MAGiC progress update

STAP meeting– 25th October 2022

Ressources on site

- No permanent staff on site as of today, but…
- … on-site engineer
  - > Hired, will start in June 2023 if administrative work is completed
  - > Roman Landsov
  - > Fusion technology background (vacuum, magnetic field, micromechanic)
  - > mechanical design, instrument contact point on site, installation activities, …
- … LLB CAD designer
  - > started on April 17th
  - > mechanical design of remaining components

- Lead scientist: discussions to open a position and have someone on site
- Lead engineer: no change

Reviews/FAT/deliveries ?

MAGIC - CTV: Detectors; Choppers - 25Jan19

MAGIC - CTV: - Guide system ; - Experimental cave - 8May19

MAGIC - CTV: Beam monitors (2020-05-12)

MAGIC - Sub-TG3.1A: Detector B (2020-11-27)

MAGIC - Sub-TG3: Beam monitors (2021-04-06)

MAGIC - CTV: Heavy shutter (2021-09-22)

MAGIC - Sub-TG3: Common shielding (2022-01-13)

MAGIC - Sub-TG3: Out of bunker super-mirrors (2022-03-08)

MAGIC - Sub-TG3: Super mirrors; Heavy shutter (2022-05-20)

MAGIC - IDR: B-field components (2022-10-26)

Since last STAP meeting

MAGIC - Sub-TG3: Detector A (2022-11-29)

MAGIC - PDR: Cave; Hutch (2022-12-14)

MAGIC - Sub-TG3: Polarizer (2023-03-03)

MAGIC - Sub-TG3: Collimation slits (2023-04-25)

MAGIC -Sub-TG3: Polarization (2023-05-02)

MAGIC - Sub-TG3: Cave (2023-05-26)

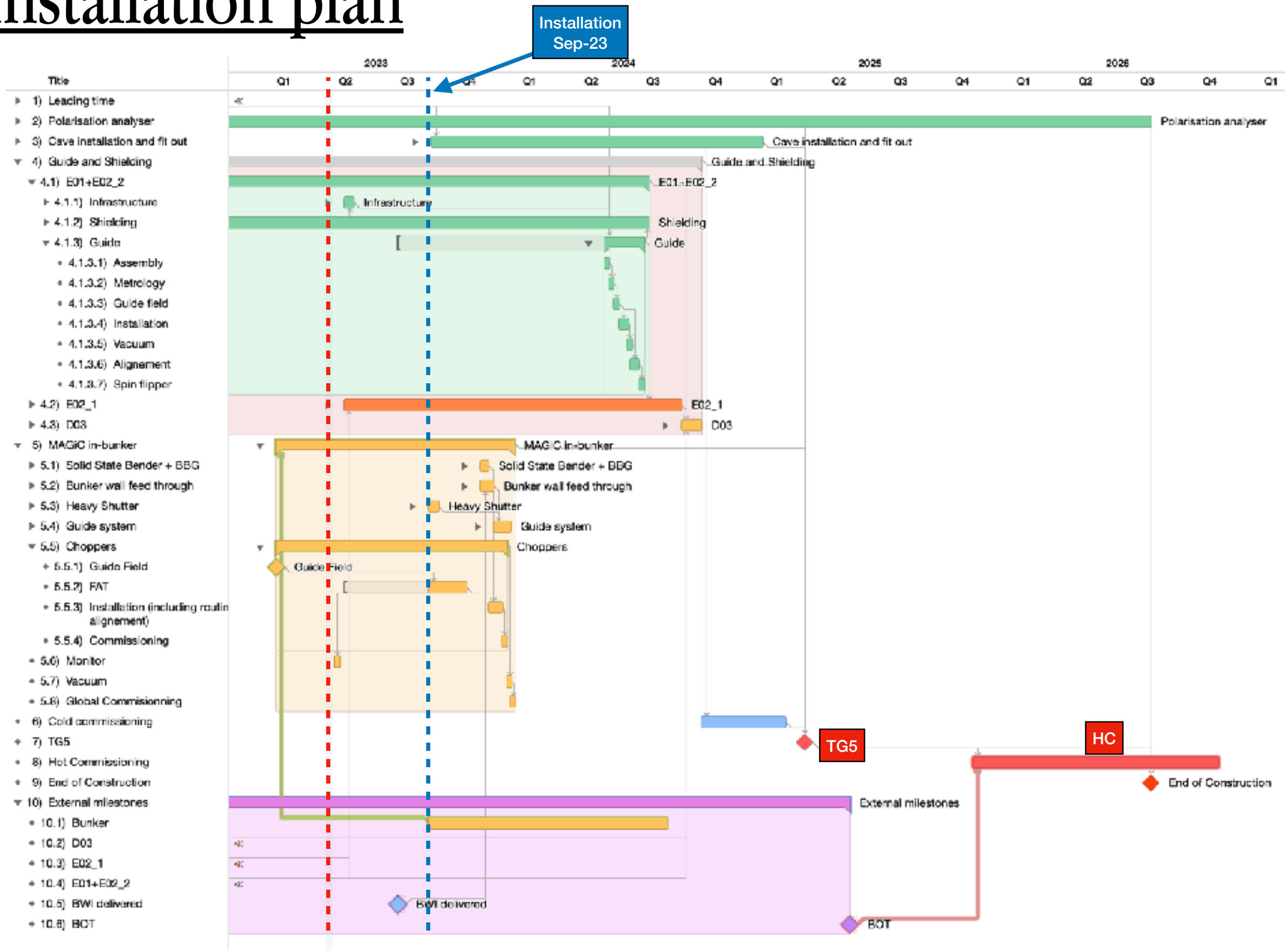
Reviews/FAT/deliveries ?

- PDR: experimental cave passed with some changes.
- IDR: polarization analyzer passed.

- sub-TG3
  - Detector A: passed in November
  - Thermal polarizer: passed in March.
  - Polarization analyzer, XYZ and cryostat: under review, feedback on May 2nd.
  - Collimation slits: under review, feedback on April 25th.
  - Experimental cave: documentation to be sent on May 10th, feedback on May 26th.

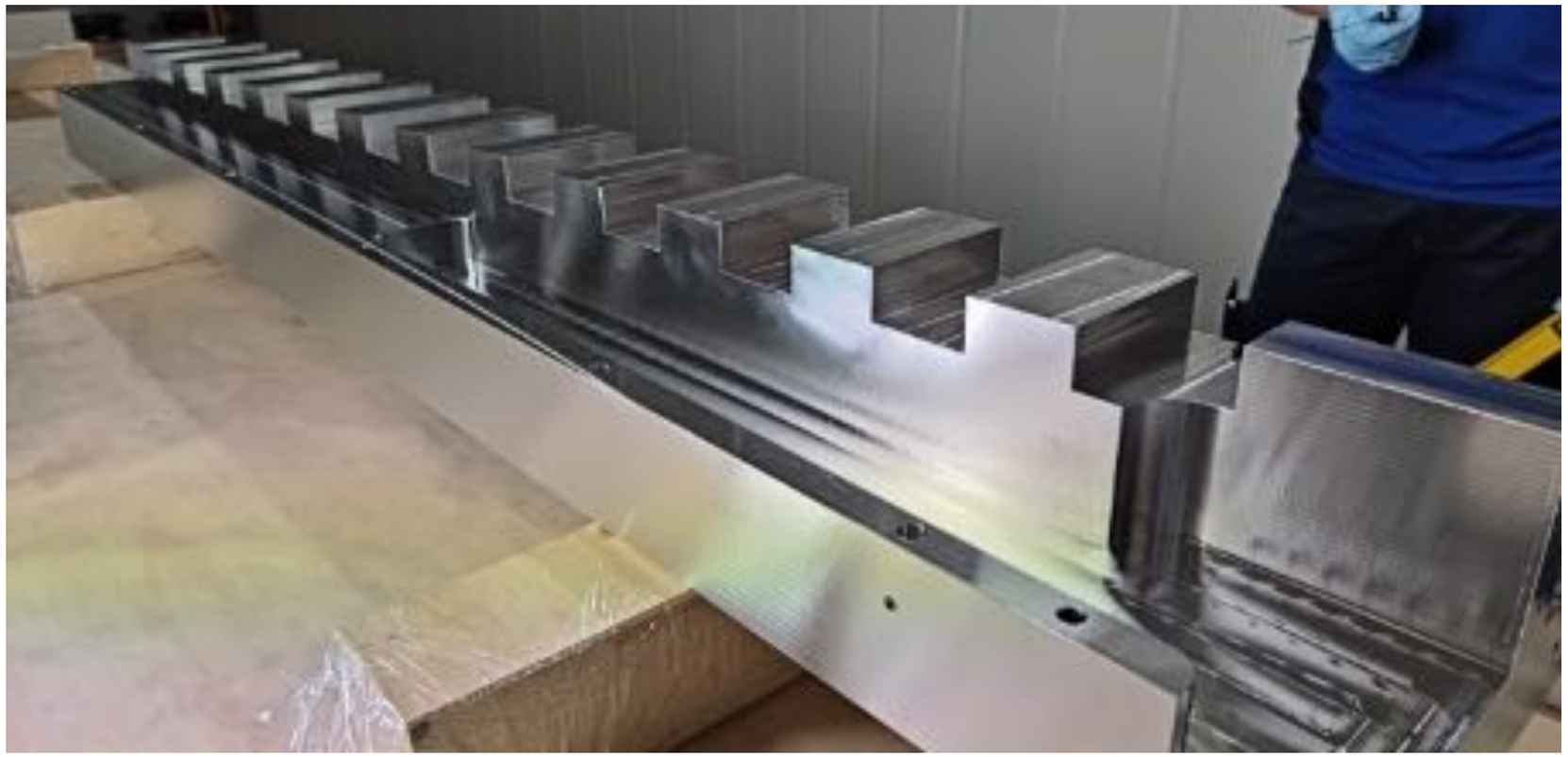
- FAT: heavy shutter tested at LLB, report in progress, delivery asap.

