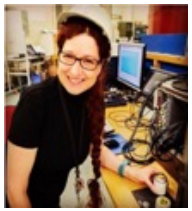
# Heimdal Instrument Diffraction STAP Meeting

Dan Mannix

Lead Scientist Heimdal Instrument ESS, Lund Sweden

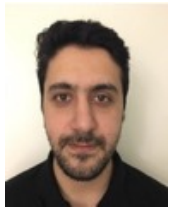
ESS - October 2025

# HEIMDAL Instrument Team



Isabel Llamas
Scientist (IFE)

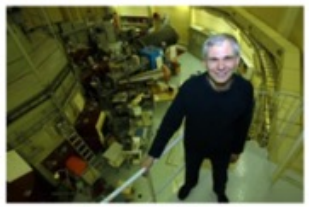
Dan Mannix
Lead Scientist (ESS)



Siamak Kianzad
Lead Engineer
(ESS)

Bengt Jönsson
Engineer
(ESS)

**Mads Jorgensen**
**In-Kind Partner AU**



Bjørn Hauback
In-kind Partner IFE

**Poul Nissen**
**In-Kind Partner AU**

Autur Glavic
In-kind Partner PSI

## Support from NSS Engineering

Nauzet Reyes
Engineer
(ESS)

Jason Morin IOE
TBL
(ESS)

Miguel Campos
Engineer
(ESS)

# HEIMDAL Risks

| | | |
|---|---|---|
| **Project Title:** | | **HEIMDAL** |
| **Project Manager:** | | **Dan Mannix / Siamak Kianzad** |
| **Date of Risk Register:** | | **2025-10-12** |
| **Project Partners:** | **1** | **Aarhus University** |
| | **2** | **IFE** |
| | **3** | **PSI** |
| | **4** | **ESS Project** |
| | **5** | **ESS Operations** |
| | **6** | |

**Top 5 Risks**

| Title | Rating | Category | Partner | Treatment |
|---|---|---|---|---|
| Instrument Infrastructure delay | 16 | Schedule | ESS Project | Avoid |
| RISK of overspend on AU budget | 16 | Schedule | ırhus Universi | Avoid |
| Instrument software | 16 | Schedule | ESS Operation | Observe |
| RISK to Schedule due to lack of Engineering resources | 16 | Schedule | ESS Project | Avoid |
| Lack of planning for HEIMDAL detectors (ESS scope) | 12 | Schedule | ESS Project | Avoid |

- **Instrument software** – DMSC. In the risk register for a long time.
- Risk of infrastructure delays, MCA, CEP, PSS.

- **Technical/Schedule risks**
  - Beam Monitor, Detector
  - Collimator Lift & Support (design & installation)
  - Detector support.

Concerns for MCA, CEP, CUP & PSS for T3

No longer a RISK but Fact

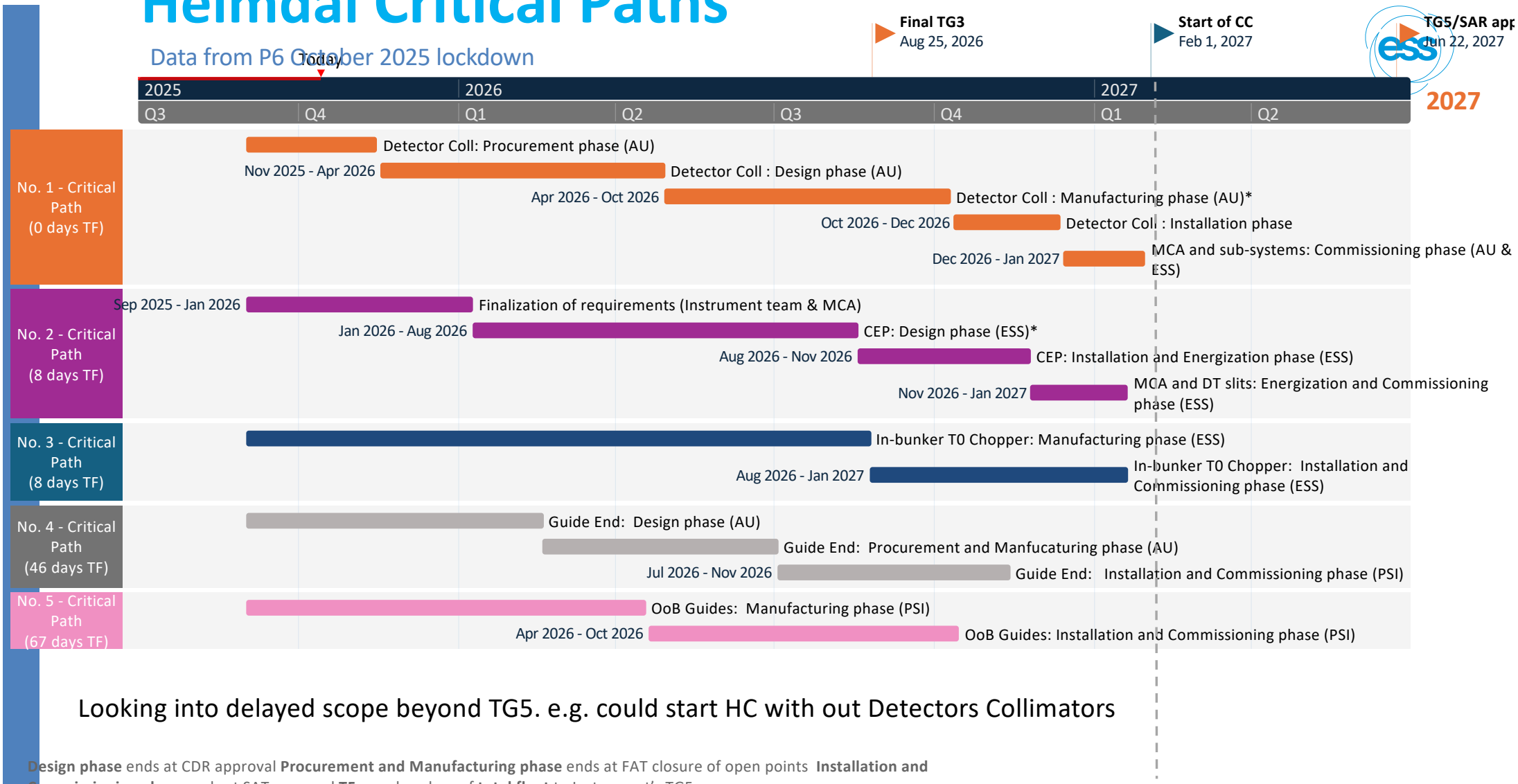
No dedicated software engineer (priority T1 & T2)

