BEER ICEB

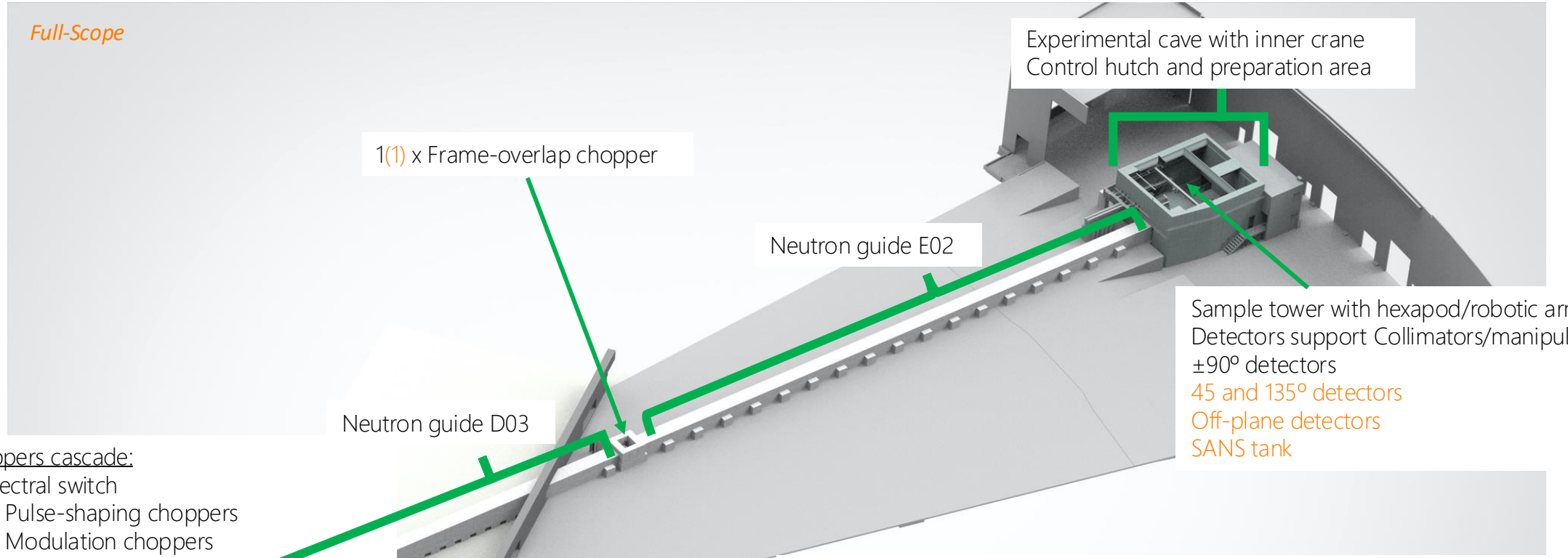
Instrument update

PRESENTED BY PREMEK BERAN

2026-06-03

BEER Engineering and Material Science diffraction

Full-Scope



Science case topics:

- In-situ and in-operando experiments close to the real conditions
- Fast strain scanning with a new modulation technique
- Phase analysis of multi-phase and composite materials
- In-situ texture or microstructure evolution
- Multi-scale characterisation
- Long term experiments

General update

Instrument team

- A lot of progress as well as challenges and issues
  - TGs are missing the effort to see the overall picture of the instrument
  - TGs change the requirements after design freeze, different requirements between TGs
  - Complicated interface CEP/MCA/ICS/ECDC – scope fights and missing interfaces connections
  - PSS equipment and processes are not properly communicated
  - Integration at all levels/sides seems to be a most demanding task
- The *onsite* instrument team is fully established and functional
  - **Grant Wallace** (IOE) in place from December 2024
  - **Bojan** (LIE) is fully back on BEER from January 2025
  - **Celine Durniak** (IDS) with BEER from January 2025
  - **Olof Duveklint** (dedicated IPL) available from March 2025
  - **Gergely Nemeth** (IS) in place from July 2025

BEER ICEB

NPI status update

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2026-06-03

TA (NIK 6.6#4) milestones

Overview and completion by EV

	PO: 24032273	Total tasks	63					kEur	
	OCC: 82606001	Done	52	it is 82.54%		Budget	Total	2720.636	
	New OCC: P5037-100	Paid	25	from 25			Paid	2670.373	it is 98.15%
		EV(%)	92.45				Rest	50.263	
		Can be paid	0						

