ODIN:

Optical and Diffraction Imaging with Neutrons at the ESS

STAP – April 2024

2024-4-15

Agenda

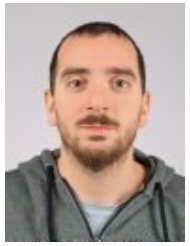
1. **ODIN team**
2. **Instrument layout overview**
3. **Components status overview**
4. **Summary**

ODIN team for the past years

ODIN construction core team

Aureliano Tartaglione
ODIN Scientist

Manuel Morgano
ODIN Scientist (PSI/ESS)



Elbio Calzada
ODIN Lead Engineer

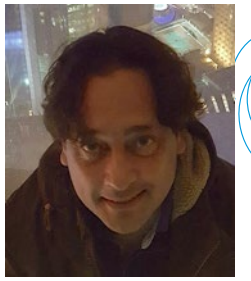
Virginia Martinez Monge
ODIN Installation Engineer

Jan Hovind
Technician of Imaging Group

Michael Schulz
Head of Imaging group

Markus Strobl
Head of Imaging group

Robin Woracek
TBL scientist



Søren Schmidt
Instrument Data Scientist for ODIN, BEER & TBL

Alexandre Gonçalves Gerk
MCA Engineer 50%

ODIN team now(-ish)

ODIN construction core team

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Manuel Morgano
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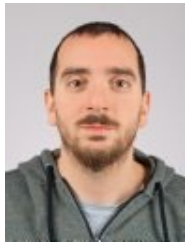

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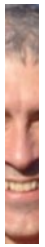

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ODIN Operation Engineer (ESS)

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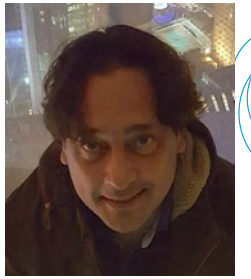

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Egla Luca
ODIN IPL

Bojan Peric
Lead Engineer XX%

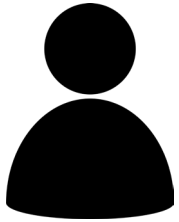
Stefanos Athanasopoulos (LU)
Commissioning scientist 80%

ODIN team as of 1st of July

ODIN construction core team

Aureliano Tartaglione
ODIN Scientist

ODIN Scientist



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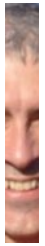
ODIN Lead Engineer



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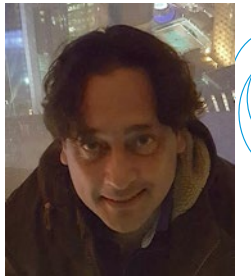

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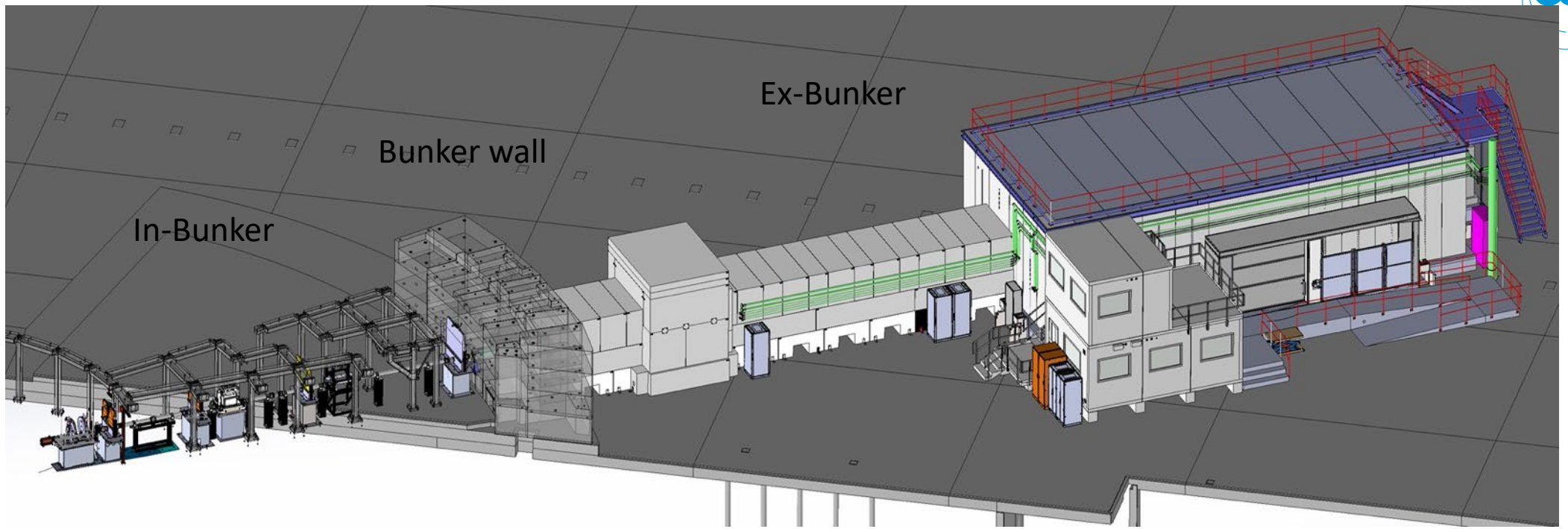
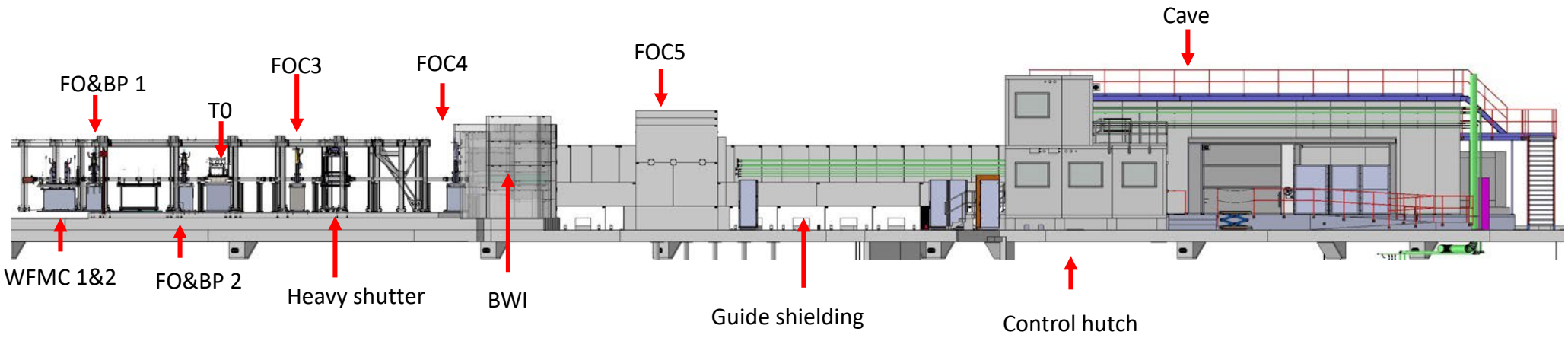
ODIN overview





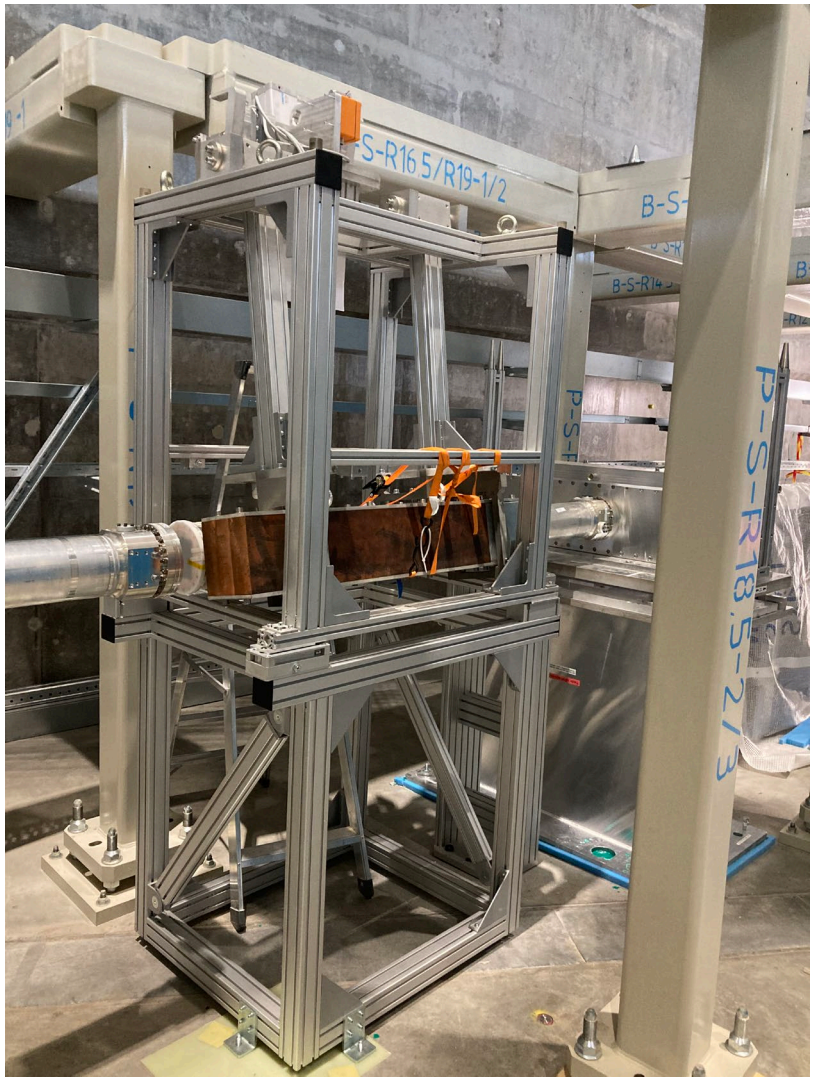
ODIN overview

	Task no.	TA ID	Deliverables – Project Results	Delivery date	Status (milestones)
TUM	WU 03	2-8	Heavy Shutter*	Dec 2022	Installed. Final integration ongoing
TUM	WU 04	9-15	T0 Chopper*	Oct 2024	Contract with ESS signed (CR approved). PDR 15 March 2023
TUM	WU 05	16-25	Choppers*	Apr 2023	Bottom housing delivered and installed FAT approved
TUM	WU 08	26-32	Motion Control and Electric Engineering*	Sept 2024	First prototype cabinet delivered Installation planned for summer
TUM	WU 11		Shielding*	-	-
TUM	WU 11.1	33-38	Guide Shielding (common shielding project)	Jan 2023	Delivery complete. Installation ongoing
TUM	WU 11.2	39-50	Cave Shielding *	Oct 2024	Wall elements installed rest is a mess
TUM	WU 12		Instrument Infrastructure	-	-
TUM		51-56	Control Hutch (TUM) *	Feb/Mar 2022	Installed SAT approved
TUM			Sample preparation area & storage (TUM) *	Feb/Mar 2022	Installed SAT approved
TUM/PSI			Power distribution (CEP)	May 2024	Installation ongoing
TUM/PSI			Utilities supplies (CUP)	May 2024	Installation ongoing
TUM	AO01	-	Bunker Wall Feedthrough	Apr 2022	Installed. SAT approved
TUM	AO02	-	Chopper supplements	Nov2021 – Apr2022	Delivered and installed
TUM/PSI		**59**	**FINAL TG3**	**Approved Apr 2024**	**Approved**
PSI	02.1	1-4	NBOA	Q1 2023	Installed
PSI	02.2	5-16	Neutron transport system (Guides)	Mar 2023	In-Bunker installed except T0. Ex-Bunker installed
PSI	06	17-32	Cave interior #	Q4 2024	On site, SAT ~ongoing.
PSI	09	33-43	White beam detectors	Q4 2024	On site, integration ongoing
PSI	10	44-48	ToF detector	Q4 2024	On site, integration ongoing

