

# ODIN: Optical and Diffraction Imaging with Neutrons at the ESS

STAP – October 2022

# Agenda



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



# ODIN team

## ODIN construction core team

Aureliano Tartaglione  
*ODIN Scientist (TUM)*



Manuel Morgano  
*ODIN Scientist (PSI/ESS)*



Elbio Calzada  
*ODIN Lead Engineer (TUM)*



Markus Strobl  
*Head of Imaging group (PSI)*



Virginia Martinez Monge  
*ODIN Installation Engineer (TUM)*



Jan Hovind  
*Technician of Imaging Group (PSI)*



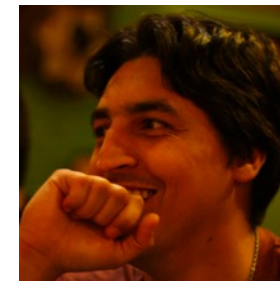
Michael Schulz  
*Head of Imaging group (TUM)*



Robin Woracek  
*Instrument Class Coordinator (ESS)*

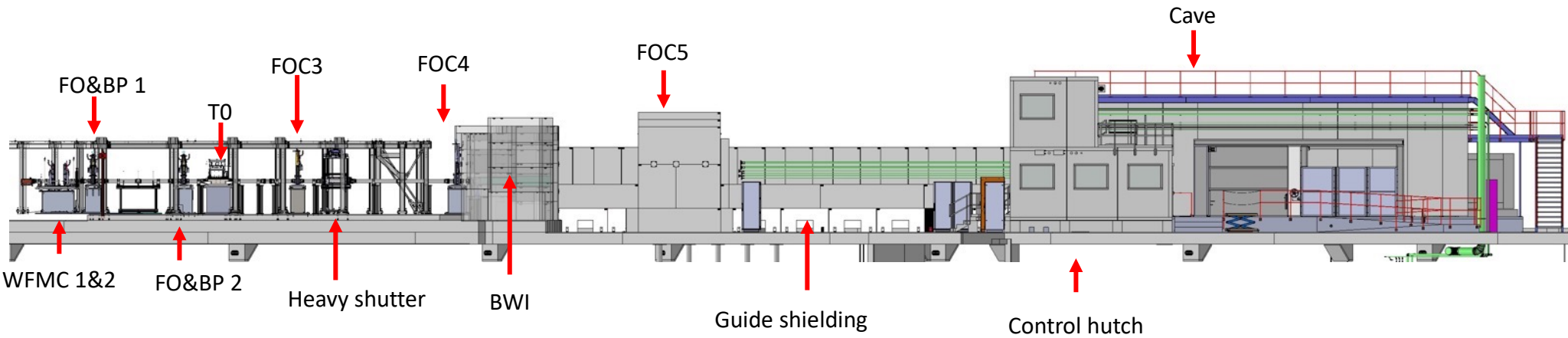
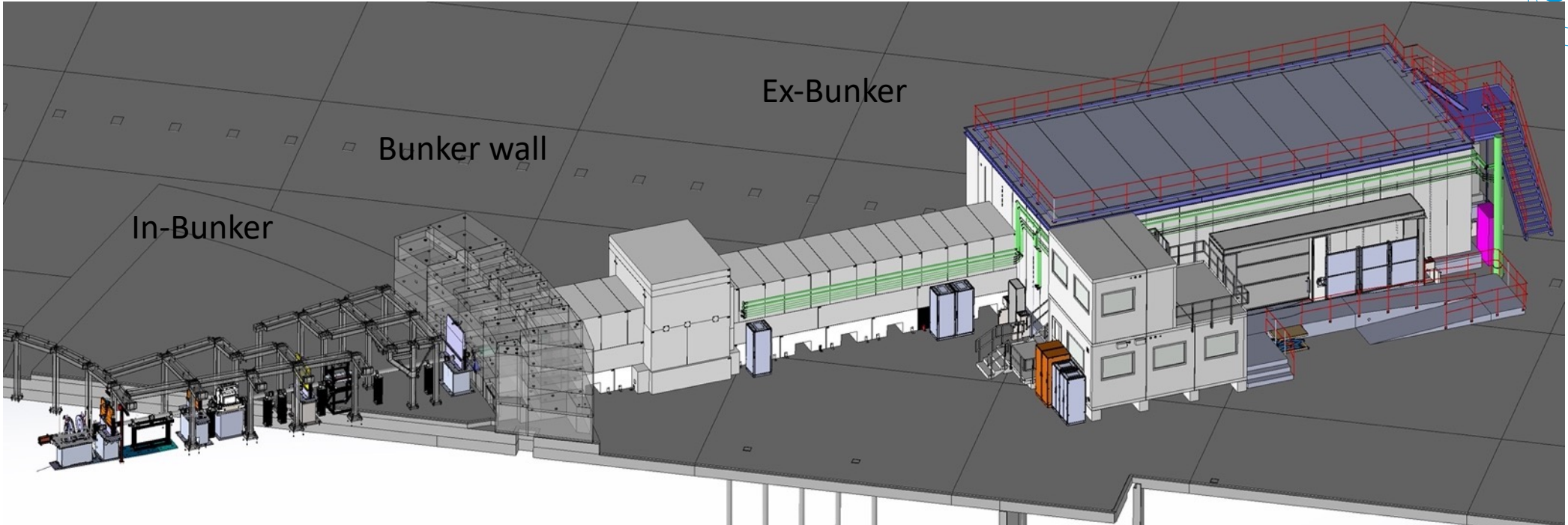


Søren Schmidt  
*Instrument Data Scientist for ODIN, BEER & TBL (ESS)*



Alexandre Gonçalves Gerck  
*MCA Engineer for ODIN (ESS)*

# ODIN overview



# ODIN overview



	Task no.	TA ID	Deliverables – Project Results	Delivery date	Status (milestones)
TUM	WU 03	2-8	Heavy Shutter*	Dec 2022	On site. SAT ongoing
TUM	WU 04	9-15	T0 Chopper*	Oct 2023	Contract with ESS signed (CR approved)
TUM	WU 05	16-25	Choppers*	Jan 2023	Bottom housing delivered and installed FAT of electronics ongoing
TUM	WU 08	26-32	Motion Control and Electric Engineering*	Dec 2022	Detail design ongoing Early procurement done First prototype FAT ongoing
TUM	WU 11		Shielding*	-	-
TUM	WU 11.1	33-38	Guide Shielding (common shielding project)	Jan 2023	Delivery & Installation ongoing
TUM	WU 11.2	39-50	Cave Shielding *	May 2022 – Apr 2023	Baseslab installed and SAT done. Manufacturing of precasted elements ongoing
TUM	WU 12		Instrument Infrastructure	-	-
TUM		51-56	Control Hutch (TUM) *	Feb/Mar 2022	Installed
TUM			Sample preparation area & storage (TUM) *	Feb/Mar 2022	Installed
TUM/PSI			Power distribution (CEP)	Apr 2023	Detail design on hold
TUM/PSI			Utilities supplies (CUP)	Apr 2023	Design ongoing
TUM	AO01	-	Bunker Wall Feedthrough	Apr 2022	Installed. SAT approved
TUM	AO02	-	Chopper supplements	Nov2021 – Apr2022	Delivered and installed
TUM/PSI		<b>59</b>	<b>FINAL TG3</b>	<b>Dec22/Jan23</b>	<b>Documents ongoing</b>
PSI	02.1	1-4	NBOA	Q4 2021	On site. Installation scheduled Dec 2022
PSI	02.2	5-16	Neutron transport system (Guides)	Nov 2021 – Mar 2022	On site. In-Bunker installed
PSI	06	17-32	Cave interior #	Dec 2021 – Mar 2022	subTG3 Complete. Manufacturing
PSI	09	33-43	White beam detectors	Q2 2023	Procured
PSI	10	44-48	ToF detector	Q2 2023	Procured

