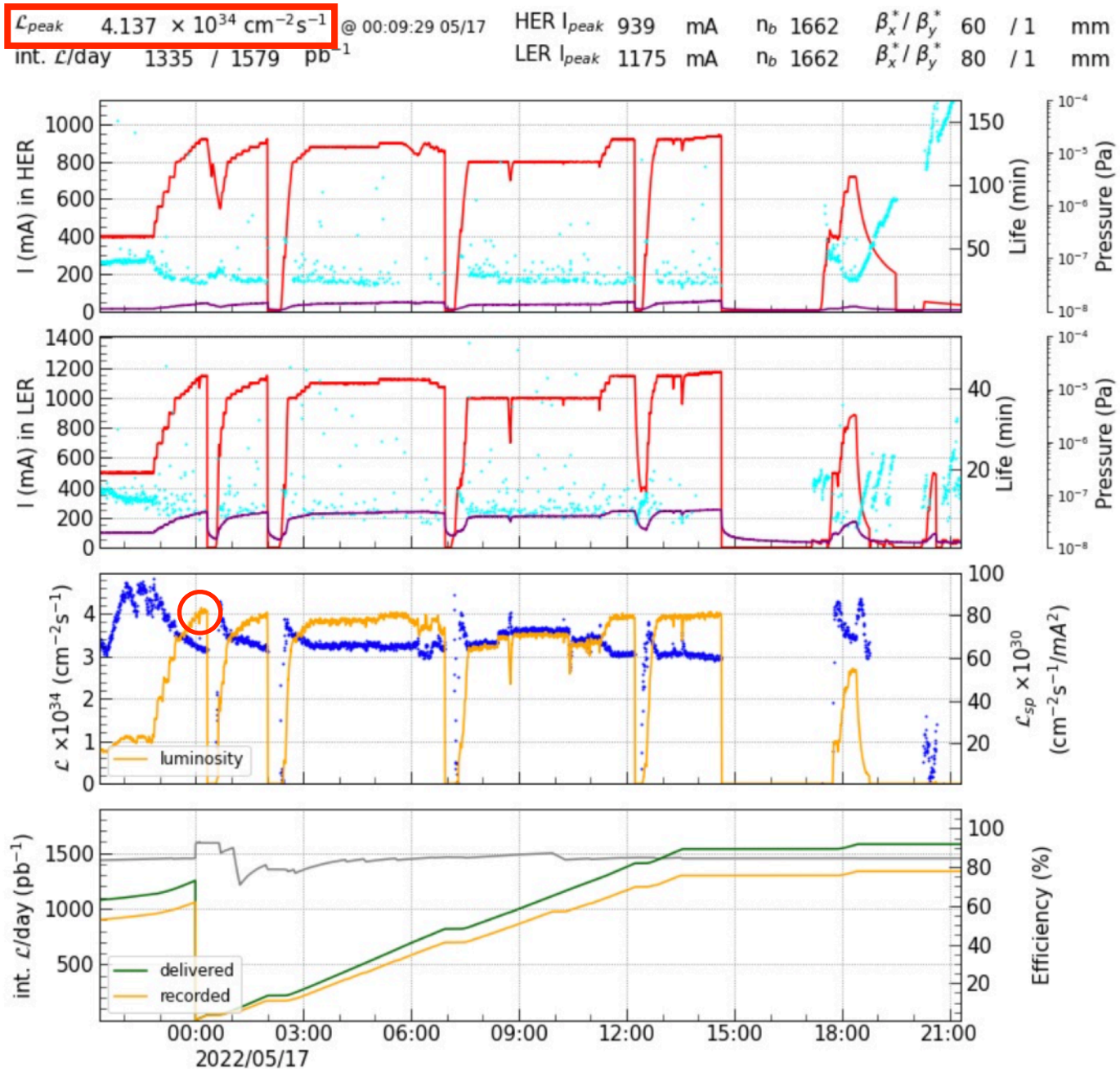
SR background in BWD modules 1021 & 1022