Milestone ID	Description	Value (kEur)	TA pay (kEur)	EV (%)	Done		Was paid	Invoice ID	Paid date
TG3	**Tollgate 3 (EOR/CDR)**	**306.548**		**5.17**					
TG3.1.1	Cave structure, control hutch and utilities	107.292		1.81	✓	1			
TG3.1.2	Safety shutter	15.327		0.26	✓	1			
TG3.2.1	Neutron guides, from 28 m	183.929		3.10	✓	1			
TG4	**Tollgate 4 (IRR-FAT/-s & IRR)**	**357.640**		**6.00**					
TG4.1.1	Neutron guides, Sector 2	71.528		1.20	✓	1			
TG4.1.2	Neutron guides, Sectors 3 and 4	35.764		0.60	✓	1			
TG4.1.3	Neutron guides, Sector 1	71.528		1.20	✓	1			
TG4.2.1	Cave structure	71.528		1.20	✓	1			
TG4.3.1	Safety shutter	71.528		1.20	✓	1			
TG4.4.1	Control hutch	17.882		0.30	✓	1			
TG4.5.1	Cave utilities	17.882		0.30	✓	1			
CC1	**Start Cold Commissioning (complete instrument)**	**0**		**0.00**	✗	0			
TG5	**Tollgate 5**	**357.640**		**6.02**	✗	0			
WP01.1	**Cave structure**	**1770.990**	**1616.044**	**33.05**	✓	100.0			
WP01.2	**Safety shutter**	**143.023**	**124.739**	**2.43**	✓	100.0			
WP02.4	**Neutron optics, Sector 2 (*)**	**1057.283**	**348.320**	**17.80**	✓	100.0			
WP02.5	**Neutron optics, Sectors 3 and 4 (*)**	**536.933**	**176.892**	**9.04**	✓	100.0			
WP02.6	**Neutron optics, Sector 1 excl. shutter pit (*)**	**853.962**	**281.335**	**14.38**	✓	100.0			
WP02.7	**Neutron optics in shutter pit**	**121.996**	**40.191**	**2.05**	✓	100.0			
WP09.1	**Control hutch**	**433.440**	**82.852**	**2.53**	✓	100.0			
WP09.2	**Cave utilities**	**91.000**	**50.263**	**1.53**	✓	72.5			
	Sum	**6030.455**	**2720.636**	**100.000**			**2670.37**		

Comparison with last year

- EV gain ~22%
- Finished WP
  - Sector 3&4
  - Instrument cave
  - Control hutch
  - Cave utilities (CEP)
- Progress WP
  - *Cave utilities (CUP)*