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

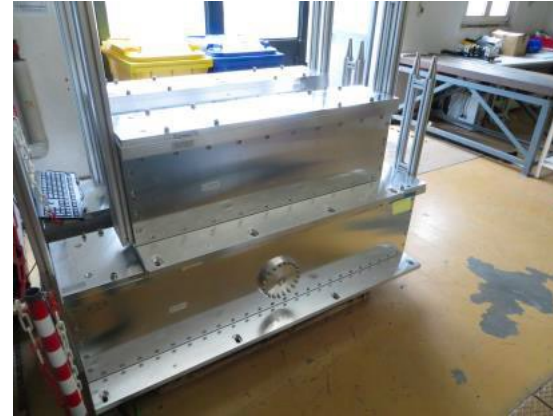
\* Item agreed to be procured by ESS for TUM

# Heavy shutter



- SAT ongoing with PSS and MCA interfaces
- Final installation scheduled March 2023

# Disk choppers



- All chopper manufacture complete
- Delivery of bottom part of housing completed
- Except FOC1 and WFMC, all bottom housing installed
- Problem: AIRBUS is finalizing FAT and solving problems found in electronics (noise)
- Delivery delayed to January 2022

# Motion Control



## MC Cabinets

- Prototype for the Optical Cave manufacture complete. FAT ongoing
- Four cabinets for experimental cave. All components and connectors early procured
- Finalization of Final TG3 design documents ongoing.

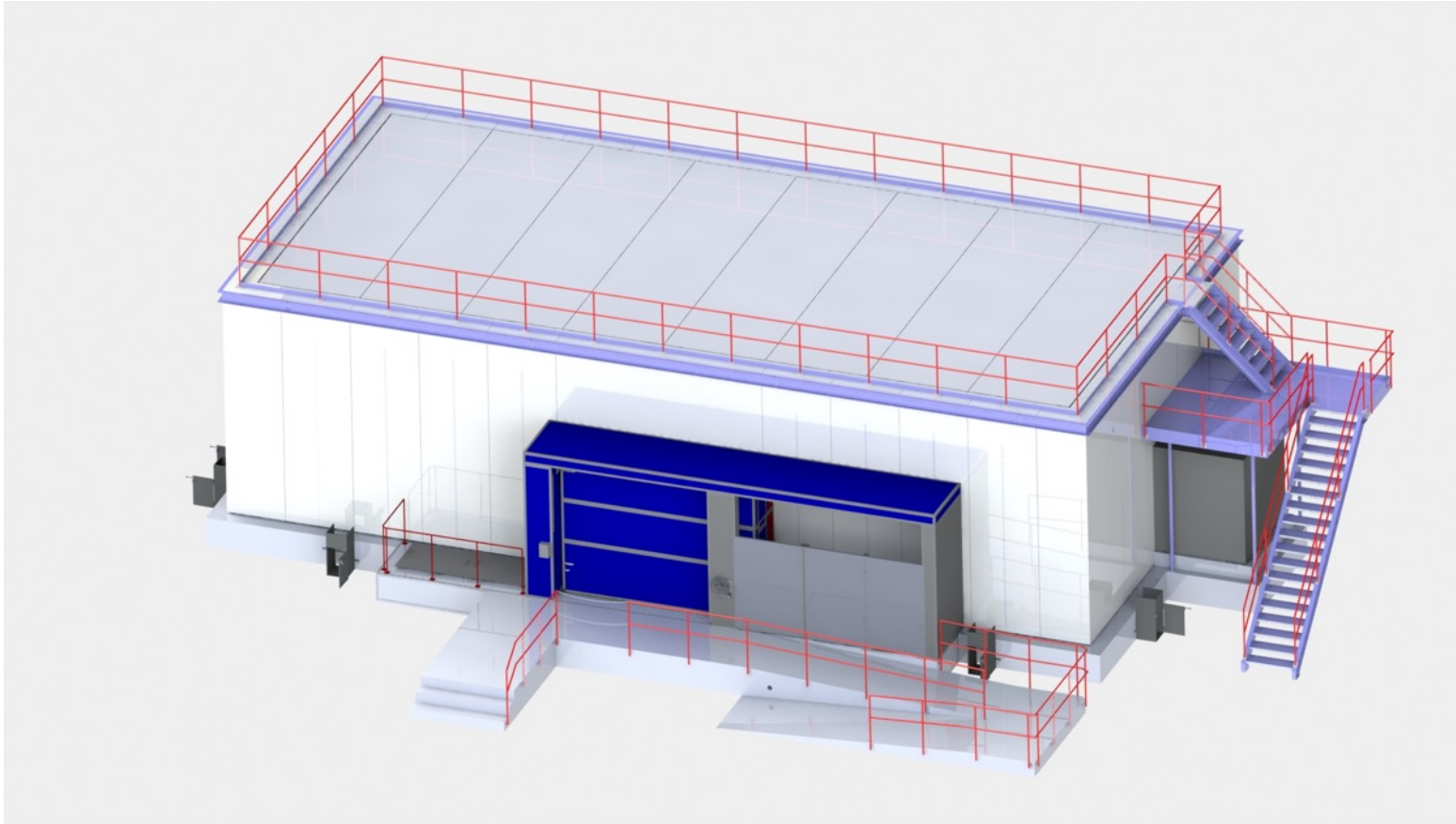


# Guide shielding (Common project)

- Manufacturing completed
- Delivery and installation ongoing

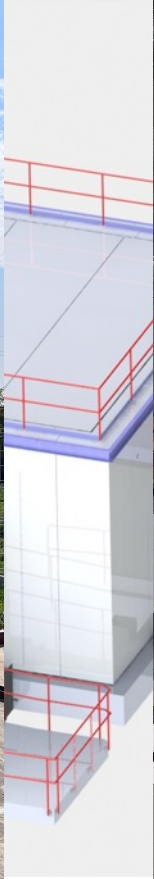


# Cave shielding



- Detail design Montecarlo simulation report released
- Installation of baseslab complete and SAT done
- Manufacture of precasted elements ongoing
- Installation start delayed: now scheduled to happen in January 2023