Installation plan



NBPI and shielding

- NBPI

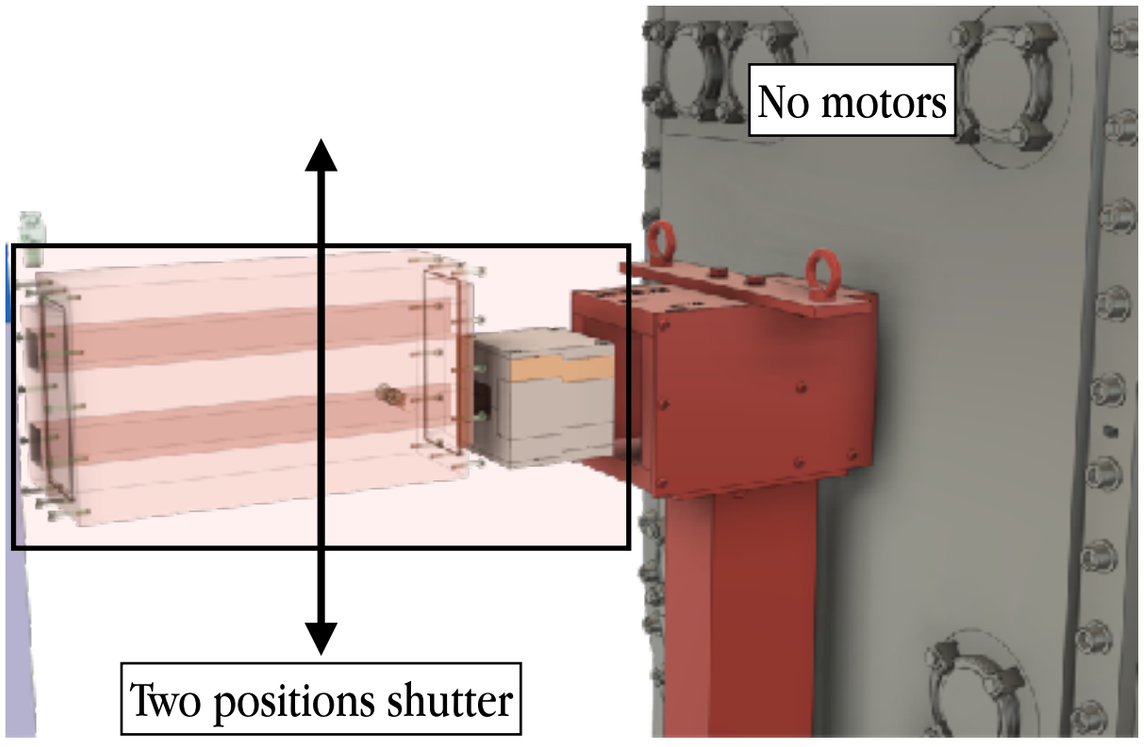


- Shielding: blocks at manufacturing stage

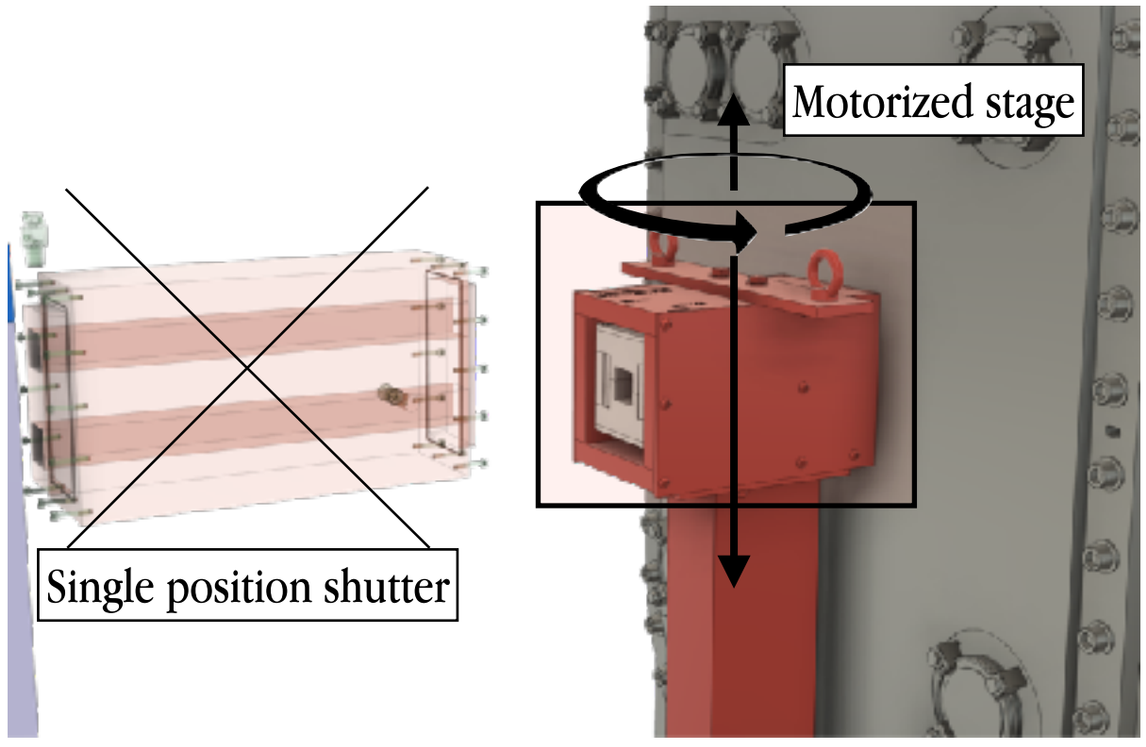
Solid state bender

- Alignement requires high precision
- More complex for a bender

Current design

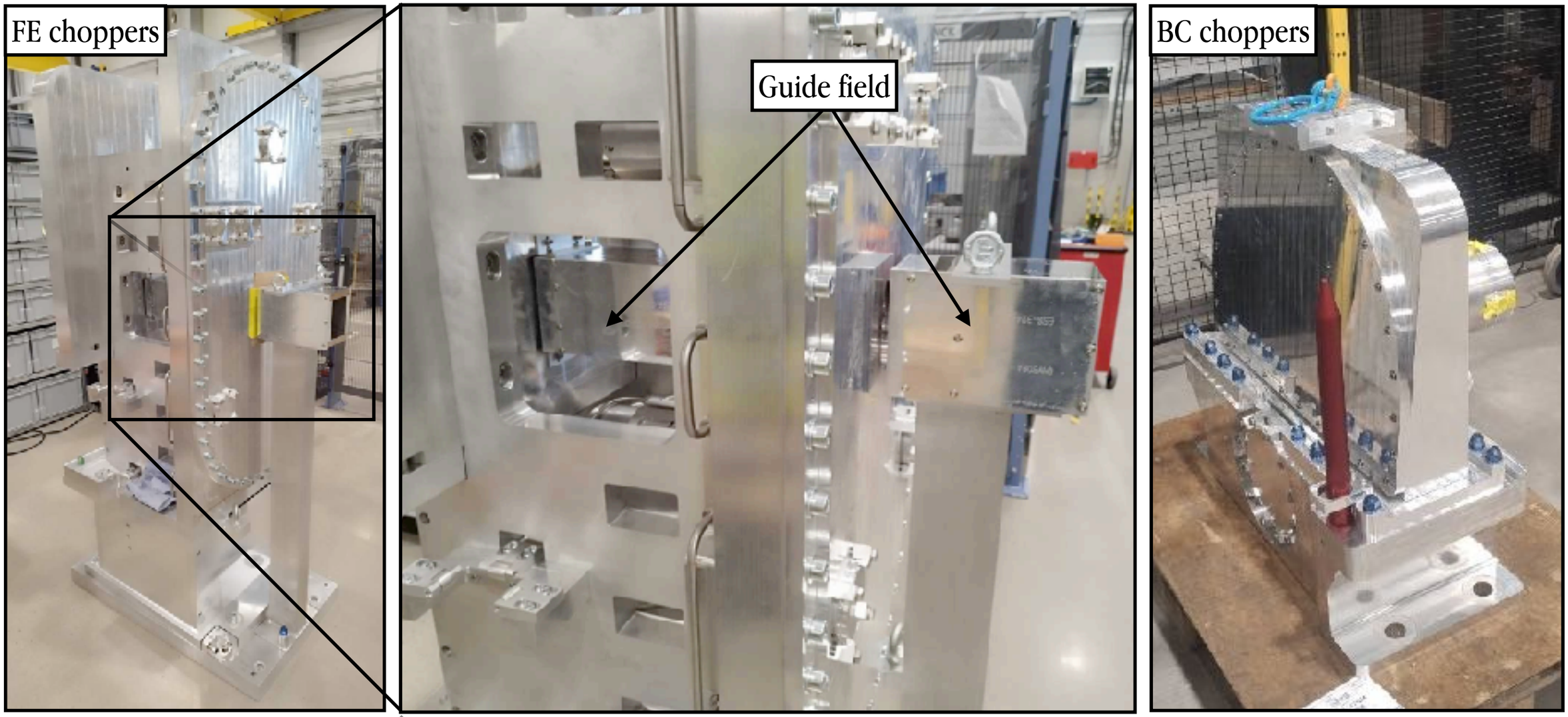


Explored design



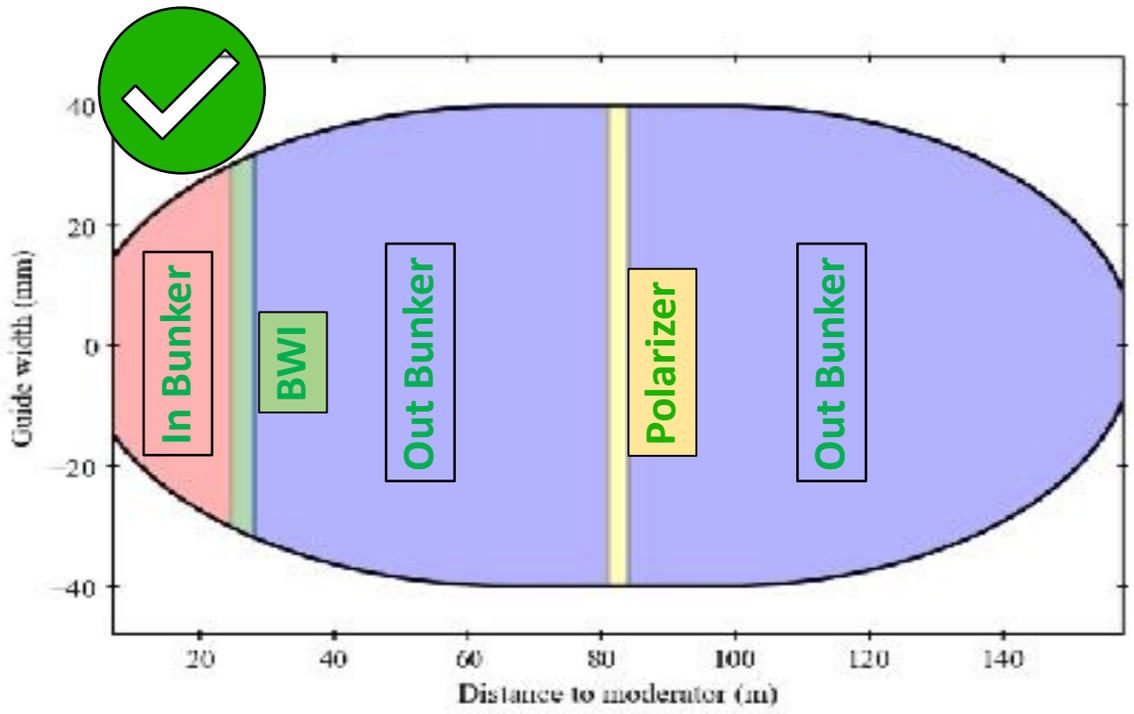
Choppers

- FATs in May 2023 as per last communication with Chopper group
- Integration of magnetic guide field done at ESS
  - Supervision: S. Klimko
  - Installation: NSS technicians



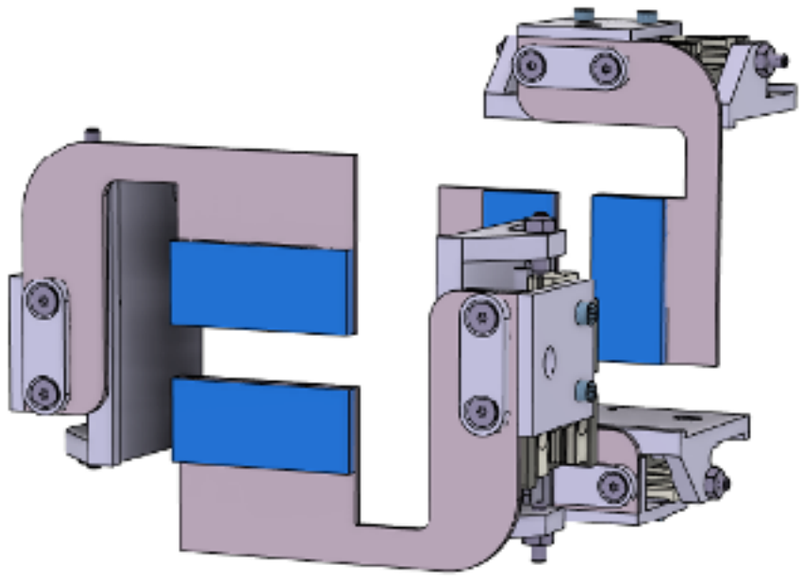
Guide system

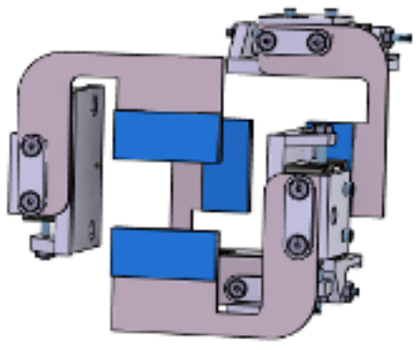
- Lot 1
  - Assembly in May-23
  - Delivery Q2-23
- Lot 2
  - Assembly in May-23
  - Delivery in Q2-23
- Lot 3
  - Assembly of first batch in progress
  - Delivery in June & October 23
- Lot 4
  - sub-TG3 passed in Mar-23
  - Delivery in Dec-23

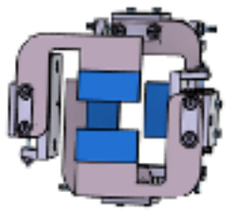


Collimation slits

- sub-TG3 in progress
- feedback tomorrow:
  - > MCA comments so far
  - > asking how to deal with death of encoders with radiation
- Integration on guide system will be done at ESS after delivery

