



ESTIA STAP UPDATE 2025

PRESENTED MOSTLY BY JOS COOPER



Overview

- Staff
- Instrument Tour
- Detector
- Risks and Issues
- Miscellaneous Points



Staff

Staffing Changes

Left

Harald Lang (Technical writer)

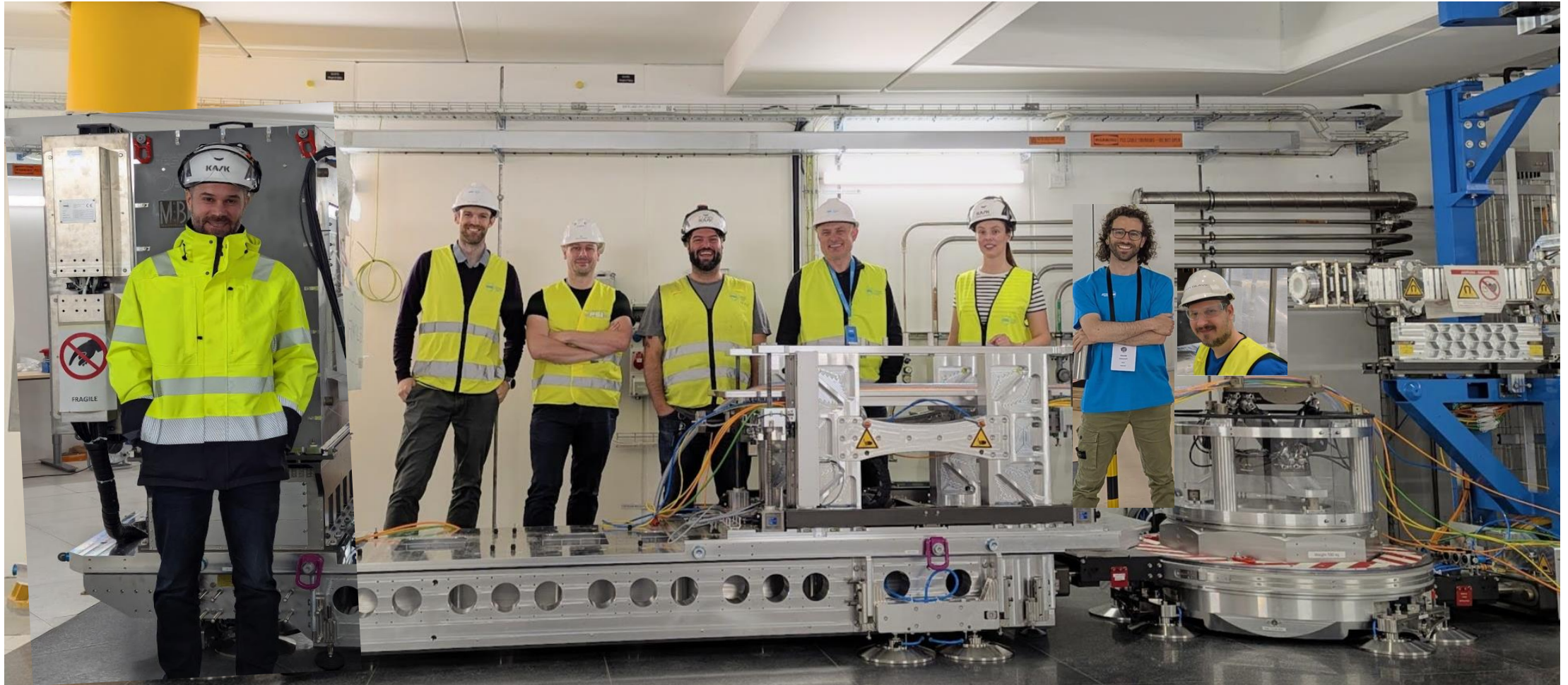


Arrived

Grace Causer (Instrument Scientist)



ESTIA Core Team



Nicolae

Jos

André

Felipe

Peter

Grace

Nicoló

Artur



Instrument Tour

Bunker

All components installed and cables connected

All systems except beam monitor tested for functionality

Integrated testing ongoing, but we are very confident from what we have done so far that these will be a formality.



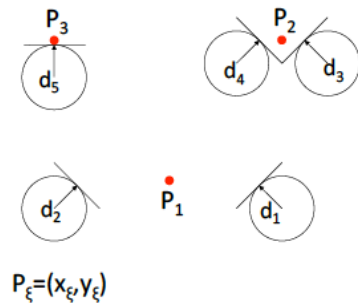
Selene Guide 1

Installed for a long time

Tested with final cables, racks, and even
NICOS control for the mover feet

Non-trivial mover foot logic implemented
and tested in NICOS (matrix
transformation)

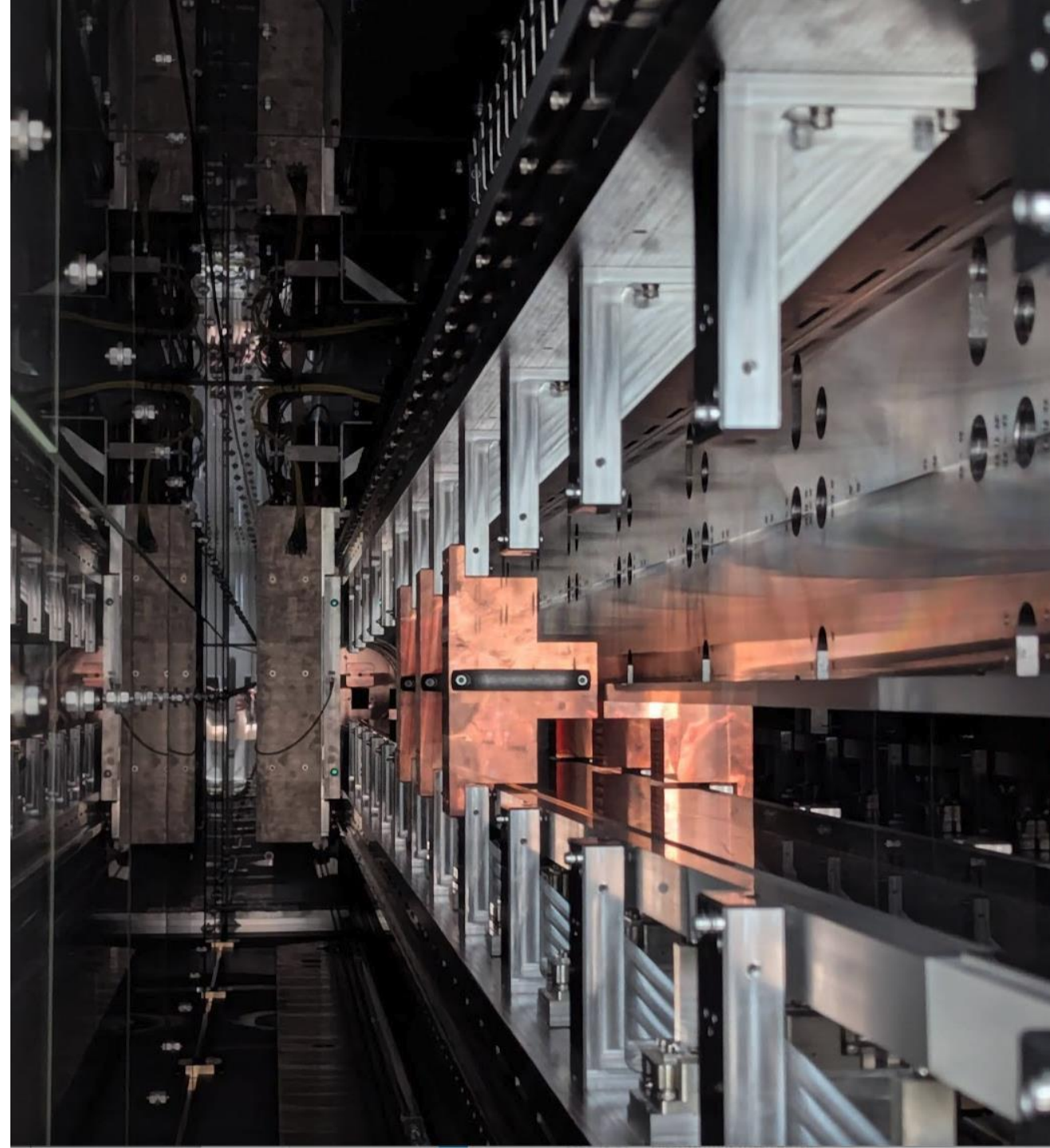
Integrated tests to be performed when
we have the MCA engineer time