Have to be prepared for changes in background conditions

SuperKEKB Status



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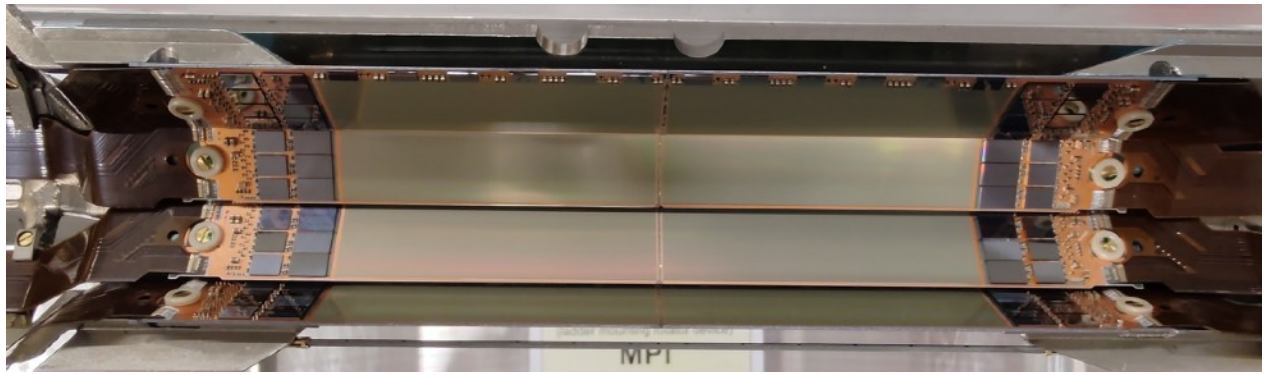
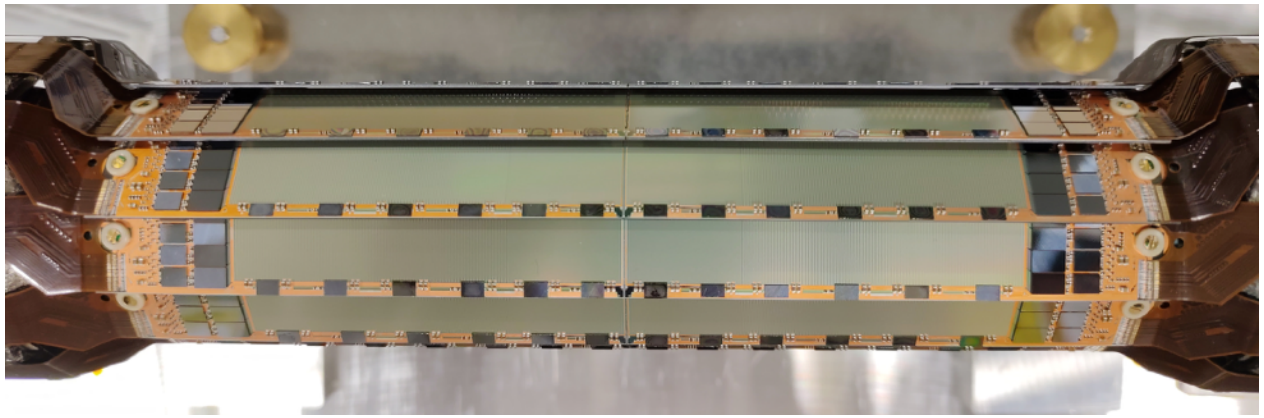
SuperKEKB Mid-Term Run Plan

(2022/2/17)