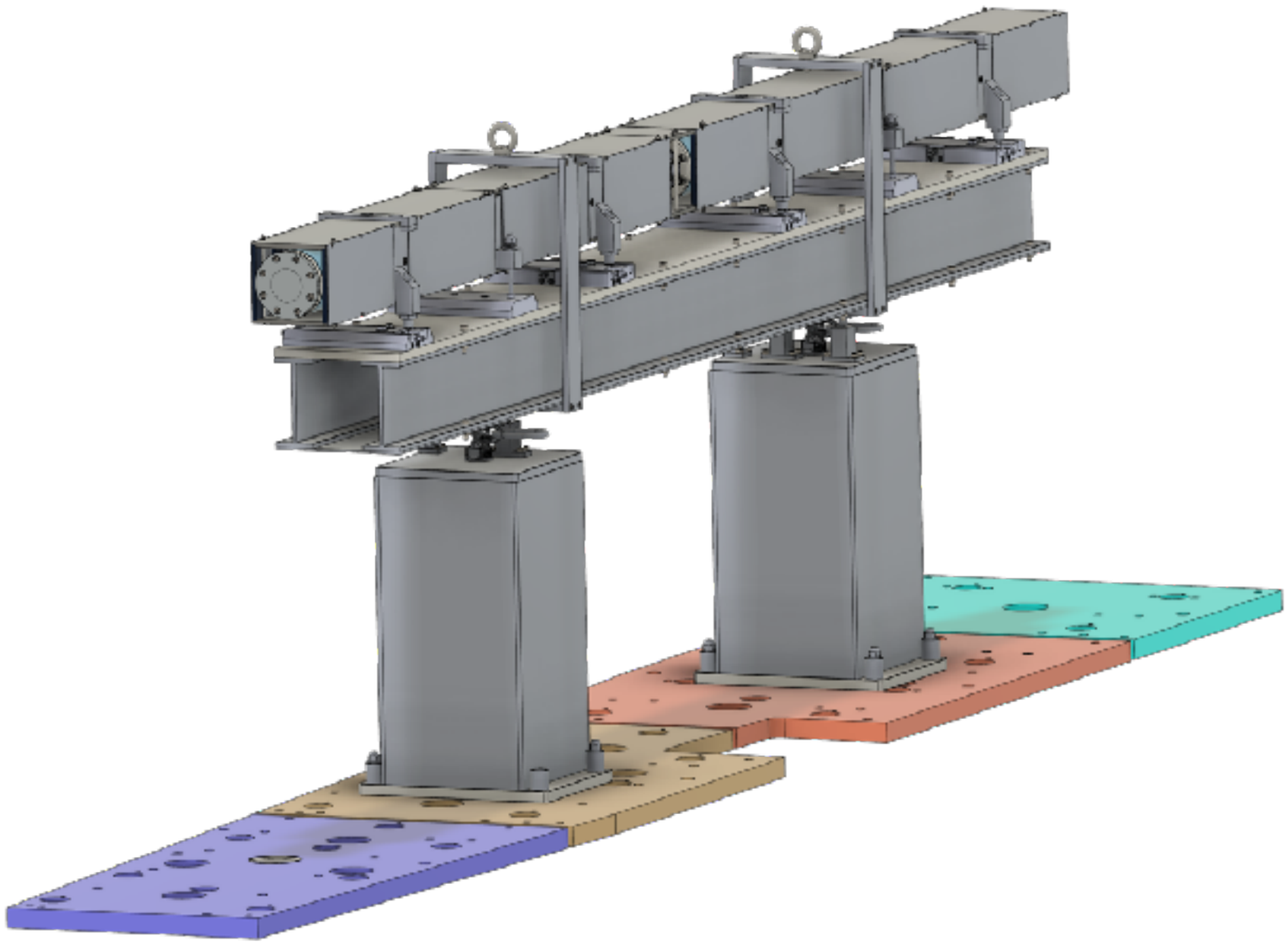




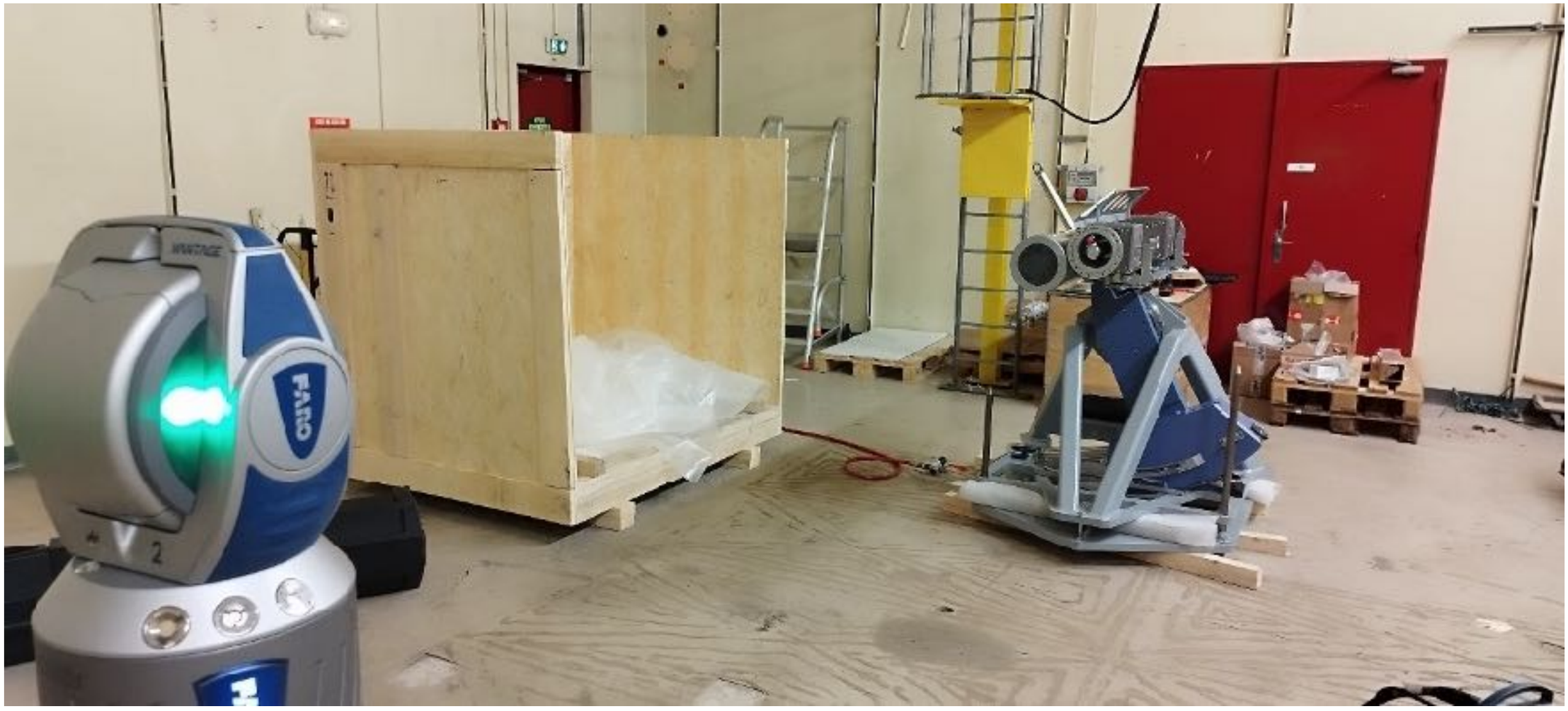


Vacuum Housing and Supports

- Detailed design done in-house for IB
- Drawings in progress (new CAD designer to help)
- Budget quote received for in-Bunker section (100 k€)



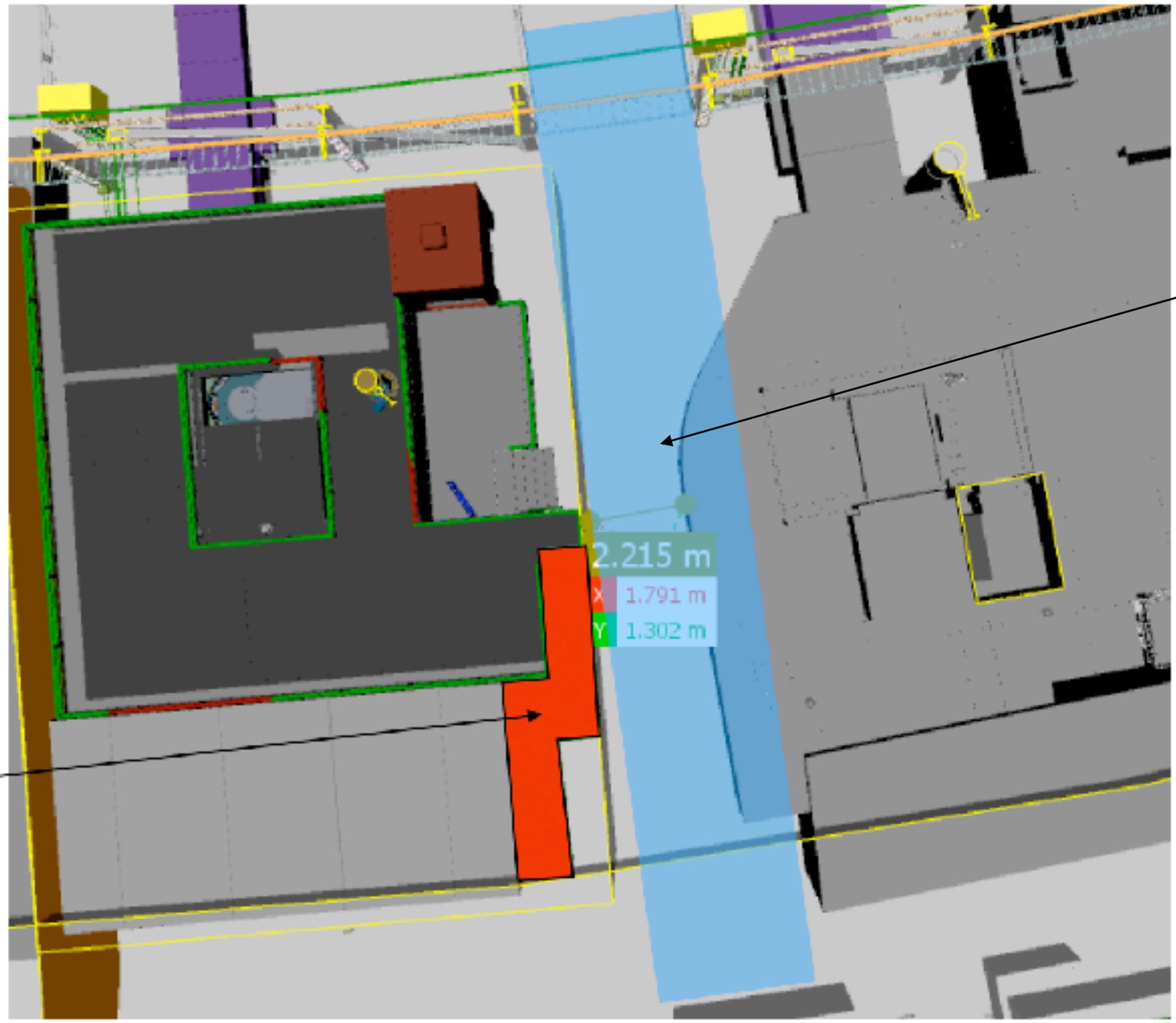
Heavy Shutter



- Accuracy: limited by alignement accuracy at ESS
- Repeatability: +/- 0.005 mm
- Opening time: ~7 seconds