$$\underline{\underline{S}} = \underbrace{(\underline{\underline{M}} \cdot \underline{\underline{A}})^{-1} (\underline{\underline{I}} - \underline{\underline{M}} \cdot \underline{\underline{B}})}_{\underline{\underline{D}}} \underline{\underline{X}}$$

$$\underline{\underline{X}} = \underline{\underline{D}}^{-1} \cdot \underline{\underline{S}}$$

$$\underline{\underline{D}} = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & -\frac{r}{2} & -\frac{1}{4} & -\frac{1}{4} \\ -\frac{1}{2} & \frac{1}{2} & \frac{r}{2} & \frac{1}{4} & -\frac{1}{4} \\ \frac{1}{2} & \frac{1}{2} & \frac{1}{4} - \frac{r}{2} & \frac{1}{4} & \frac{1}{4} \\ -\frac{1}{2} & \frac{1}{2} & \frac{1}{4} + \frac{r}{2} & -\frac{1}{4} & \frac{1}{4} \\ 0 & \frac{1}{\sqrt{2}} & -\frac{1}{2\sqrt{2}} & 0 & \frac{1}{2\sqrt{2}} \end{bmatrix}$$



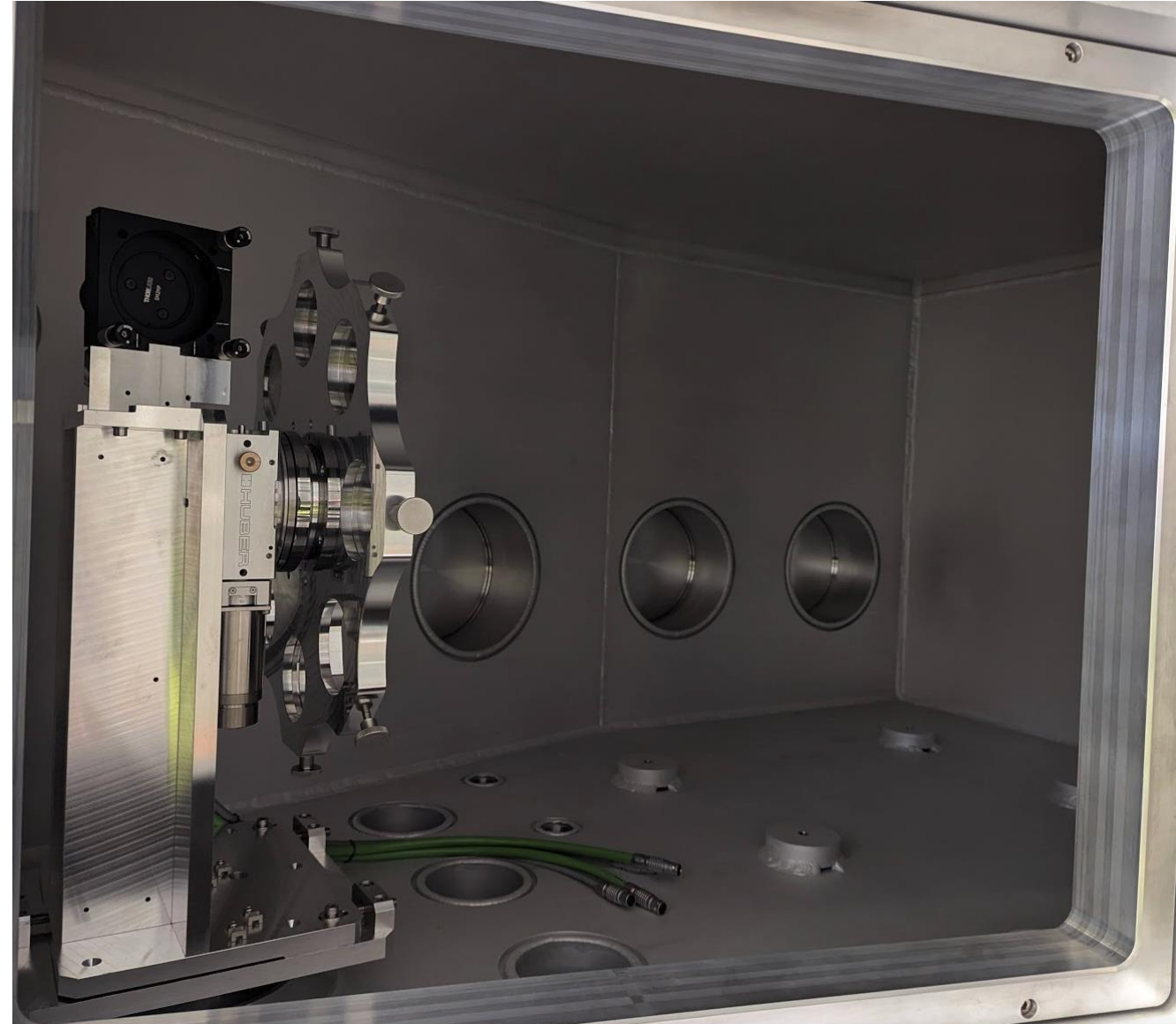
Middle Focus Chamber

Chamber and mask changer installed

Waiting for the polariser motion stage and polariser (delivered in November from PSI, after a delay for the polariser stage)