2 IOE Engineers Hiring started for Magic & Heimdal

Concern on integration for T3 instruments

# Heimdal Critical Paths

Data from P6 October 2025 lockdown

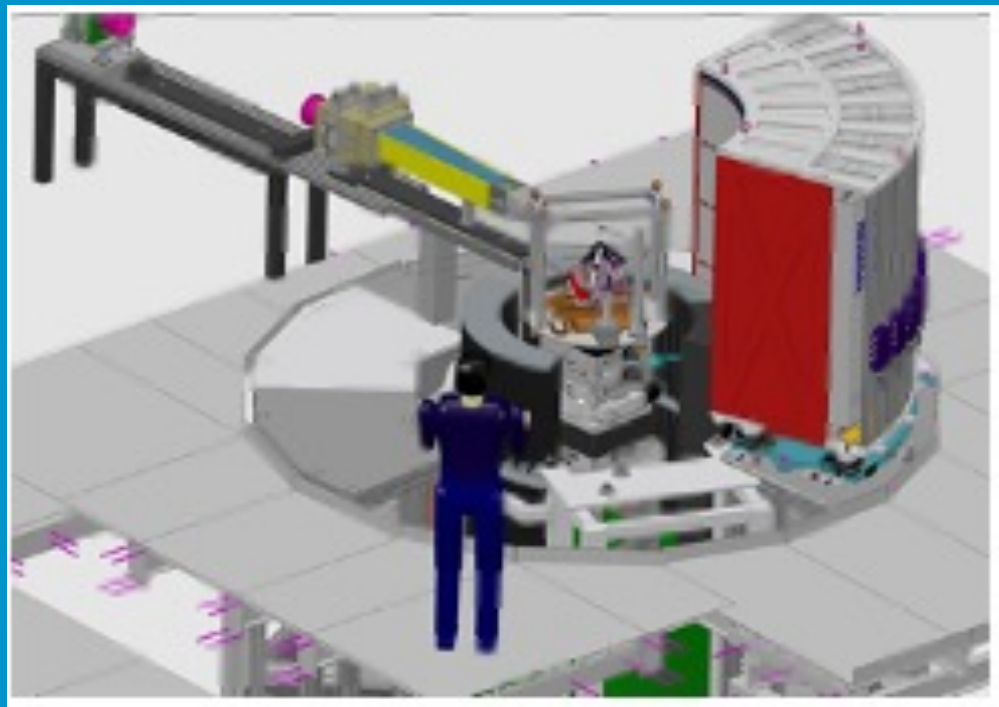


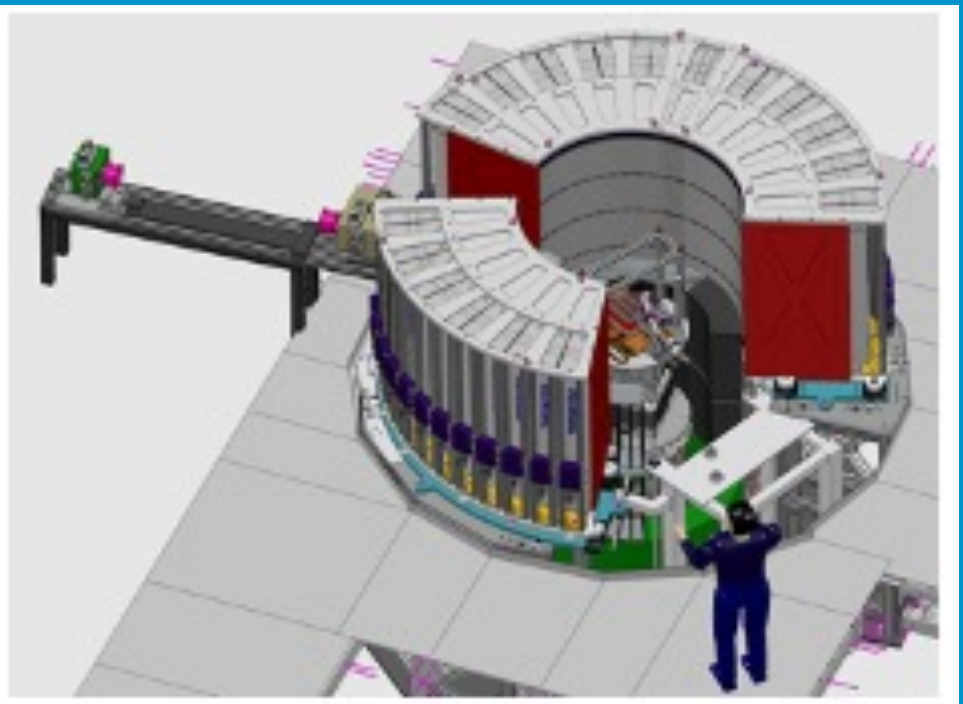

Looking into delayed scope beyond TG5. e.g. could start HC with out Detectors Collimators