Parts of this item agreed to be delivered by ESS for PSI

* Item agreed to be procured by ESS for TUM

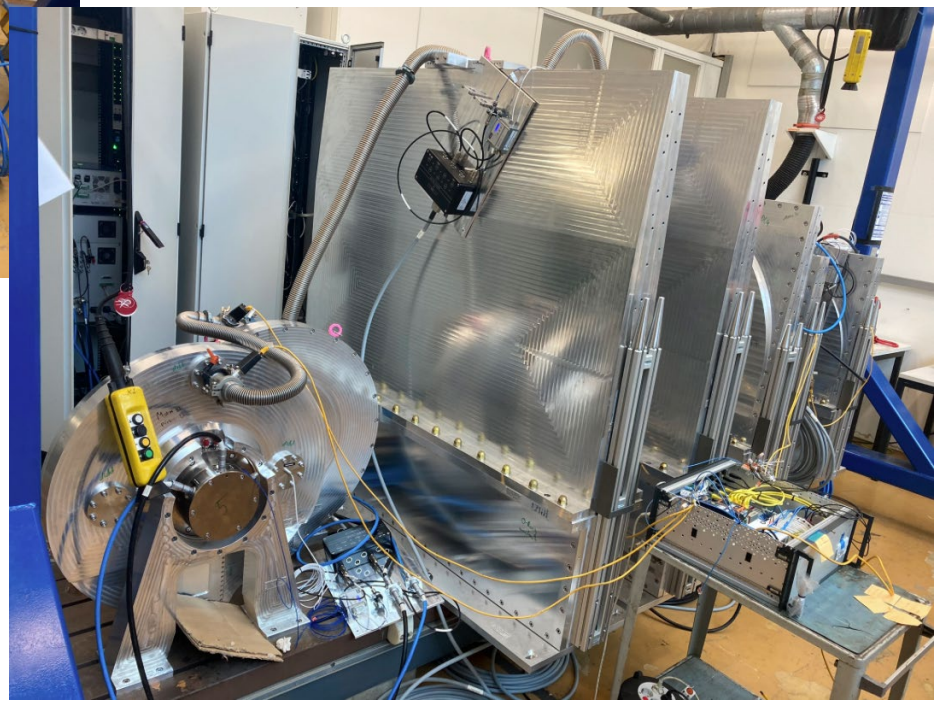
Heavy shutter



- Installed in bunker (and then removed)
- Guide integrated
- PSS and MCA test done

Disk choppers

- Except FOC1 and WFMC, all bottom housing installed
- FAT complete
- Delivery scheduled April/May



Motion Control

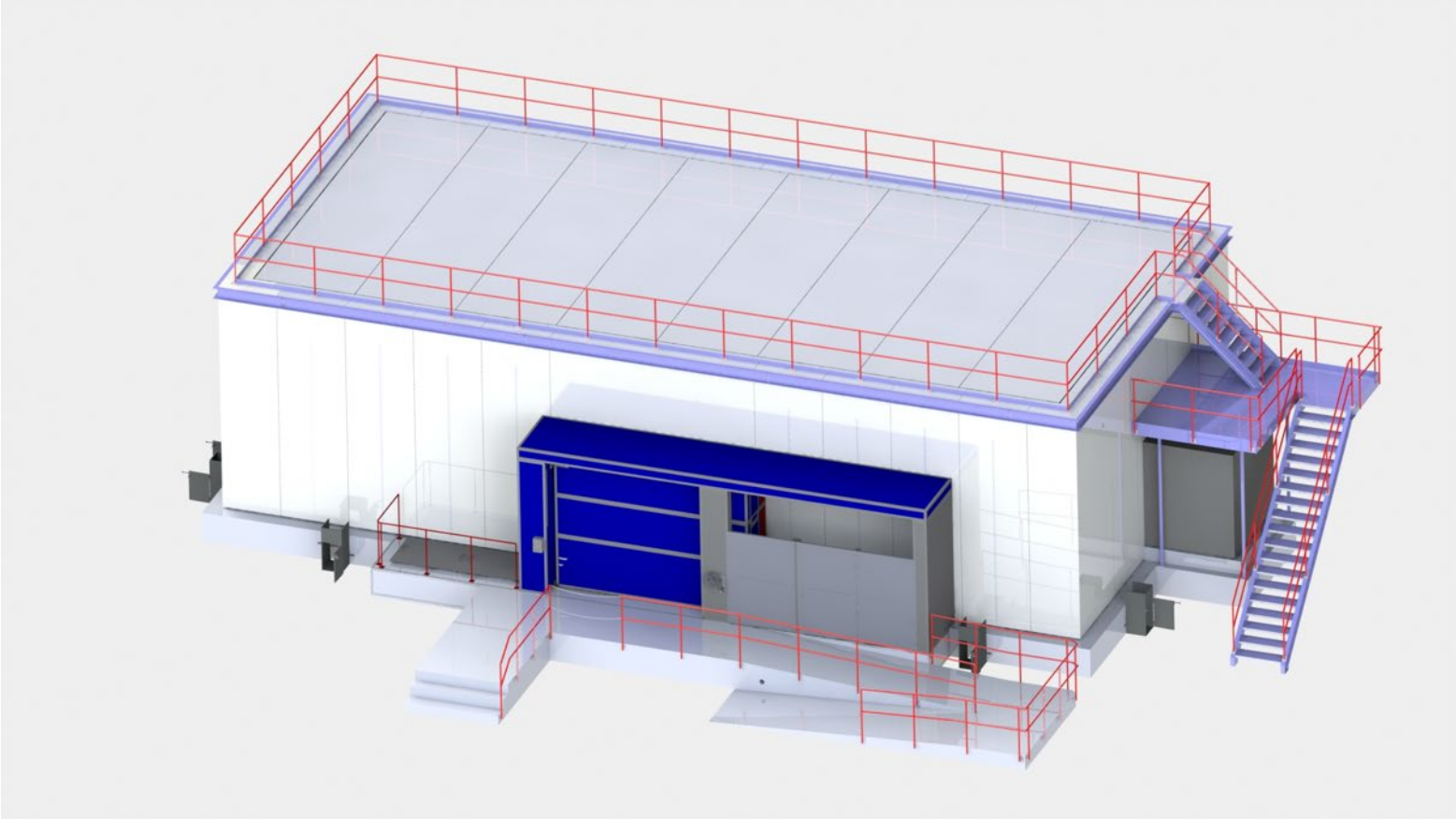
MC Cabinets

- Prototype cabinet manufacture done and fully tested (based on ODIN´s design)
- Assembling of five cabinets for cave ongoing
- FAT done

Guide shielding (Common project)

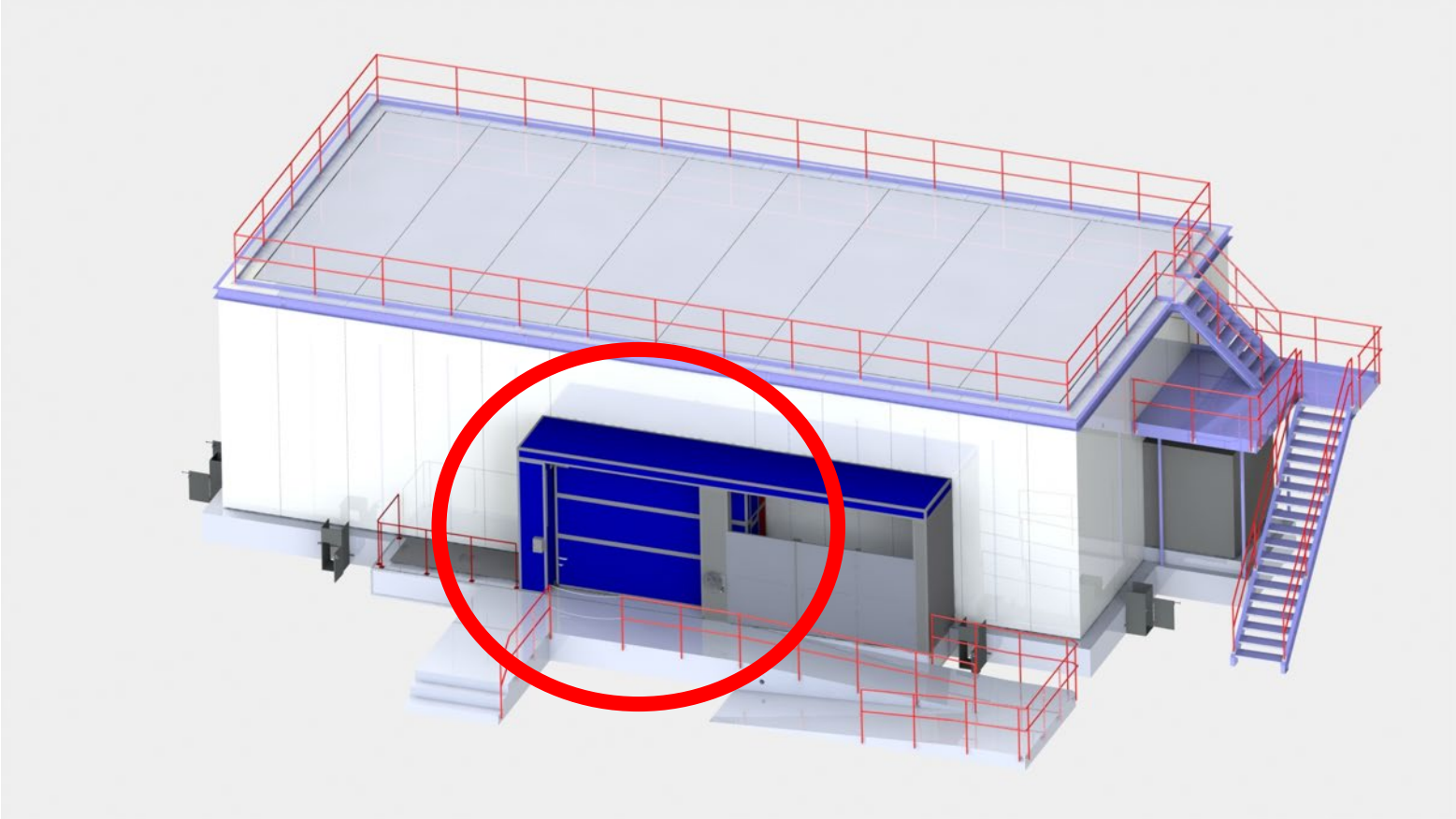
- Manufacturing complete
- Installation ongoing