- TA amendment v4 with the common projects (CEP, CUP, CMCA) signed Aug/2025

TA (NIK 6.6#4) milestones

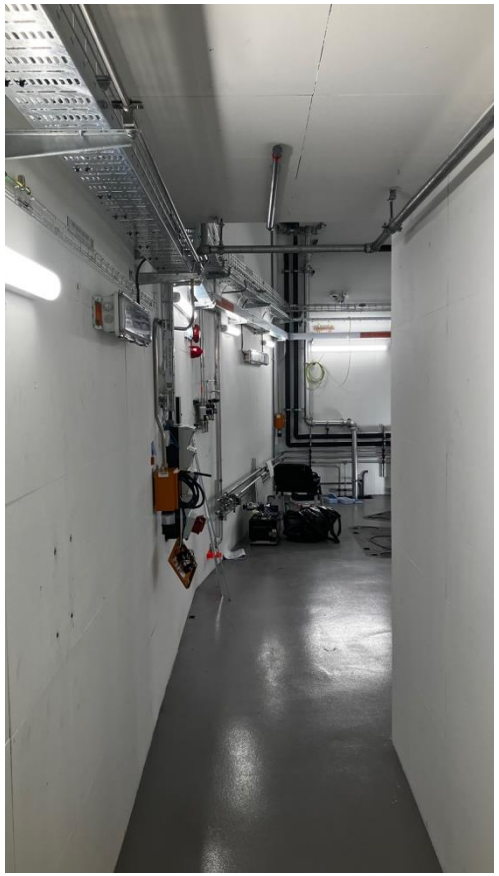
Cave structure

WP01.1	**Cave structure**		**1770.990**	**1616.044**	**33.05**	100.0				
WP01.1.1	Designed (TG3)		347.386		5.85	1				
WP01.1.2	Procurement contract signed		71.180	80.802	1.36	1	1	2411000071	24/5/2024	
WP01.1.3	Detailed design approved (CDR)		355.901	404.011	6.80	1	1	2500000118	15/4/2025	
WP01.1.4	Start of construction (RFD, RFI)		284.721	323.209	5.44	1	1	2500000118	15/4/2025	
WP01.1.5	Access for installation of equipment (SAT)		711.802	808.022	13.60	1	1	2611000003	14/1/2026	

- Design inherited from the previous contract (CDR in Q4/2019)
- Tender for cave and hutch signed 17/4/2024
- TG3 approved 14/2/2025
- FAT 24/4/2025
- SAT 23/10/2025

Instrument Cave

Cave structure



Instrument Cave

Cave structure

TA (NIK 6.6#4) milestones

Control hutch

WP09.1	**Control hutch**		**433.440**	**82.852**	**2.53**	100.0				
WP09.1.1	Designed (TG3)		107.885		1.13	1				
WP09.1.2	Procurement contract signed		16.278	4.143	0.07	1	1	2411000071	24/5/2024	
WP09.1.3	Detailed design approved (CDR)		81.389	20.713	0.35	1	1	2500000118	15/4/2025	
WP09.1.4	Start of construction (RFD, RFI)		65.111	16.570	0.28	1	1			
WP09.1.5	Access for installation of equipment (SAT)		162.777	41.426	0.70	1	1	2611000047	13/4/2026	

- Design inherited from the previous contract (CDR in Q4/2019)
- Tender for cave and hutch signed 17/4/2024
- TG3 approved 14/2/2025
- SAT 29/1/2026
- Checking the lighting and ventilation pending (finish by the end of June)

Control hutch

Hutch structure and interior

TA (NIK 6.6#4) milestones

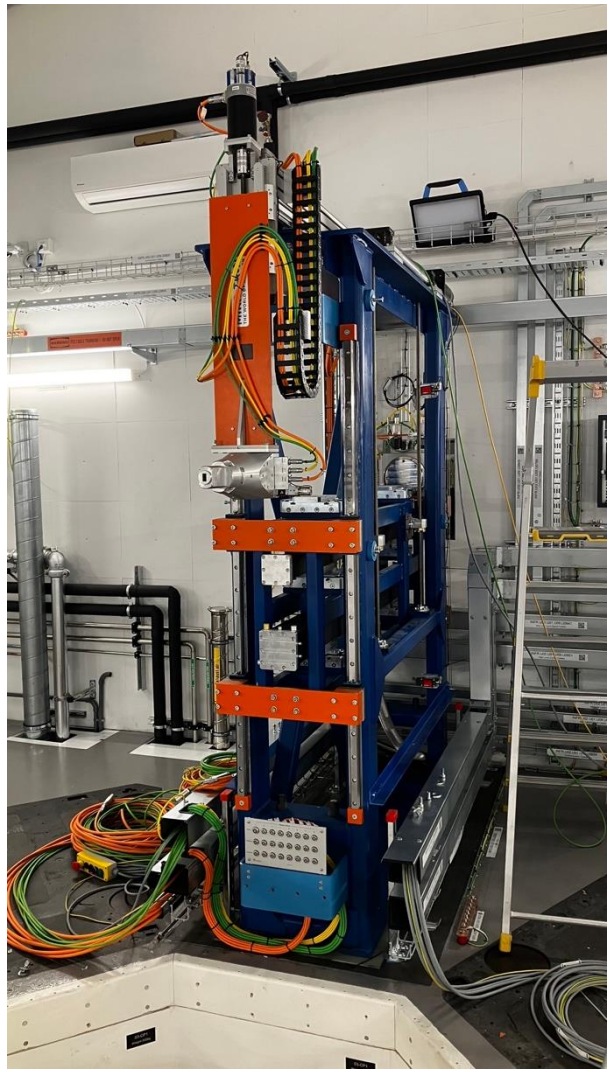
Neutron guide – 12.5 m in E02 (just before and in the cave)