**Design phase** ends at CDR approval **Procurement and Manufacturing phase** ends at FAT closure of open points **Installation and Commissioning phase** ends at SAT approval **TF:** number days of **total float** to Instrument's TG5

# Heimdal Rescope Detectors

EUROPEAN SPALLATION SOURCE

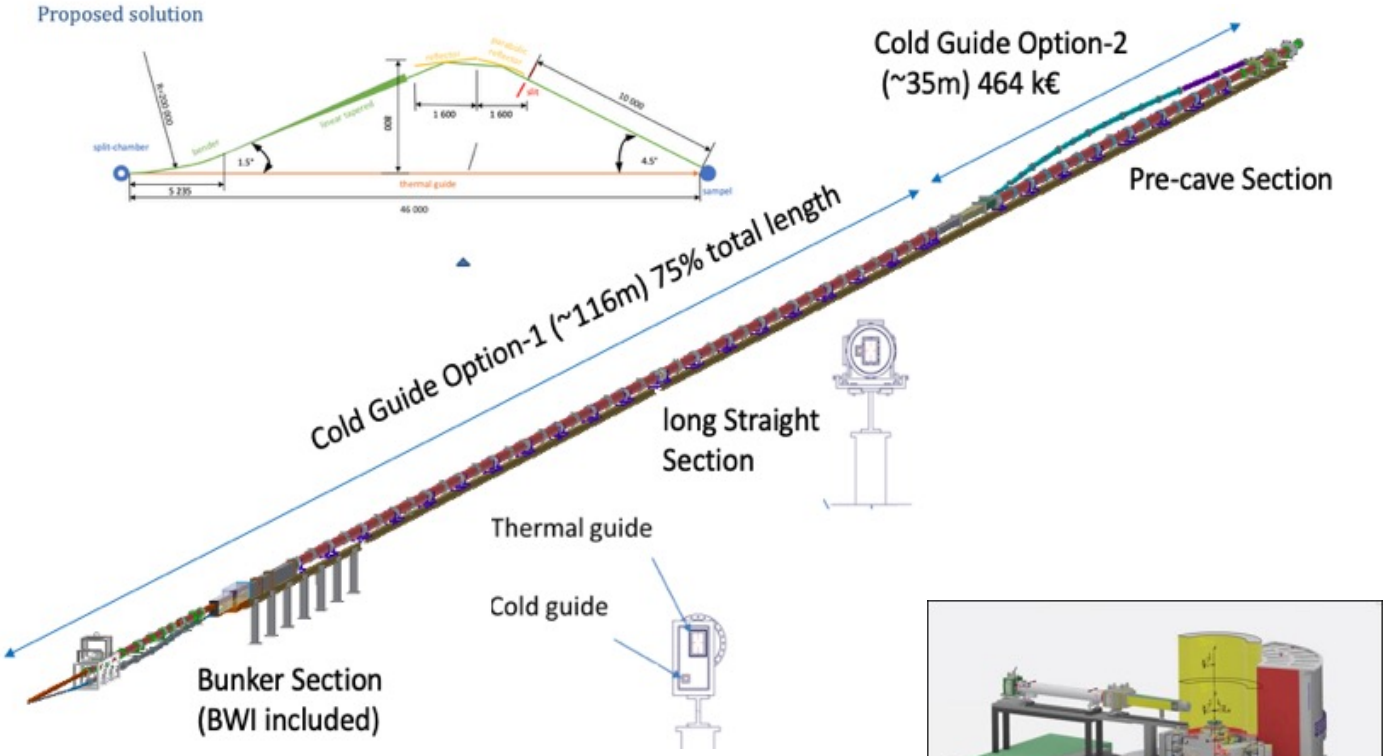




Fixed @ (~10-90°) + Rescope Review !