Cave shielding



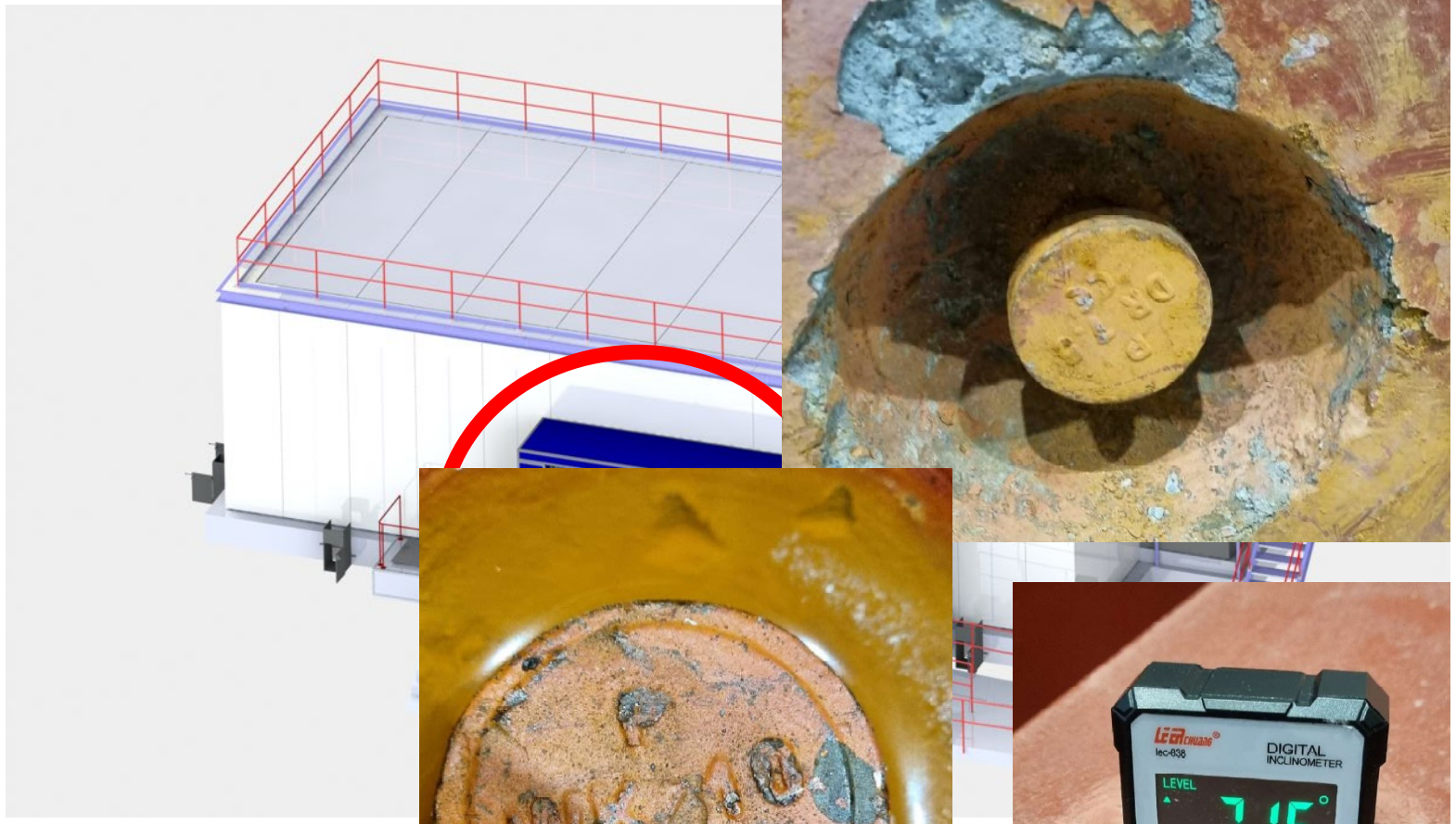
- Wall installation complete
- Beam stop, sliding door, roof and railings still missing

Cave shielding: doors



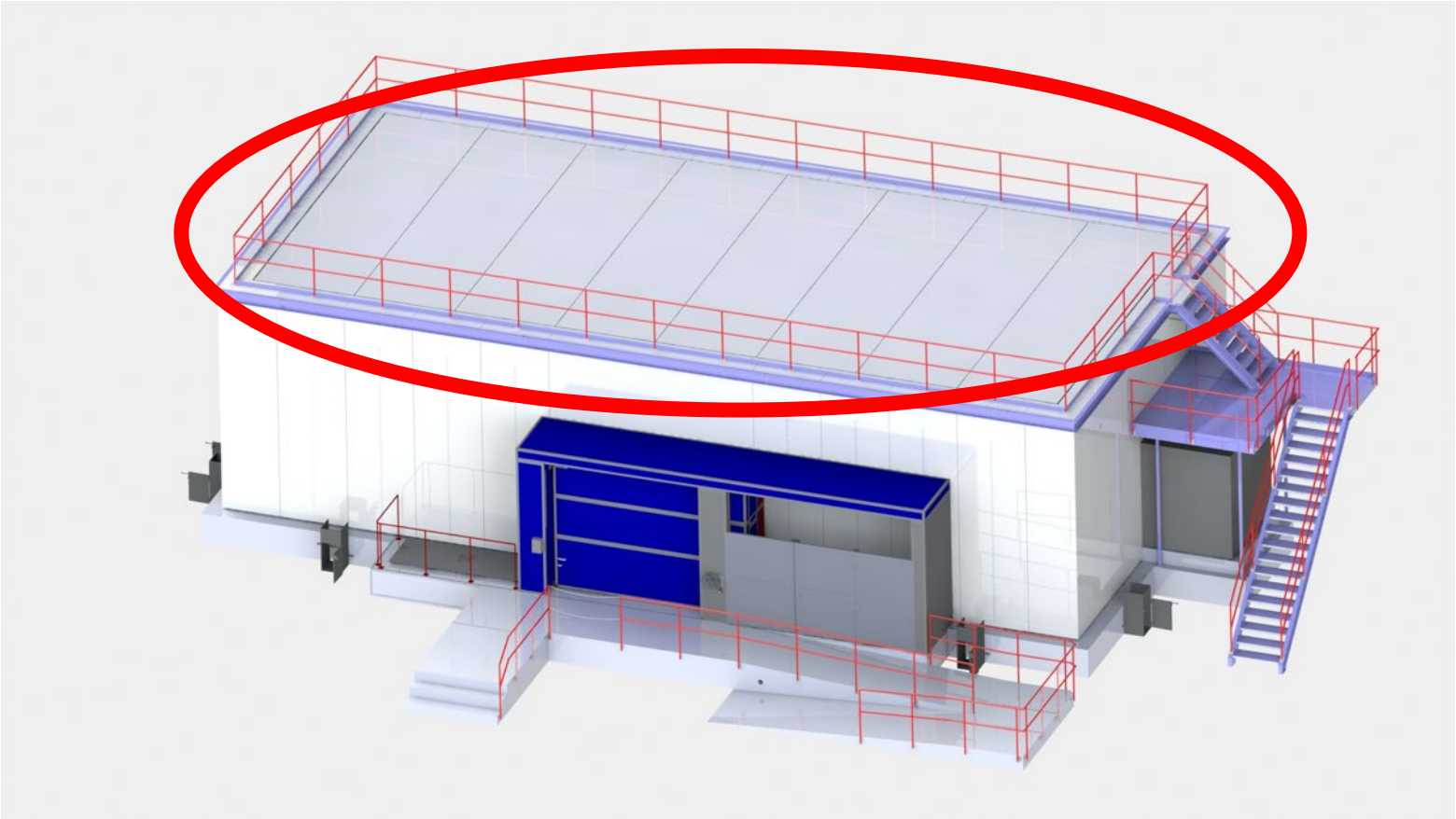
- Manufactured by MIR
- All elements (but one…) have been manufactured
- FAT last Thursday (waiting for feedback)
- Shipment soon (except the missing element…)
- Installation in summer?

Cave shielding: doors



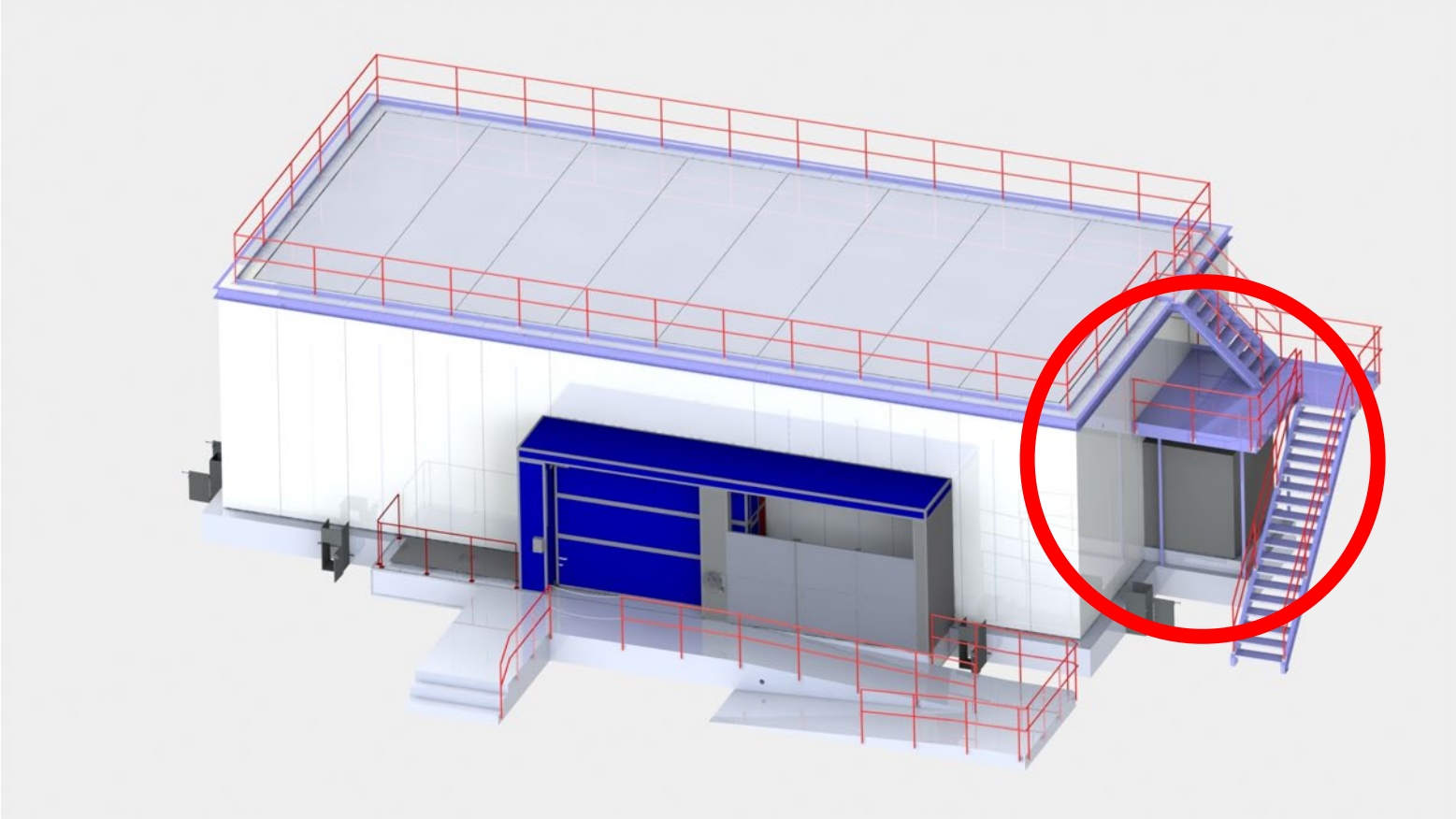
- Manufactured by MIR
- All elements (but one…) have been manufactured
- FAT last Thursday (waiting for feedback)
- Shipment soon (except the missing element…)
- Installation in summer?