# Cave shielding



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January

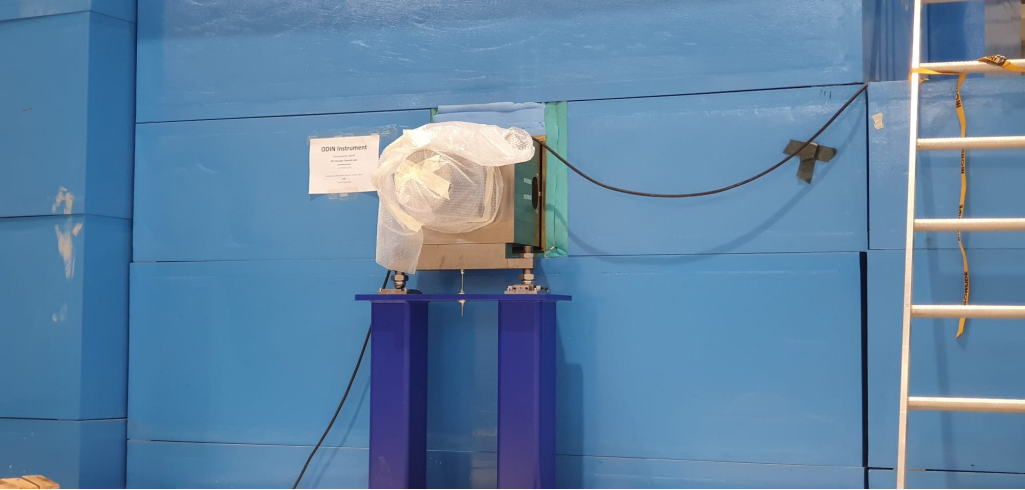
# Control hut

- Structural installation complete
- Electrical installation resumed after six months: FBS labelling of cables (ESS) was missing
- Complete SAT won't be possible until final electrical power connection is in place, only structural and inspection SAT.
- Final electrical connectivity is ESS scope, but will only happen in 2023 as part of CEP installation (delayed).



# Bunker wall insert

- Installation and SAT complete



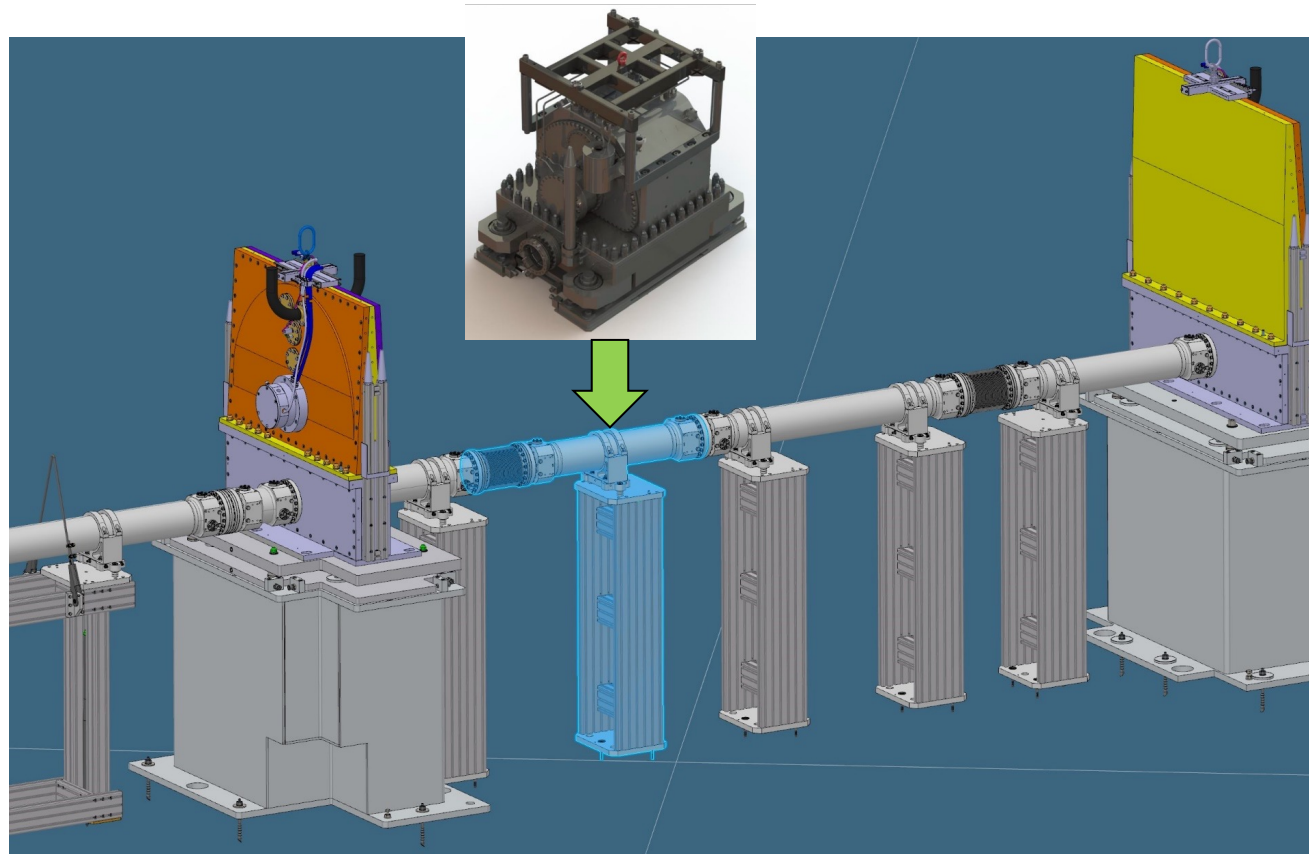
# Chopper supplements

- All components and tools are in Lund
- All installed except FRH (11.5m)
- Requirement of electrical conductivity was changed to „recomendation“. It came after CDR and the instrument is now looking for solutions. Solution proposed by ESS (epoxy grouting) wasn't satisfactory in other instrument.