Optics for mask changer aligned

Motion tested ex-situ

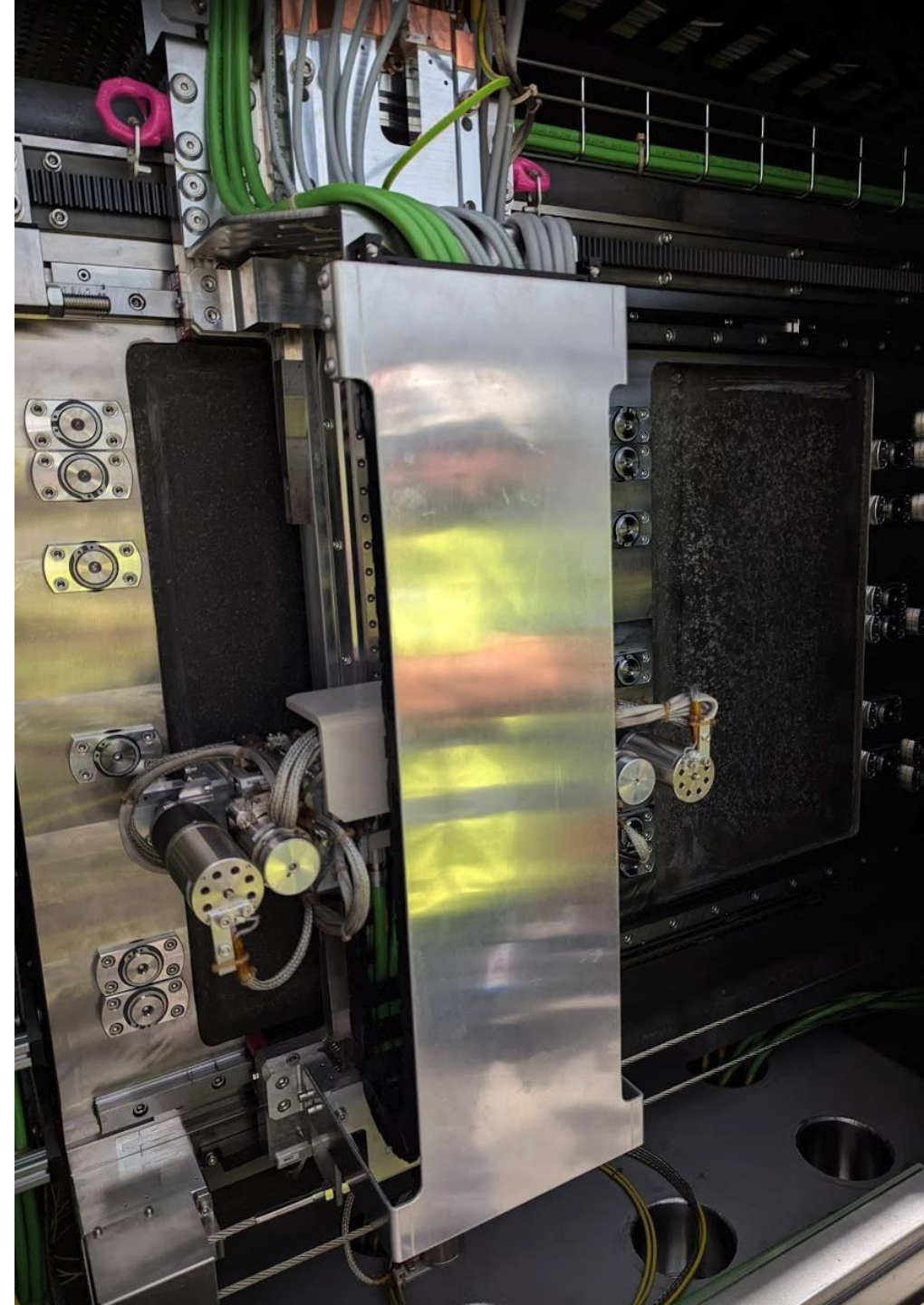


Selene Guide 2

Installed for a long time

Testing ongoing, NICOS logic implemented but untested

Integrated tests to be performed when we have the MCA engineer time



In Cave Optics



Slit system tested in lab

Guide fields assembled

Vacuum tested

Additional sample environment motion
panel installed

Aligned to nominal



Sample Stage



Installed

Airpads tested

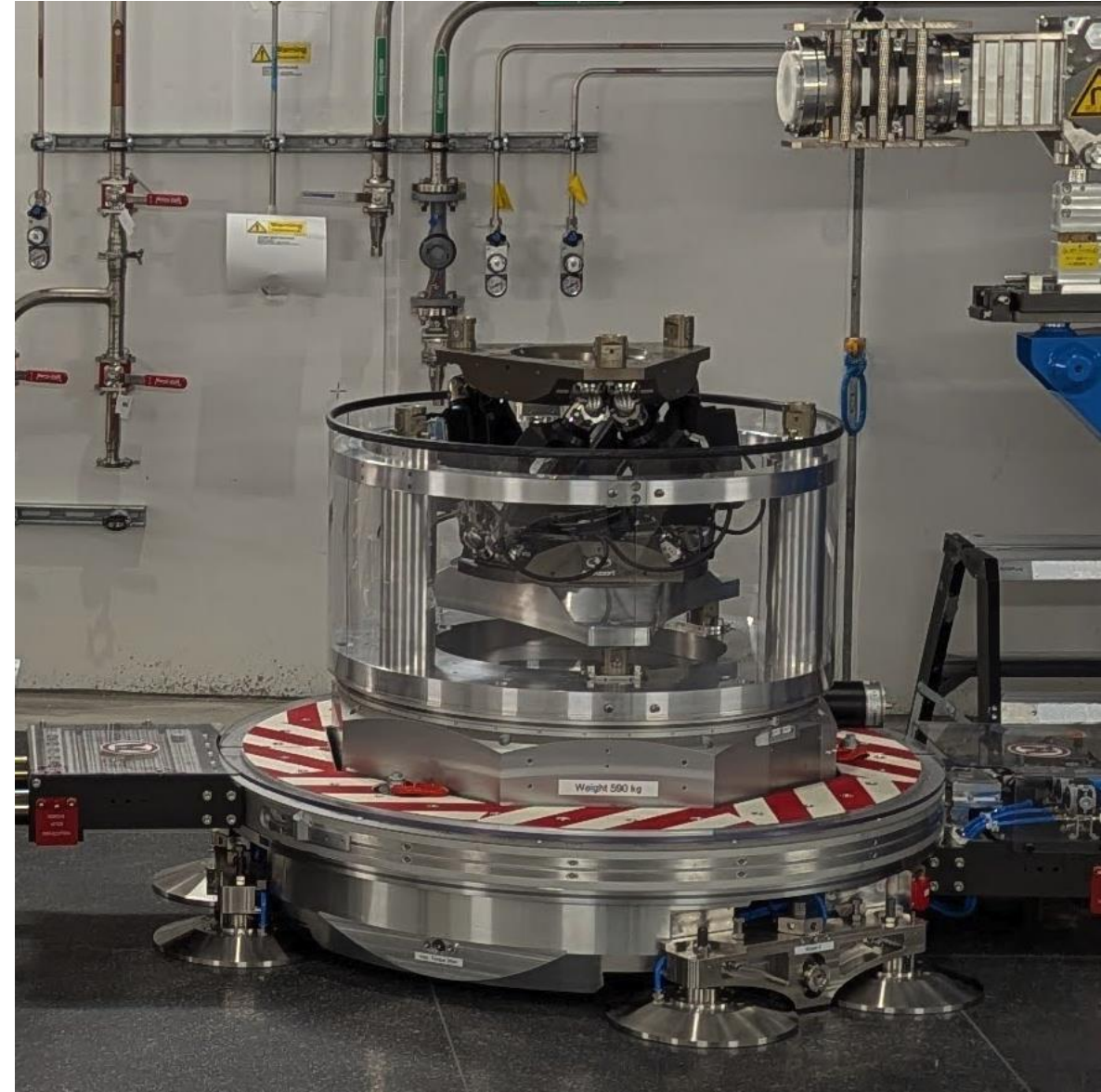
Pneumatic connections to in-cave optics
and detector arm tested

