DREAM update for STAP

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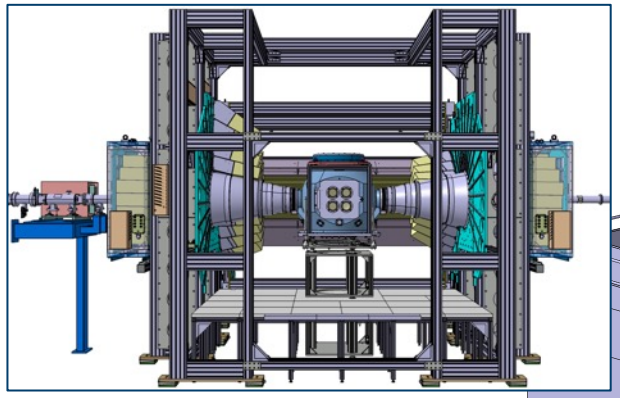
DREAM instrument

- **Partners: FZJ 76% (Lead Partner), LLB 20%, ESS 4%**
  Construction budget: 13.66 M€
  Completion: Q2 2024

Exptl. Cave (LLB)
- Installed

Infrastructure (ESS)
- CUP, CEP, PSS

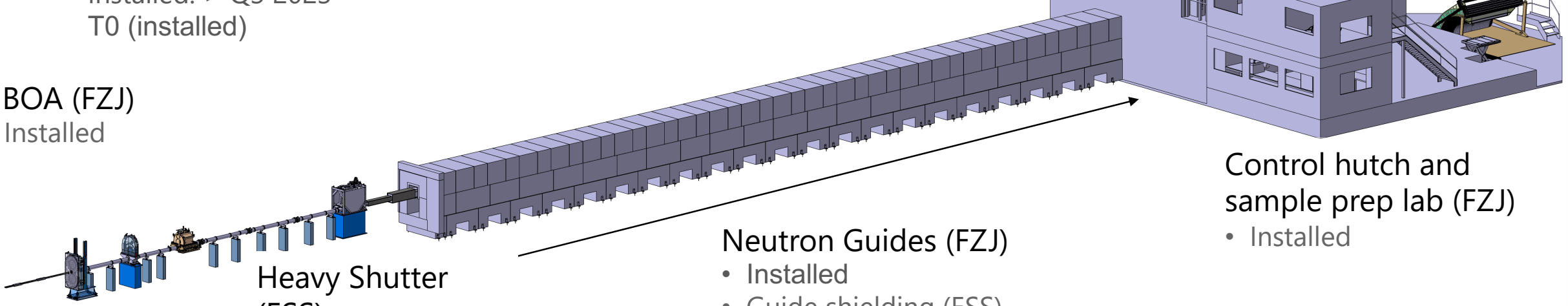
Detectors (FZJ)
- In Mfg. (CDT)
- Installed: Q2 24



Cryofurnace (LLB)
- ESS scope

Disc choppers (FZJ)
(PSC, OC & BC)
In Mfg. (FZJ & racks ESS)
Mfged
Installed: > Q3 2023
T0 (installed)

Sample vessel (FZJ)
- Installed



NBOA (FZJ)
- Installed

Heavy Shutter (ESS)