Cave shielding: roof



- Two layers
- Top layer: manufactured by MIR, FAT pending
- Bottom layer (borated) not manufactured. Will be given to some other company for manufacturing soon

Cave shielding: beam stop



- Two parts: concrete and steel/PE
- The steel/PE part has been already manufactured by MIR, FAT pending
- Concrete part not manufactured. Will be given to some other company for manufacturing soon

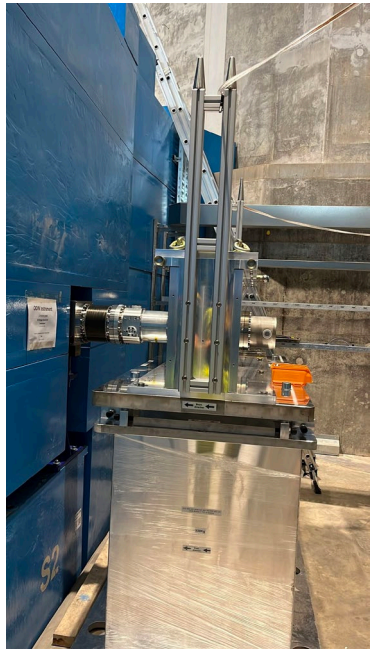
Cave shielding

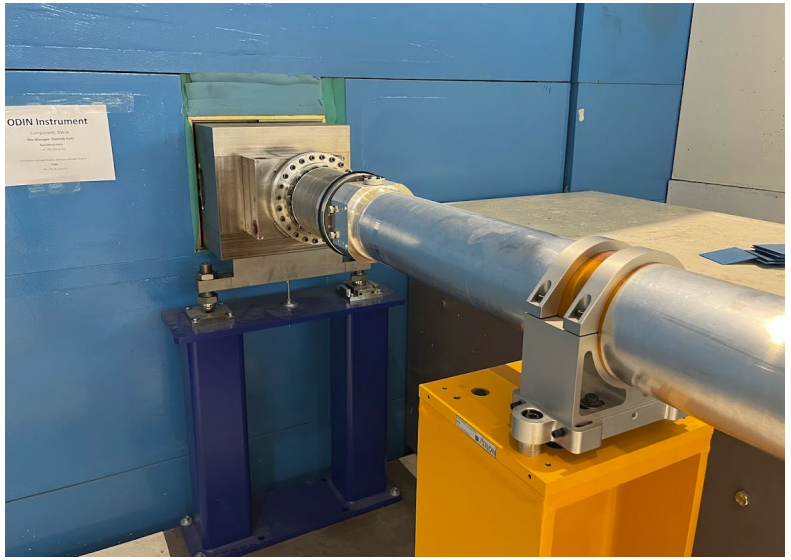
Control hutch

- Installation complete

Bunker wall insert

- Installation complete



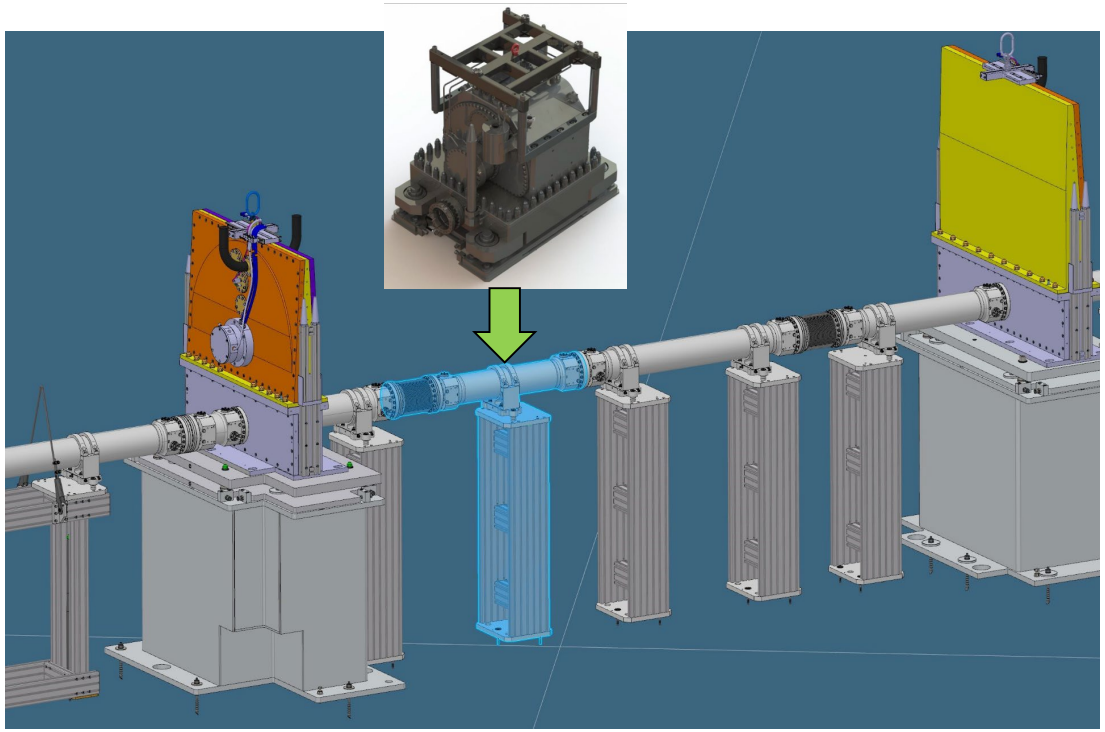


Chopper supplements

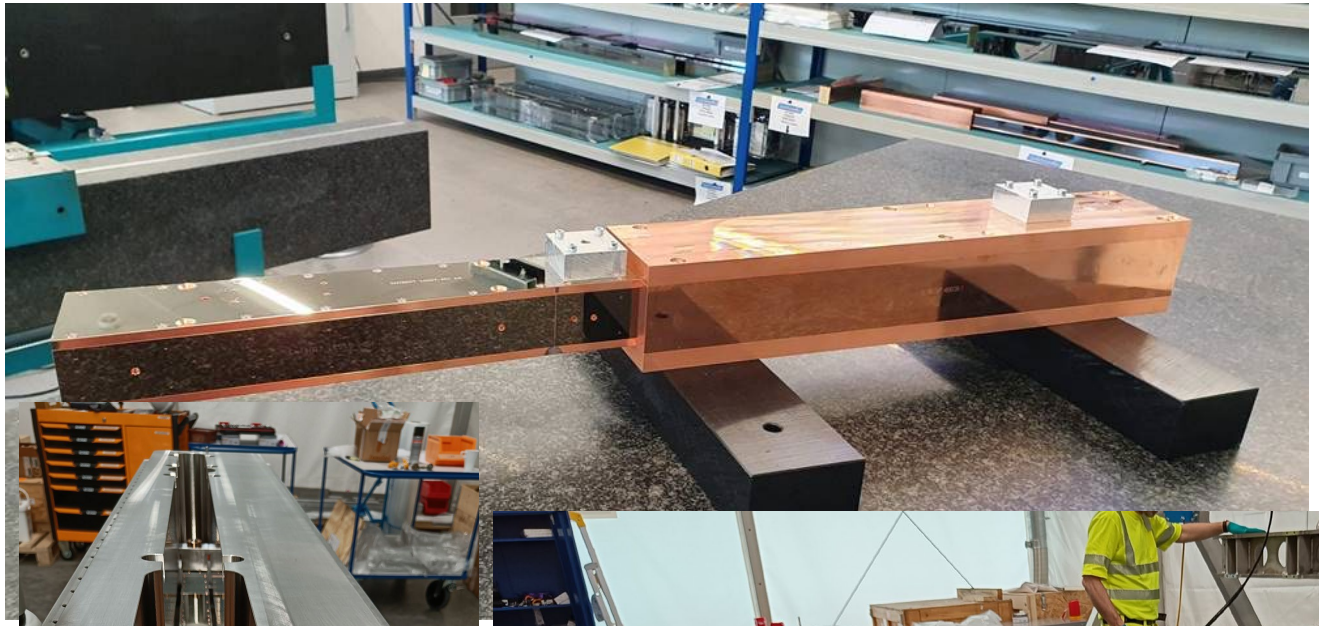
- Designed and tested in TUM
- All installed except FRH (11.5m)

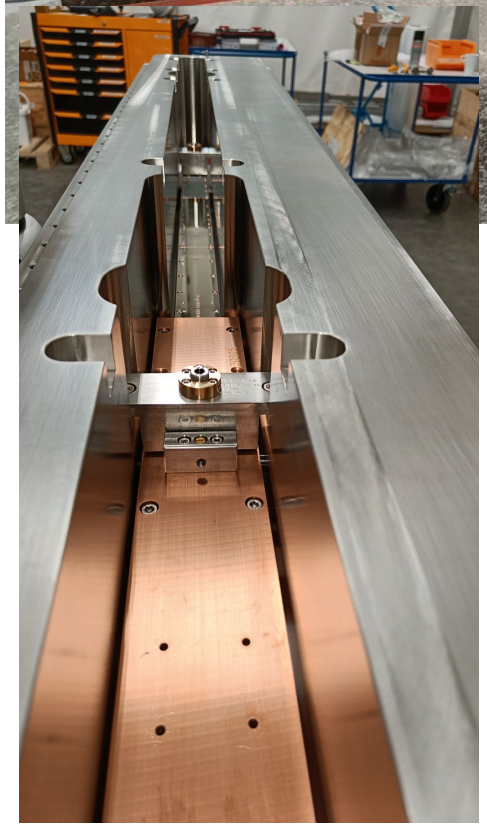
T0 chopper

- The ODIN T0 chopper will be a duplicate of DREAM´s, already delivered at ESS
- It willl be assembled by ESS Chopper group
- Mitigation installed in place (vacuum vessel). Instrument could start hot commisioning without T0 chopper



