

Update on Ionization Laser System (IoLS) activities at CERN

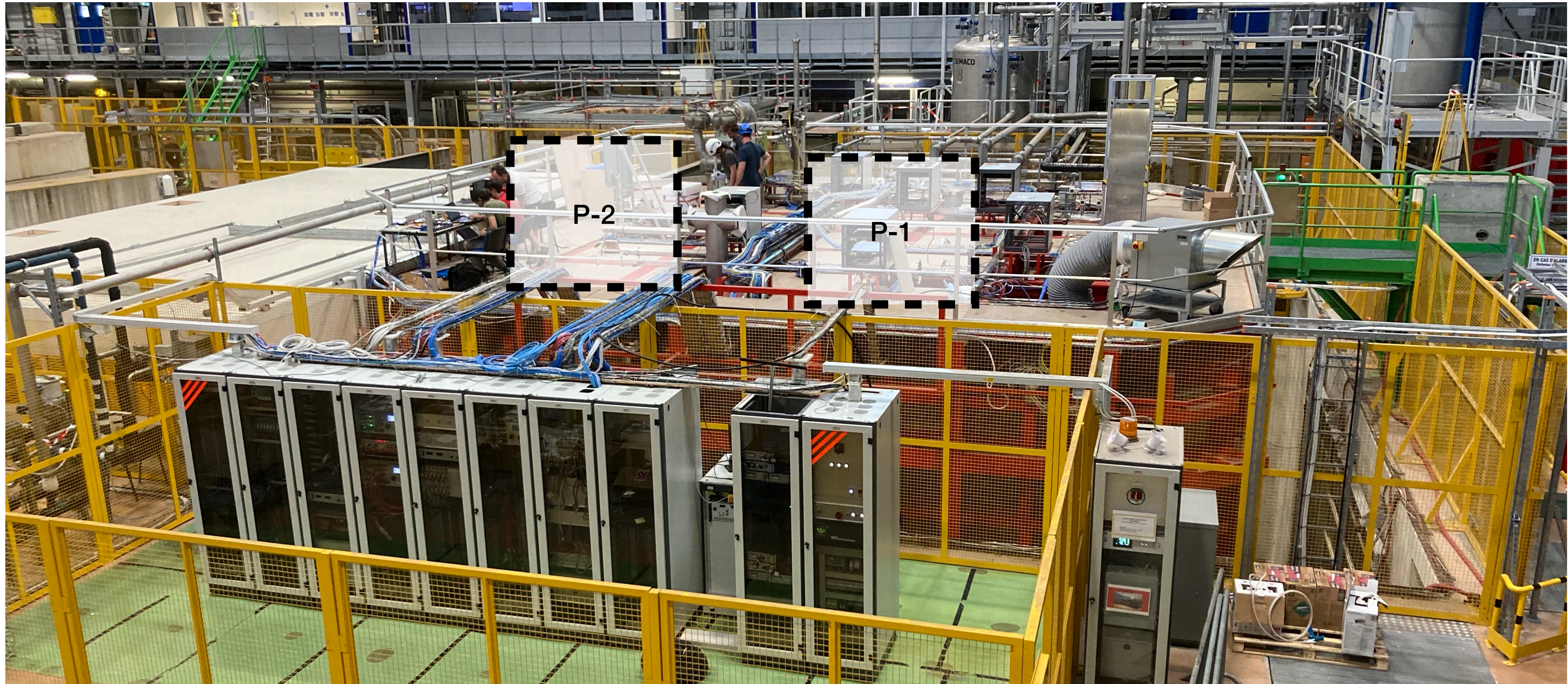
Mattia Fani - Los Alamos National Laboratory

Overview

- Status of IoLS installation
- LBLS mirrors installation
- Status of periscopes locations
- Supports for laser stands
- IoLS Assembly Room
- IoLS Storage Room