# Heimdal Rescope (SANS)

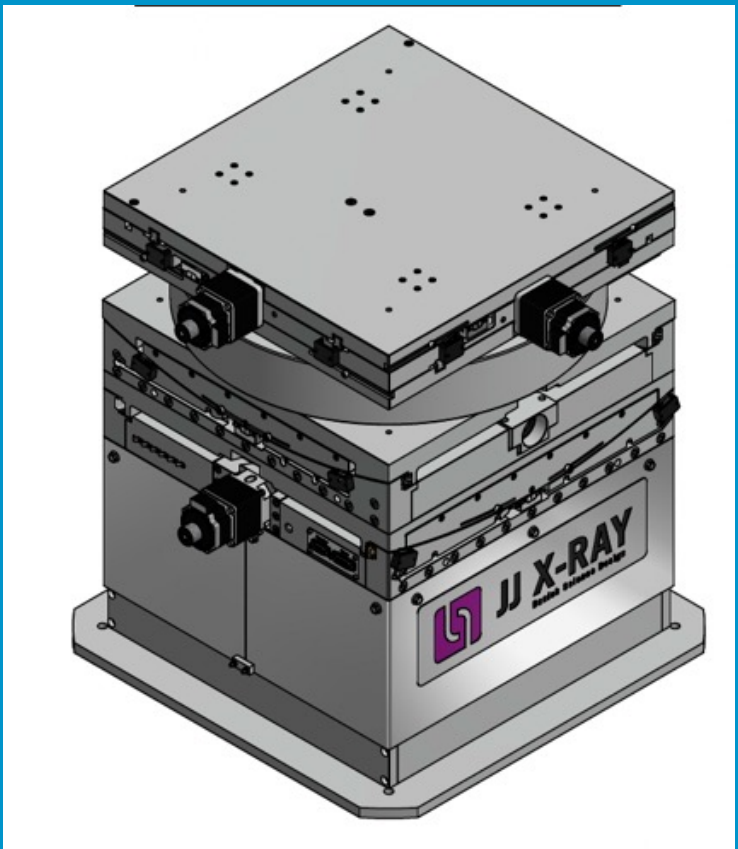
| Rescope Item | Cost k€ |
|---|---|
| **Rescope 1: Diffraction Detectors** current scope 1sr 10-90° | 1730 |
| Double Dector coverage 1.0sr - 2.0sr Costed CDT (2023) 10-80° | 1540 |
| Triple Detector coverage 2.0sr ->3.0sr costed CDT (2023) 190-290° | 1540 |
| High Resolution Detector Collimator | 168 |
| **Subtotal Rescope 1:** | **3248** |
| **Rescope 2: SANS Scope** | |
| Wide Shielding (Mirrotron offer) | 265 |
| Final 40m Cold guide (Swissneutronics) | 464 |
| SANS TANK (estimate) | 100 |
| 2 x Cold Choppers ESS Common | 600 |
| SANS Detector 1 (BANDGEM) 0-4° | 500 |
| SANS detector 2 (BANDGEM) 4-10° | 500 |
| **Subtotal Rescope 2: SANS** | **2429** |
| **Upgrade 3: Imaging** | |
| Imaging detector (timepix 28x28) | 150 |
| Detector Mounting motorisation | 50 |
| **Subtotal Rescope 3: Imaging** | **200** |
| **Total 2sr Detector + SANS** | **4137** |
| **Total Rescope to full scope** | **5877** |