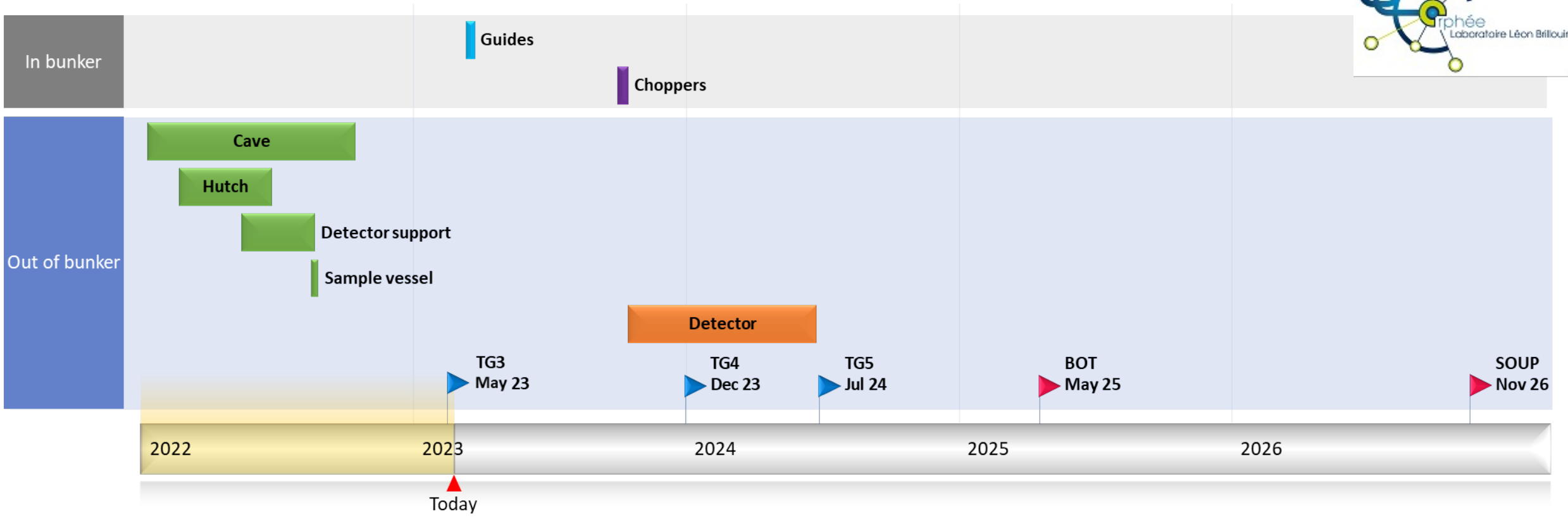
Inside the bunker

Neutron Guides (FZJ)
- Installed
- Guide shielding (ESS)

Control hutch and sample prep lab (FZJ)
- Installed

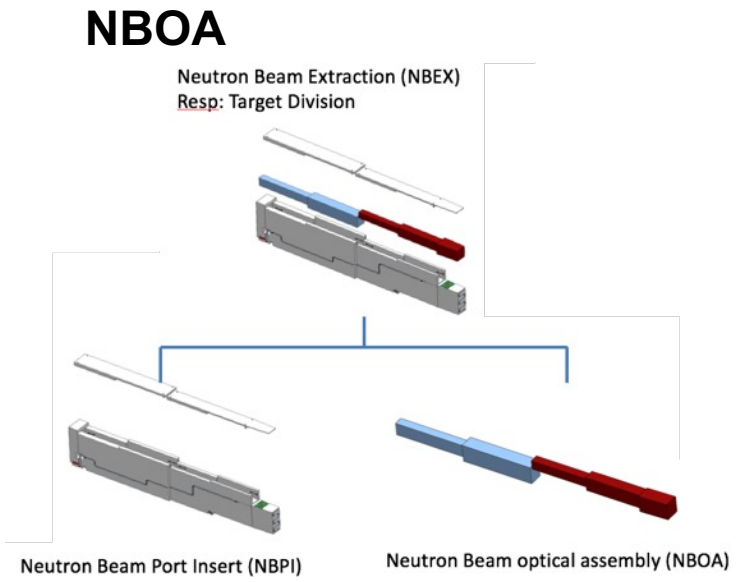
In-bunker installation: ongoing
ESS to remove and re-install first few meters

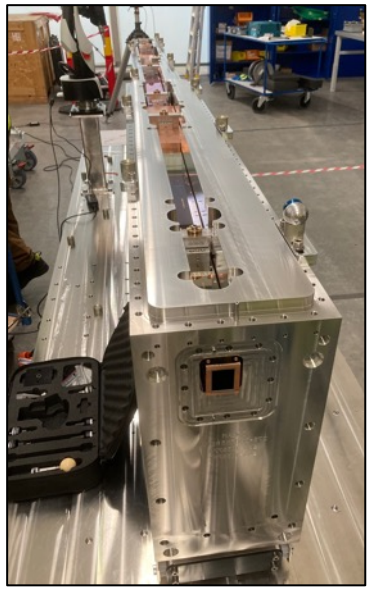
Installation overview



- Final design review (TG3) is delayed (homework & ESS finalizing requirements)
- TG5 is moved to July 2024 (later detector delivery due to staff shortage at CDT)
- DREAM will be ready for first neutrons in 2025/2026

Neutron Beam Optics Assembly / Bridge Beam Guide / Bi-spectral Switch





DREAM NBOA is being installed

- NBOA/NBPA is installed
- Bi-spectral switch was assembled at FZJ
- First neutron tests of the switch at ISIS completed in July 2022
- Vitess/McStas simulations of the results are ongoing
- More beam time in May with improved mechanical assembly & for publication

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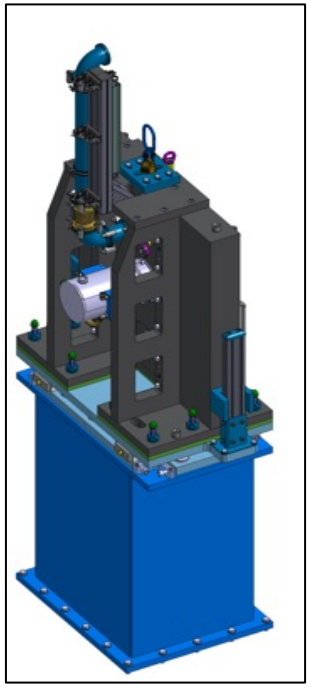
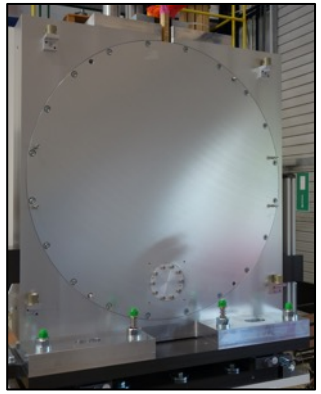
Chopper system