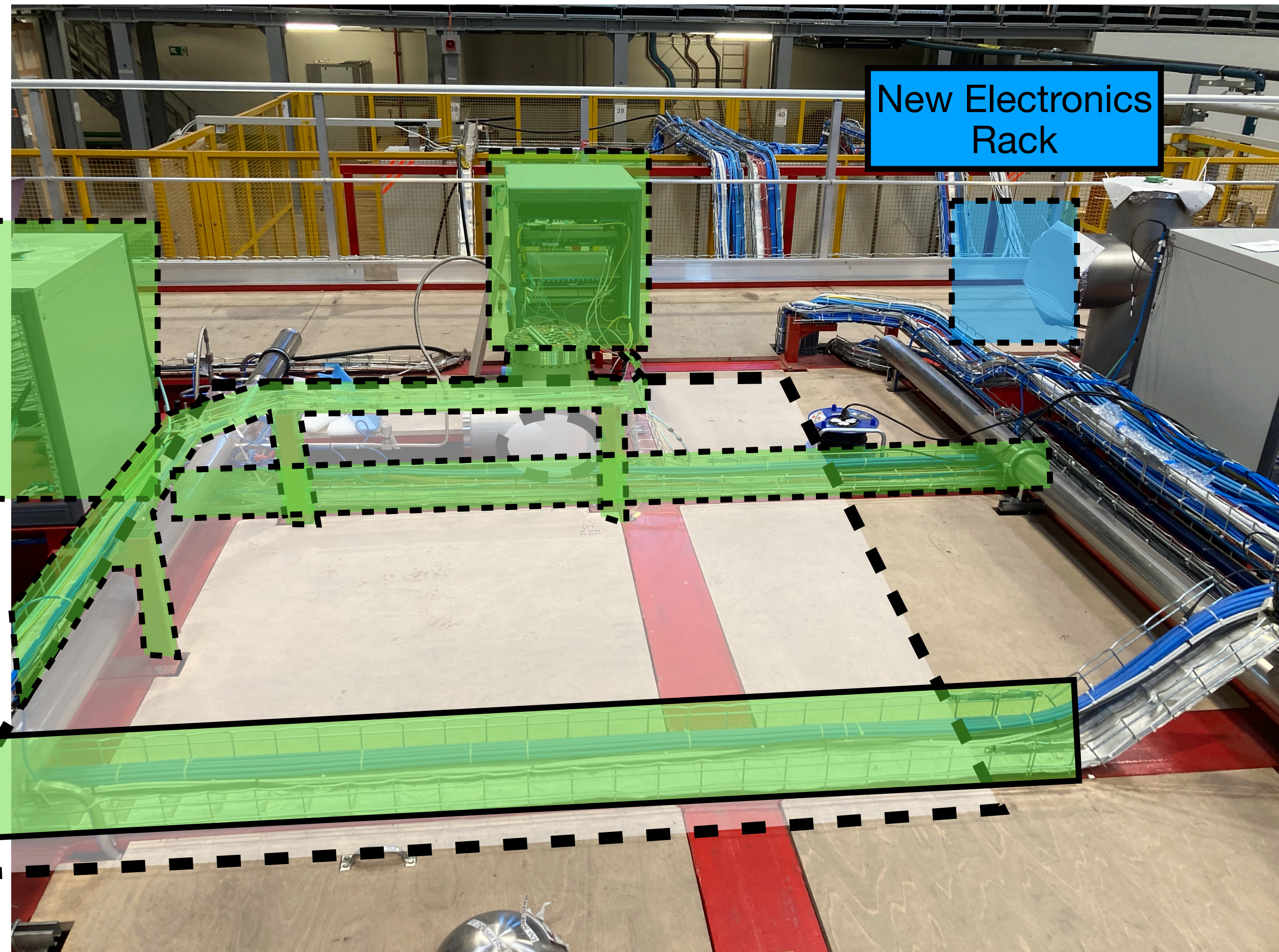
Disclaimer: this presentation is way more detailed than it is probably needed. This is because of the responsibility I feel representing you all at CERN for the preparation of our systems installation

Reminder: IoLS tents locations



Tent space preparation for Periscope 1

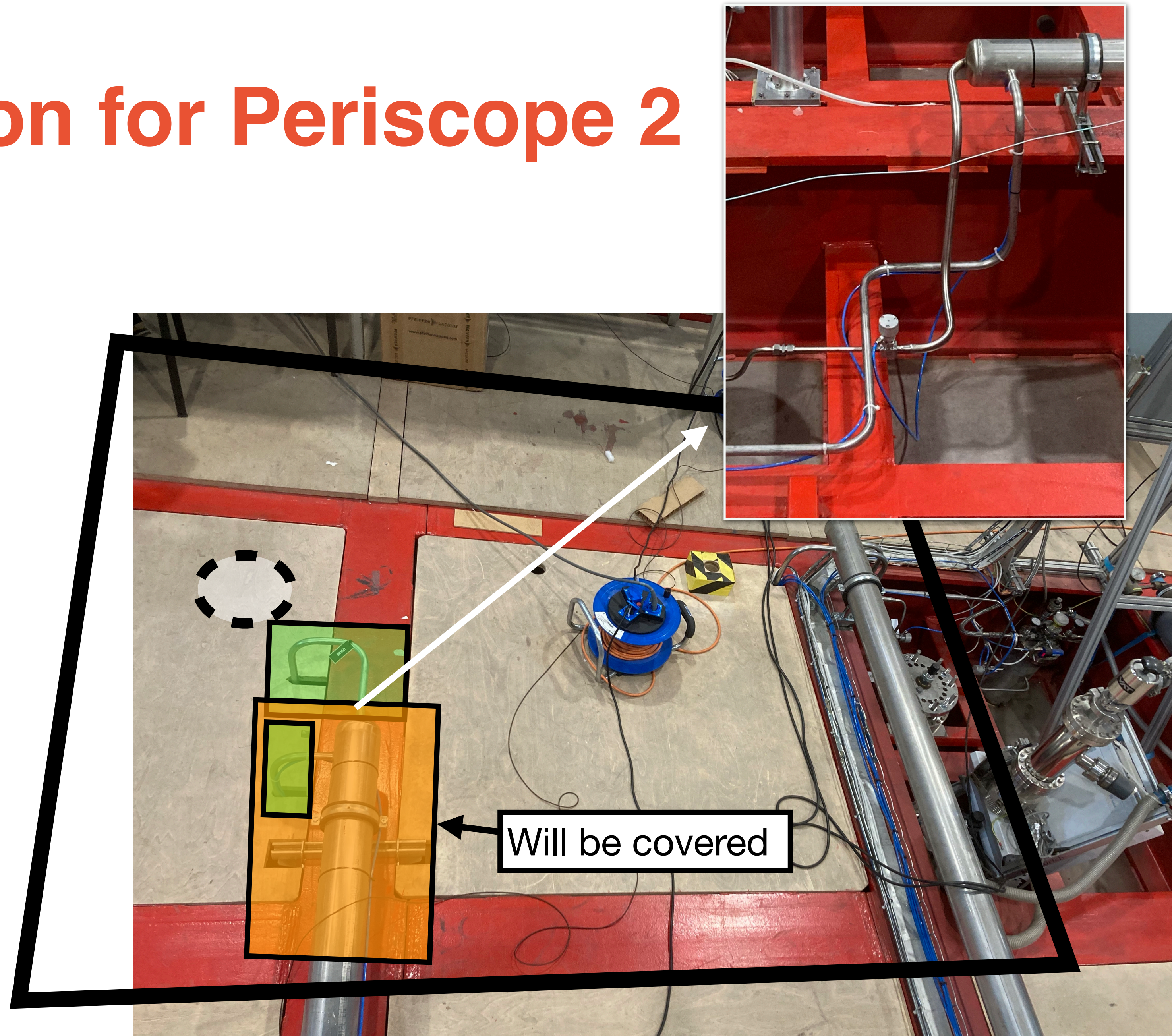
- Obstacles identification and removal
 - Electronics racks + supports
 - Lifted cable tray + supports
 - Ground cable tray
 - Preexisting flange + connections
- Reroute cables
- Safety interventions
 - Remove harmful ground points
 - Cover remaining cable tray