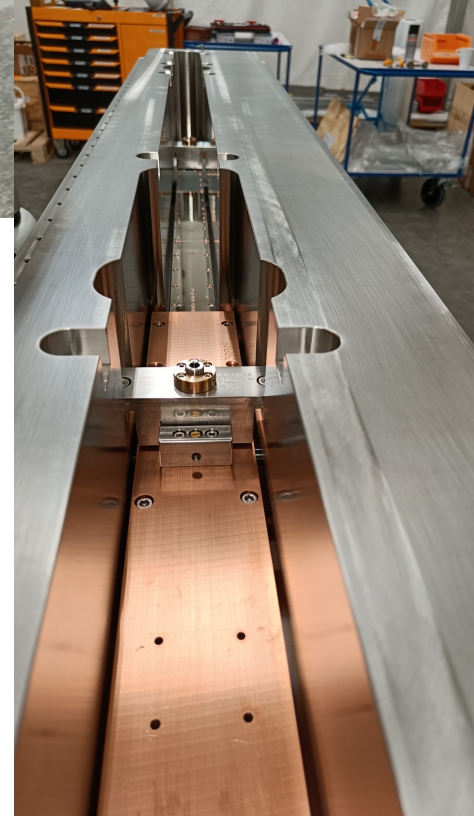
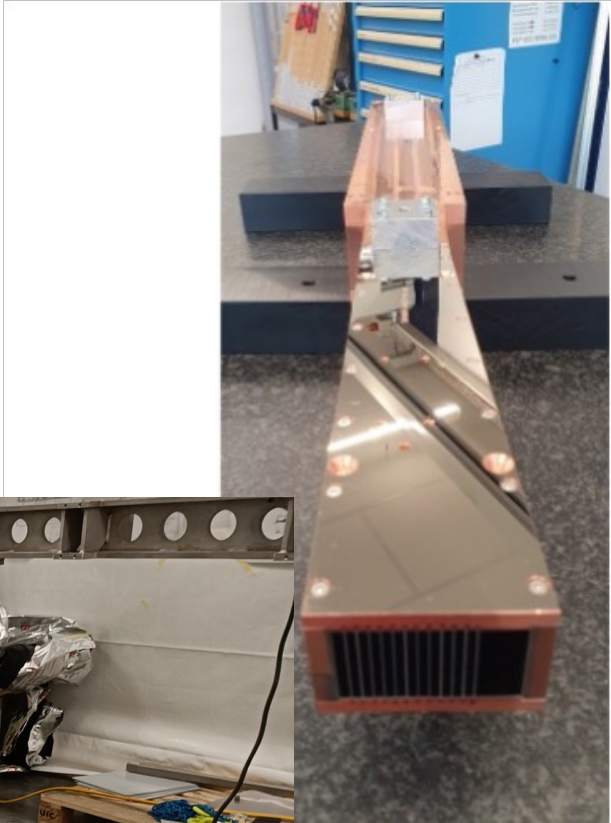