Pulse Shaping Chopper (308 Hz) & Overlap Chopper (14 Hz)

- Disks, hubs and SKF spindles delivered to FZJ (three months delay at custom)
- Final wiring and integration of cooling tubes
- Chopper base delivered to ESS
- Planned installation in Q4 2023





T0-Chopper (ESS)

- Installed, SAT is pending
- Integrated with in-bunker guides

Band Control Chopper (112 Hz)

⚠ Failure of the second hub at SKF

- Chopper base delivered to ESS
- Planned installation: TBD

First failure

- Chopper disks and housings were delivered to SKF for final assembly & tests
- BC chopper reached target speed of 112 Hz
- Failure of the hub was observed during the endurance tests
- Further tests were halted
- ESS Chopper group was informed

Second failure

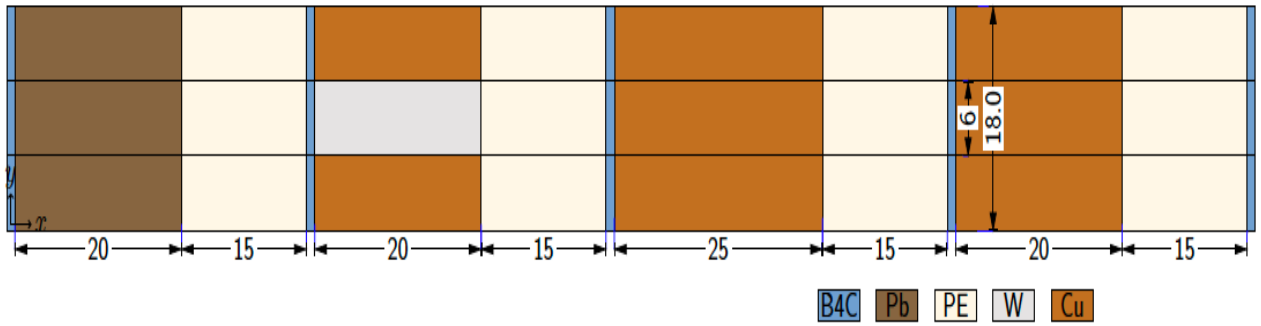
- New hub: milled from a solid Al piece
- New hub installation tool sent from FZJ
- Greasing was properly applied
- Same failure

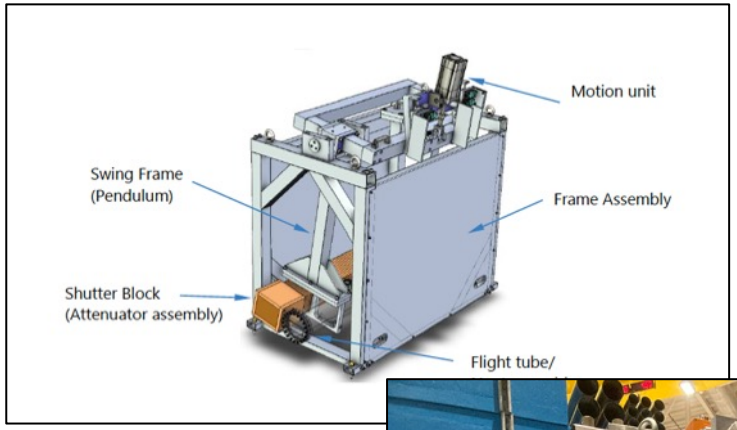
Way forward

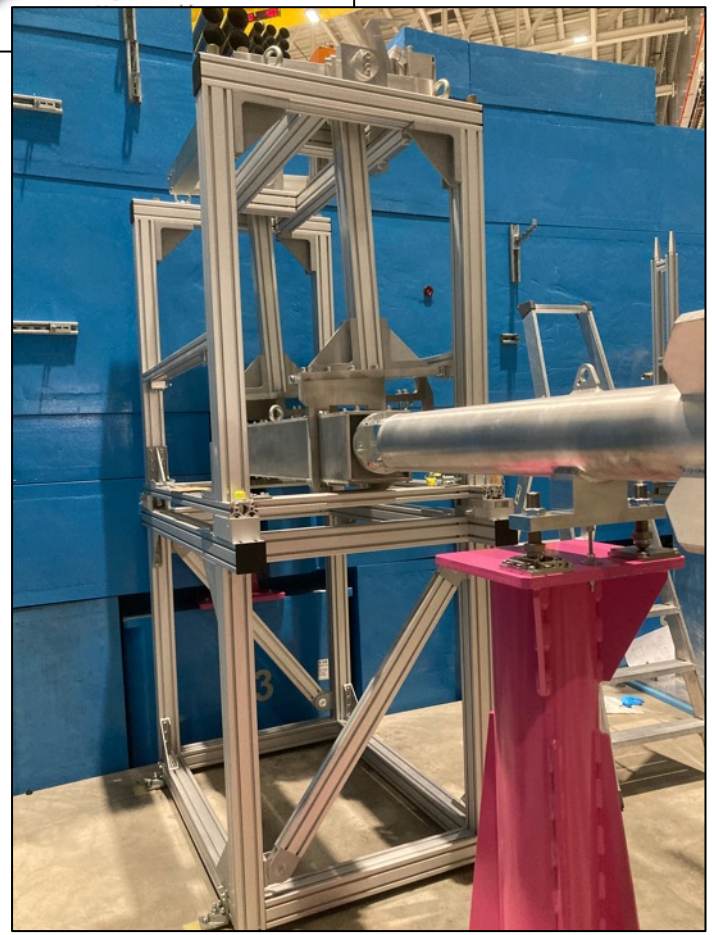
- Microscopy studies of hub & disk at FZJ
- Discussions with Airbus
- Separate FAT & SAT of PSC and BC
- ESS chopper group visit to FZJ