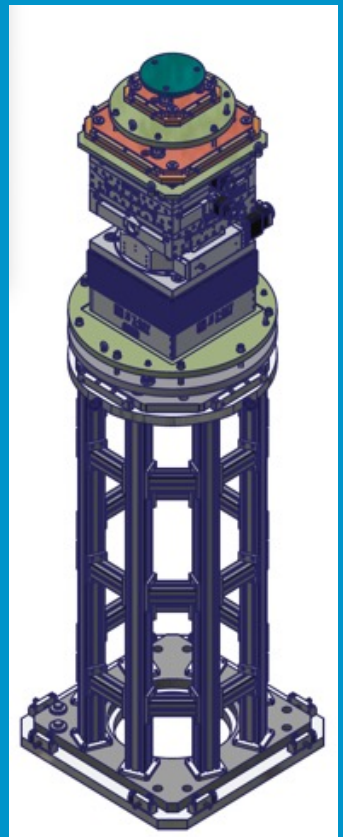


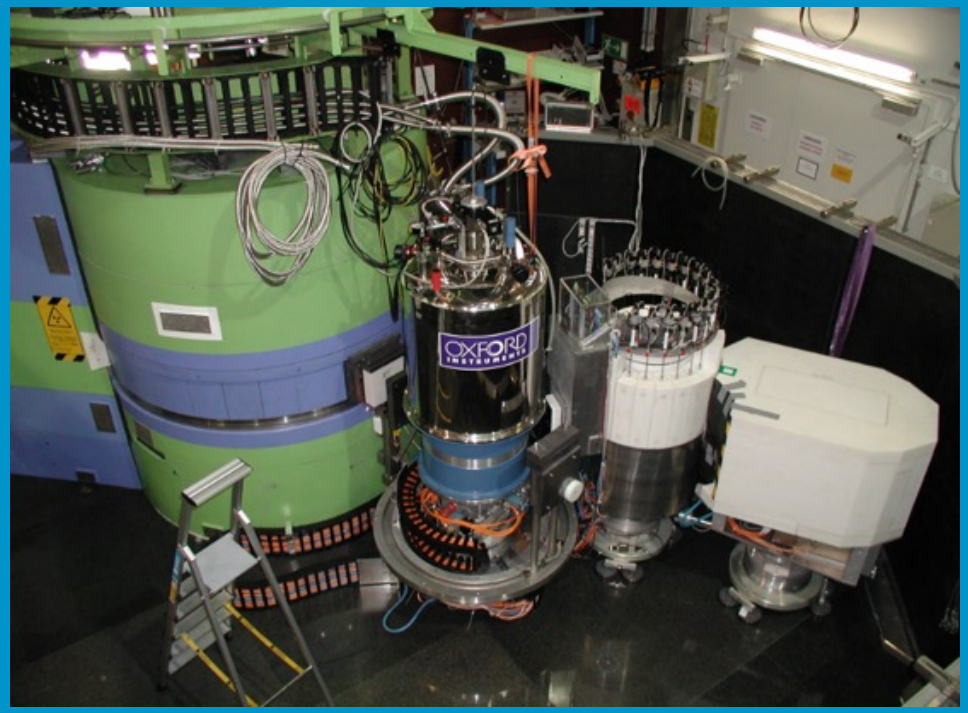

# Progress & Successes
# Sub-System Update

# Sample Table (x,y,z +w)

EUROPEAN SPALLATION SOURCE



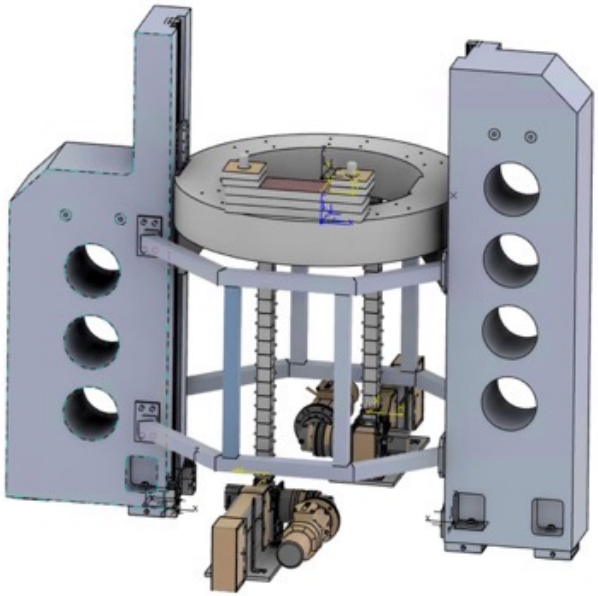



PANDA MLZ Munich Magnet

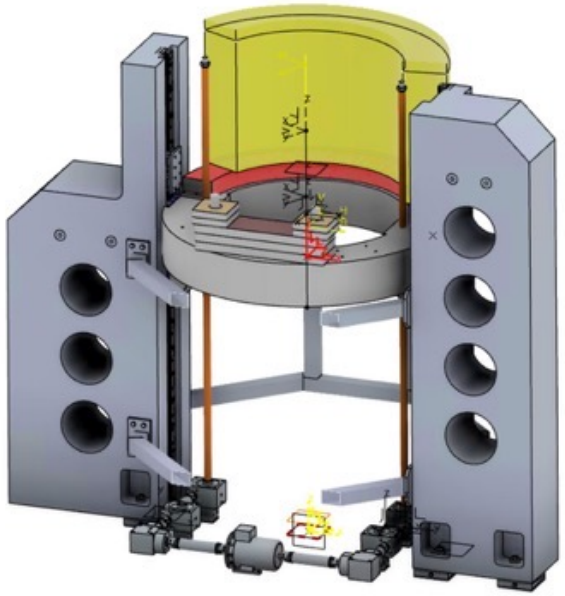
Commercial Solution & Magnetic field compatible (~8T)

# Design Update – Collimator Lift & Support (Nauzet)

- Collimator contract awarded to JJ-X-ray
- Concept evaluation approved
- Detailed design initiated
- Discussions with suppliers initiated and venor specialist involved