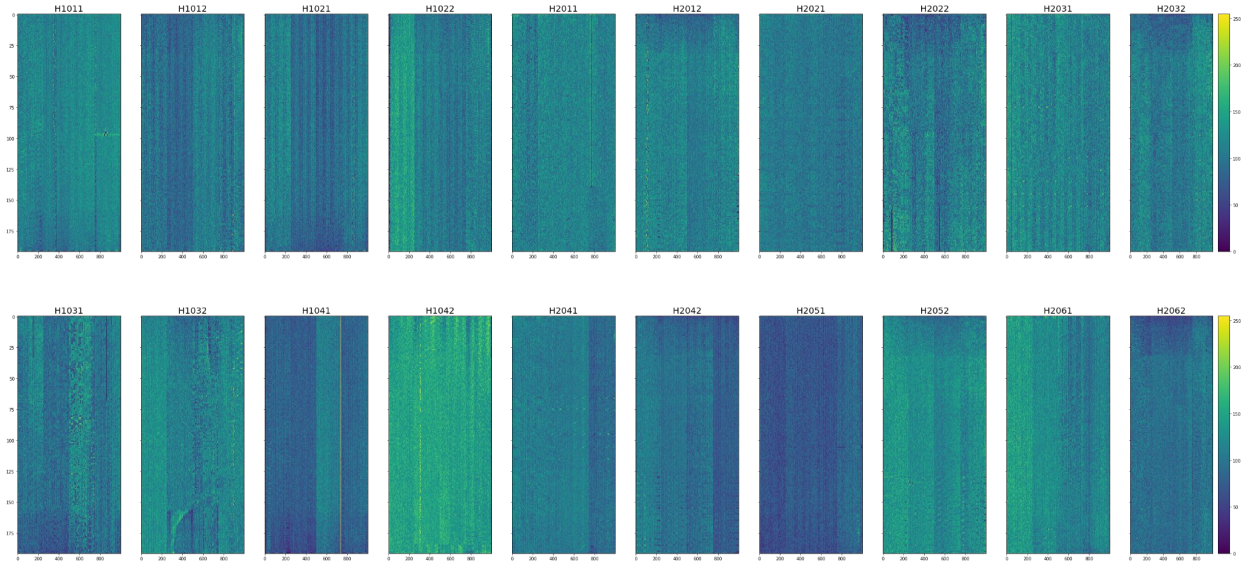
	2021									2022			
	4	5	6	7	8	9	10	11	12	1	2	3	
FY2021		2021b ¤3.2M 4/1 → 7/5						2021c ¤2.2M 10/19 → 12/23				2022a ¤1.2M 2/21 ←	Total ¤6.6M /y
	2022									2023			
	4	5	6	7	8	9	10	11	12	1	2	3	
FY2022		2022b ¤3.0M 4/1 → 6/30		QCSR leak check			LS1 (PXD, TOP exchange)						Total ¤3.0M /y
	2023									2024			
	4	5	6	7	8	9	10	11	12	1	2	3	
FY2023	LS1 (PXD, TOP exchange)						2023c ¤2.9M 10/1 → 12/27			1/4 ←	¤2.9M	2024a	Total ¤5.8M /y
	2024									2025			
	4	5	6	7	8	9	10	11	12	1	2	3	
FY2024		2024b ¤3.4M 4/1 → 7/12						2024c ¤2.4M 10/16 → 12/25				2025a ¤1.2M 2/25 ←	Total ¤7M /y
	2025									2026			
	4	5	6	7	8	9	10	11	12	1	2	3	
FY2025		2025b ¤3.4M 4/1 → 7/12						2025c ¤2.4M 10/16 → 12/25				2026a ¤1.2M 2/25 ←	Total ¤7M /y

First PXD Half-Shell completed @MPP in March





Pedestal Map



Ladder Overview

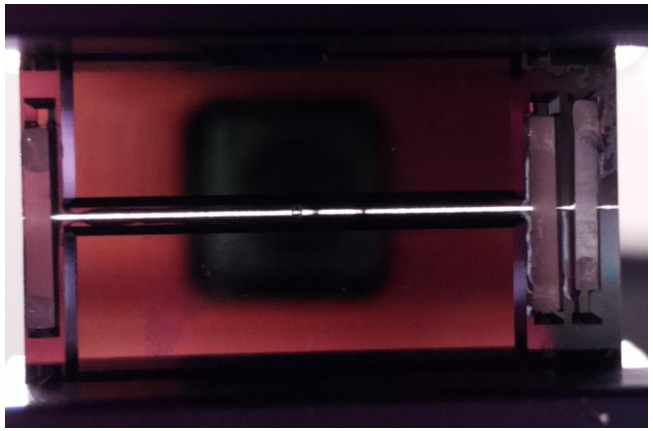
Inner	series	fwd	bwd	grade	location
2	L37	W05_IF	W42_IB	B/A	MPP
3	L56	W37_IF	W06_IB	Ph II/C	MPP
4	L57	W11_IF	W46_IB	B/B	MPP
6	L61	W52_IF	W55_IB	A/A	MPP
7	L62	W53_IF	W53_IB	B/B	MPP
11	L66	W50_IF	W69_IB	C/B	MPP
12	L67	W67_IF	W67_IB	A/A	MPP
13	L68	W66_IF	W58_IB	A/A	MPP
14	L69	W69_IF	W59_IB	A/A	MPP
15	L75	W68_IF	W61_IB	?/A	

Outer	series	fwd	bwd	grade	location
1	L42	W02_OF1	W03_OB1	?/B	MPP
10	L52	W43_OF1	W33_OB1	A/A	MPP
11	L53	W05_OF1	W04_OB1	A/A	MPP
12	L54	W45_OF2	W10_OB1	A/A	MPP
13	L55	W37_OF1	W37_OB1	Ph II/Ph II	MPP
14	LK70	W60_OF1	W56_OB1	A/A	MPP
15	LK71	W56_OF2	W54_OB1	A/A	
16	LK72	W57_OF1	W56_OB2	A/B	
17	LK73	W57_OF2	W59_OB2	A/A	
18	LK74	W56_OF1	W53_OB2	A/A	