X. Pons, S. Detraz, F. Resnati, D. Macina (CERN), CERN Technicians, M. Fani (LANL)

Tent space preparation for Periscope 2

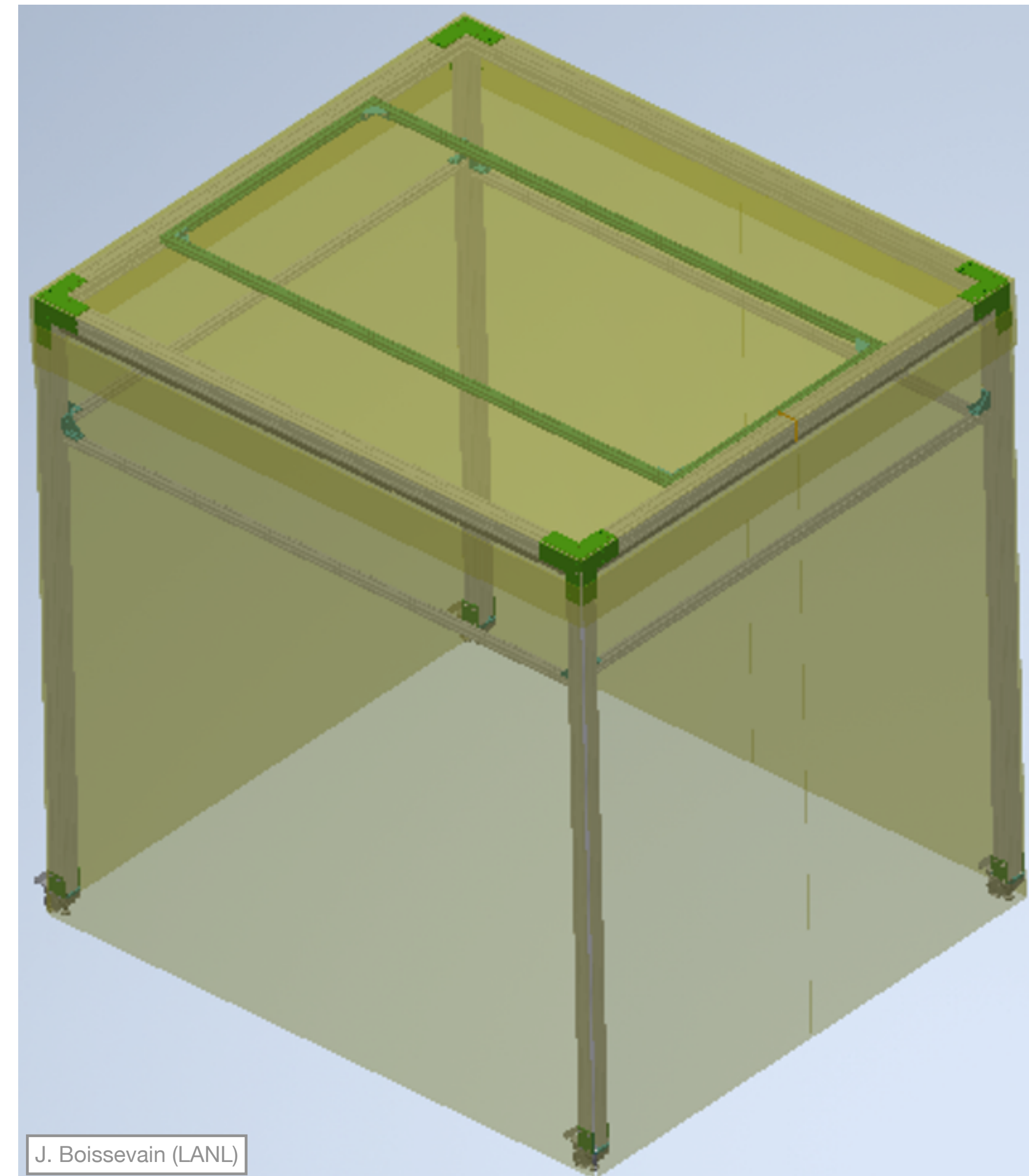
- Work space evaluation
 - Clearer than P-1 site
 - Flange already clear
 - Close objects are not removable
- Check conditions for installation of laser components
 - Will require crane
- Safety interventions
 - Cover + **modify vacuum pipes**