Rotation stage tested in place

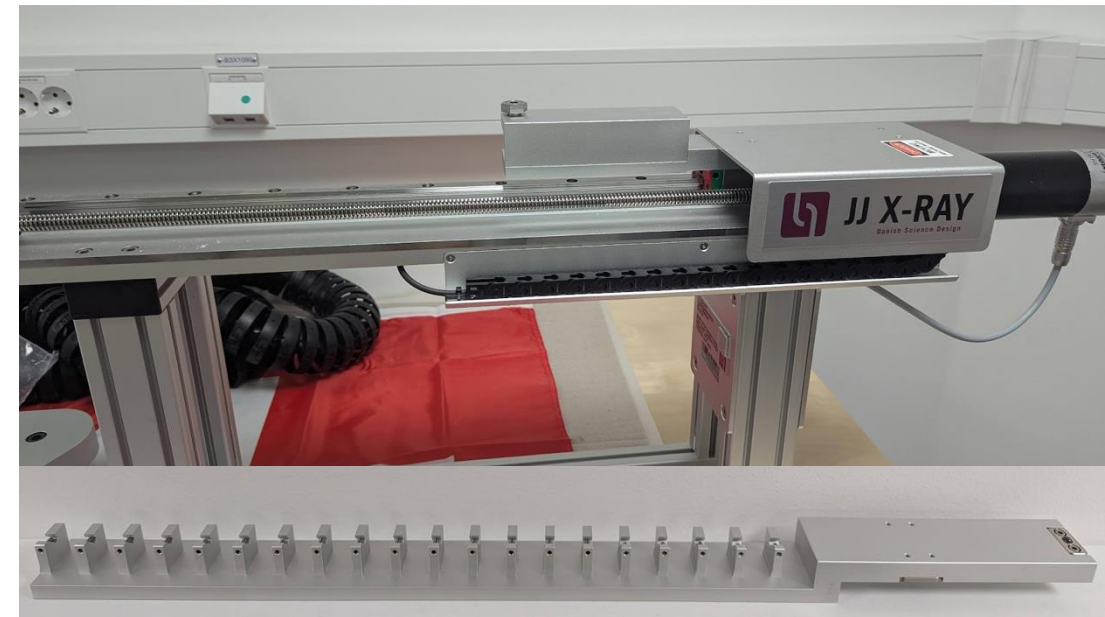
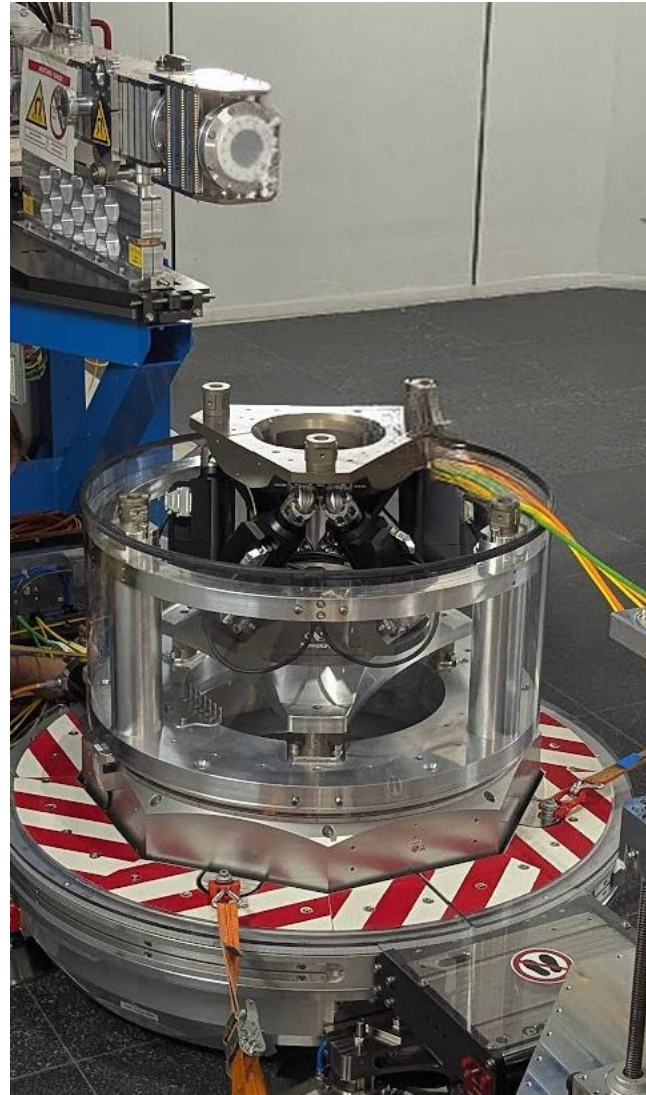
Hexapod tested in lab, EPICS driver
written and tested

Lateral adjustment stage tested with
sample stage and detector arm
connected and floating

Full integrated tests to be done when
MCA engineer time available



Sample Environment



Detector Support Arm



Installed

Airpads tested

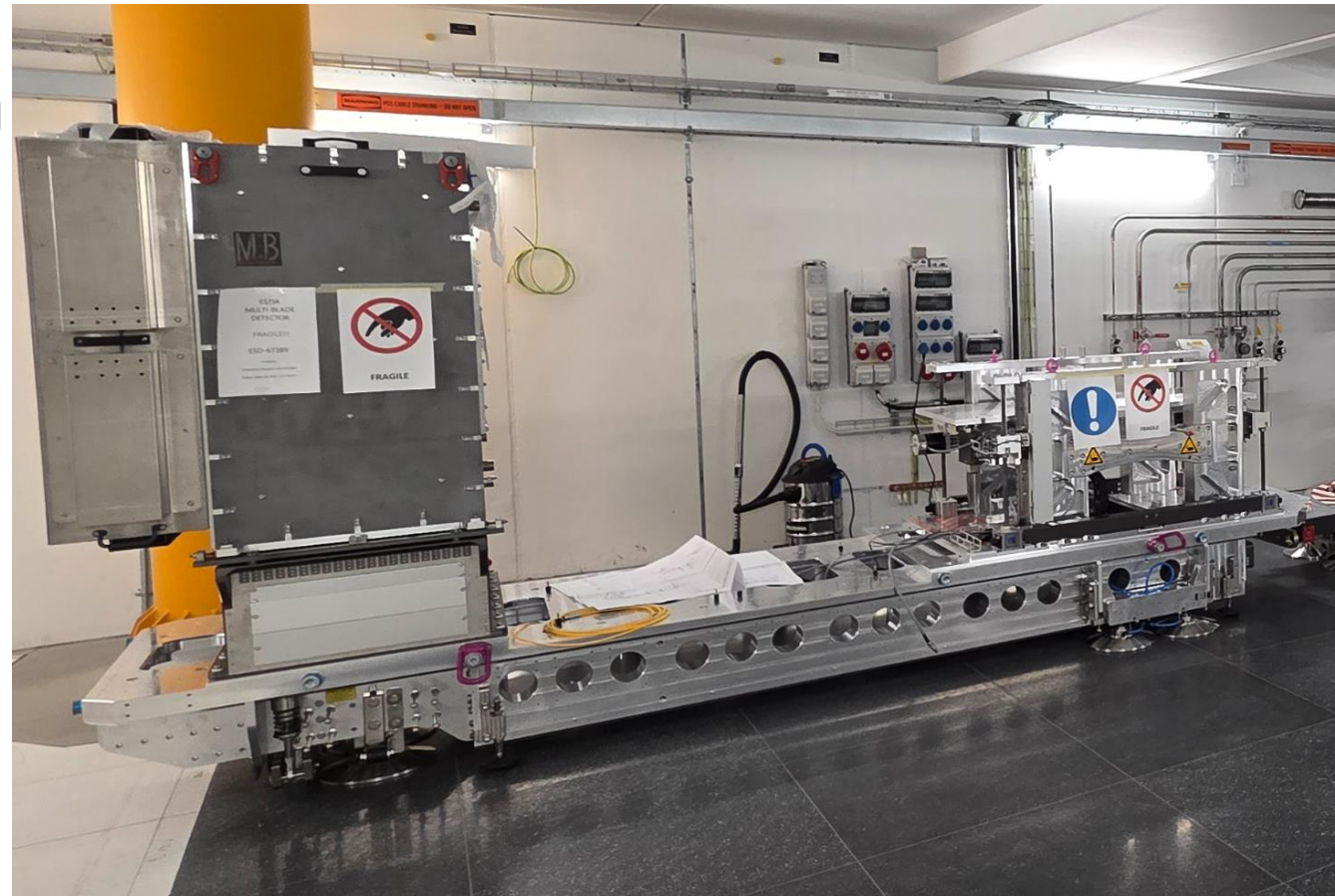
Rotation friction wheel tested

Motion for logic configured (i.e. no trying to move without air pressurised)