Experimental Cave

- PDR in December 22
- stairs modification to accommodate for MIRACLES …



Experimental Cave

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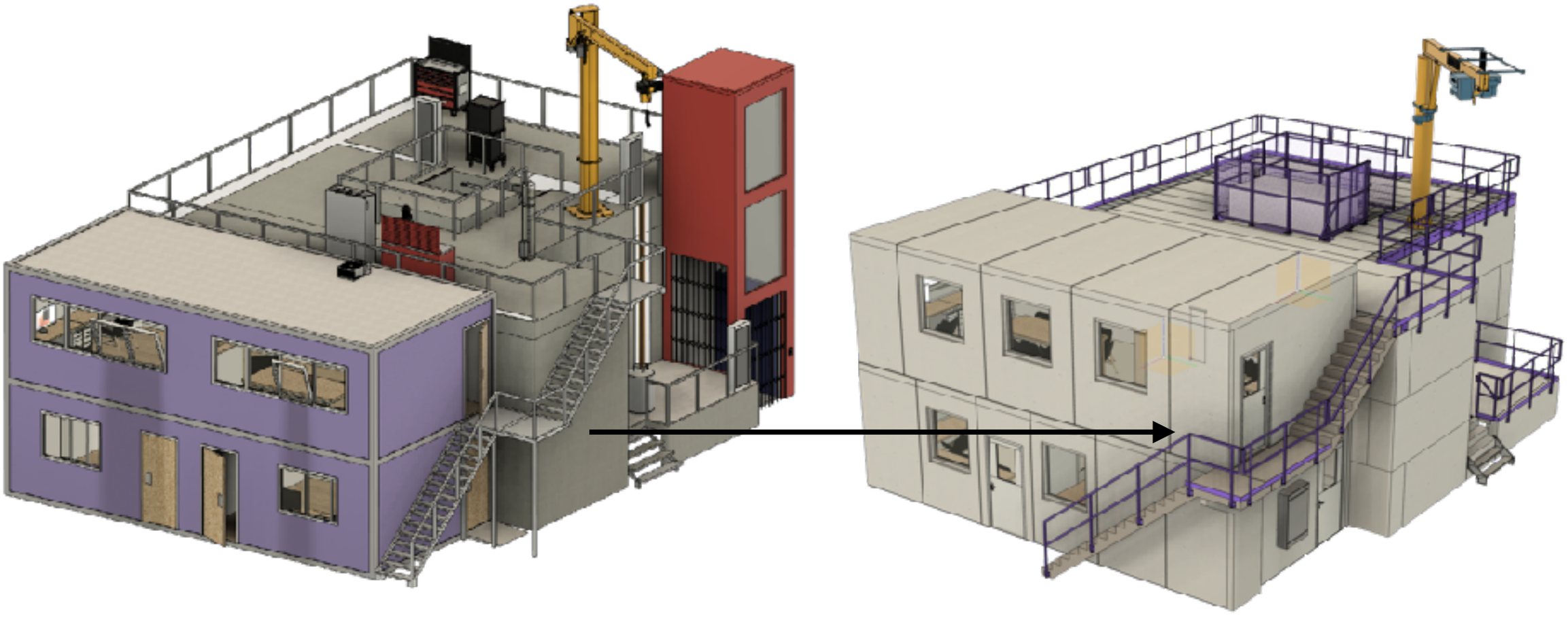
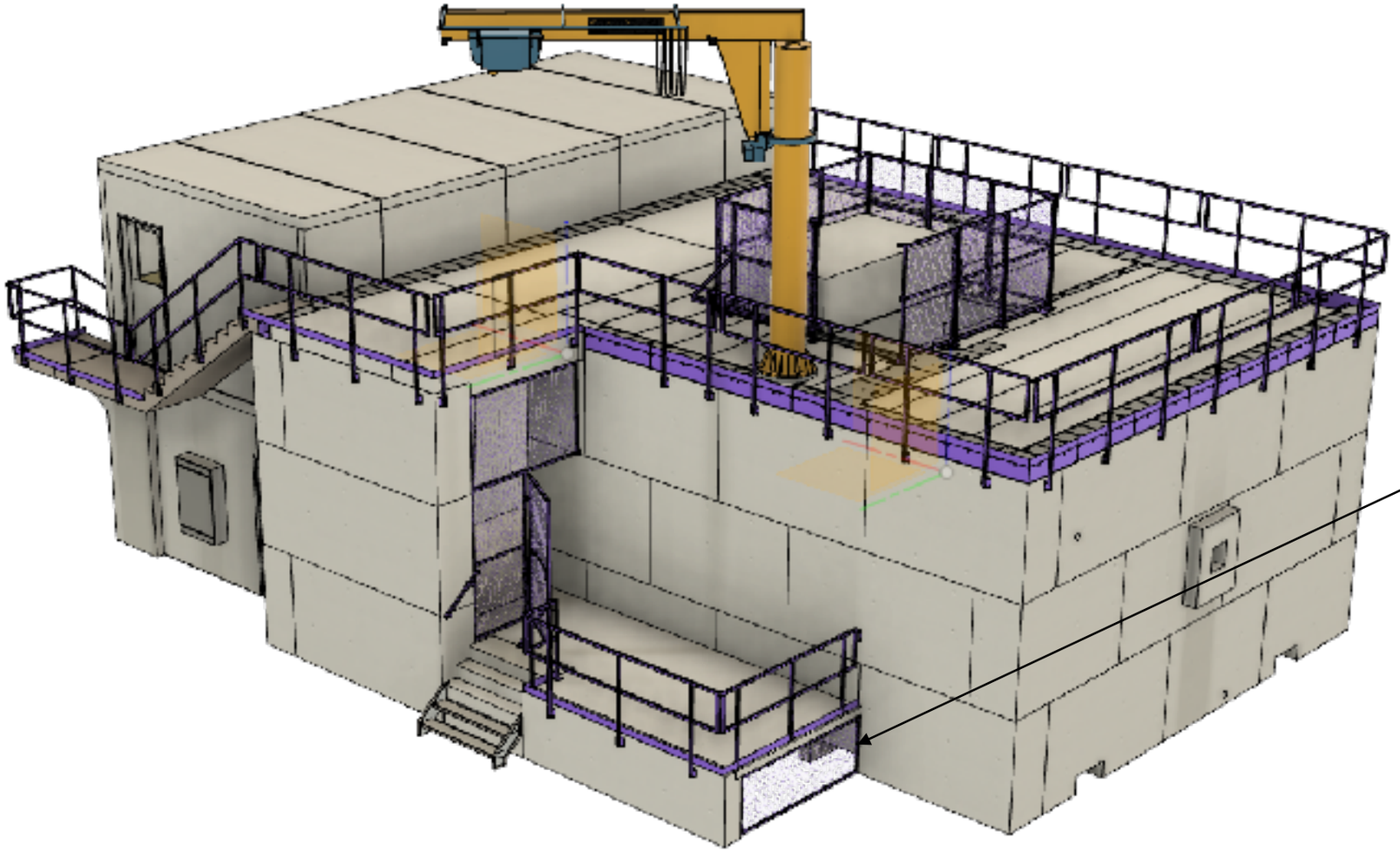
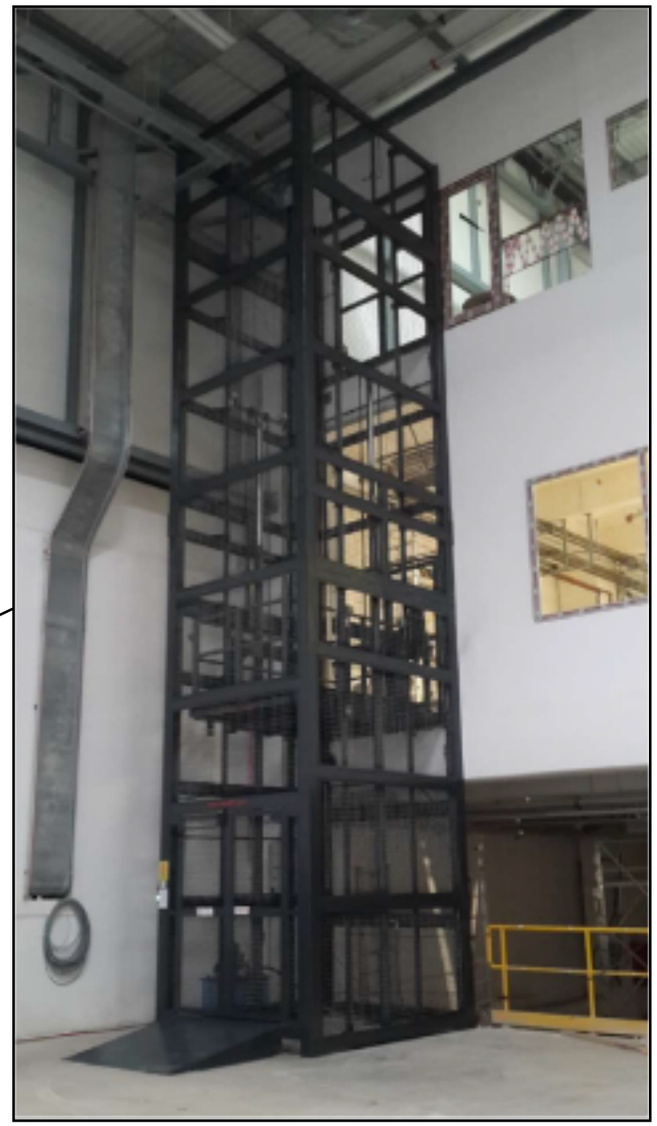