# T0 chopper

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



# NBOA

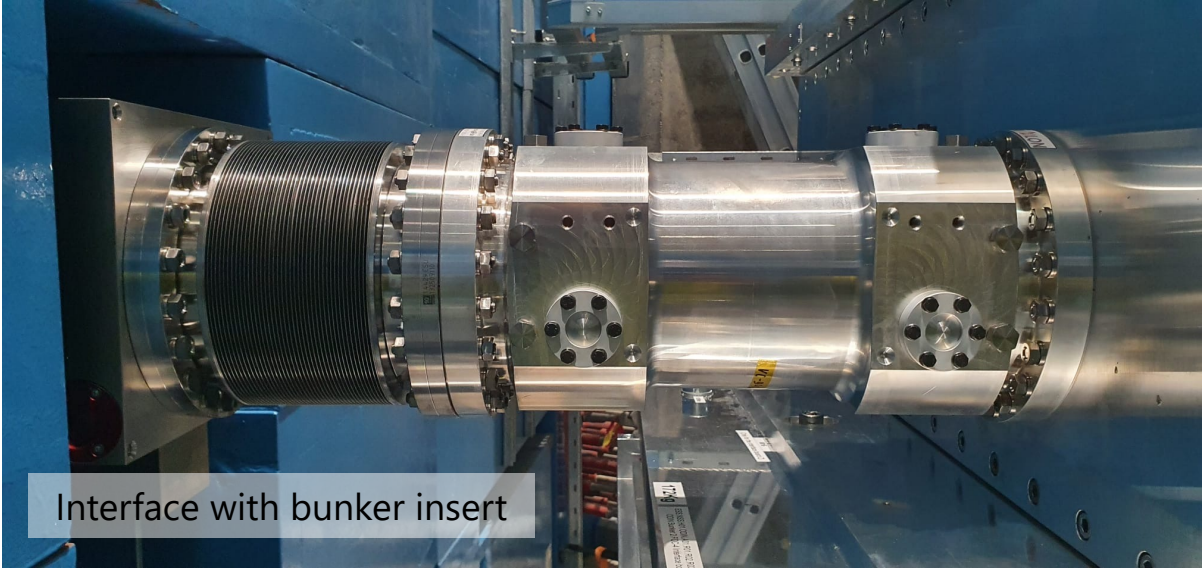


Integrated in the NBPI

# Neutron guides



Installed guides in bunker



Interface with bunker insert

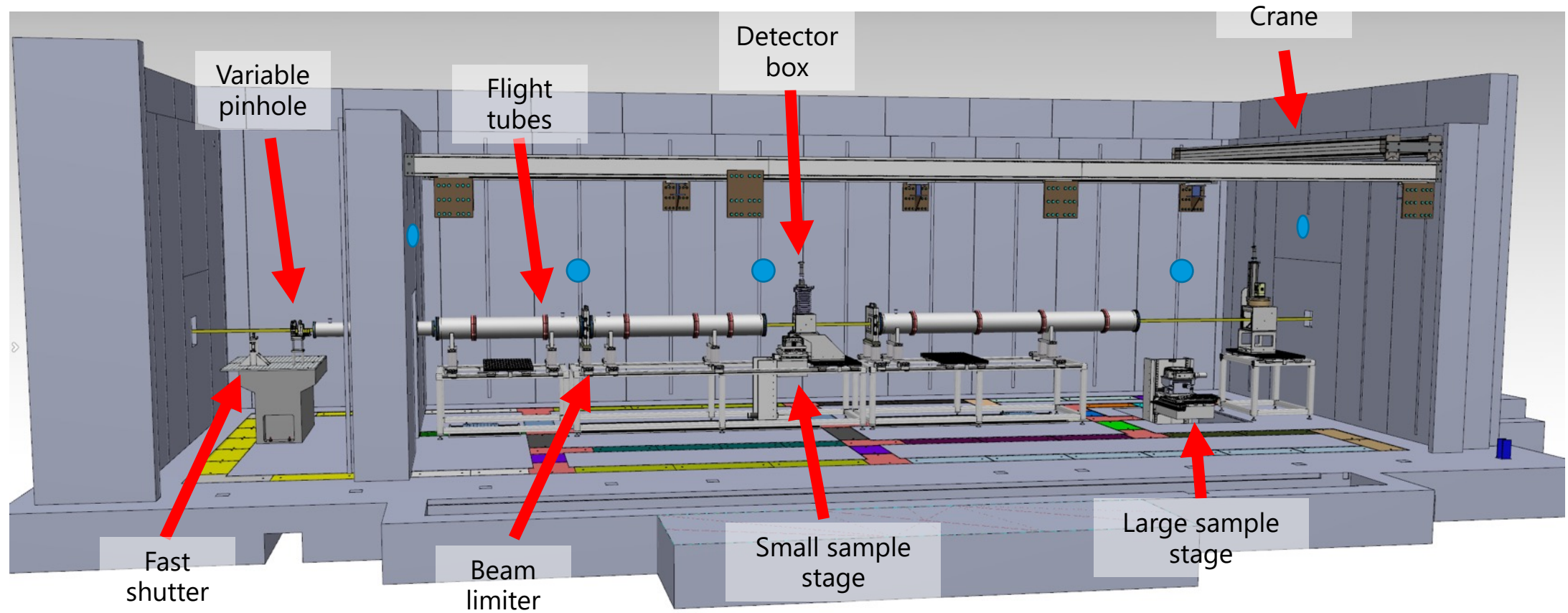


Neutron guides @ RATS