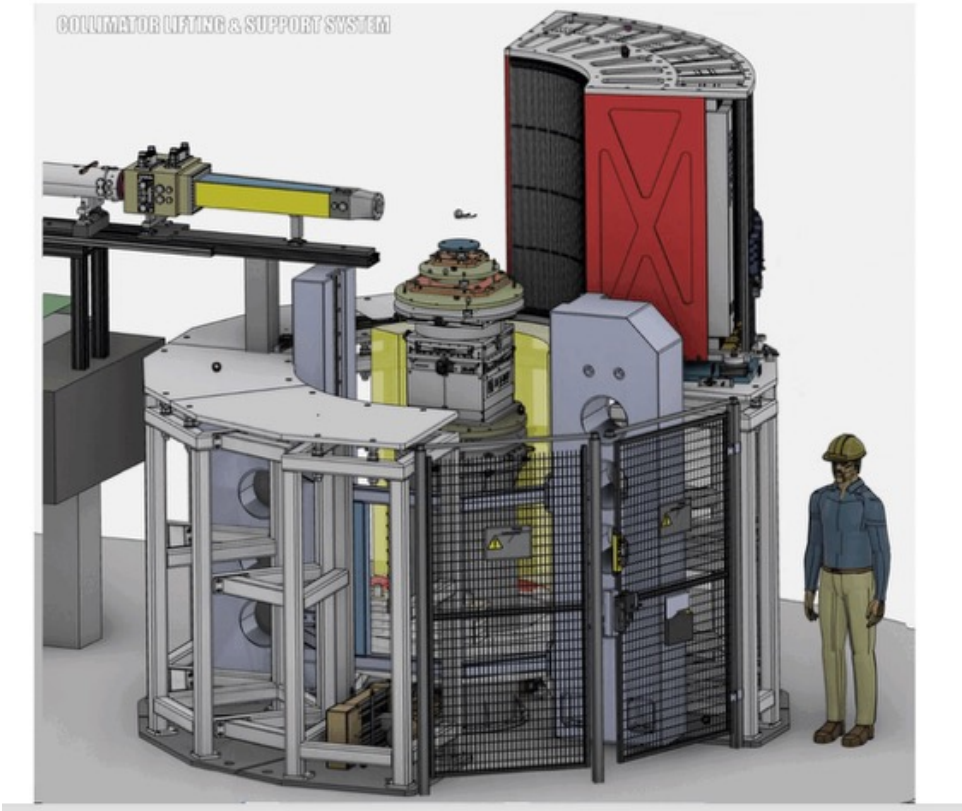


Linklift (Serapid)



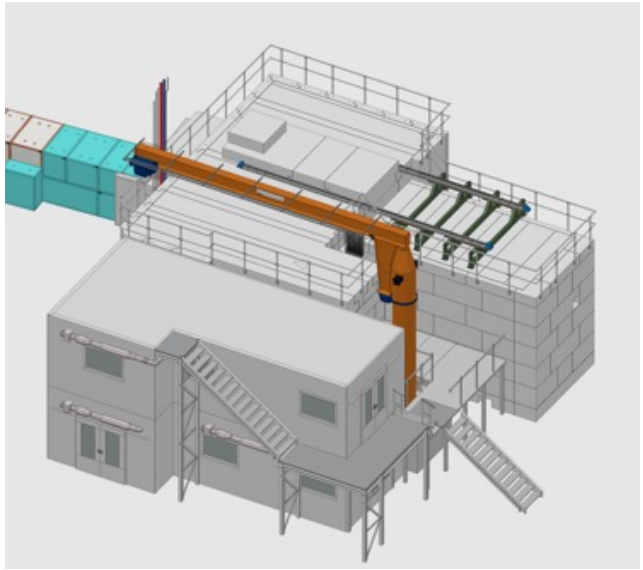
Screw Jacks (ZIMM)

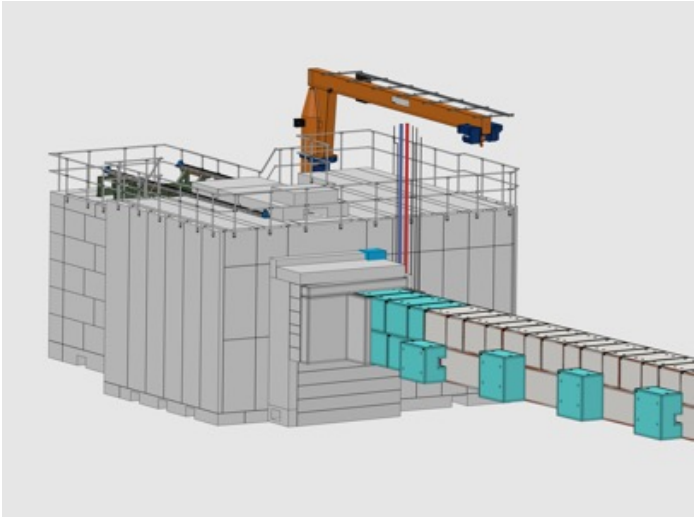
# Design Update – Collimator Lift & Support (Nauzet)



# Cave & Hutch

- Sub-TG3 approved for the cave structure (beam stop yet to be reviewed).
- First installation package (base slabs) to start early December.
- Internal cave crane to be contracted to Mirrotron (received quote)
- Hutch preliminary design model delivered by Mshield.
- Sliding hatch mechanism kick-off 27/10 (Asturfeito).
- Cave crane designed changed. Specification to be confirmed prior to procurement (Mshield).
- Preliminary design done for the PSS components. To be contracted.





# Choppers Manufactured at ESS

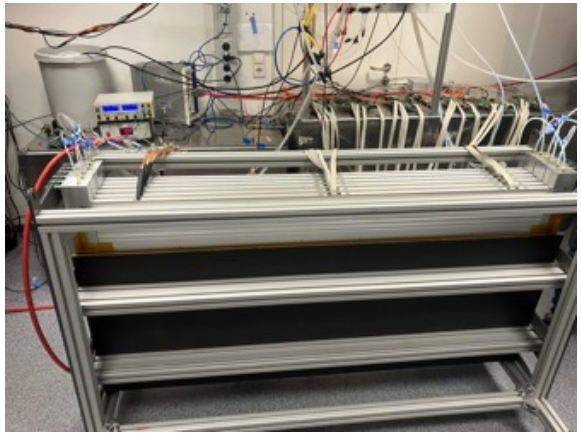
EUROPEAN SPALLATION SOURCE


TPSC 1&2.