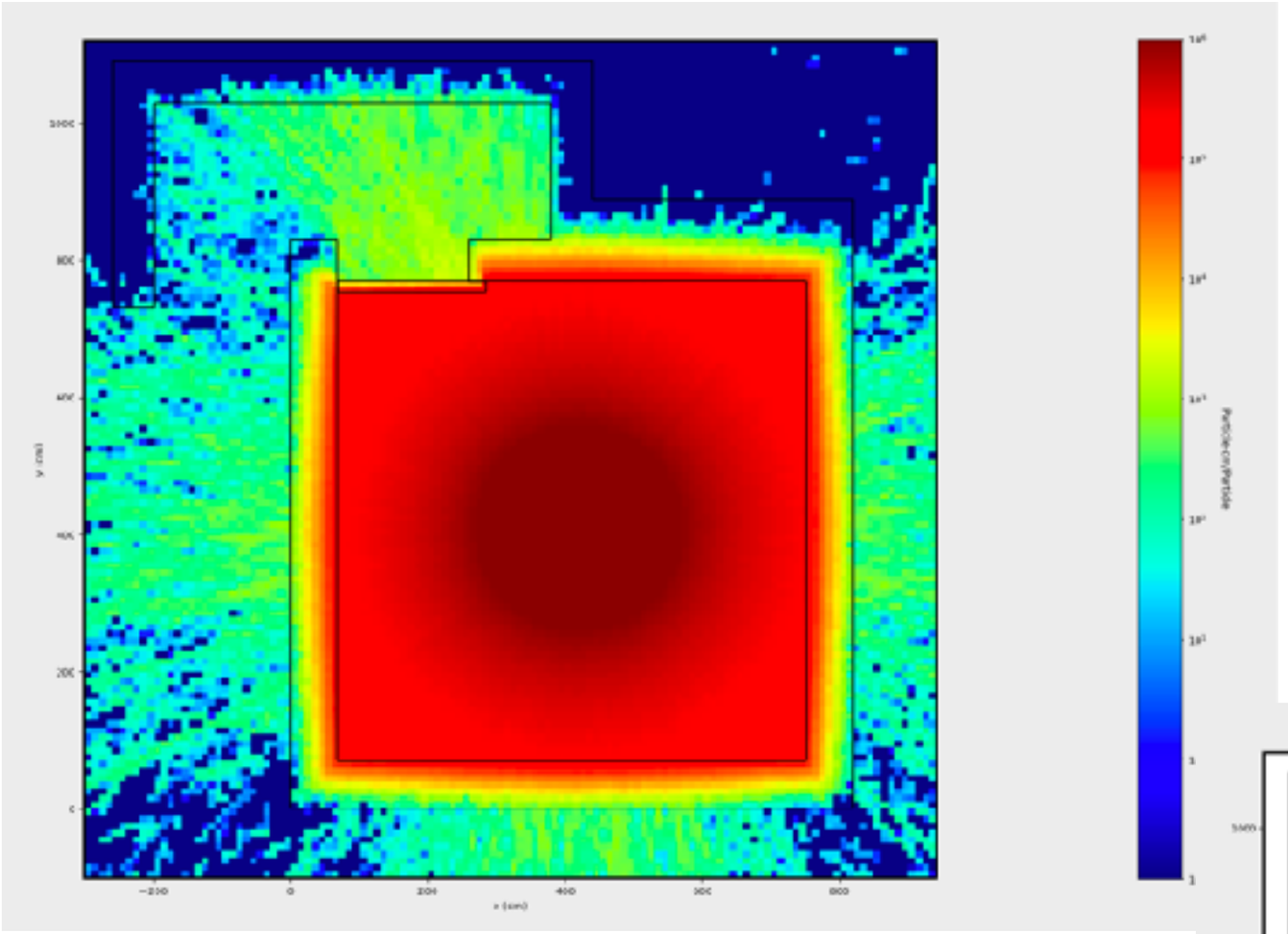
Experimental Cave

- sub-TG3 to come in May-23
- Current design without elevator.
- Discussion ongoing with potential supplier



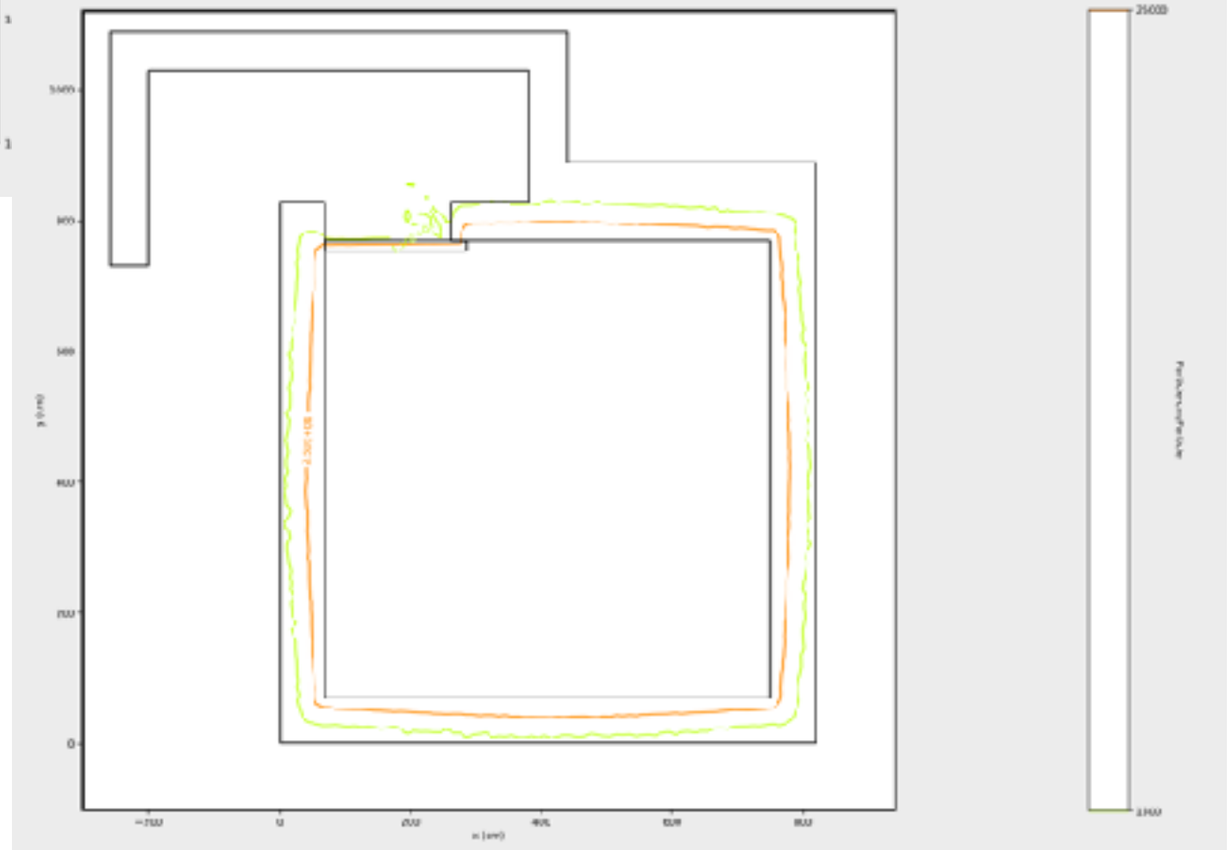


Experimental cave



Calculations of doserate for H1/H2 scenarios

Doserate maps to be submitted with sub-TG3 documentation.