Remote handling tests as part of the FAT

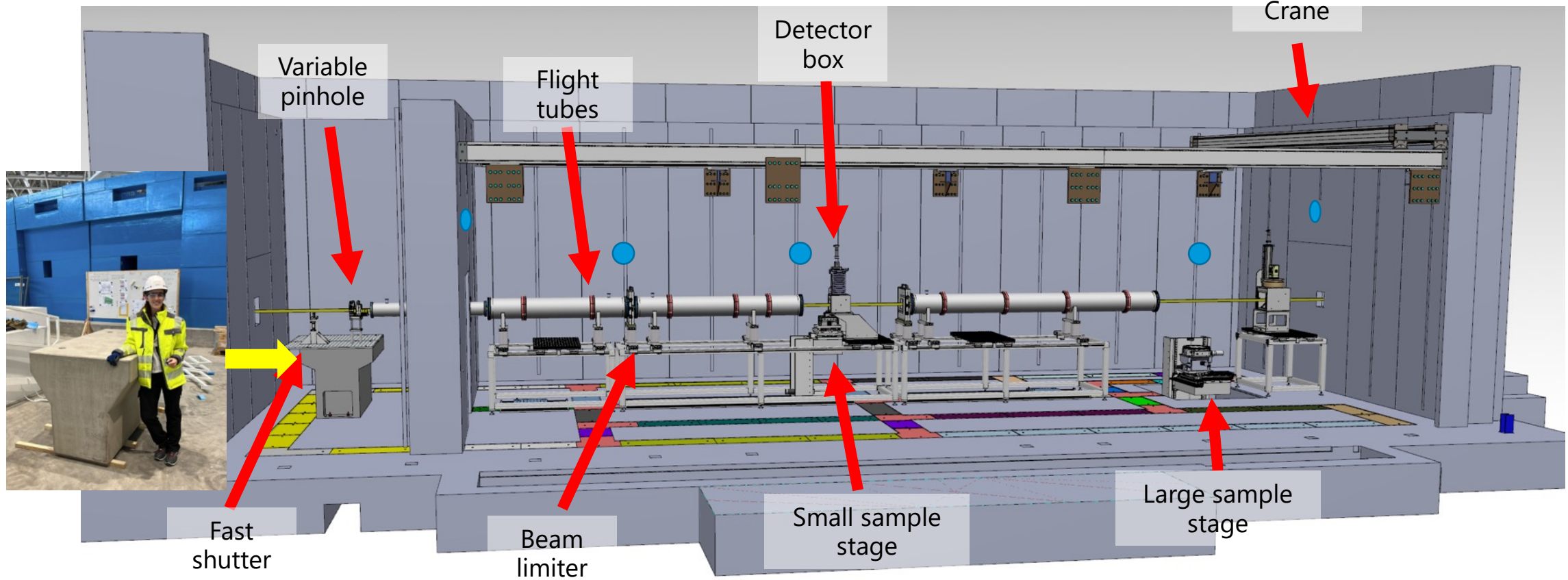
# Cave interior



● Metrology system

TG3 complete

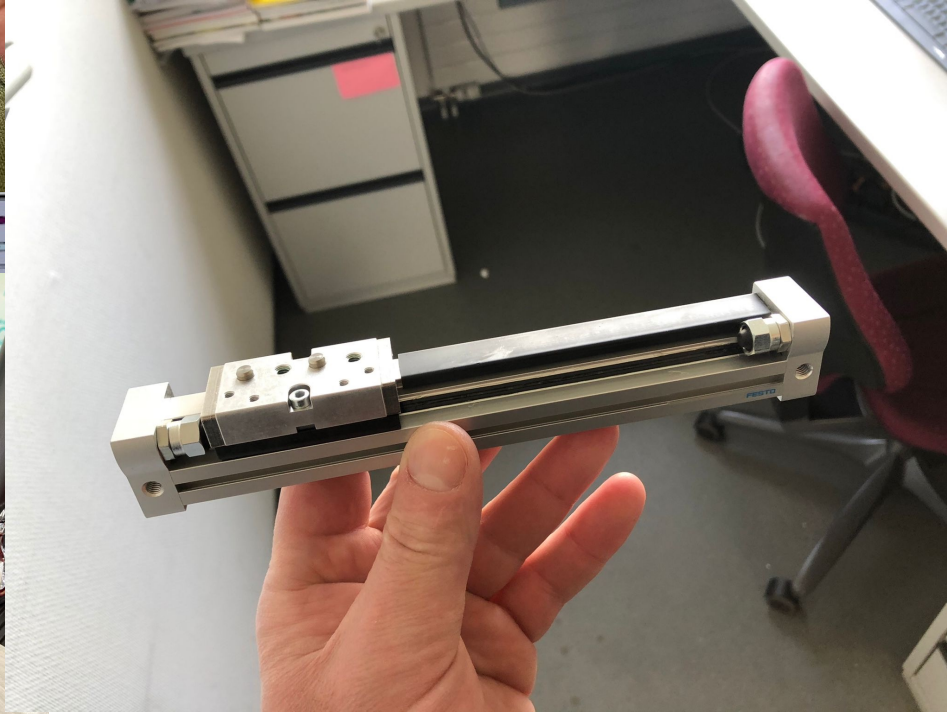
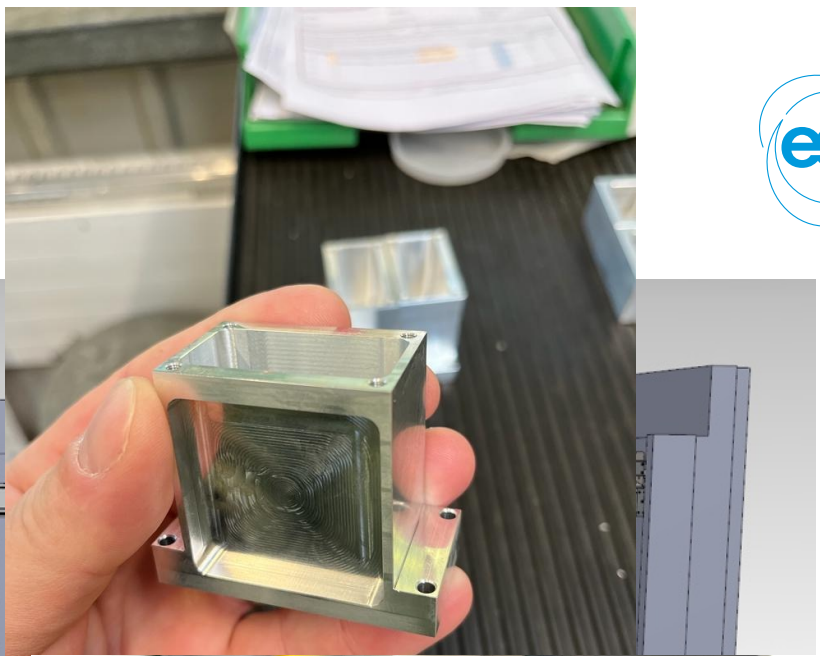
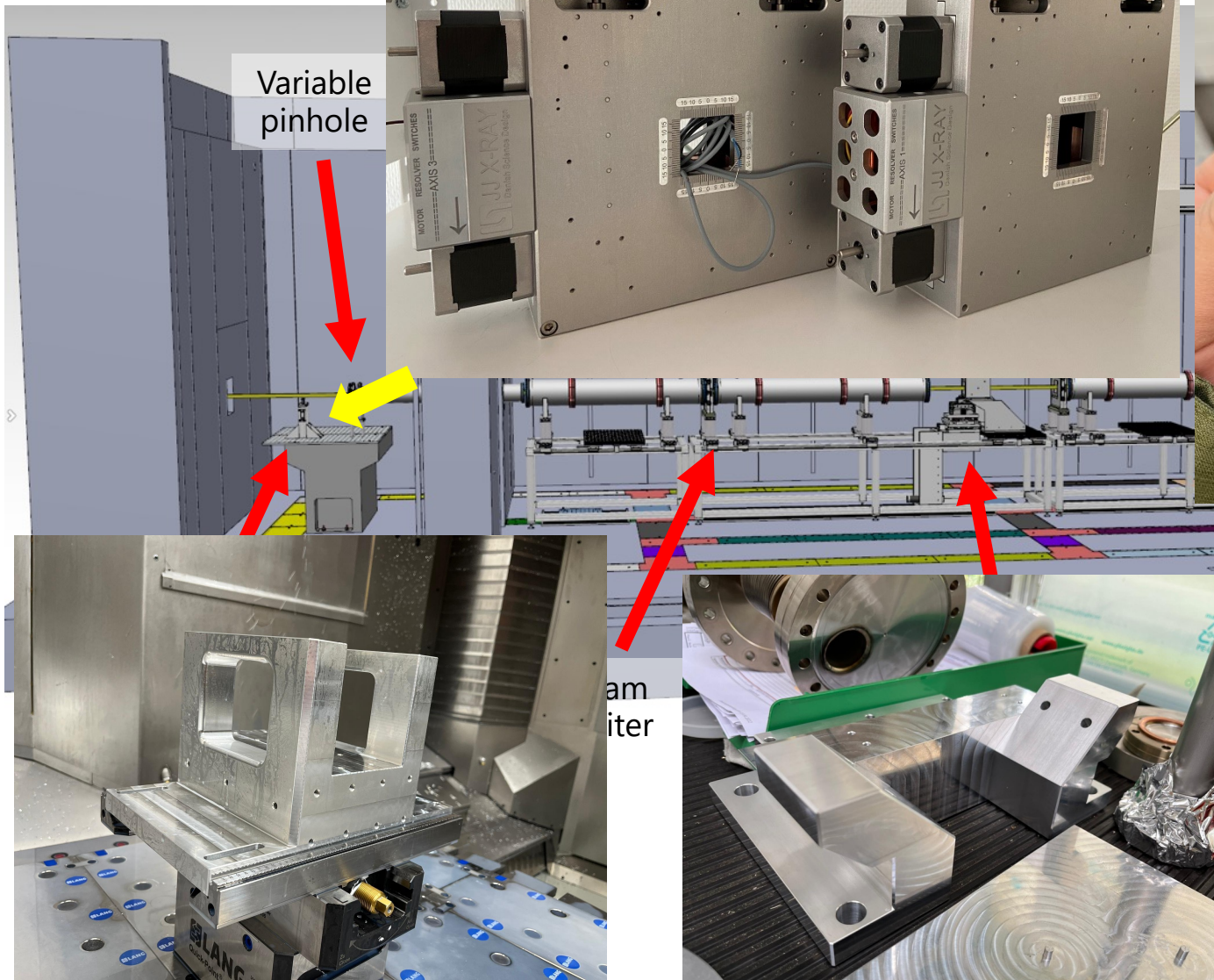
# Cave interior