X. Pons, S. Detraz, F. Resnati, D. Macina (CERN), CERN Technicians, M. Fani (LANL)

Laser tent

- Design finalized
- Proposed craning procedure discussed
- Tent material selected and approved
- Vendor identified
- Next: order submission through CERN



Installation of IoLS stand supports

● P-1:

- LL1: **OK**
- SL1 - original: 2 mm additional Al plate (in place)
- SL3 - **modified**: 2 mm additional Al plate (in place)

● P-2:

- LL2 **modified**: needs additional Al plate (in place)
- SL2 - **modified**: 3 mm additional Al plate (in place) + 2 mm GF10 (in place) + 2 mm Al plate (in place)
- SL4 - **modified**: 3 mm additional Al plate (in place) + 2 mm GF10 (in place) + 2 mm Al plate (in place)

● **WARNING**: distances on model \neq reality (a few mm)

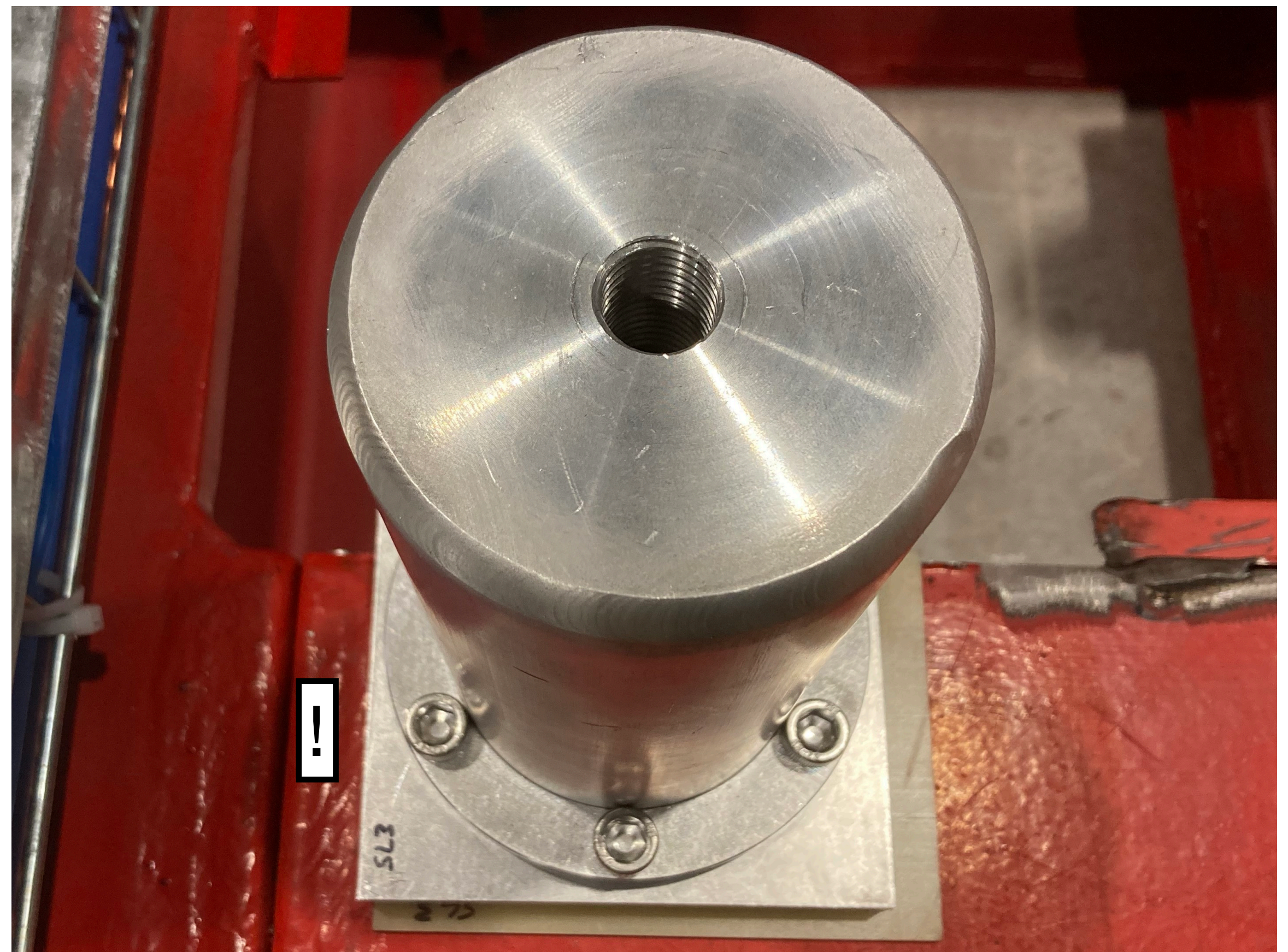
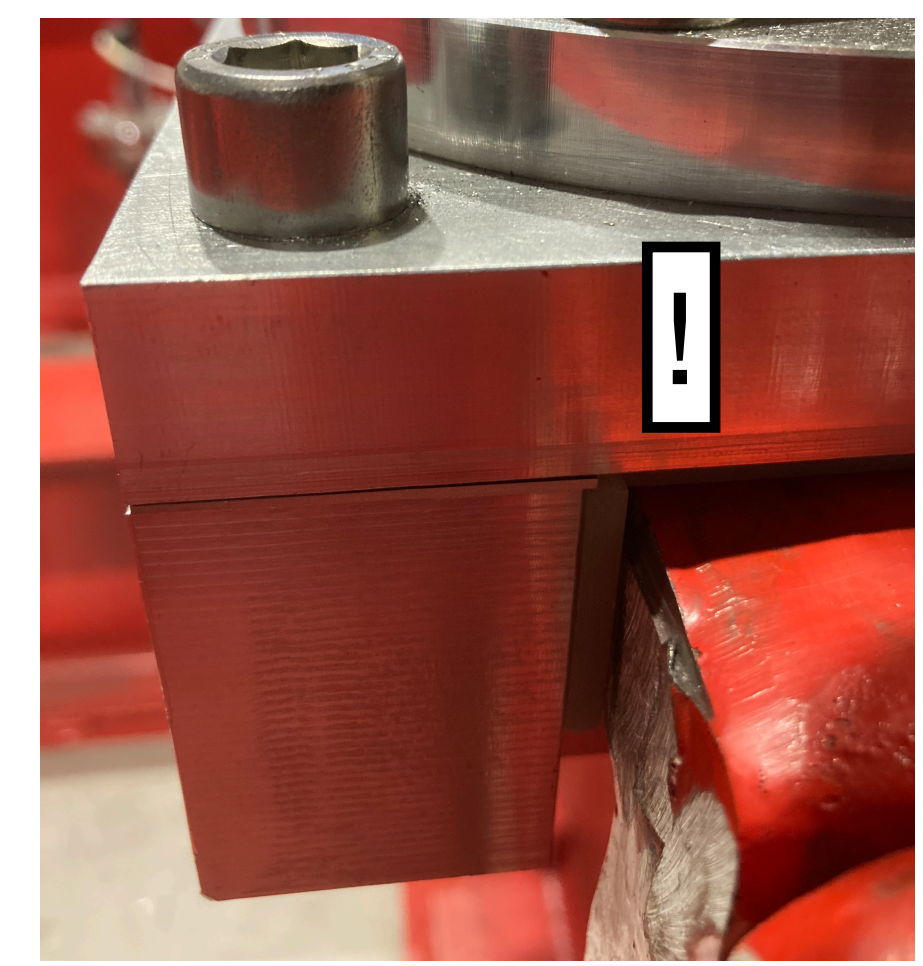
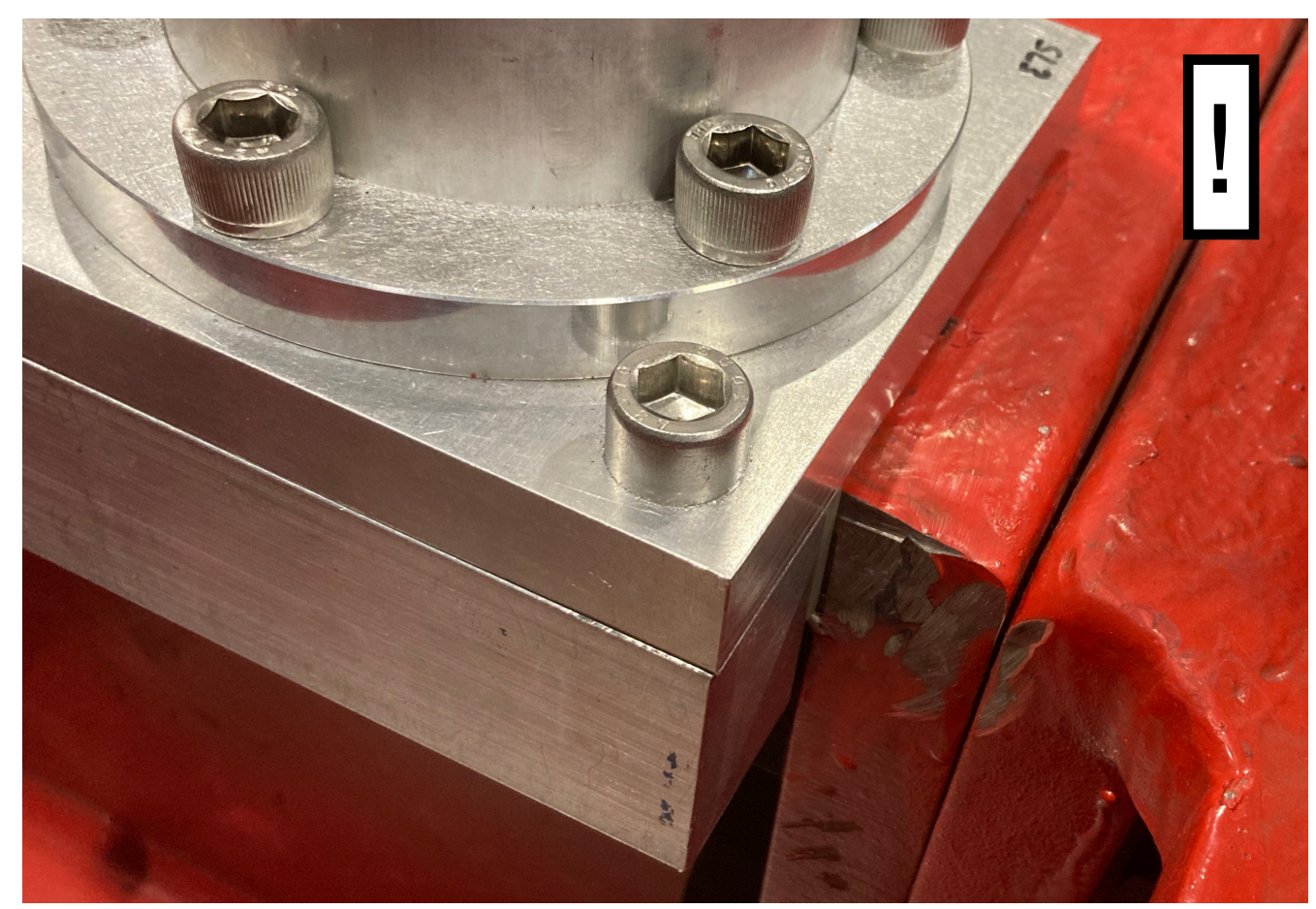
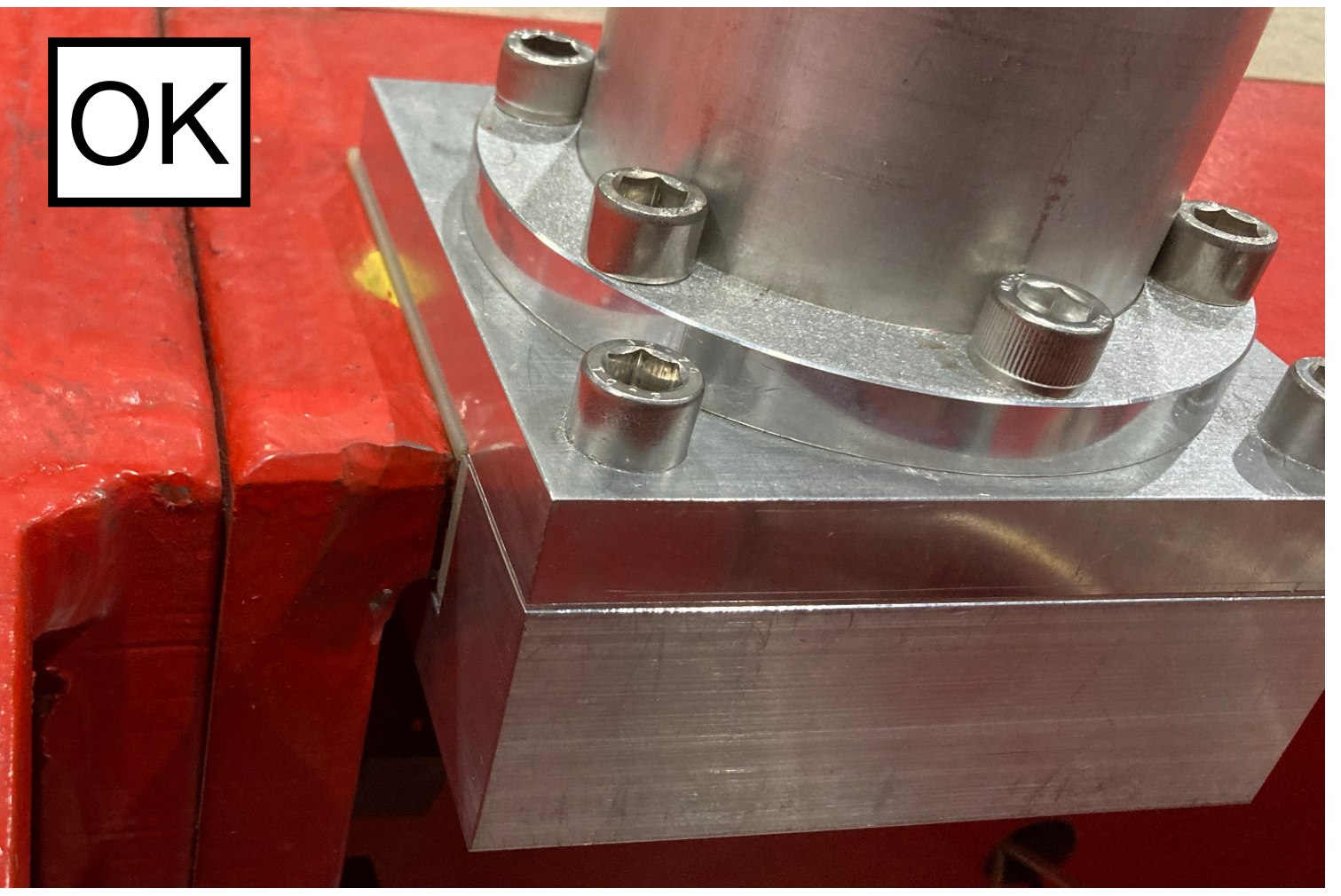
Issues:

- Cryostat beam welding points make surfaces uneven
- Beam thickness not uniform at mm precision

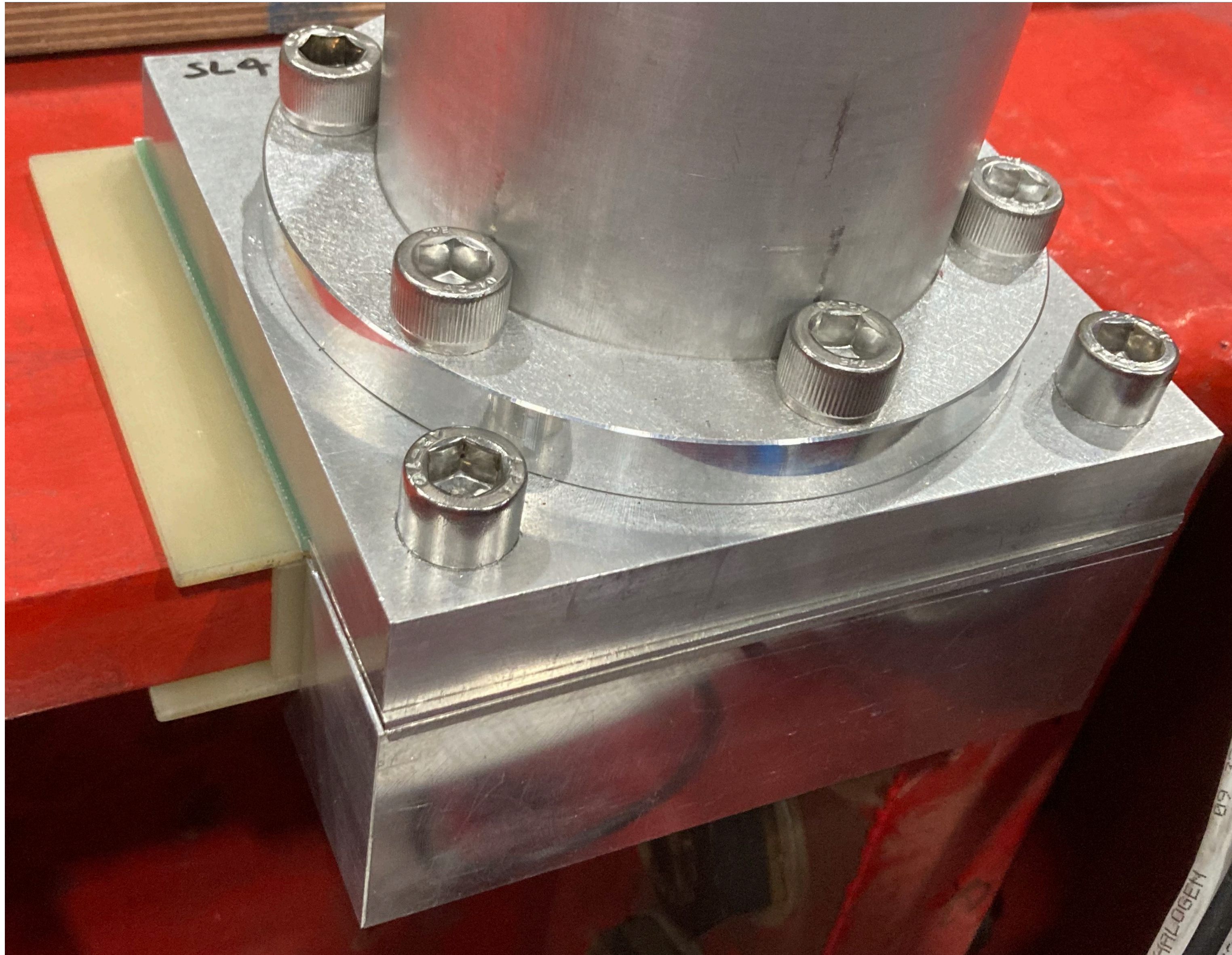


P-1

Electrical
insulation
OK



P-2 Short Leg (right side)