Able to achieve accuracy of $5/10,000^{\text{th}}$ of a degree reproducibly with encoder feedback → 35 μm at the detector position

Analyser stage partially tested but awaiting MCA support

Detector installed

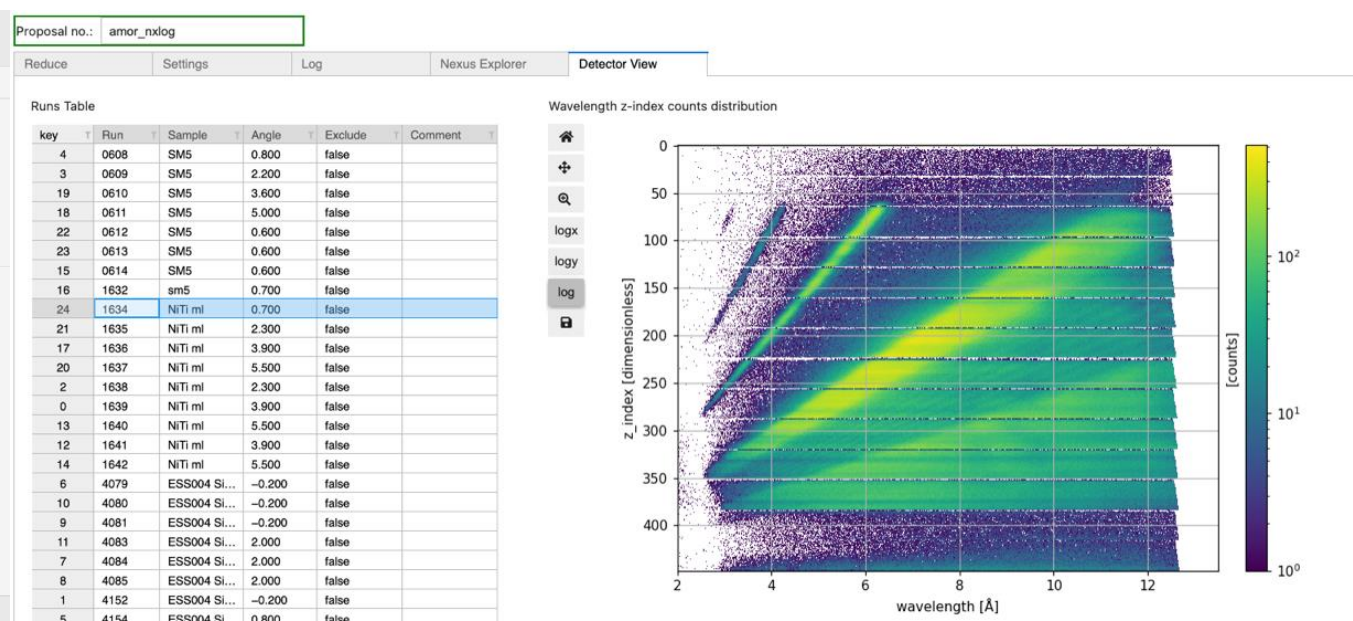
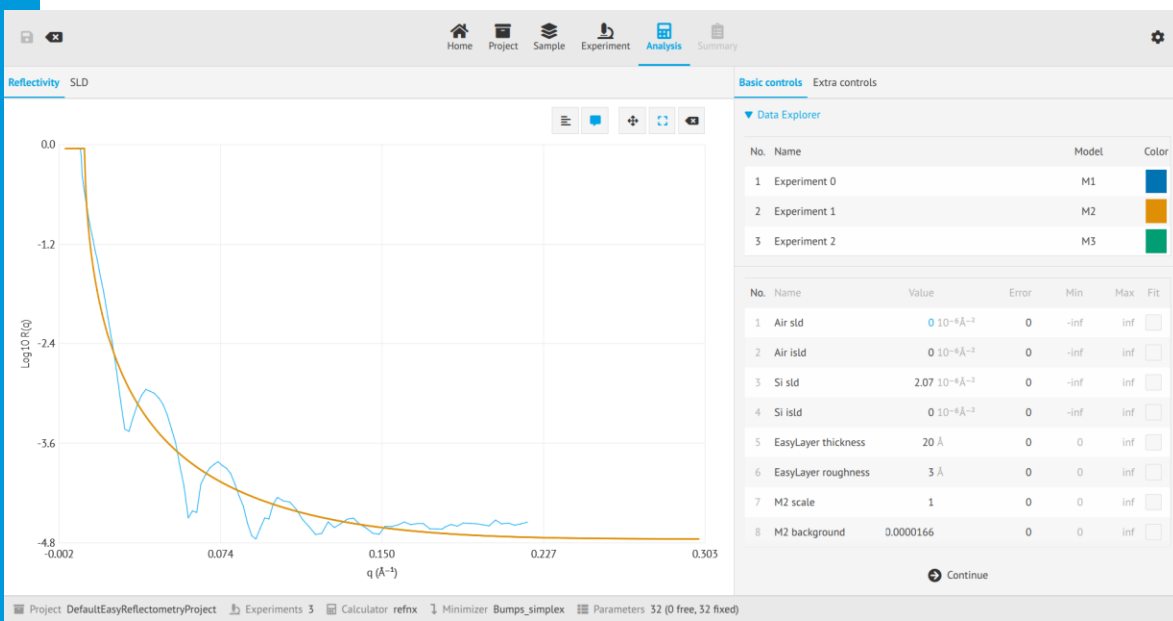
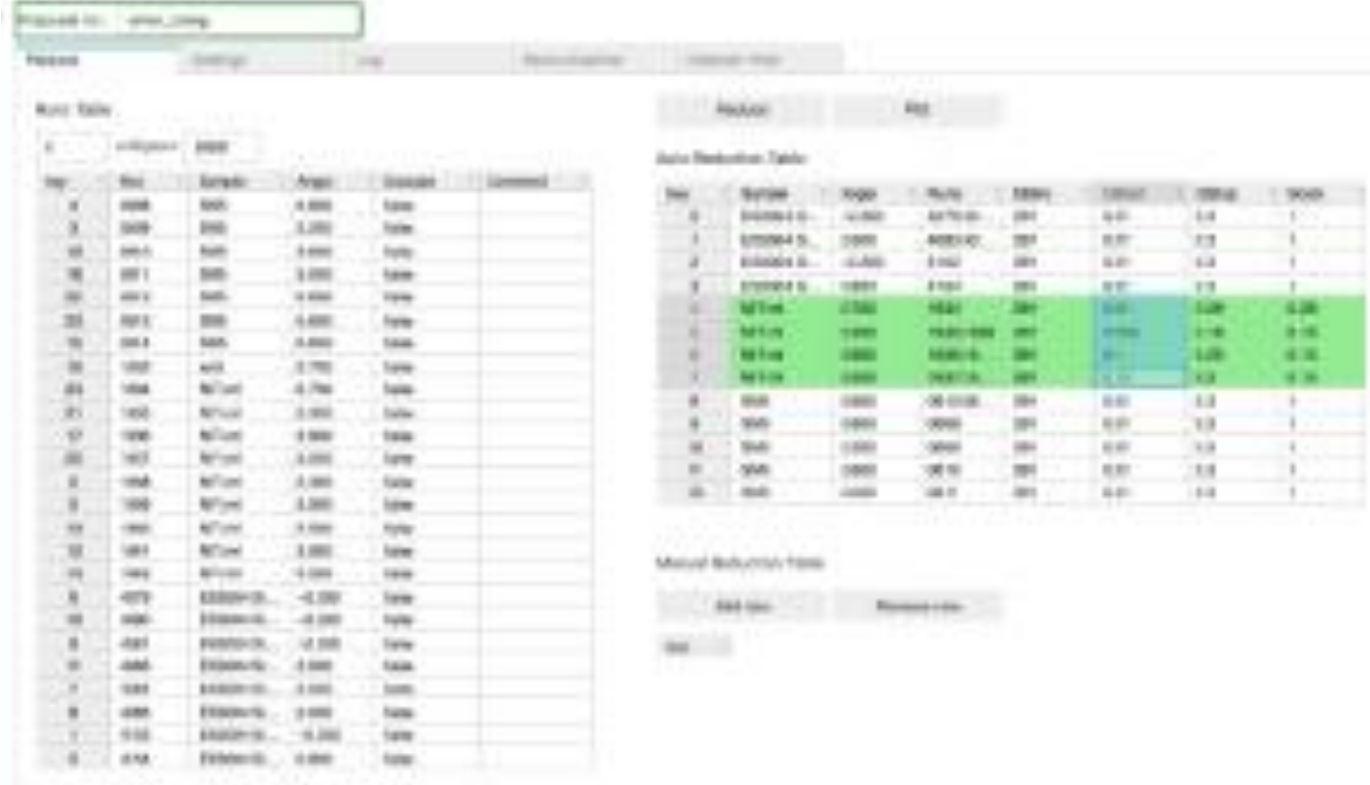