NBOA



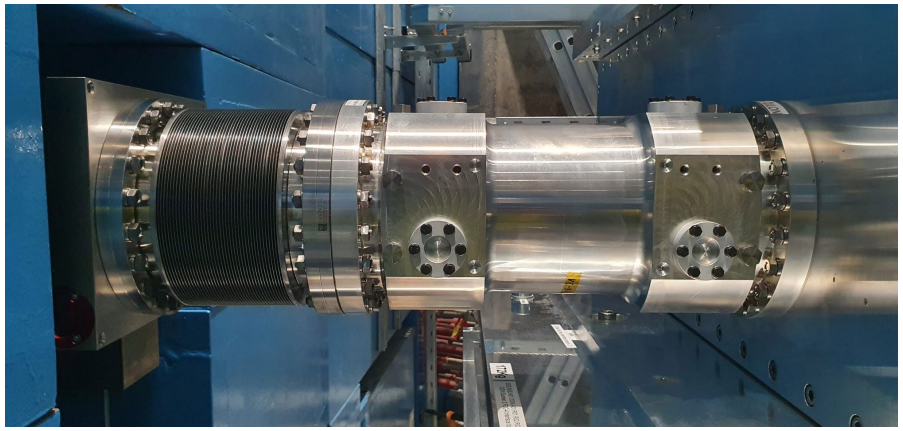


- Installation complete

Neutron guides

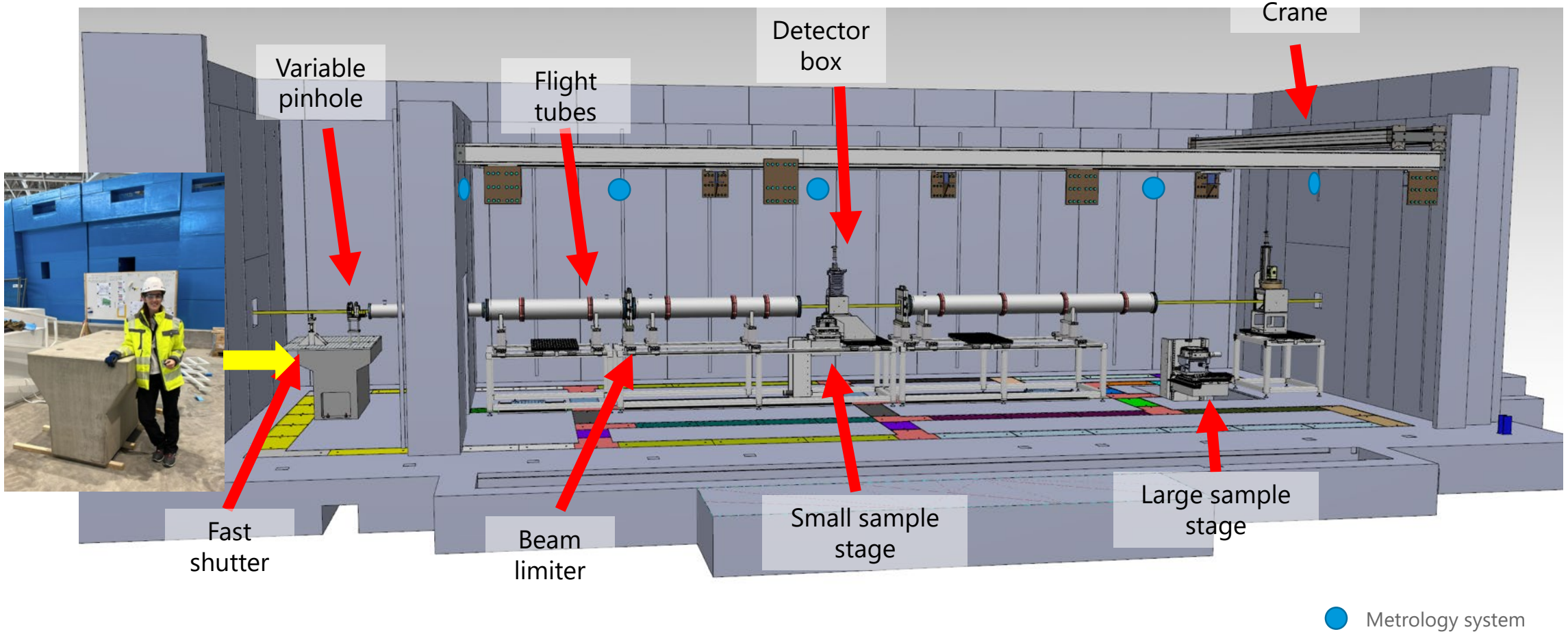
Installed guides in bunker

Interface with bunker insert



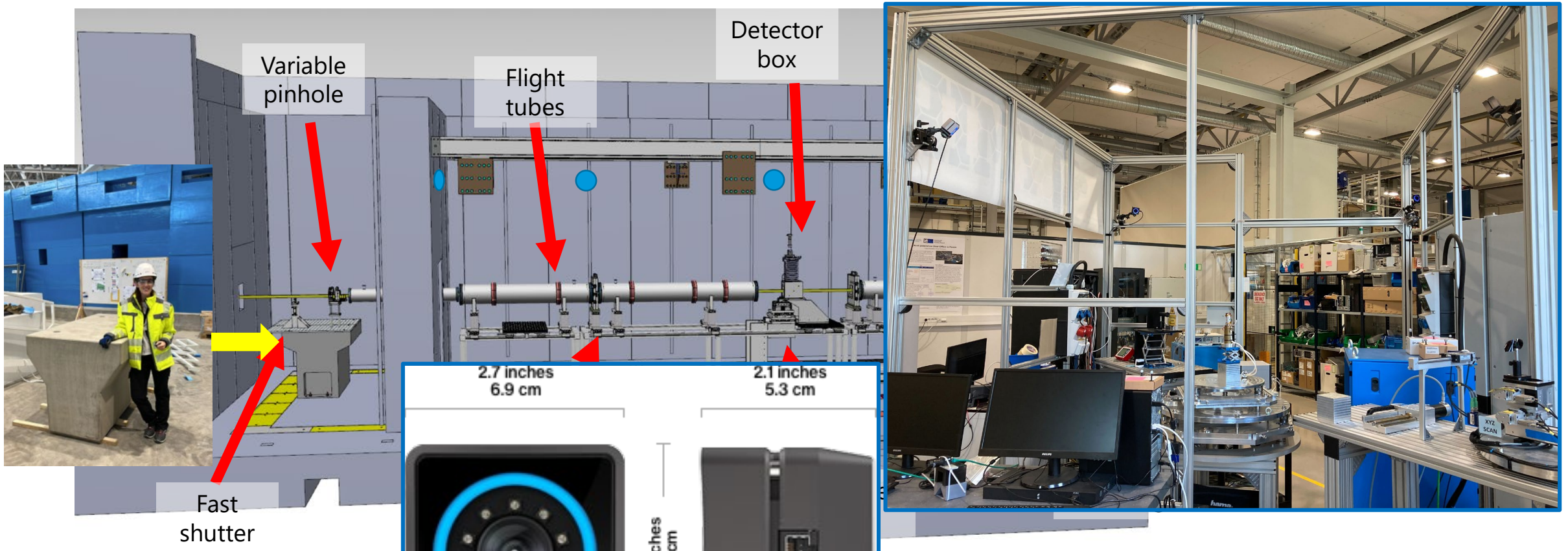
Installed guides ex bunker

Cave interior



Last components delivered

Cave interior



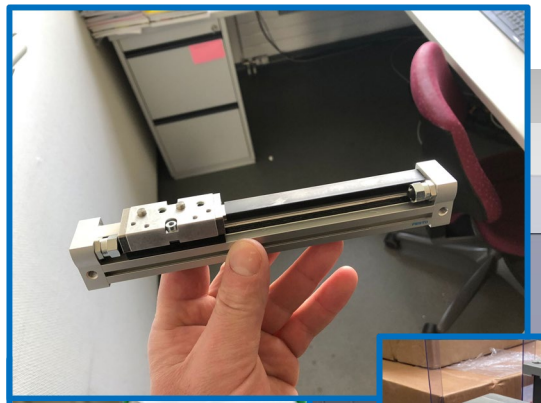
Metrology system

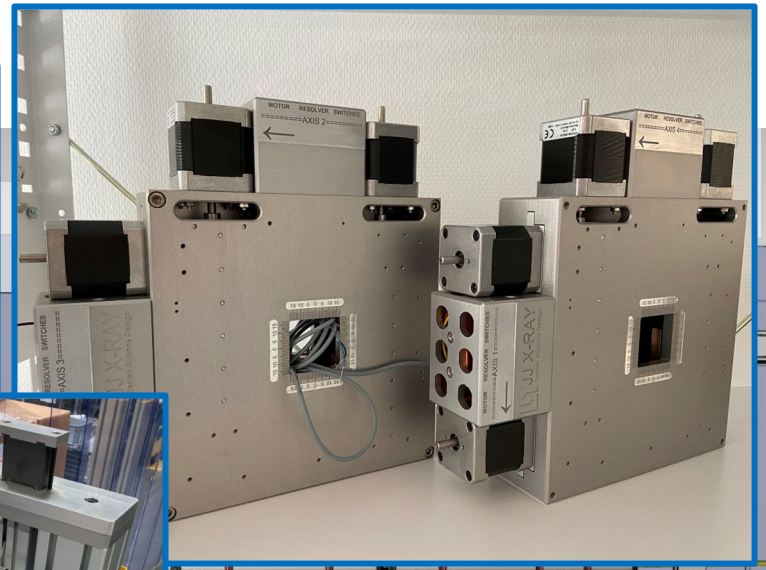
All components deliv

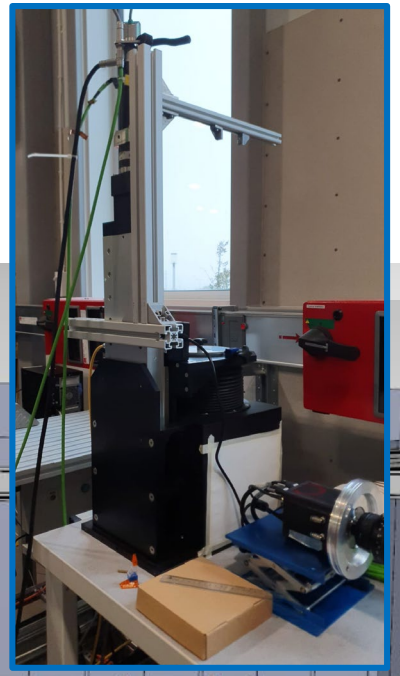
Metrology

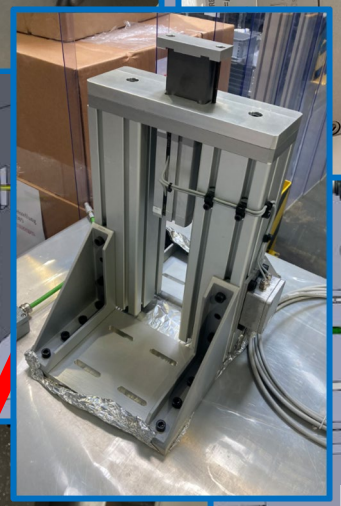
- Eight Optitrack Camera Prime 13
- Possible to achieve 30microns spatial resolution