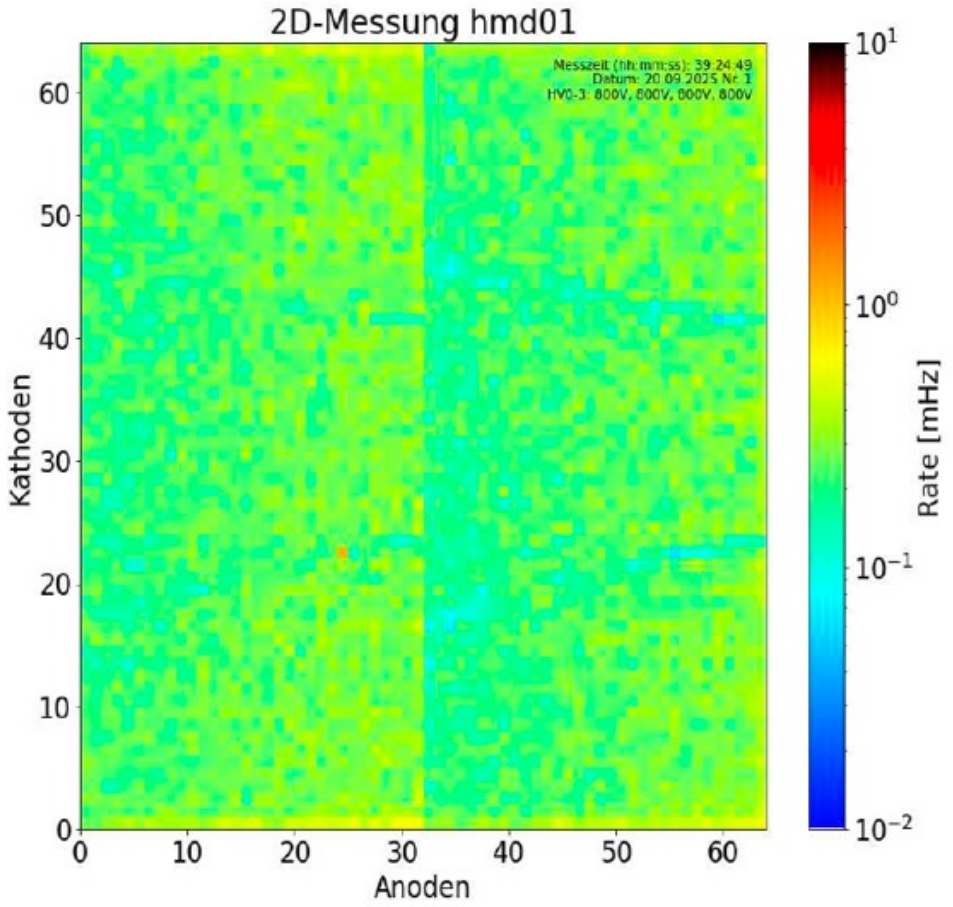
TWSC 3

TFOC 3

# A0 Detector Manufactured at CDT

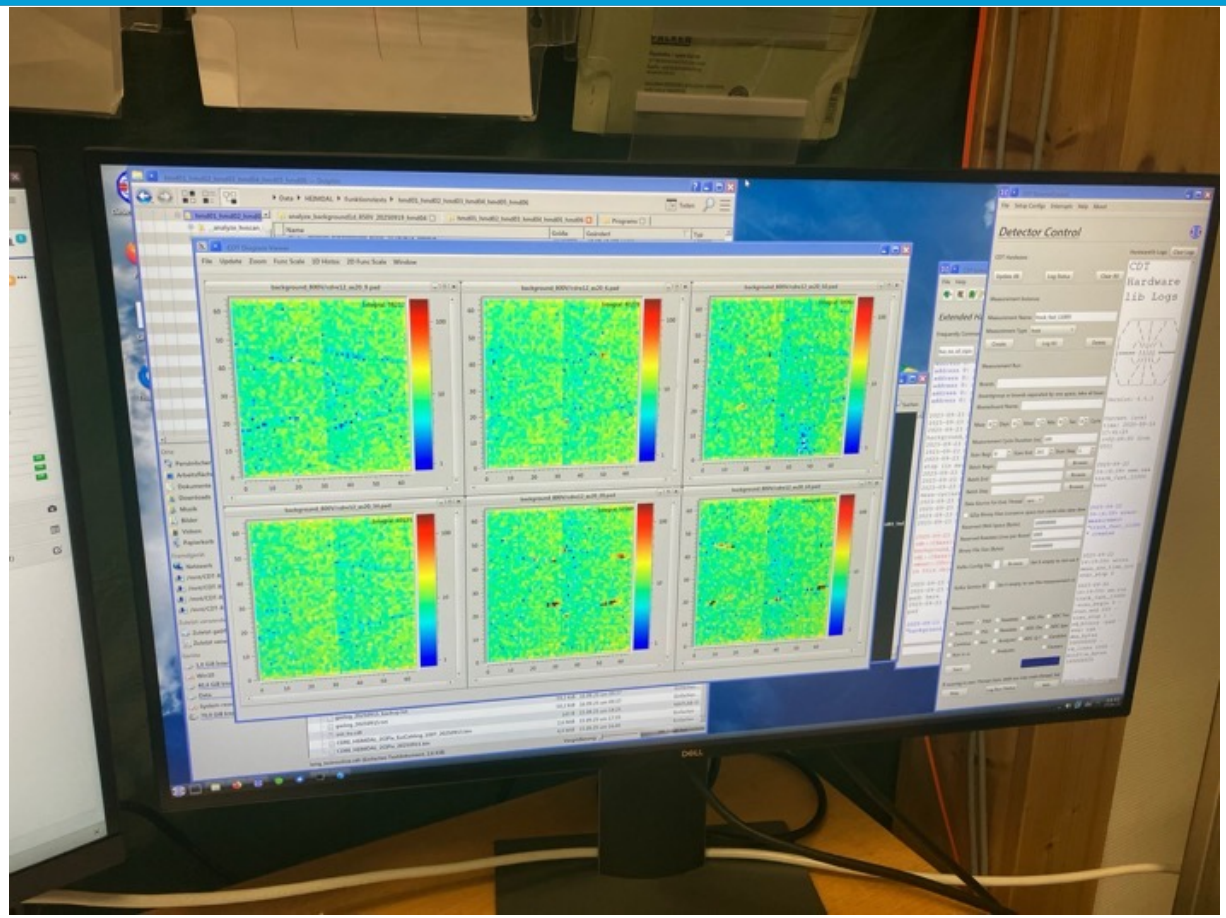


- Nice, stable operation over 35-39 hours at 800 V.
- No anode wire nor cathode strip is missing (would be seen as white line).
  - Structures seen are due to anode wire spacers ($Al_2O_3$).
- Very low background of cosmic neutrons and intrinsic zero-rate: 0,3 mHz per Voxel.



# Visit to CDT Heimdal/Magic

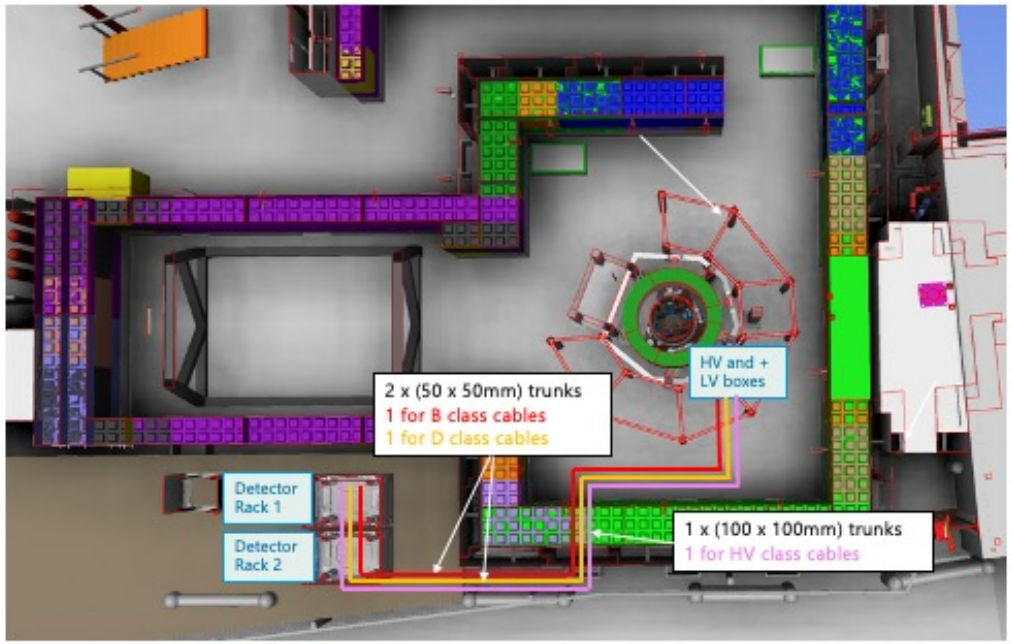
EUROPEAN SPALLATION SOURCE



# CUP & CEP & MCA

EUROPEAN SPALLATION SOURCE

Detector Cabinet




Utilities & Electrical Infrastructures

Fully costed for Heimdal and similar scope to DREAM.

MCA making progress,
Table of Motion in progress

# Summary

EUROPEAN SPALLATION SOURCE

Starting Installation Phase: Cave in-bunker components December 2026.
We hope to Heimdal show-off installations for next STAP meeting.

2D detector fixed 10-80 Degrees limiting instrument performance for first science. Need for to push ESS on urgency for detector rescope!

SANS rescope ? What is happening with rescopes in SSO ?

Possible issues with ESS deliverables: MCA CEP bottlenecks with Tranche-3 instruments. Software development & PSS not is P6 workplans difficult to track progress.

Chopper systems manufactured ready for testing & installation at ESS.