WP02.5	**Neutron optics, Sectors 3 and 4 (*)**		**536.933**	**176.892**	**9.04**	✓	100.0			
WP02.5.1	Procurement contract signed		156.896		2.64	✓	1			
WP02.5.2	Designed (TG3)		52.299	48.884	0.88	✓	1	✓ 1	2111000349	1/12/2021
WP02.5.3	Manufactured (RFD)		0.000	0.000	0.00	✓	1			
WP02.5.4	Delivered to site		286.770	91.434	4.83	✓	1	✓ 1	2211000139	5/10/2022
WP02.5.5	Start of installation (RFI), Sector 3		0.000	0.000	0.00	✓	1			
WP02.5.6	Installed (SAT), Sector 3		9.832	18.287	0.17	✓	1	✓ 1	2611000007	3/2/2026
WP02.5.7	Start of installation (RFI), Sector 4		0.000	0.000	0.00	✓	1			
WP02.5.8	Installed (SAT), Sector 4		31.136	18.287	0.52	✓	1	✓ 1	2611000007	3/2/2026

- All parts (guide, housings, slits, guide exchanger) on site
- SAT Dec/2025

Neutron optics Sector 3&4

Guide, slits and guide exchanger



TA (NIK 6.6#4) milestones

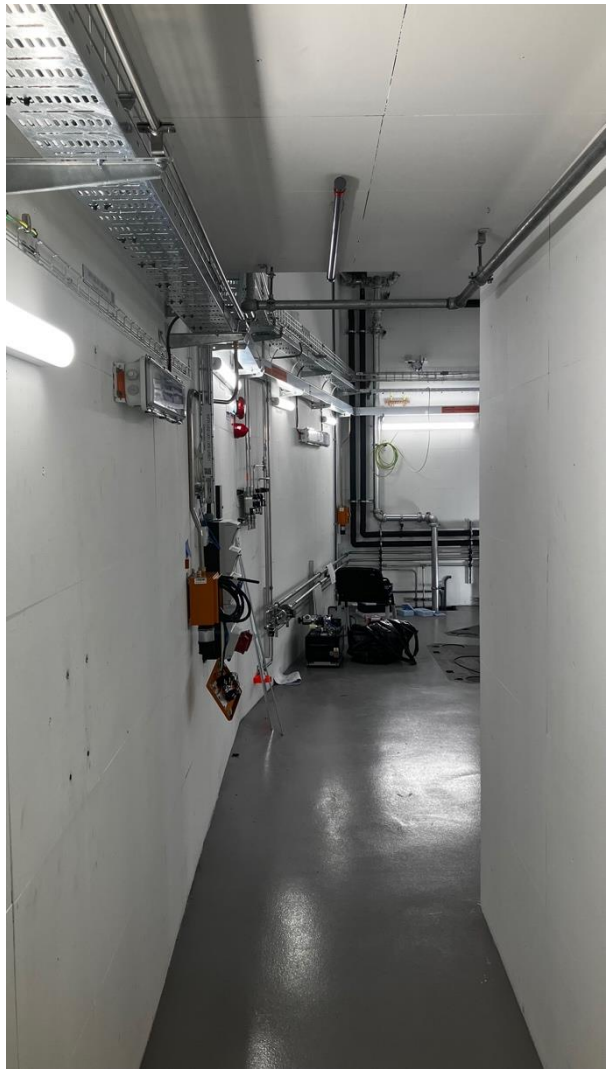
Cave utilities

WP09.2	**Cave utilities**		**91.000**	**50.263**	**1.53**	72.5			
WP09.2.1	Designed (TG3)		40.737		0.69	1			Change request for CUP/CEP
WP09.2.2	Procurement contract signed		2.513	2.513	0.04	1	1		Change request for CUP/CEP
WP09.2.3	Detailed design approved (CDR)		12.566	12.566	0.21	1	1		Change request for CUP/CEP
WP09.2.4	Start of construction (RFD, RFI)		10.053	10.053	0.17	1	1		Change request for CUP/CEP
WP09.2.5	Installed (SAT)		25.131	25.131	0.42	0	0		

- Joined common projects – CEP, CUP and CMCA
- Requirements formulated and budget offers received (328 kEur)
- Change request signed on Aug/2025
- CEP details: instrument area mostly done, (some CUP and D03 connection missing)
- CUP details: Piping, cave HVAC all installed (missing heat-exchangers – expected Oct/2026)
- CMCA details: shutter, pneumatic, MCA & PSS boxes, shutter operation panel all installed