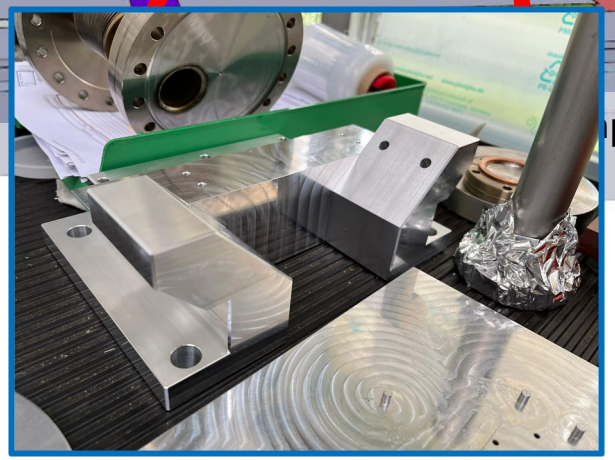
Cave interior







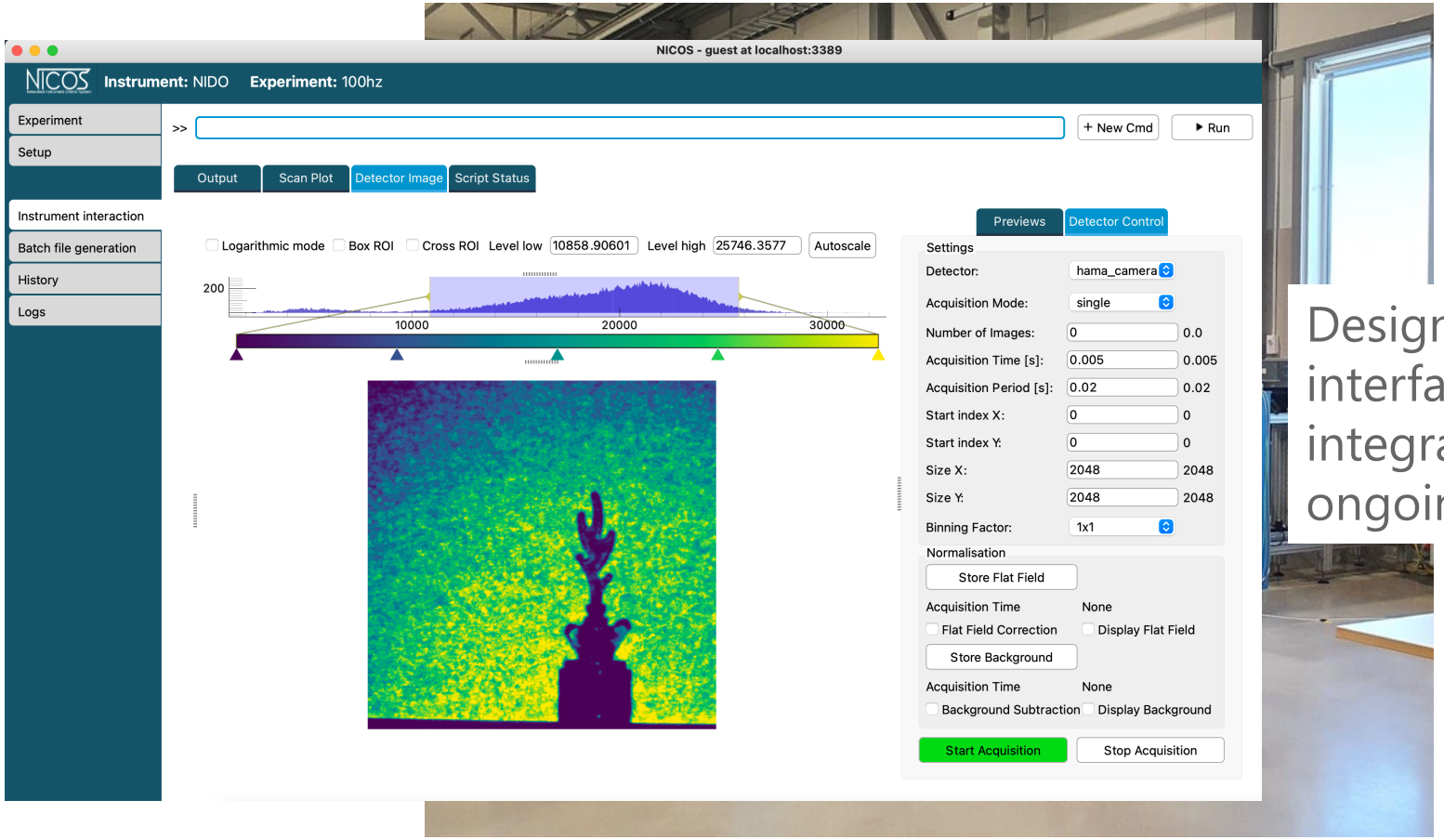




White beam detectors

❖WB detector has been purchased and received, and has is being integrated in YMIR

White beam detectors



Design of ODIN interface and integration into EPICS ongoing

- WB detector (same as for ODIN) has been purchased and received, and has been integrated in YMIR
- Camera for ODIN already at ESS (arrived this week)

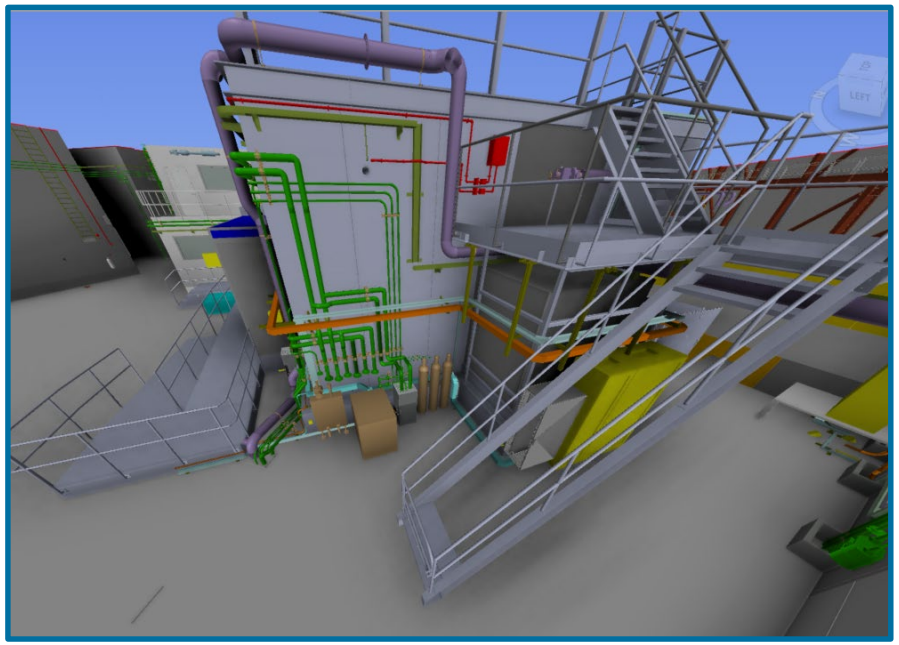
ToF detector

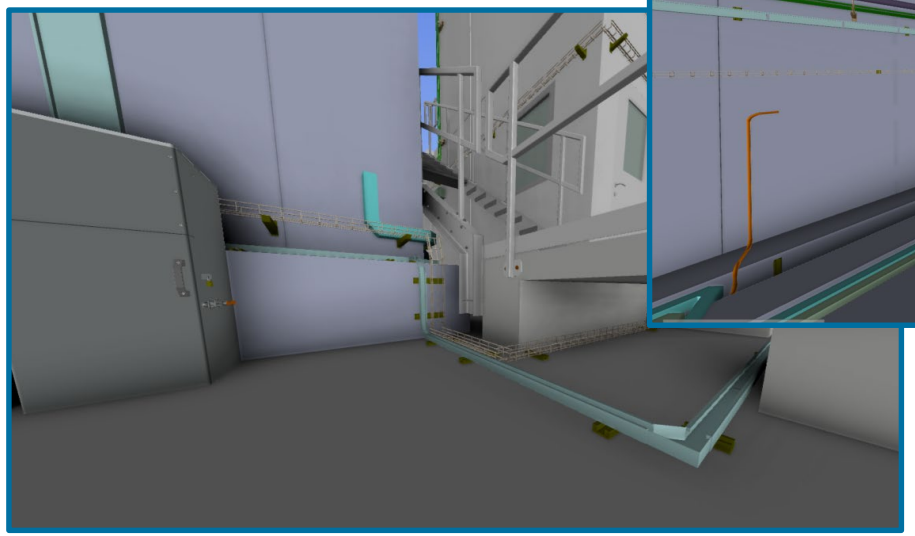
- Current selection for day-1 detector: TPX3CAM
- Agreement with ESS management for additional fundings at/shortly after BOT to purchase TPX4CAM (or tiled TPX3CAM) to be used as primary detector during accelerator ramp-up

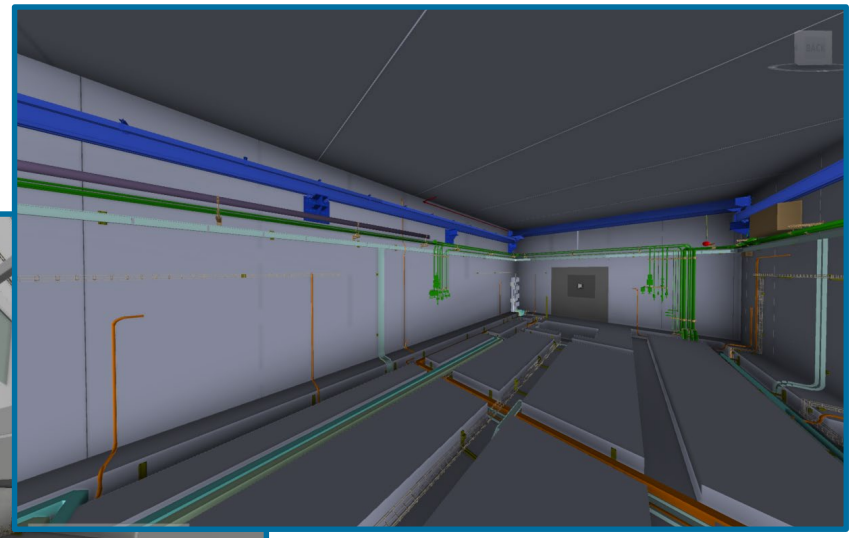
Infrastructure

ODIN belongs to two „turn-key“ ESS common projects for infrastructure:

- CEP (Common Electrical Project): design, procurement and installation of electric needs
  - CDR in November 2023. Installation ongoing
- CUP (Common Utilities Project): design, procurement and installation of utilities needs (gases, cooling water, pneumatics)
  - CDR complete. Installation ongoing







Installation

Lessons learned and future challenges

Lessons learned

- Very good experience with ESS teams: Logistics, Rigging, Safety (OHS), Spatial integration and SAM
- Support of NSS technician is very important during installation tasks: hot work and other unexpected tasks where special permits are needed
- Working with suppliers used to move around in ESS environment and proactive helps a lot (Mshield, Axilon/SNAG): they know the procedures, are used to deal with ESS rules and willing to collaborate

Challenges

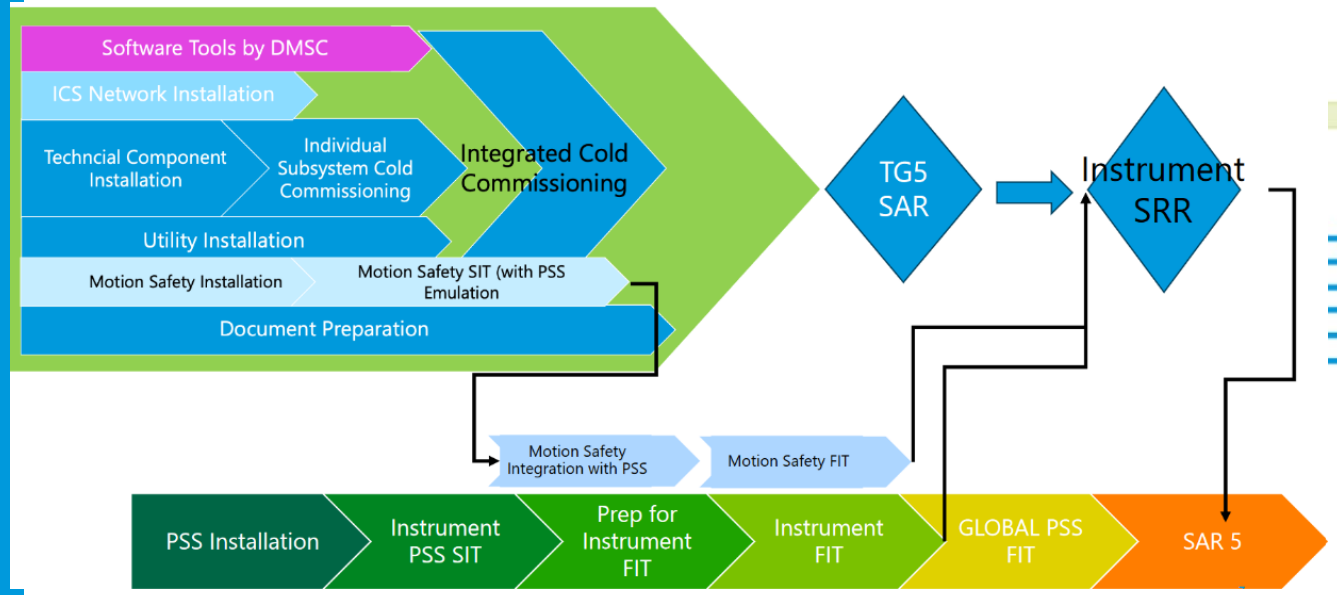
- Installation of the cave
  - The installation is delayed (ends May/June2023) pushing TG5
  - FAT and SAT of structural parts: not clear the ESS counterpart or team responsible for that. TUM prepared all protocols pushing MIRROTRON to produce them too
  - Working with MIRROTRON is a major challenge for the rest of the cave manufacturing and installation
- Little to no power invested in the instrument scientists to act in case of urgency (e.g. procurement procedures too clunky and no budgetary power)