Inner: 6 ‚A', ‚B' ladder available, possibility for one more A

Outer: 4 A, 1 Ph II available, Material for 4 A,B

LK61, BWD repaired, FWD has problemss -> checking

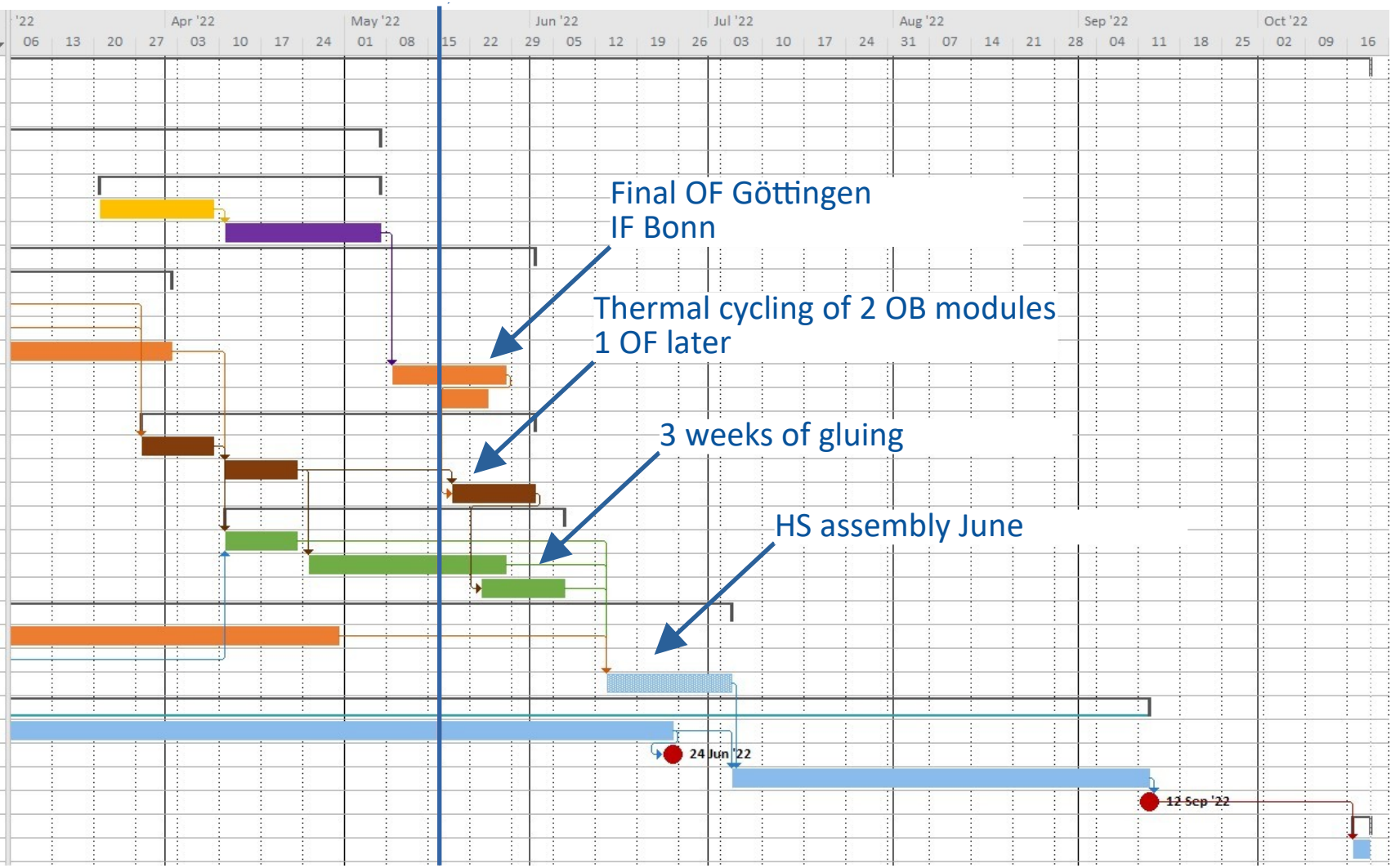


Schedule (Still 5 ladders to go)

LK71: 17.5. – 20.5
LK72: 23.5. – 25.5.
LK73: 30.5. – 2.6.
LK74.: 3.6. – 7.6.
LK75: 8.6 -- 10.6.