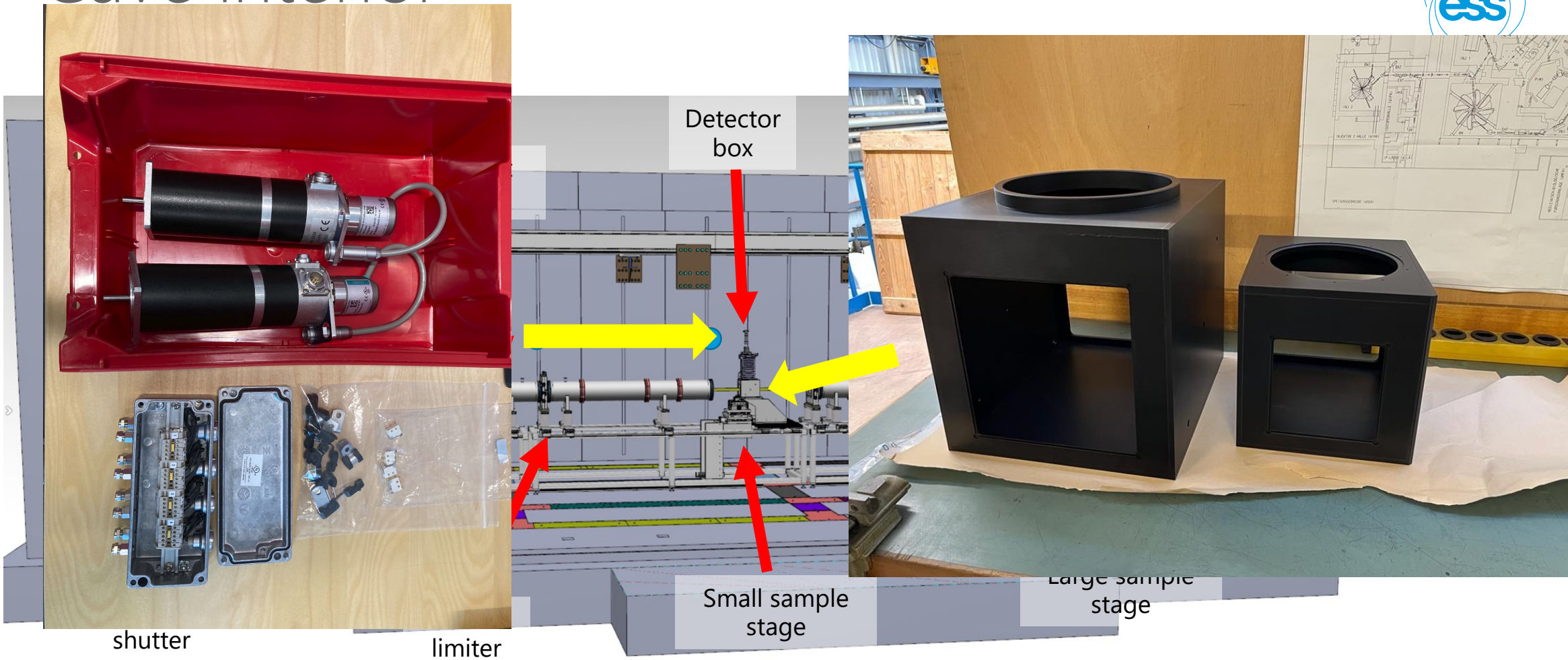
● Metrology system

TG3 complete

# Cave int



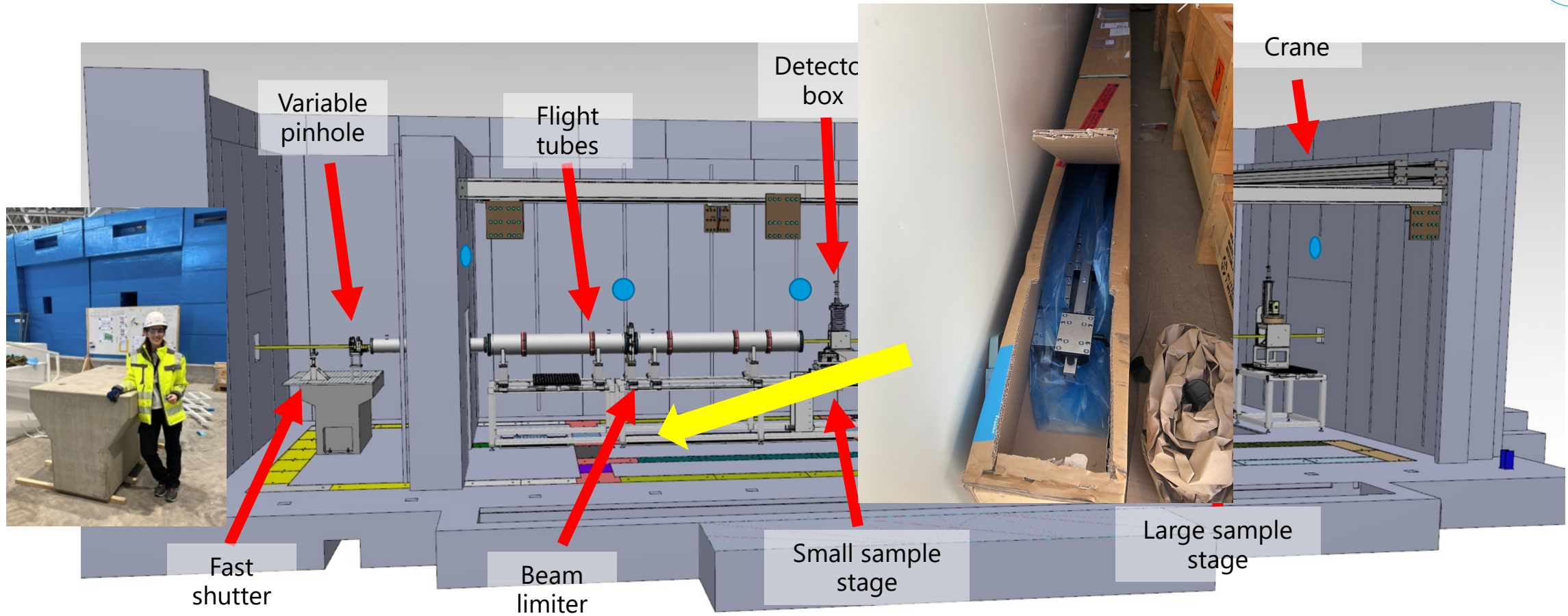
# Cave interior



TG3 complete

● Metrology system

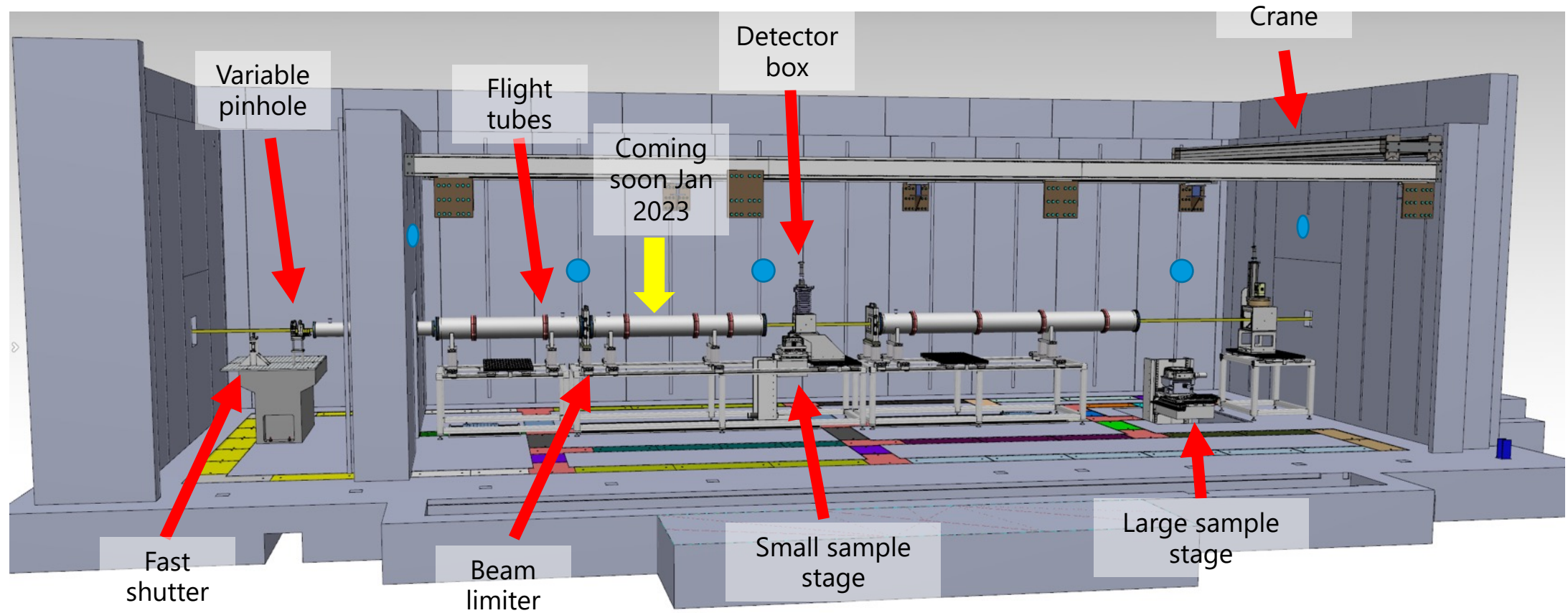
# Cave interior



TG3 complete

● Metrology system

# Cave interior



● Metrology system

TG3 complete

# White beam detectors



- ❖ WB detector (same as for ODIN) has been **purchased** and received, and has been integrated in YMIR
- ❖ Camera for ODIN **purchased** and on the way