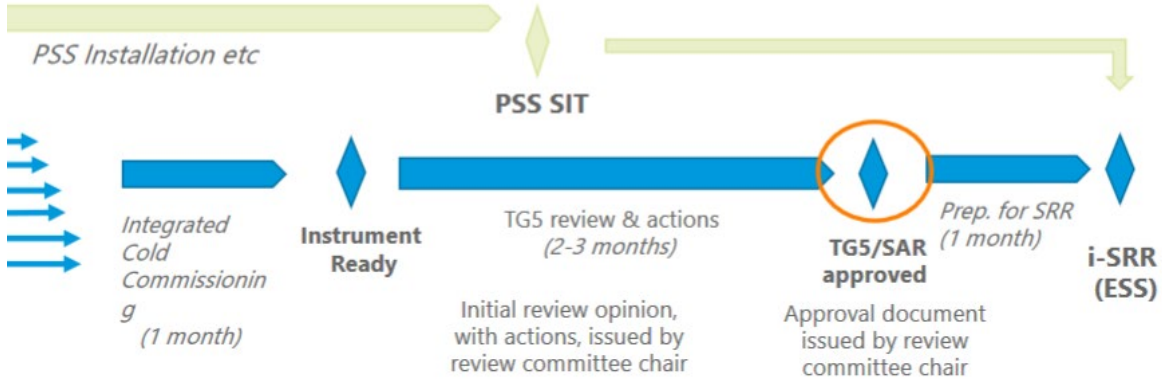
Status of ODIN instrument: Summary

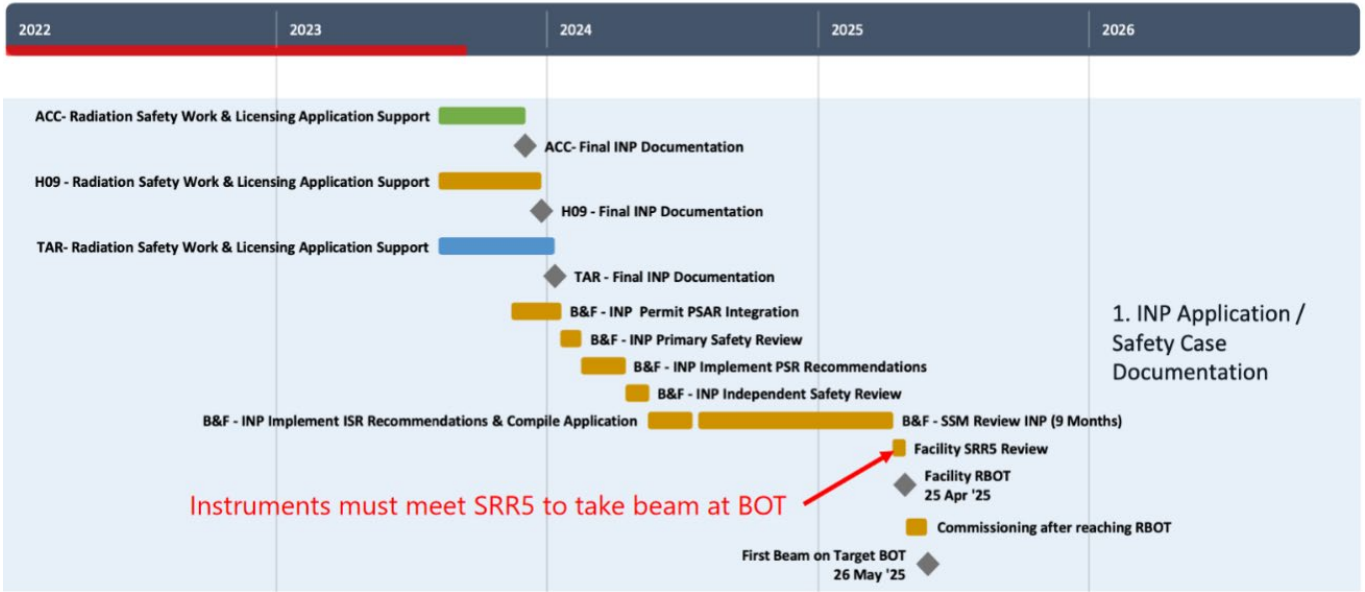
- Installation of ODIN has not progressed much since summer, mostly due to issues with cave (except CEP and CUP)
- Great experience overcoming the grouting issue late last year. The remediation activities were organized and executed timely and really well.
- PSS design & Hazard Analysis: PSS design ongoing. IHA updated submitted.
- T0 chopper will be integrated by ESS based on ESS prototype model. Delivery: Q2 2025. Mitigation in place to complete installation.

- Final TG3 completed last week
- Installation driven by the cave (delayed). TG5 now planned to late 2024/beginning 2025
- Big uncertainties (imho) that this timeline is realistic. Cold commissioning activities squeezed in ~1 month and dependent on best case scenarios for all relating activities
- Loss of staff is a big risk for the project

Road to BoT


Software Tools by DMSC
ICS Network Installation
Techncial Component Installation
Individual Subsystem Cold Commissioning
Integrated Cold Commissioning
Utility Installation
Motion Safety Installation
Motion Safety SIT (with PSS Emulation
Document Preparation
TG5 SAR
Instrument SRR
Motion Safety Integration with PSS
Motion Safety FIT
PSS Installation
Instrument PSS SIT
Prep for Instrument FIT
Instrument FIT
GLOBAL PSS FIT
SAR 5


PSS Installation etc
PSS SIT
Integrated Cold Commissioning (1 month)
Instrument Ready
TG5 review & actions (2-3 months)
Initial review opinion, with actions, issued by review committee chair
TG5/SAR approved
Approval document issued by review committee chair
Prep. for SRR (1 month)
i-SRR (ESS)


2022
2023
2024
2025
2026
ACC- Radiation Safety Work & Licensing Application Support
ACC- Final INP Documentation
H09 - Radiation Safety Work & Licensing Application Support
H09 - Final INP Documentation
TAR- Radiation Safety Work & Licensing Application Support
TAR - Final INP Documentation
B&F - INP Permit PSAR Integration
B&F - INP Primary Safety Review
B&F - INP Implement PSR Recommendations
B&F - INP Independent Safety Review
B&F - INP Implement ISR Recommendations & Compile Application
B&F - SSM Review INP (9 Months)
Facility SRR5 Review
Facility RBOT 25 Apr '25
Commissioning after reaching RBOT
First Beam on Target BOT 26 May '25
Instruments must meet SRR5 to take beam at BOT
1. INP Application / Safety Case Documentation

How to manufacture a plate (the ESS way)

Manuel Morgano 2024-Feb-28 14:13 +0100

ESS-5283209.2_1.0.pdf *(1.06 MB)*

Request requires approval. 2024-Feb-28 14:13 +0100

DETAILS

Request created
2024-Feb-28 14:13 +0100

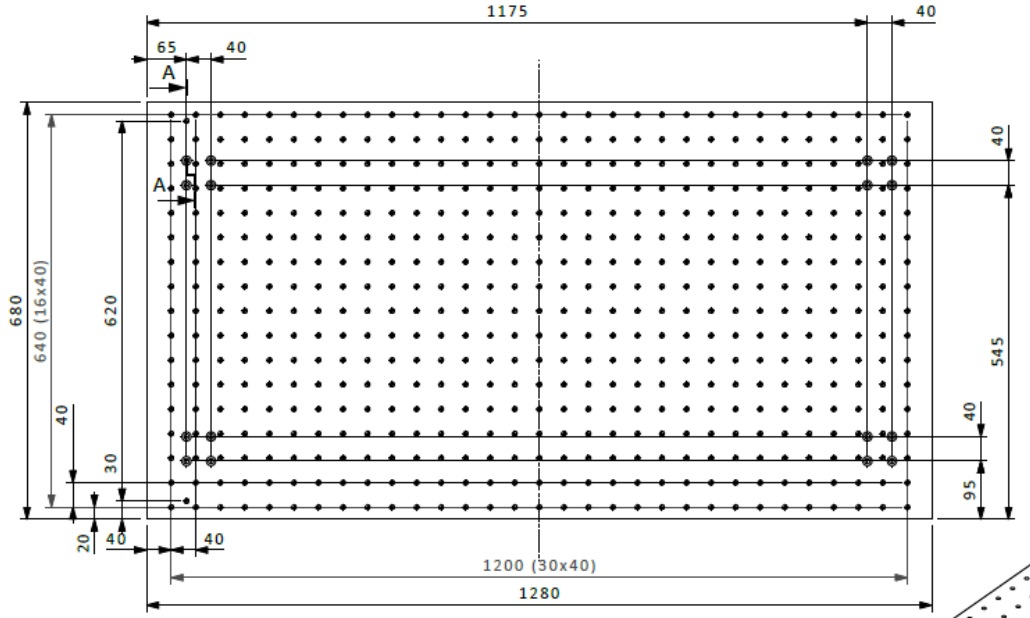
Type of request
Manufacturing of new component/s

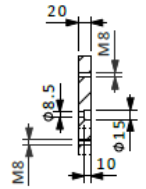
Mechanical class
Not classified

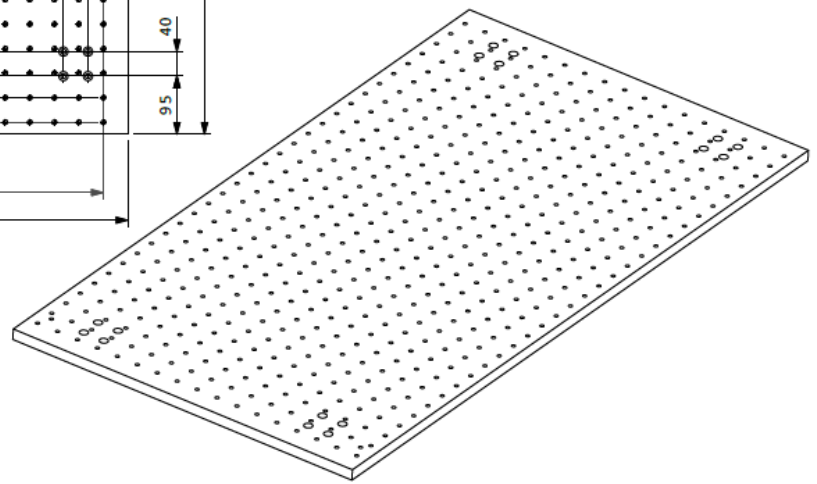
Quantity
1

PCC/OCC Code
82605004 - IC - Instr. #3 ODIN PSI

Desired due date
2024-Mar-08







Farblos eloxiert

Note:
General tolerances
Linear Dimensions, Forms and Position: ISO 2768-mK
Chamfers, Radii and Angular Dim's: ISO 2768-vK

+0.3 +0.1 -0.1 -0.2

Item No.	Part Number	Qty	CAD Number	Title	Description	Material	Material std	Material cert.
1		1	ESS-5283209	Rasterplatte M8 Endposition	-	HABA ALU6082	-	-

General Tolerances: See note | Surface Roughness: Ra 3,2 | Edges: See note

Rasterplatte M8 Endposition

Document Type: Machining drawing | Mass [g]: -N/A-
Drawing Type: Machining | Standards: ISO 128, ISO 14405
Design Maturity: A | Integration Maturity: | Document Status: Release | Change Order:
Drawn by: bengtjonsson | Reviewed by: | Approved by:
Drawing Number: ESS-5283209.2 | Revision: 1.0 | Date of Issue: 2024-02-02
Size: A2 | Scale: 1:1 | Sheet: 1/1

NOT FOR MANUFACTURING

How to manufacture a plate (the ESS way)

Your request status changed to: **Request approved** 2024-Mar-04 08:09 +0100

[redacted] approved this request 2024-Mar-04 08:09 +0100

Manuel Morgano 2024-Feb-29 09:46 +0100

Hi!