Heavy shutter (ESS)

Shutter block composition







- Neutronics simulations are done by FZJ
- Installed by ESS
- Guide alignment inside the shutter to be done by ESS
- SAT is planned by ESS

Neutron guides

- In- & out-of-bunker guides* are mechanically installed
- Vacuum tests completed by ESS
- Alignment report completed by SNAG
- Electrical isolation tests to be done by ESS

* *Last piece of the guide in the cave will be installed later*

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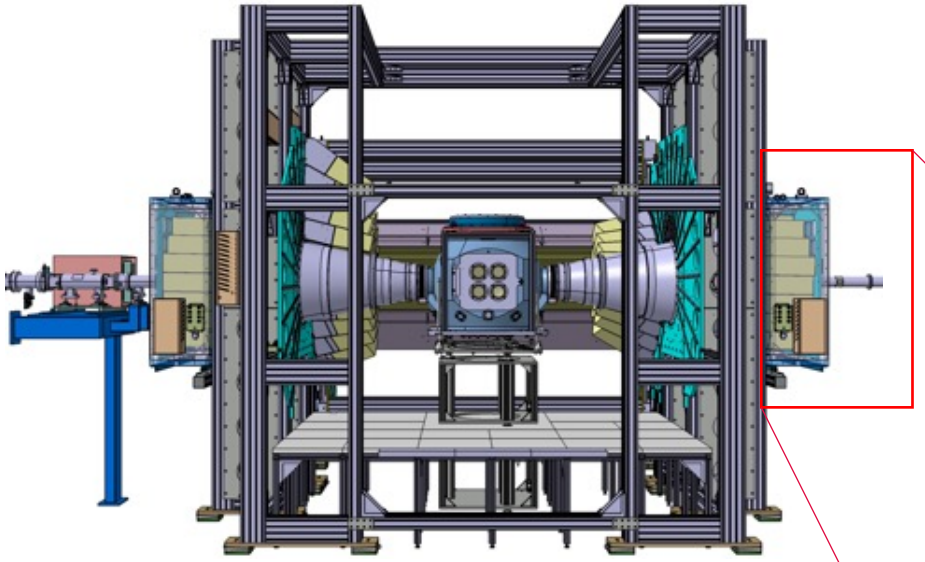
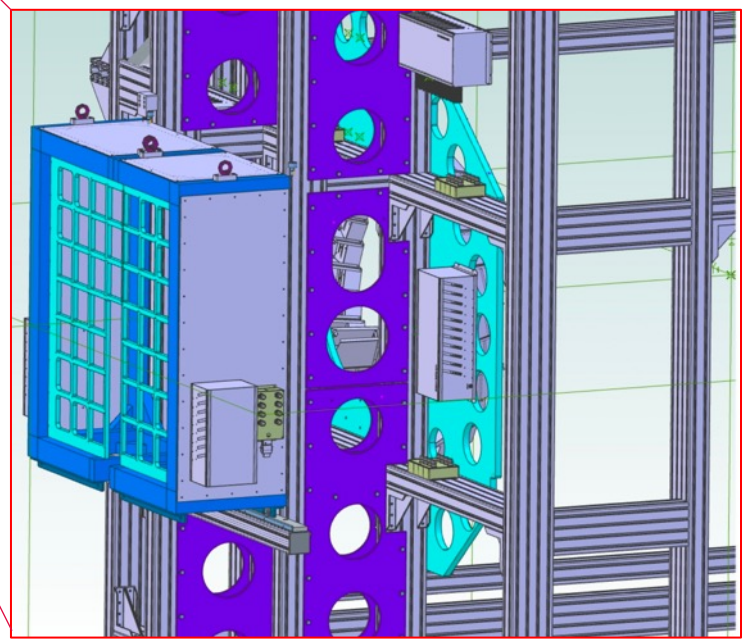
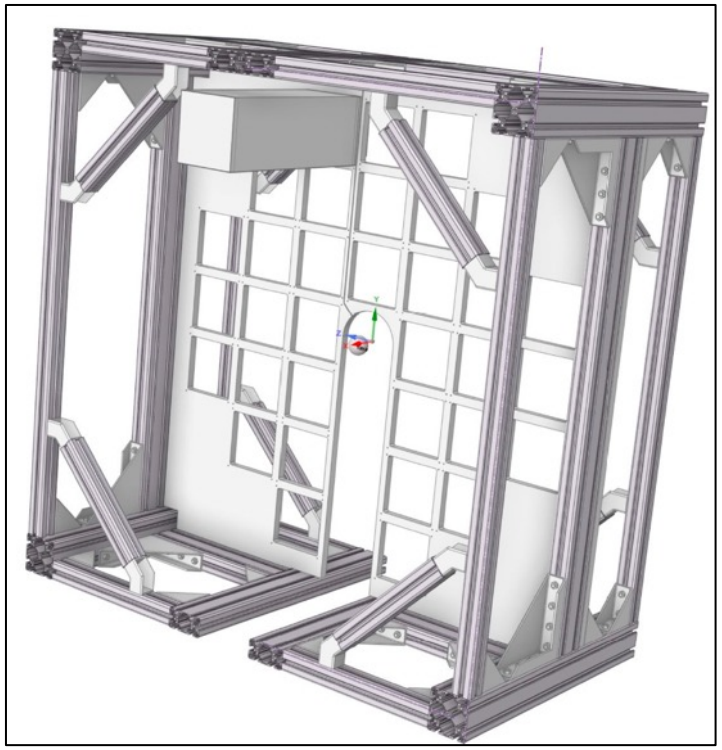
Detector support & sample vessel