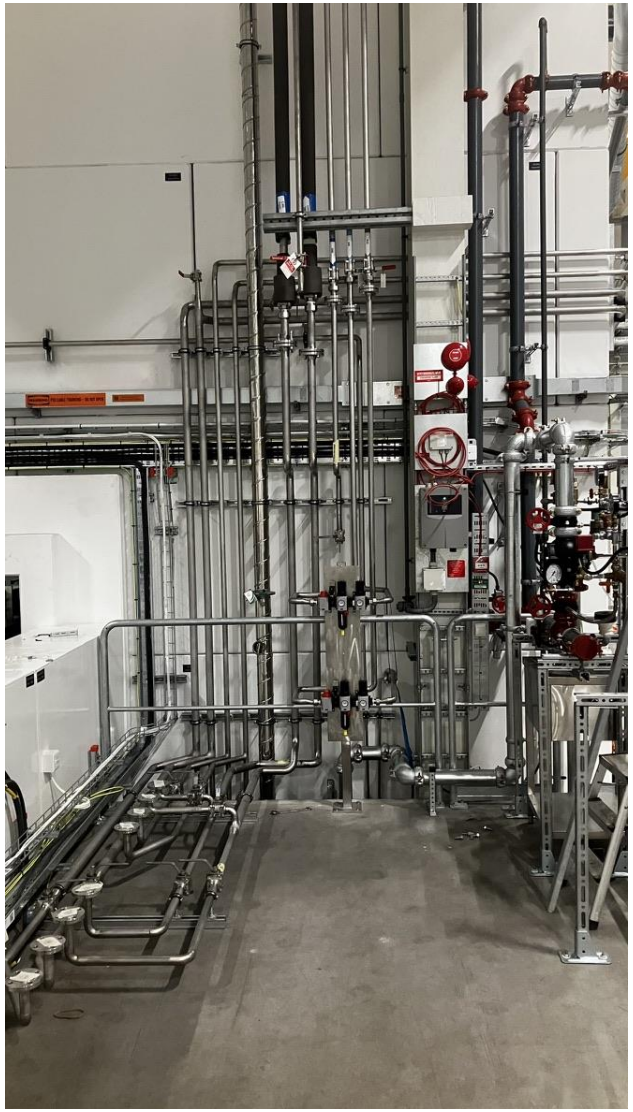
Instrument utilities

CEP, CUP & CMCA



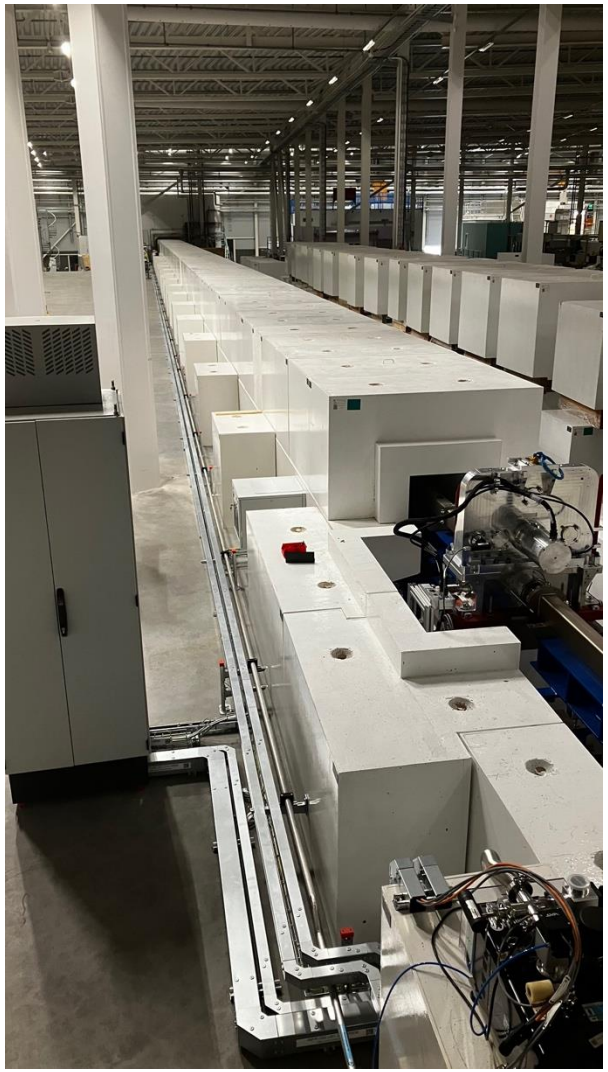
Instrument utilities

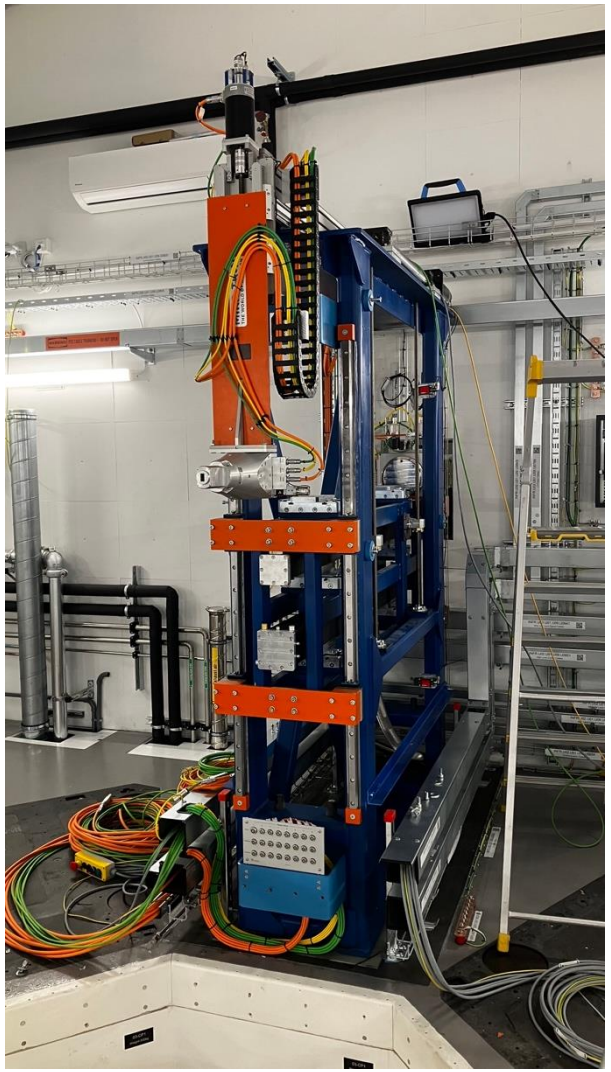
CEP, CUP & CMCA



Instrument utilities

CEP, CUP & CMCA





Instrument utilities

CEP, CUP & CMCA

TA (NIK 6.6#4) milestones

Minor cost from instrument construction

Items	NPI			Hereon			
Insurance of unload by Logistics	0.50	€	151.16	0.50	€	151.16	
Tools (Grant)	1.00	€	38.04	0.00	€	-	
Isolation for the racks	0.00	€	-	1.00	€	381.16	
Clamps for feedthrough	1.00	€	76.96	0.00	€	-	
Cave feedthrough pipes	1.00	€	4,356.20	0.00	€	-	
False floor	0.00	€	-	1.00	€	39,549.00	
ICS installations	1.00	€	391.85	0.00	€	-	
Vacuum component along the whole instrument	0.50	€	3,398.60	0.50	€	3,398.60	
PSS support for the key exchange box	0.50	€	679.93	0.50	€	679.93	
Thread repair for base plates	0.00	€	-	1.00	€	25.36	
Travel cost	0.50	€	57.99	0.50	€	57.99	
Scafolding rent and build	0.50	€	968.79	0.50	€	968.79	
Bojan's phone costs ???	0.00	€	-	0.00	€	-	
		€	**10,119.50**		**€**	**45,211.97**	**€** ***55,331.47***
Design of the feedthrough	0.75	€	13,678.16	0.25	€	4,559.39	
Hexapod cabel pulling and false floor grounding	0.00	€	-	1.00	€	2,065.81	
Cave ventilation CUP	1.00	€	3,995.00	0.00	€	-	
Hutch workshop furniture	1.00	€	7,474.64	0.00	€	-	
Contrul hutch furniture	0.50	€	5,563.44	0.50	€	5,563.44	
		€	**40,830.74**		**€**	**57,400.61**	**€** ***98,231.35***