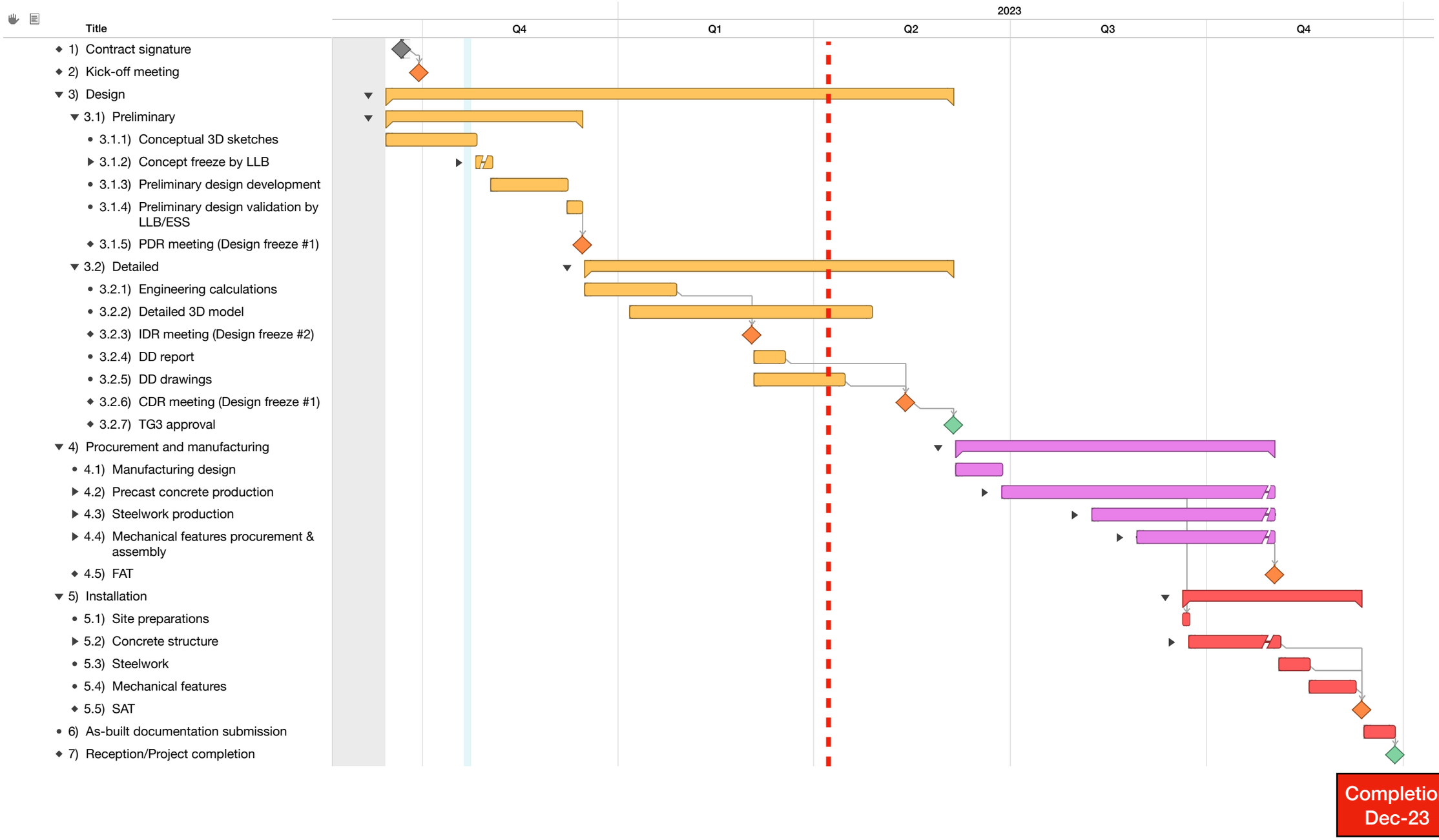


Calculations of doserate for H1/H2 scenarios

All calculations showed 1.5 μSv/h threshold well within the cave wall.