Software (DMSC)

A lot of progress!

- NICOS
- Reduction
- Data itself

DMSC report included for information



Detector

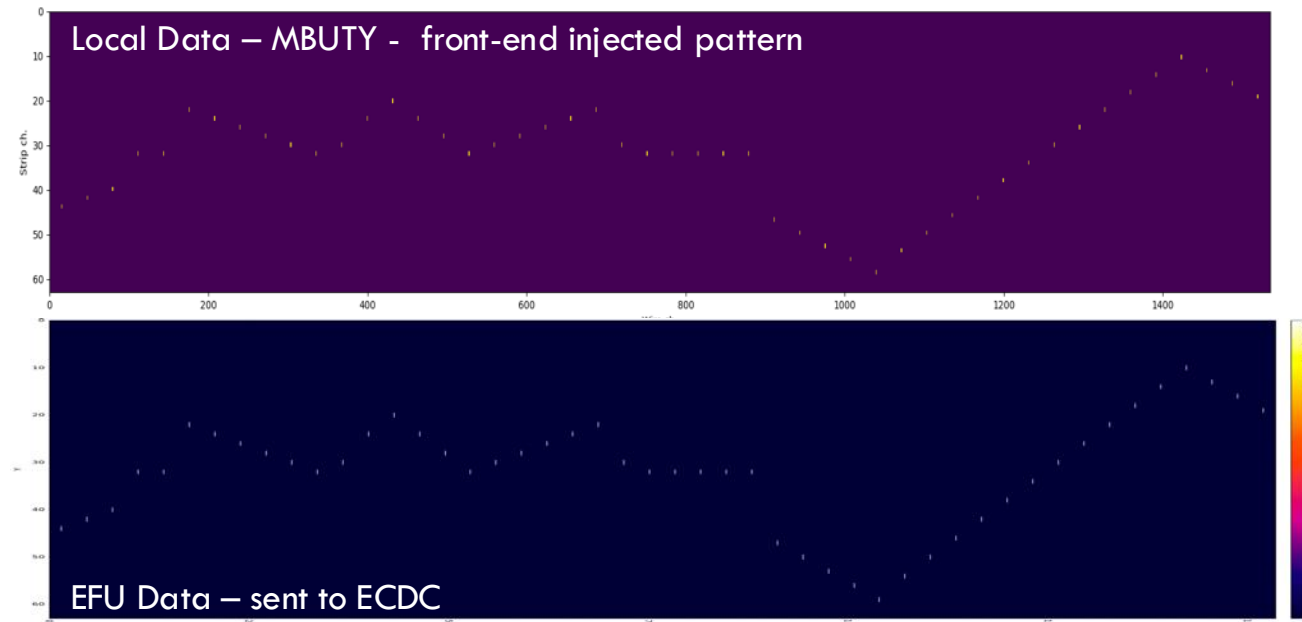
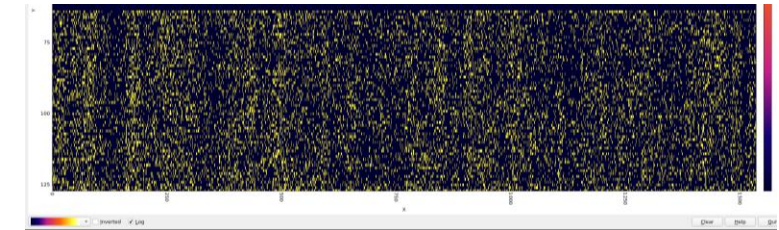
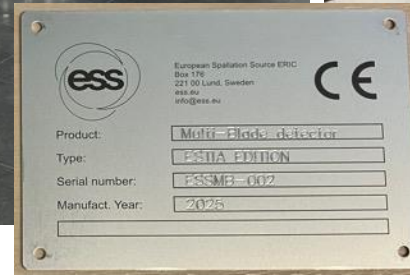
(presented by Francesco Piscitelli)

Multi-Blade: ESTIA



Cosmic Muons

- CE marking complete
- Documentation complete
- Detector, electronics and racks installed
- Cold Commissioning has started
- DATA chain locally tested and to ECDC EFU
- TO DO:
 - Alignment
 - Some of the integrated tests
 - Final cable installation on arm



Risks and Issues

Risk Register

Risks

- Motion safety now top issue
 - One (recently started) motion safety engineer at ESS
 - Backlog from earlier instruments
- PSS relates to ability to take neutrons, current timelines for them push our “ready for neutrons” by several months → ongoing higher level discussions
- Nothing to be done now, but still need a defined ESS procedure for allowing instruments to take beam after BoT date.