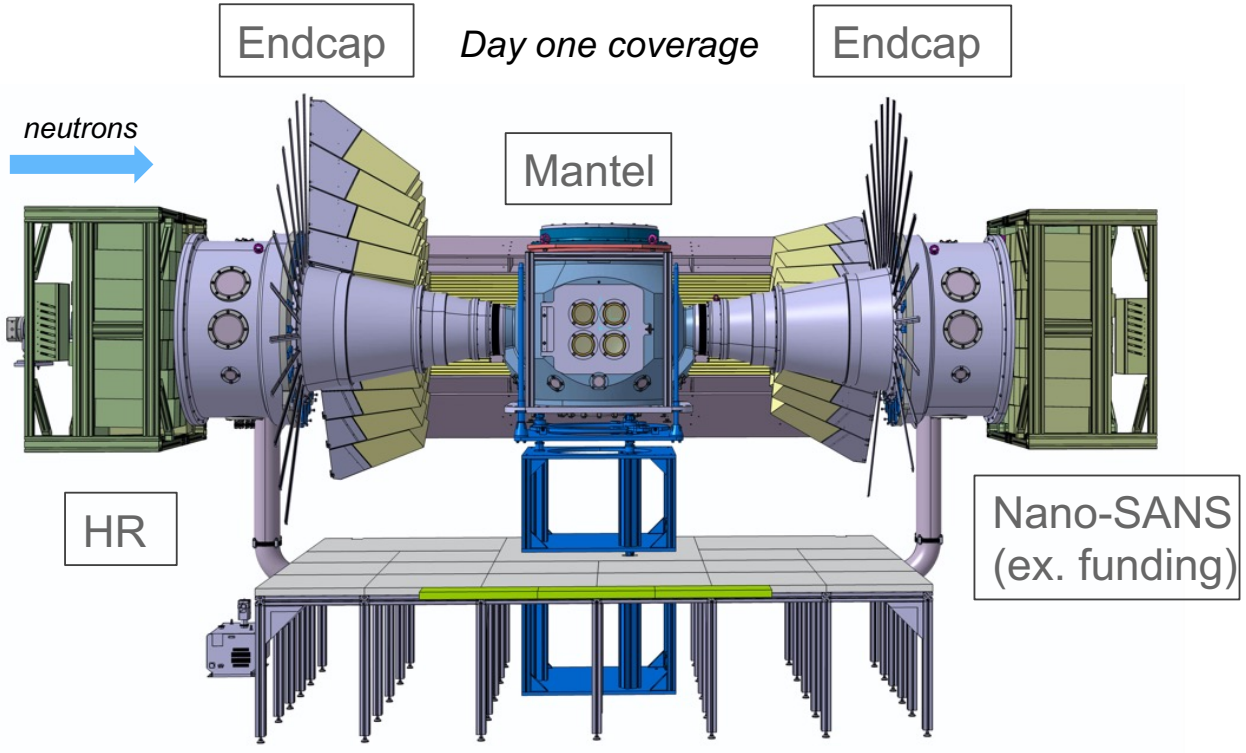
- Installed at ESS
- HR and nm-SANS detector holders are being manufactured