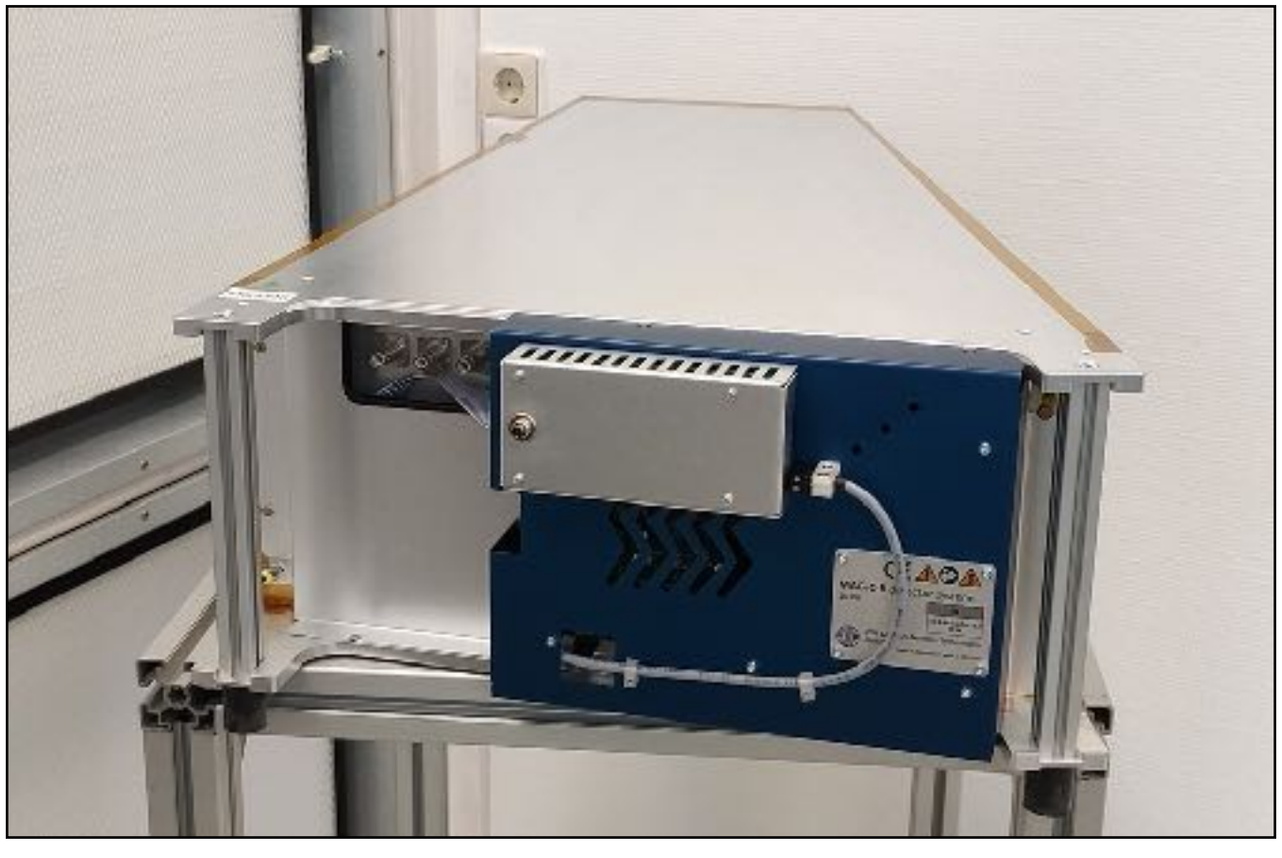
Experimental Cave

- Following plan perfectly so far
- Based on time required for DREAM and BIFROST



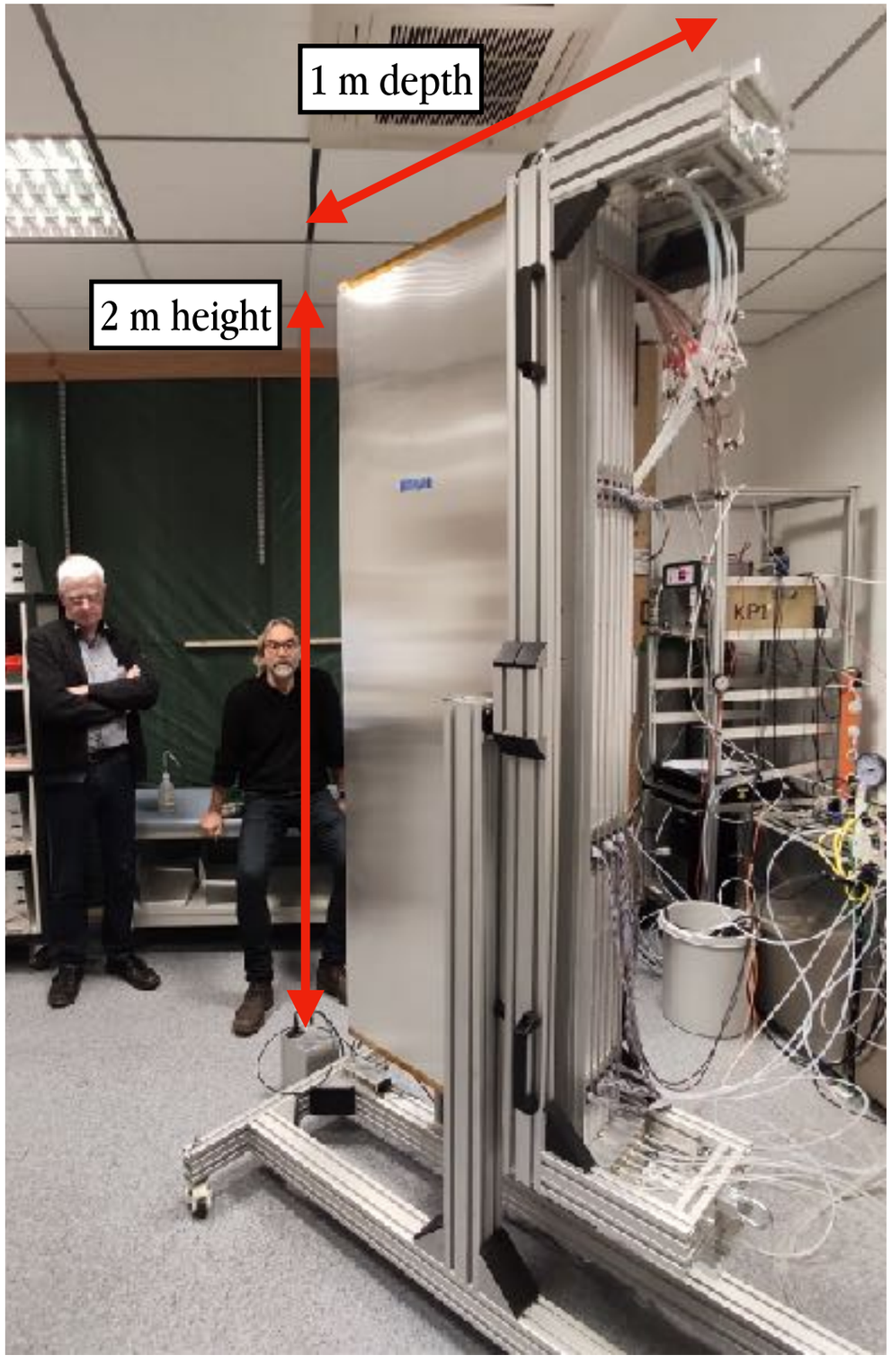
Detector B

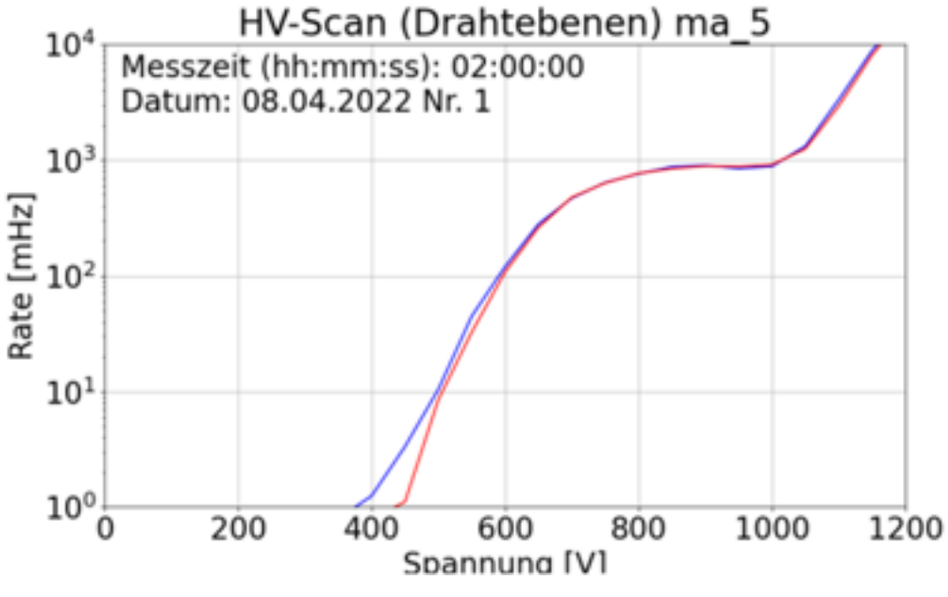
- All modules will be sent to ESS (Utgard) in May for integration and tests with the master module.
- Help from CDT greatly appreciated !



Detector A

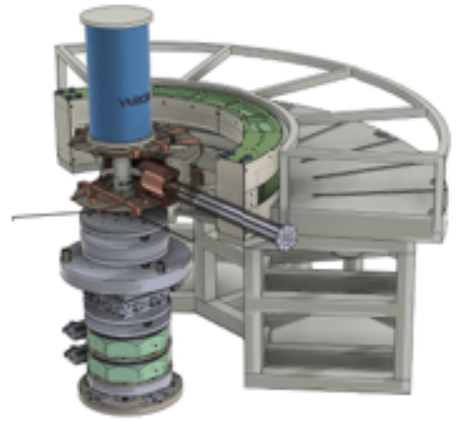
- **sub-TG3 passed in Q4-22**
- First segment manufactured for test
- Work on the interface with support table and shielding will start based on the 1st segment.
- Manufacturing in first half of 2024





PA/XYZ

- sub-TG3 in progress
- feedback on May 2nd



Analyzer

Engineering reports/documents:

- Activation report: ESS-4969915
- Design Verification report: ESS-4969913
- Prototype report: ESS-4969917
- Magnetic design report: ESS-4969918
- Drawing Package: ESS-4969920
- STEP file package: ESS-4969919
- Quality Plan: ESS-4969914
- Support table draft description: ESS-4969921