Top 5 Risks				
Title	Rating	Category	Partner	Treatment
Motion Safety not being ready	15	Schedule	ESS Project	Observe
MCA Commissioning	15	Schedule	ESS Project	Reduce
Instrument false floors not ready in time	10	Schedule	ESS Project	Reduce
Energization	8	Schedule	ESS Project	Reduce
Design Delay for PSS Project	8	Schedule	PSI	Reduce

Top 5 Risks				
Title	Rating	Category	Partner	Treatment
Motion Safety not being ready	15	Schedule	ESS Project	Observe
Design Delay for PSS Project	15	Schedule	PSI	Reduce
Remote access	12	Schedule	ESS Project	Avoid
If the procedure for allowing beam isn't defined, Estia can't start hot commissioning	10	Schedule	ESS Operations	Observe
Energization	0	Schedule	ESS Project	Reduce

Risk Register

Issues



- Motion commissioning now an issue rather than a risk
 - Schedule delay from MCA resource availability
- Decision making issue is from before my time, but still comes up
 - Wasted resources re-examining closed decisions
 - Q-gate retrospectives for installed components and sample environment
- Documentation costs!!
 - Technical writer for > 1 year
 - Cost is certainly an underestimate

Top 5 Issues					
Title	Rating	Category	Partner	Cost	Delay
MCA Commissioning	9	Schedule	ESS Project	25-100k€	4-6 months
Delays and additional work due to inefficient ESS decision making processes	9	Cost	ESS Project	100-300k€	4-6 months
Procurement delay of the Analyzer procurement	9	Schedule	PSI	N/A	4-6 months
Documentation flooding	4	Cost	ESS Project	25-100k€	1-3 months
MCA budget offer delayed	0	Cost	ESS Project	300-1000k€	N/A

Miscellaneous Points

Things to note

ESTIA will not have in-cave sprinkler system

- ~ 12 months to get permission to have this exception

Instrument crane soon to be re-inspected and energized, but no current authorisation system at ESS to allow even experienced operators to use it (other than rigging team)

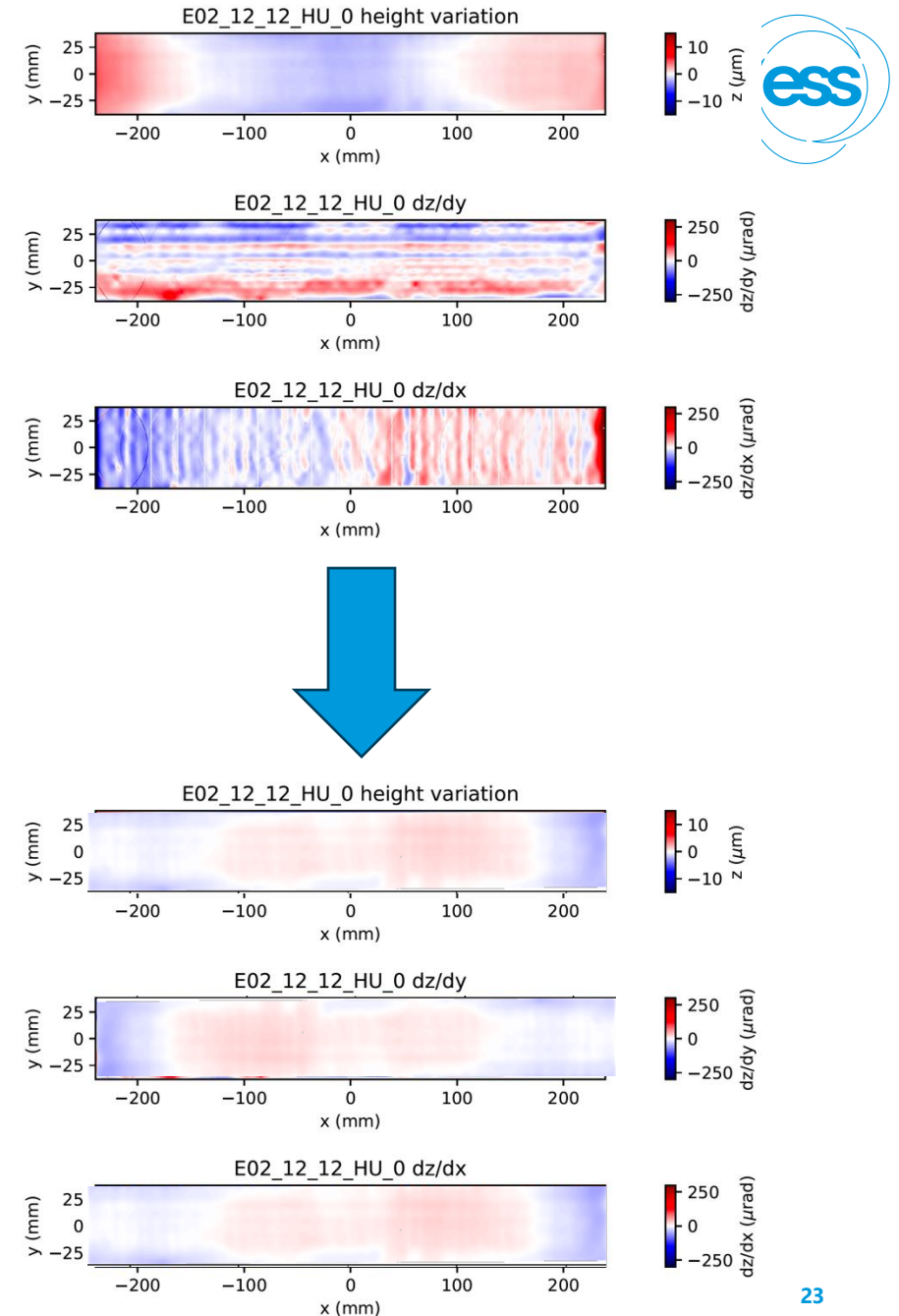
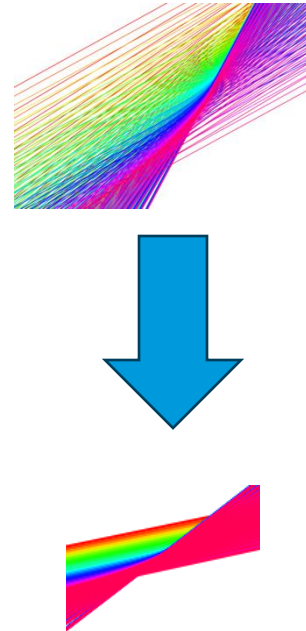
Instrument false flooring (which was a risk from last year) still not installed, but impact on project has been mitigated by redesign of rack supports

- New company to ESS, underestimated all aspects of project in their bid.