The drawing is released. Do you require level maturity P for this, or since it is a very simple component, the status it is now is sufficient?

Given the change in approval procedure schedule for today, I'd be very happy if we could keep it like this, otherwise it will be delayed significantly...

The STEP file is attached.

ESS-5283209_1.0.stp

[redacted] 2024-Feb-29 08:31 +0100

Manuel Morgano Please provide reviewed and approved drawings and a STEP-file.

[redacted] approved this request 2024-Feb-28 14:22 +0100

Your request status changed to: **Waiting for material and/or components** 1 week ago 15:03

Manuel Morgano 1 week ago 09:44

Hi [redacted] "normal" Aluminium is fine for me, there are no crazy requirements in terms of parallelism and tolerances (it's just an interface plate after all).

Meanwhile, we are trying to release the drawing, but the engineer is off for the next two weeks. We are still trying to get some help for the release from CAD support, but I would still appreciate if we can move forward meanwhile.

[redacted] 1 week ago 06:52

Miguel Campos Ferro I'm waiting for a quotation from HABA regarding the aluminium plate. If you can accept "normal" AW 6082T6/T651 I think we can get this done faster. There might however be some uncertainty regarding the form stability of the material as compared to the HABA version. But as you drawing does not include any tight tolerances for the flatness and parallelism I feel confident that we can acheive the tolerances regardsless of the material.

I'm also waiting for a quotation for a Thorlabs base plate of custom size.

I would also appreciate if you can attach the released drawing with correct maturity.

Manuel Morgano 2024-Mar-28 10:07 +0100

Hi [redacted]

any idea about the status of the manufacturing? thanks!

How to manufacture a plate (the ESS way)

[redacted] 6 days ago 10:05 LATEST **4th of April**

Hello Manuel Morgano ,

my apologizes , I was not aware that even in CHESS , you could not see the pdf under ESS-5283209.

I attach it here.

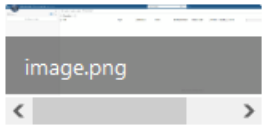
Have a nice day

[redacted]

ESS-5283209.2_2.0-1.pdf

Manuel Morgano 6 days ago 09:36

Hi [redacted] as I said, I don't have access to CATIA, therefore I cannot download it (see screenshot).



Since I assume you guys have access to it, could you download it instead. That would be really helpful.

Thanks a lot

Manuel

[redacted] 6 days ago 09:08

Please Manuel Morgano , download it from chess and attach it to this request.

thanks

[redacted]

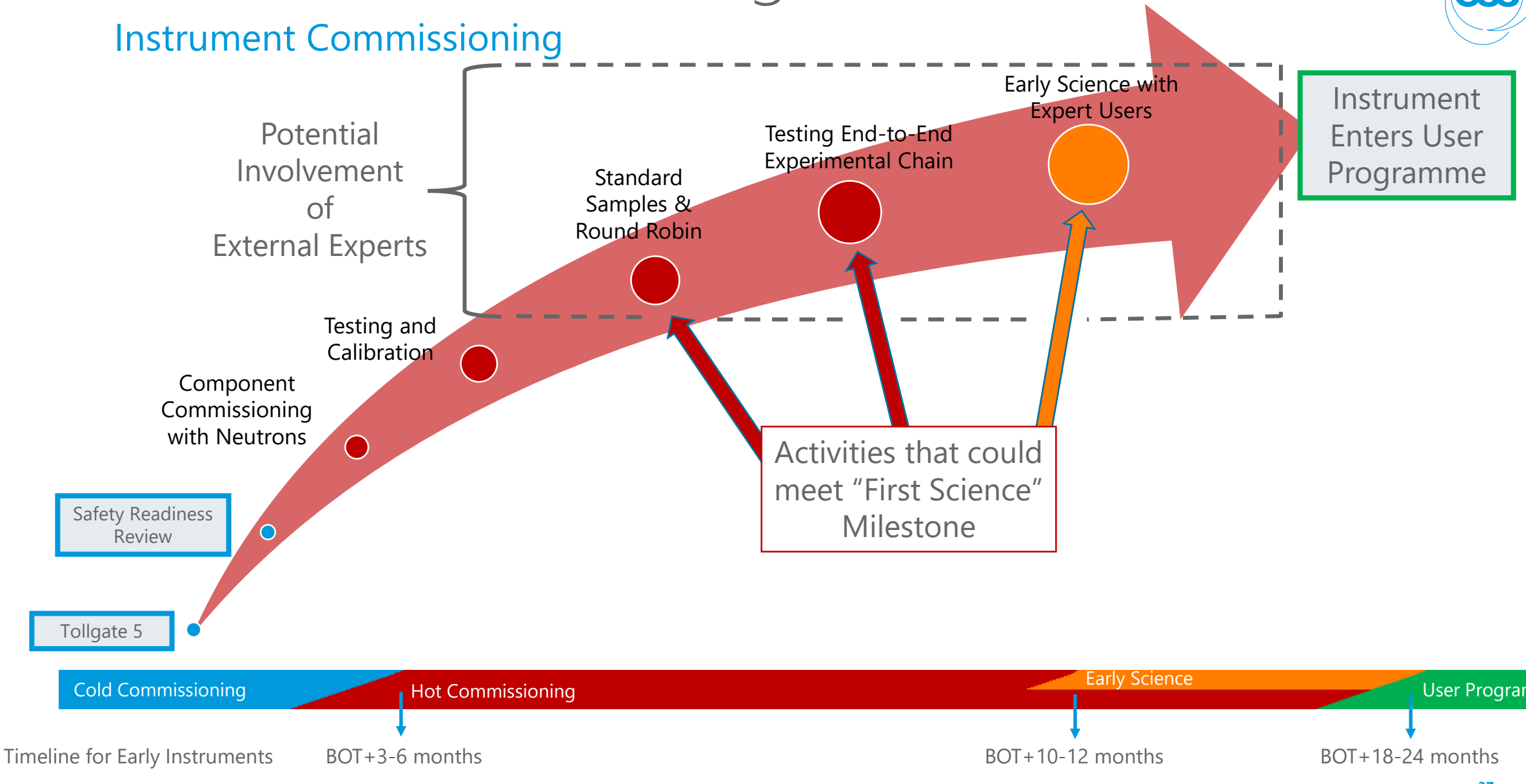
Manuel Morgano 6 days ago 09:00

Hi [redacted] we managed to change the LoM to the correct one. I don't have access to CATIA myself, so I cannot attach the drawing, but you can easily download it under the chess number ESS-5283209.

Thanks!

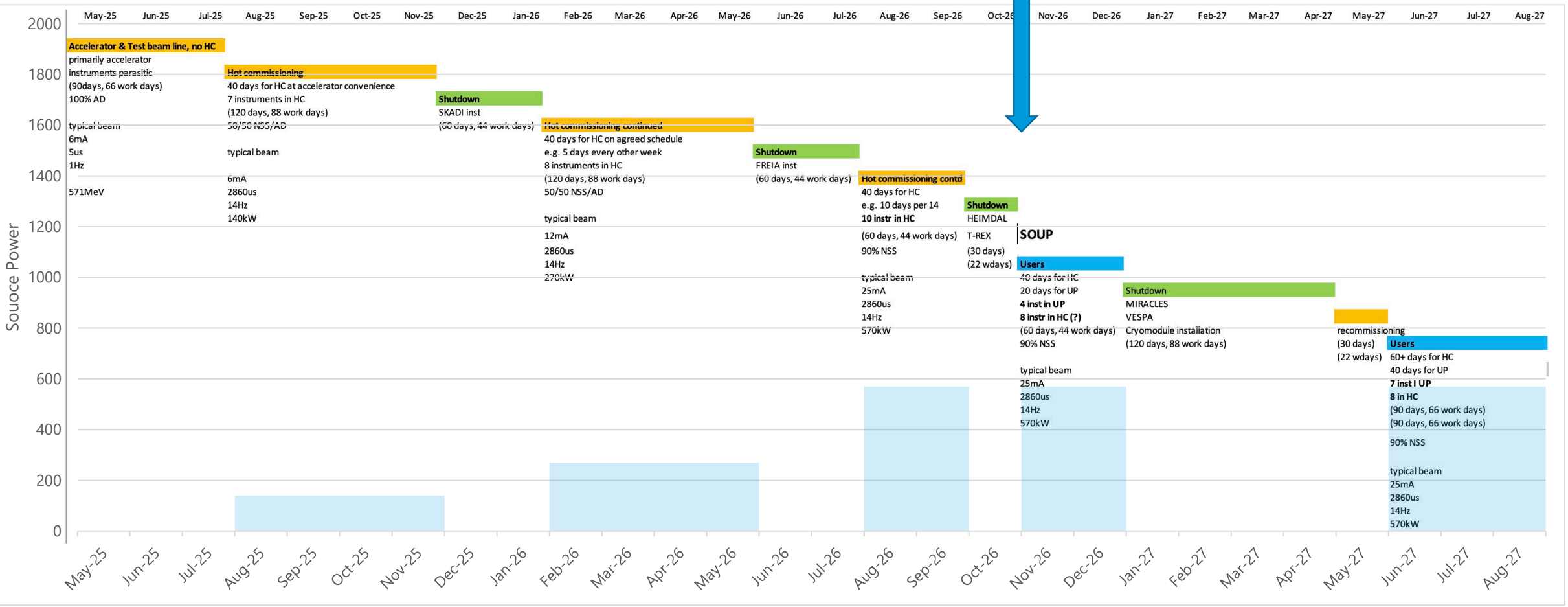
Towards the User Programme

Instrument Commissioning



Ramp Up

Aim is first users 18 months after BOT



570 kW @ 571 MeV & Mk I Moderator ~= 200 kW @ 2GeV -> 0.1 x 2MW flux

https://confluence.esss.lu.se/pages/viewpage.action?spaceKey=OPS&title=Operation+Parameters+Accelerator%2C+Target%2C+NSS+during+start-up

Questions?

Dinner tonight

Hjulet mat och vin @18:30