PXD2 Schedule

Task Name	Start	Finish	Duration
PXD2	**Wed 01/04/20**	**Wed 19/10/22**	**666 dys**
Sensor production	**Wed 01/04/20**	**Fri 03/09/21**	**373 dys**
sensors from PXD9-21a	Fri 02/07/21	Fri 02/07/21	0 dys
Module assembly	**Wed 01/04/20**	**Fri 06/05/22**	**548 dys**
PXD9-20 batches	**Wed 01/04/20**	**Fri 24/09/21**	**388 dys**
PXD9-21 batches	**Mon 21/03/22**	**Fri 06/05/22**	**35 dys**
FC, SMD, rework	Mon 21/03/22	Fri 08/04/22	3 wks
Kapton attachment	Mon 11/04/22	Fri 06/05/22	4 wks
Module characterization BN/DESY/GÖ/MPP	**Mon 24/01/22**	**Wed 01/06/22**	**93 dys**
PXD9-20/21 testing of current stock	**Mon 24/01/22**	**Fri 01/04/22**	**50 dys**
W66/67/68/69_IF	Mon 24/01/22	Fri 18/02/22	4 wks
W67/69_IB	Mon 07/02/22	Fri 18/02/22	2 wks
W56_OF2, W59_OF1, W54_OB1	Mon 21/02/22	Fri 01/04/22	6 wks
PXD9-20/21 testing of new modules	**Mon 09/05/22**	**Fri 27/05/22**	**3 wks**
last OF	Tue 17/05/22	Tue 24/05/22	6 dys
Thermal cycling	**Mon 28/03/22**	**Wed 01/06/22**	**48 dys**
L1 modules	Mon 28/03/22	Fri 08/04/22	2 wks
L2 modules	Mon 11/04/22	Fri 22/04/22	2 wks
Remaining modules	Thu 19/05/22	Wed 01/06/22	2 wks
Ladder assembly	**Mon 11/04/22**	**Mon 06/06/22**	**41 dys**
L1 Gluing campaign	Mon 11/04/22	Fri 22/04/22	2 wks
L2 gluing campaign	Mon 25/04/22	Fri 27/05/22	5 wks
Gluing campaign 22-2	Tue 24/05/22	Mon 06/06/22	2 wks
Half Shell Assembly	**Mon 26/07/21**	**Mon 04/07/22**	**246 dys**
Testing of L2 modules	Mon 28/02/22	Fri 29/04/22	9 wks
HS1	Mon 26/07/21	Fri 25/02/22	31 wks
HS2	Tue 14/06/22	Mon 04/07/22	3 wks
HS testing at DESY	**Mon 28/02/22**	**Mon 12/09/22**	**141 dys**
HS1 Test at DESY	Mon 28/02/22	Fri 24/06/22	17 wks
Half Shell 1 ready	Fri 24/06/22	Fri 24/06/22	0 dys
HS2 test at DESY	Tue 05/07/22	Mon 12/09/22	10 wks
Half Shell 2 ready	Mon 12/09/22	Mon 12/09/22	0 dys
Shipping to KEK	**Mon 17/10/22**	**Wed 19/10/22**	**3 dys**
Ship Half Shells to KEK	Mon 17/10/22	Wed 19/10/22	3 dys



Availability of gluing and mounting experts absolutely crucial May + June!

BPAC Recommendations on LS1 Preparations

Concerns

- The schedule for the new beam pipe is very tight and the availability of the new beam pipe is a critical component to the success of LS1.
- It appears that the collaboration has a very limited number of **switcher chips** to complete the assembly of the required ladders. The misaligned bumps are worrisome.
- The continued misfortune regarding the availability of ladders is of great concern. There now is a non-zero probability that the **PXD2 may not be fully populate**d.
- The **loss of expertise** for the pixel detector is a key concern. A well-trained installation team is needed to carry out the delicate work.
- Although there has been excellent effort to document the extraction and installation procedure of the VXD, to mitigate the impact of disappearing expertise and the possibility of continuing travel restrictions, there is no substitute for **hands-on presence**.
- Timely decision will be needed whether to replace the TOP PMTs to be well prepared for the delicate work.
- The TOP PMT and electronics replacement will be challenging and require experienced crews.

Recommendations

- It is recommended to start making **contingency plans** for the unfortunate situation that the PXD2 detector may **not be complete** and optimise it for physics performance.
- Practice the **installation** of the VXD often to minimise the risk of accidents, **mimicking the real detector as closely as possible** including a realistic modelling of the cable plant. It is strongly recommended to practice the beam pipe assembly and the VXD support assembly with the key experts.
- Effort should be given to early and advanced planning to allow for the possibility of **former experts to participate** in the extraction and installation process.
- Continue practising the installation of the TOP MCP-PMTs to ensure that there are enough people adequately trained to ensure timely installation.