- Support table and lifting interfaces description: ESS-4969922
- Magnetic and gravitational deformation calculations: ESS-4969916

Required documentation:

- SSDD: ESS-1138696
- Operation and Maintenance: ESS-1138713
- Integration and Verification: ESS-1138710
- Initial Operations and Staging: ESS-4969910
- Concepts of Operation: ESS-3420117

XYZ polarization device

Engineering reports/documents:

- Magnetic design report: ESS-4969953
- Relay description: ESS-4969954
- STEP model: ESS-4969952
- PDF 3D: ESS-4969951

Required documentation:

- SSDD: ESS-1138685

Variox cryostat

Engineering reports/documents:

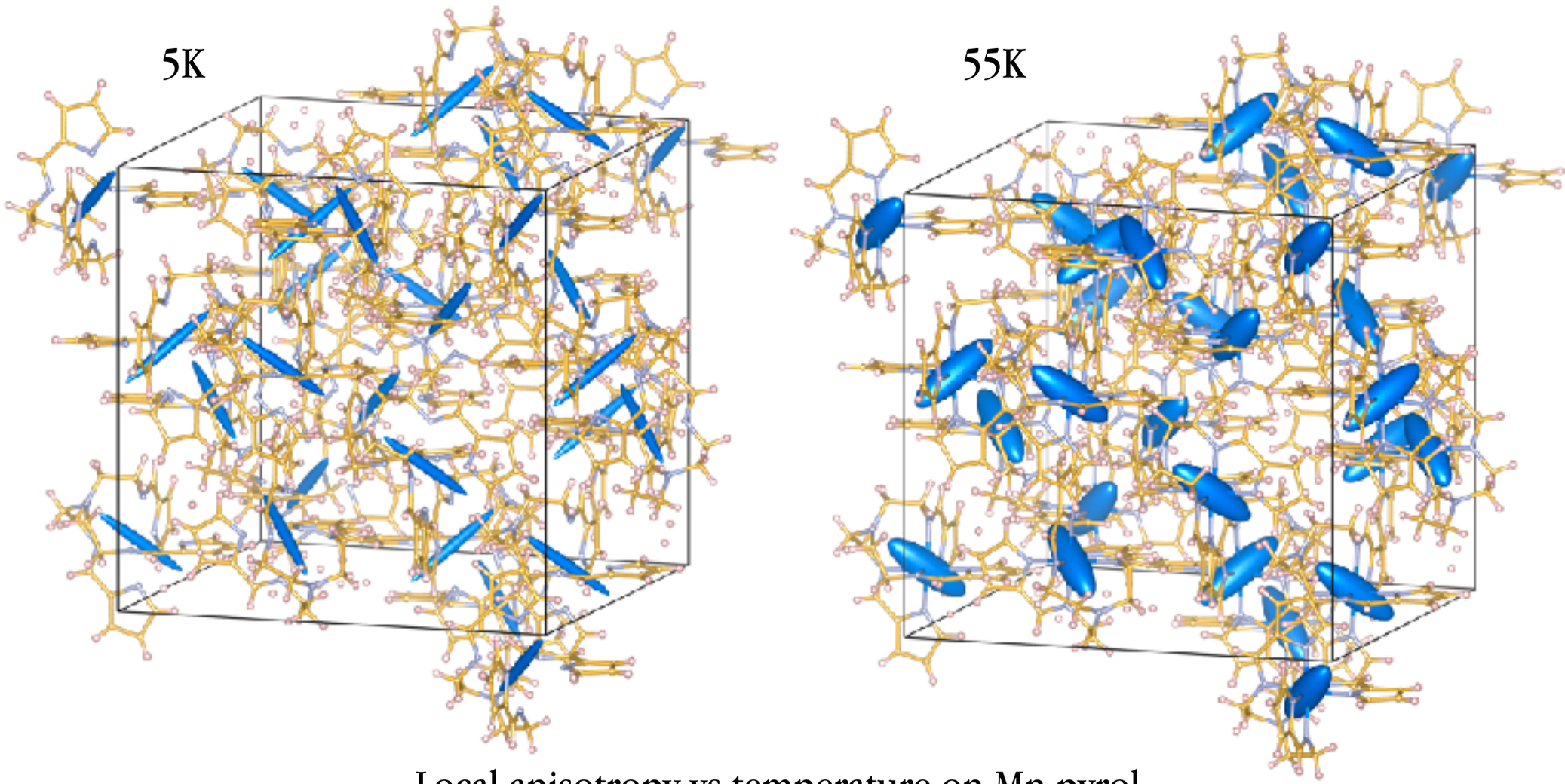
- Tail machanical design report: ESS-4969934
- Drawing package: ESS4969935

Required documentation:

- SSDD: ESS-1138691

Preparing scientific activities

- Experiment on TAIKAN (BL-15) at J-PARC
- Incident polarization experiment on a powder (molecular magnet)
- Good experience, showed difficulties with background, peak shape.
- Working on it in CRYPSY.



Local anisotropy vs temperature on Mn-pyrol

Questions