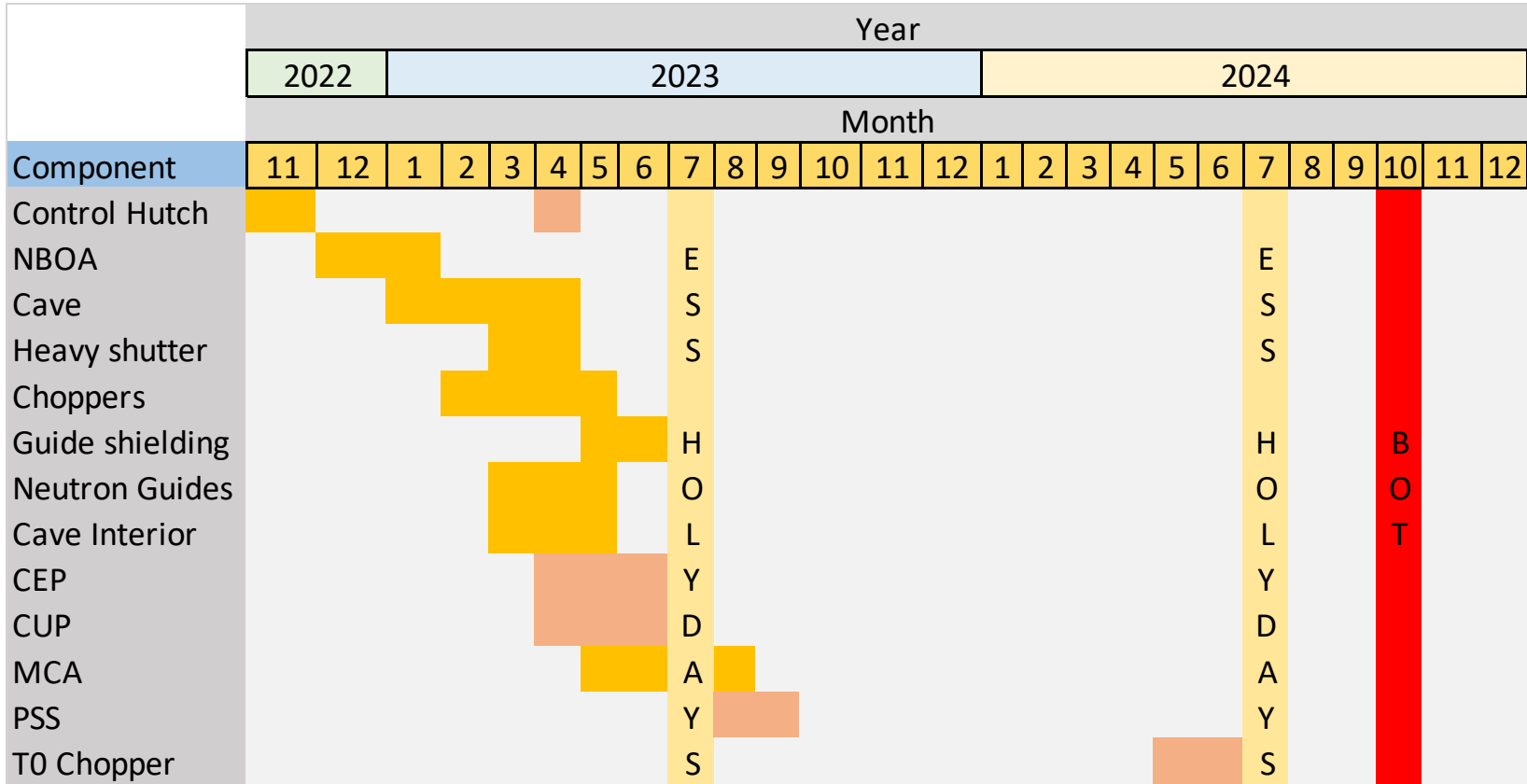
# ToF detector

- ❖ Current selection for day-1 detector: TPX3CAM developed by TUM
- ❖ Agreement with ESS management for additional fundings at/shortly after BOT to purchase TPX4CAM to be used as primary detector during accelerator ramp-up
- ❖ Existing TPX3Cam detector to be tested as diffraction detector (LANSCE beamtime in December)
- ❖ Detector has been purchased



# Installation

## Updated installation plan





# 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 helps a lot (MICo): they know the procedures and are used to deal with ESS rules
- Lessons learned from other instruments (Loki) helped a lot to be aware of the risks involved

### Challenges

- Installation of the cave
  - The installation is delayed (ends April 2023) pushing TG5
  - FAT and SAT of structural parts: not clear the ESS counterpart or team responsible for that. TUM is preparing all protocols.
- Grounding requirements: not clear if could or not be an issue not to comply with the insulation requirement (now turned into a "recommendation" from ESS). So far the solution proposed by ESS didn't work (epoxy grouting).

# Status of ODIN instrument: Summary



- Installation of ODIN have begun and is progressing: Hutch, Cave, Guide shielding, Bunker wall insert, in-bunker guides and chopper bottom housing complete.
- Components with FAT ongoing: Choppers electronics and cooling water circuit
- 1/6 MCA cabinet ready: FAT ongoing
- 4/6 MCA cabinets with components already procured
- Cave installation resumes in Jan 2023 and should be completed by Apr 2023. Manufacture of pre casted elements ongoing
- Cave interior components (PSI and Axilon): In manufacturing
- CEP: **Detail design on hold. Installation timeline unknown.**
- CUP: Requirements definition and compilation ongoing. Detail design already ongoing.
- PSS design & Hazard Analysis: PSS design ongoing. IHA updated submitted.
- T0 chopper will be integrated by ESS based on ESS prototype model. Delivery: End 2023. Mitigation in place to complete installation.
- Final TG3 scheduled January 2023. Documents ongoing.
- Installation driven by the cave (delayed). **TG5 now shifted to July 2023**



Questions?