Items to be procured

Micro Focus Optics

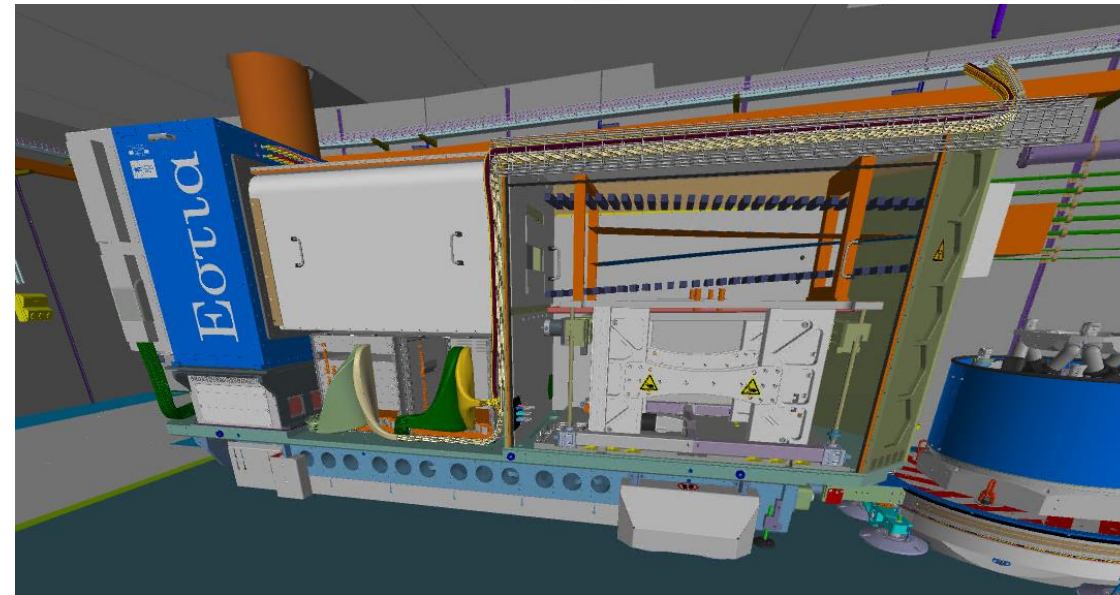
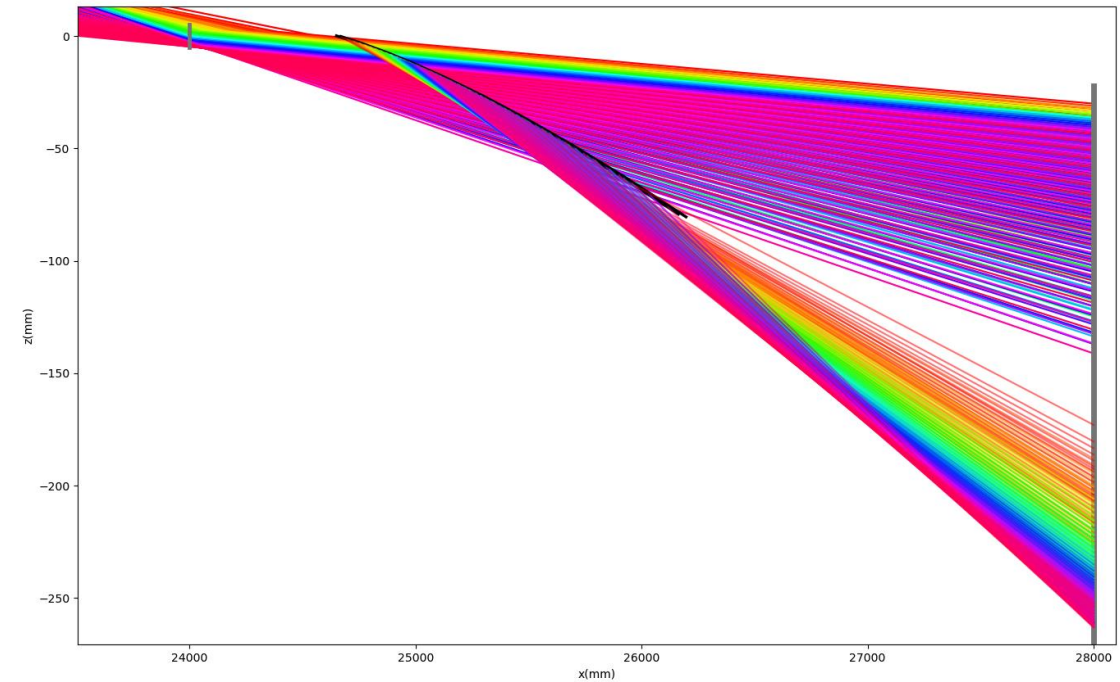
- Optics ground by lens company
 - Zeiss or similar
- High cost per section
 - ~60kEUR
- Takes minimum focus size from 1mm to 60um (horizontal) on the sample
- Procurement/design calculations started
- **NOT** part of TG5 scope



Items to be procured*

Analyser and Spin flipper

- Double layer logarithmic spiral
 - Centered on the sample point
- Possibility to measure reflected and transmitted beams at once
 - Factor of two gain in flux
- Technically non-trivial
- *Procurement started
- Lead time around 12 months
- Excluded from TG5 (though not TG3)



Cold Commissioning



Full motion testing with MCA

Now a low risk activity (from our view), just need MCA resources

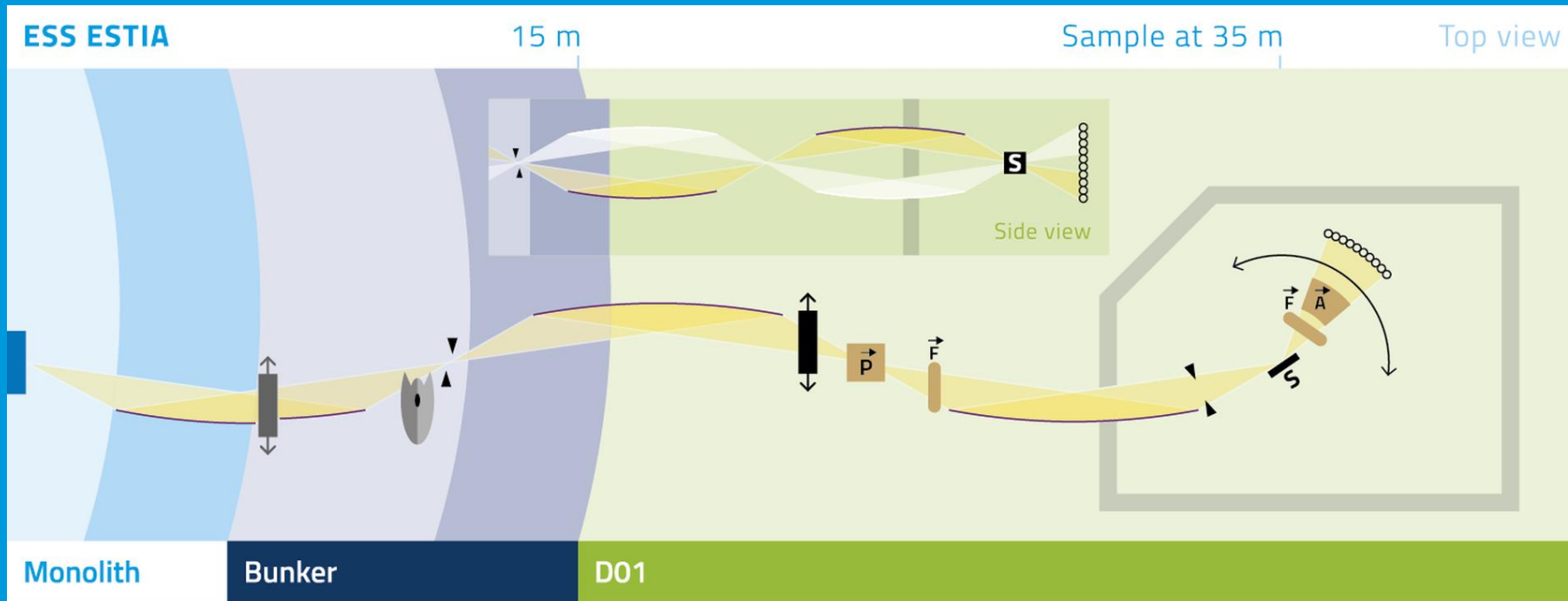
Motion testing through NICOS

All remaining axes are “simple”, even if final interface will not be. New ECDC member lowers risk here.

Testing of all axes and components to ensure meeting of all low and high requirements (that can be tested without beam)

Again, pre-tests at PSI make this low risk as we are confident in the performance of the components.

Low risk – but huge amount of work and documentation to be ready for March



ESTIA Early Science Workshop
9th December 2025
Online



Acknowledgements

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Many more here at PSI and ESS