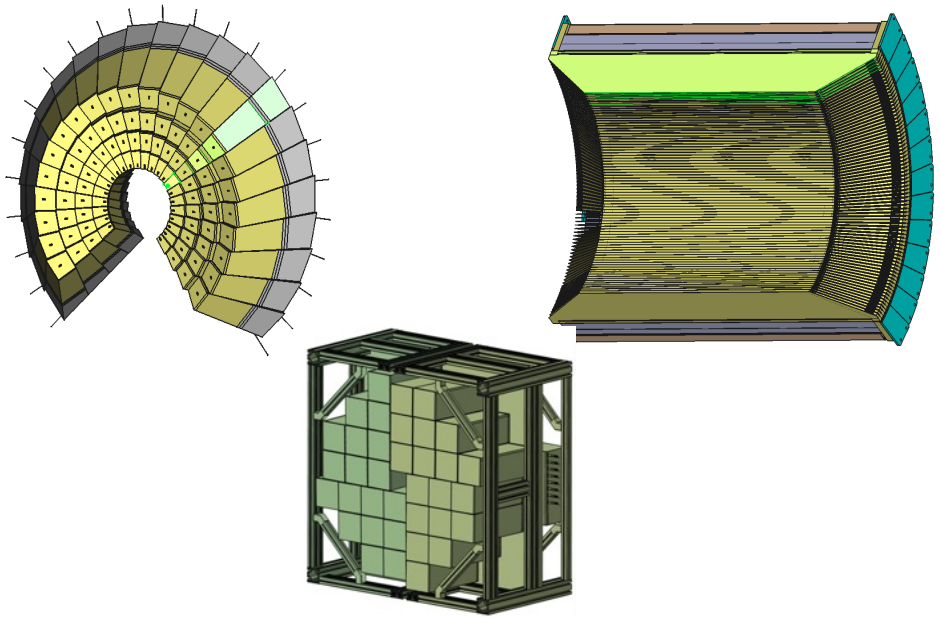




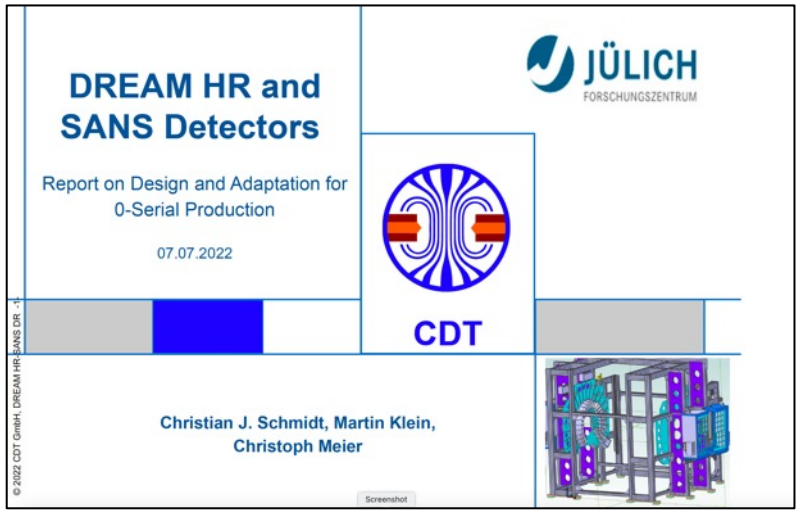


DREAM detectors



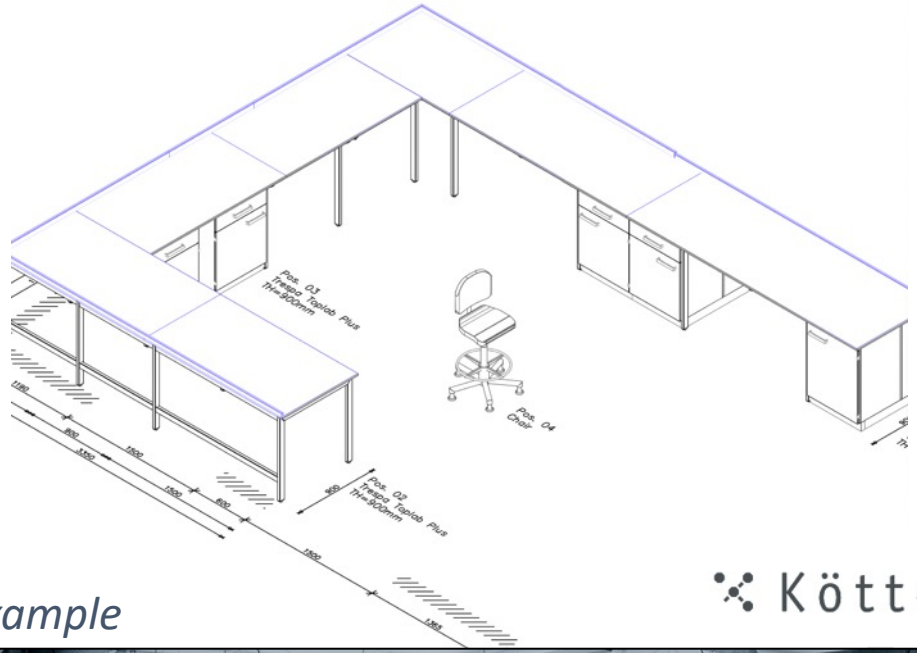


- Endcap & mantle first segments are successfully tested with neutrons
- Endcap: last modules are being manufactured
- Mantel: serial production is ongoing
- HR & SANS: report on 0-series received, ready for serial production
- Staff shortage at CDT pushed the final installation date to Jul. 2024



Control hutch & sample preparation lab

- Installed at ESS, pre – SAT is completed
- Additional re-wiring completed
- Lab furniture for prep lab is ordered