- Items that are **not** part of any **common project** or **TA** but have to be done to finish the instrument
- A change request/TA amendment has to be agreed on and signed
- Split by in-kind partners proposed
- Some items are disputable (PSS supports, cave ventilation, cabinet isolations, …)

- **IOE is asking for tools/monthly operational budget – who is responsible?**

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Further progress

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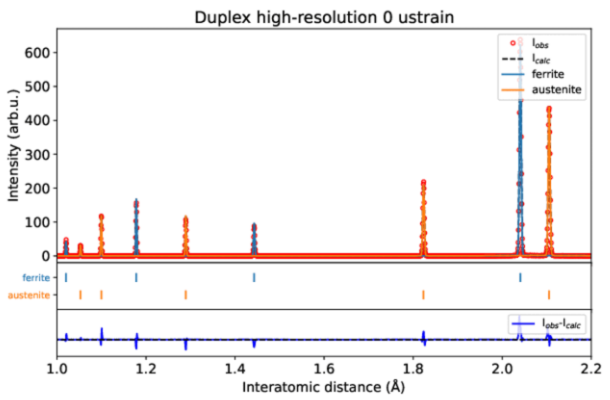
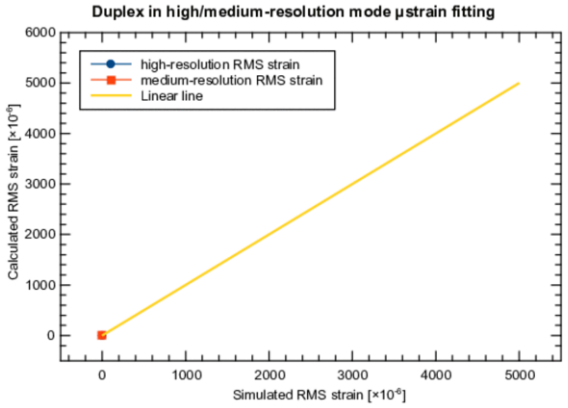
2026-06-03

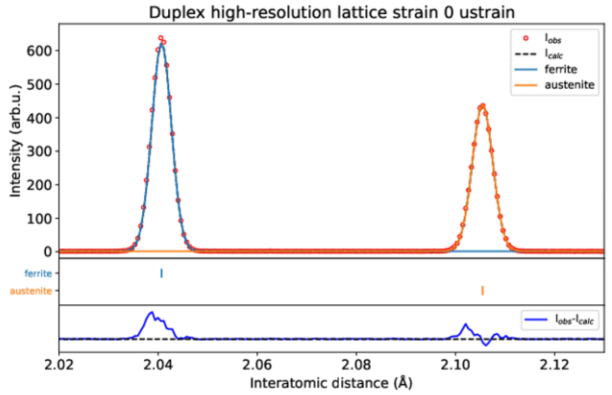
Further progress

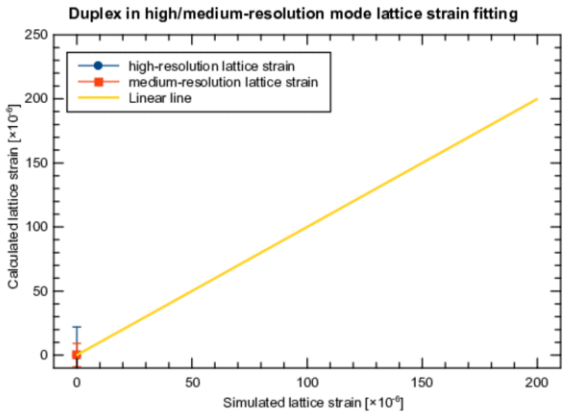
DMSC and alignment

- Data reduction workflow for **pulse-shaping is ready** and under deep testing
  - Simulated reduced data analysed with existing software
  - Lattice strain and microstrain were simulated; it matching the required resolution of 50 με
- Data reduction workflow for **modulation:** the first **successful implementation**
- Data streaming pipeline under testing
- Nexus file writer is a tested functional









Further progress

DMSC and alignment

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- The BEER team received an RAC (Röntgen-Ångstrom Cluster) grant for the implementation of the advanced alignment features together with colleagues from StressSpec@FRMII
- MSc student project (co-supervised by Gergely) to implement cameras to increase the robot's absolute accuracy below 50 μm