Köttermann

Example

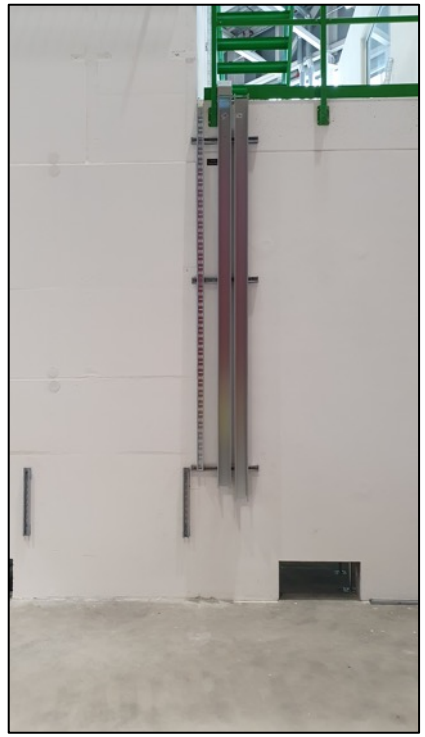
Experimental cave

- Installed
- CEP & CUP & PSS requirements finalized
- Design of patch & gas panels finalized

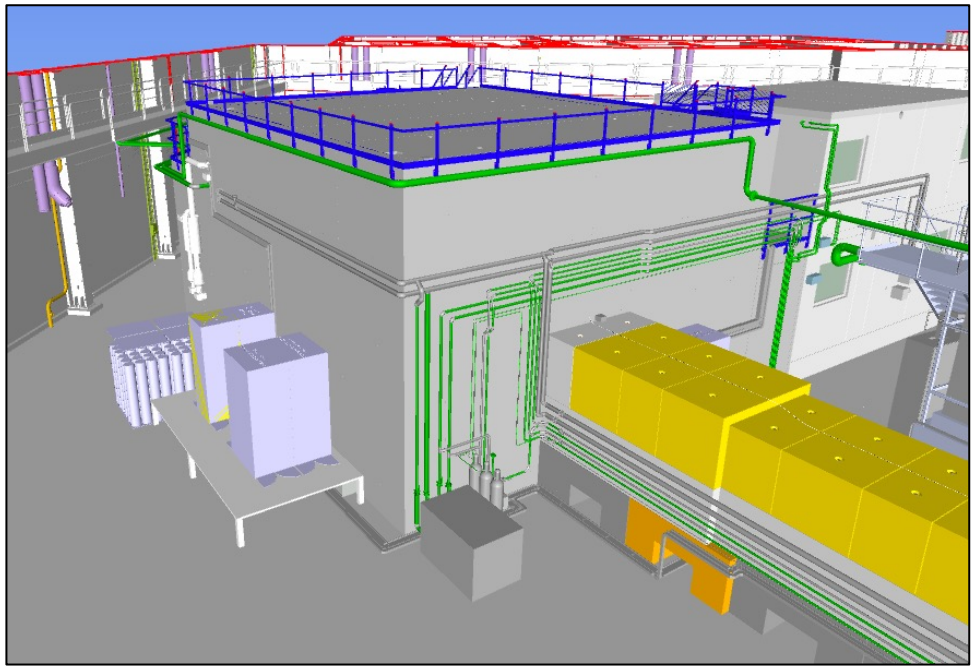
Common projects

- Common Electrical Project (CEP): installation started
- Common Utility Project (CUP): CDR completed
- Personnel Safety System (PSS): PDR completed
- New coordination installation meetings between CEP, CUP, PSS and Detector group
- Common shielding project 50 % complete

CEP installation in DREAM cave



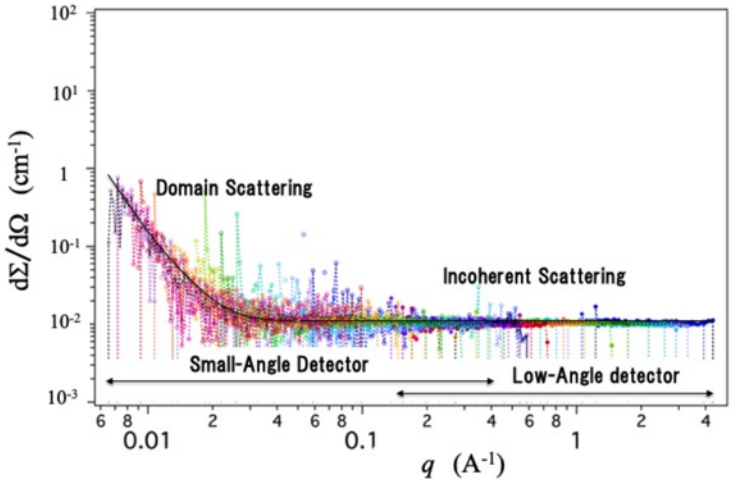
DREAM model with CUP infrastructure



DREAM Specific SEE: Cryofurnace with Sample Changer

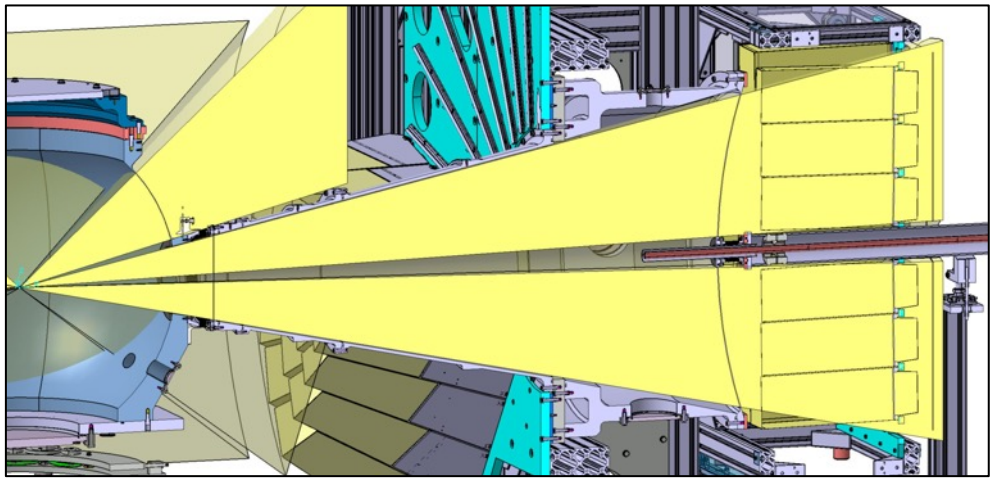
- Scope & budget are transferred to ESS SAD
- Sole supplier was identified (Article 16)
- Two pre-kick-off meeting discussions about technical scope
- Preliminary design & budget estimation (low temperature only) was received
- Dilemma of choosing a window material: V is good for diffraction, but bad for SANS
- Possible solution: single-crystal Si window (used for SANS SEE)

SANS scattering from Vanadium window

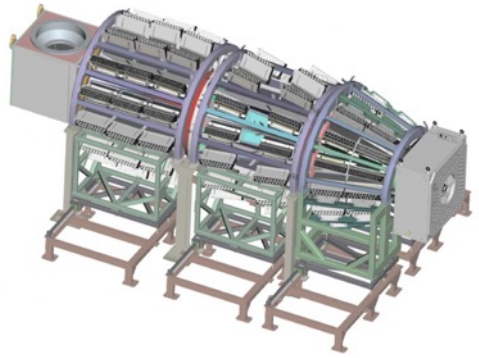


Input from: SNS & MLZ SANS groups

Window mount shall not block scattered neutrons (yellow)



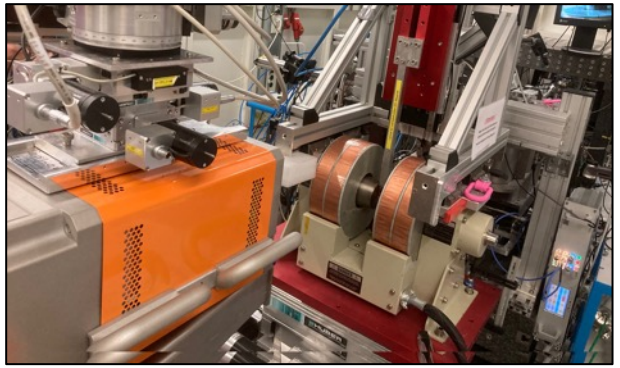
Possible input from NIMROD @ ISIS ?



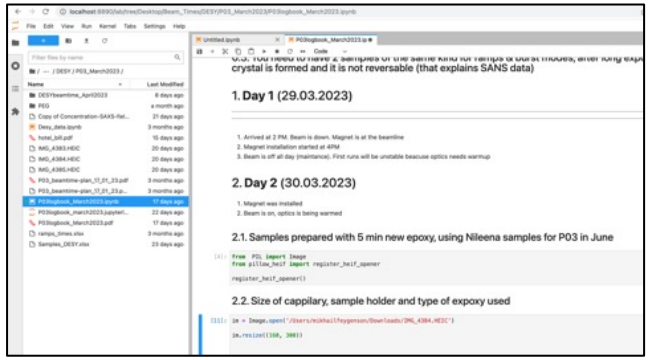
Towards the first science at ESS

- Common beam time at DESY & MAX IV with DREAM staff, DMSC & Materials and Physics Support
- Sample preparation at ESS: Chemistry and Life Science Support & Deuteration and Macromolecular Crystallisation
- Why synchrotrons: comparable data rates & high throughput, like DREAM

Magnet setup @ DESY



Jupyter notebook



Issues

- Delay in Final TG3 (homework + clarifying ESS requirements)
- Delay in TG5 (not critical, still before BOT)
- Delays with SAT of hutch (re-wiring, Swedish building permit)
- BC hub issue, effect on schedule is not yet clear

Future STAP meetings for DREAM

- Only two components to install: choppers and detectors
- STAP presentations are getting shorter
- Big push from ESS for detailed plans for hot commissioning & first science
- STAP member input is critical for both
- Suggestion: shift the focus from technical updates to discussions about hot commissioning & first science