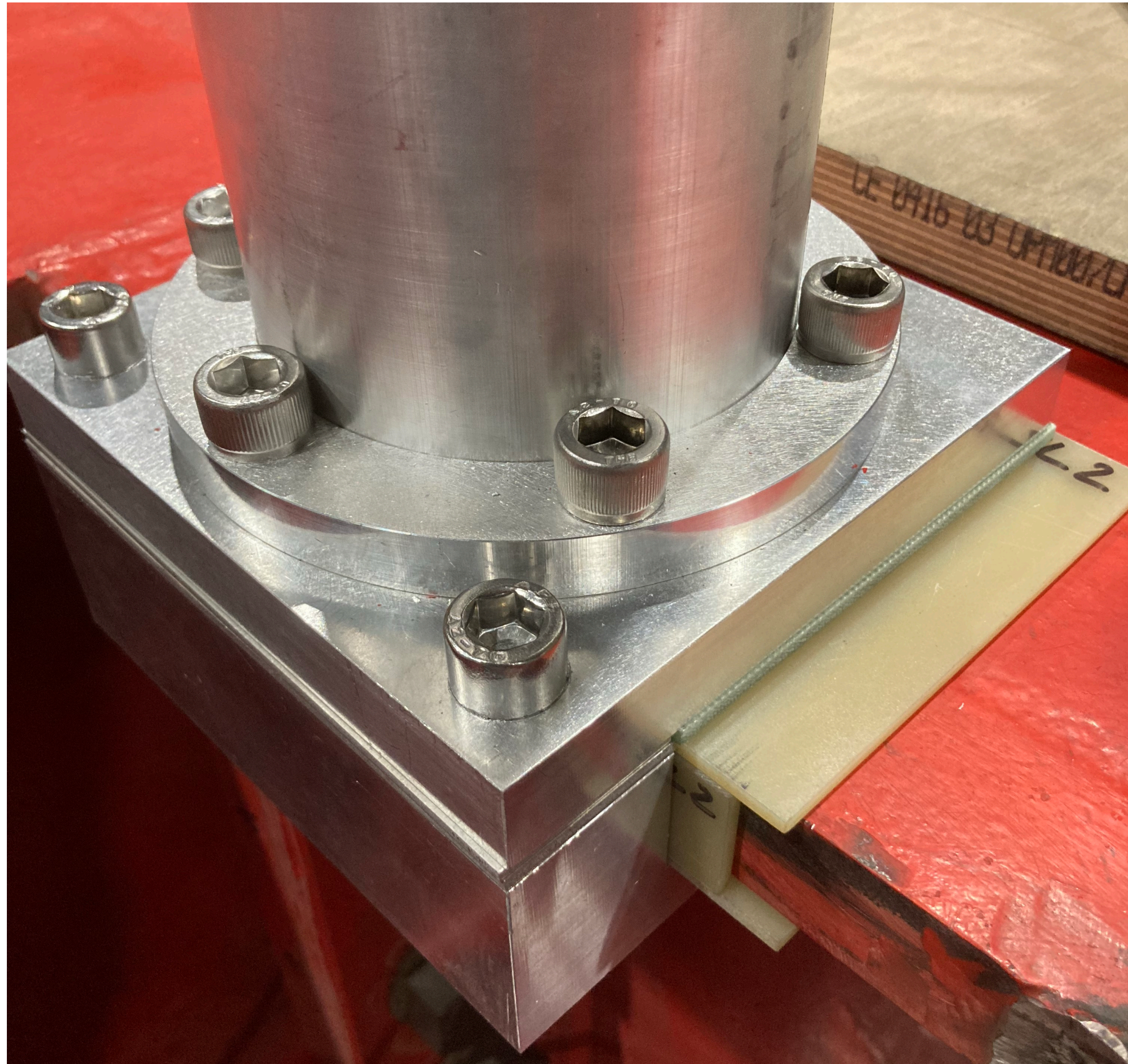


- 2x 2-mm Alu plates
- 1 additional GF10 plate
- Vertical GF10 does not fully shield Alu structure
 - Need to order a new one

Electrical
insulation
OK

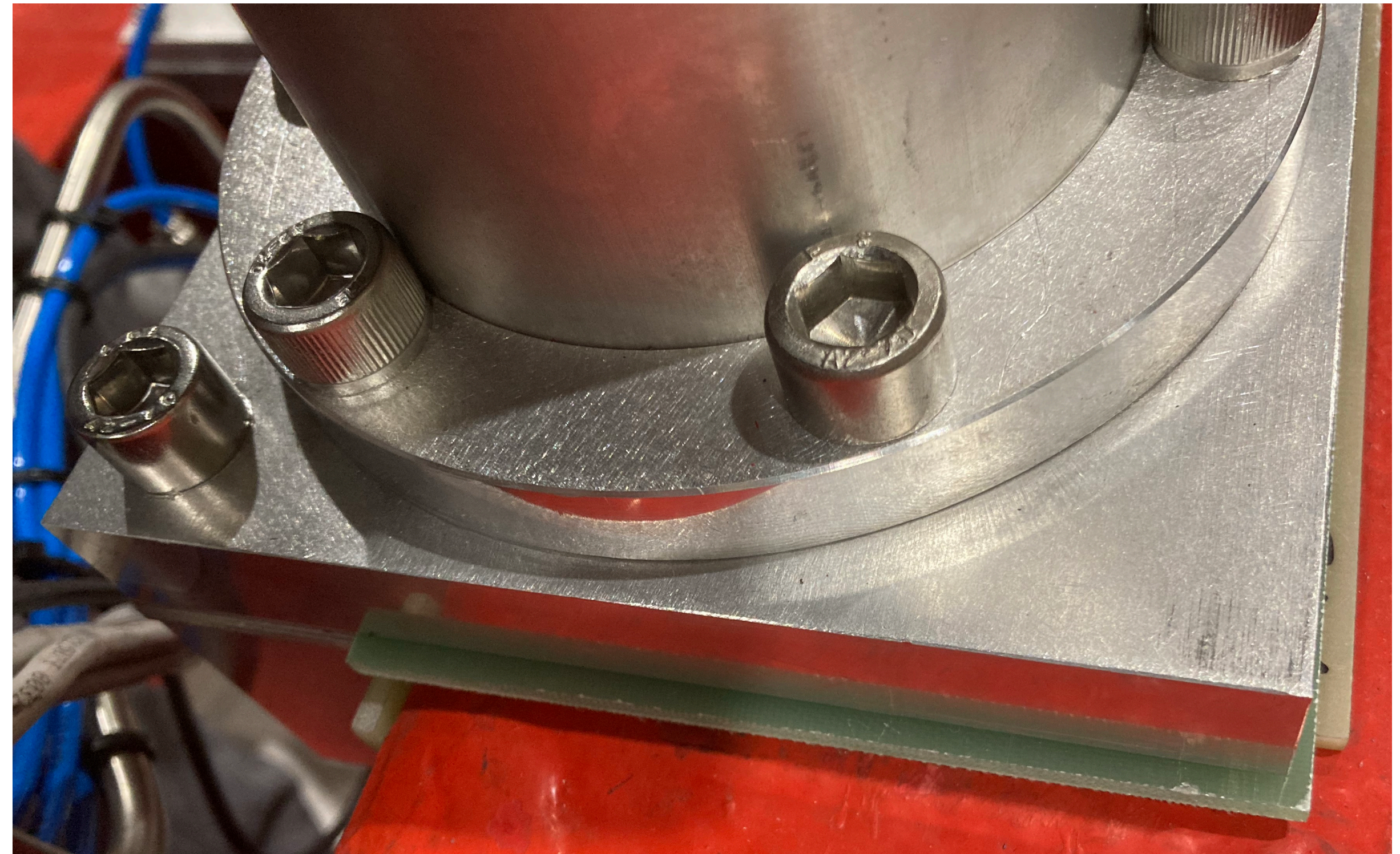


P-2 Short Leg (left side)

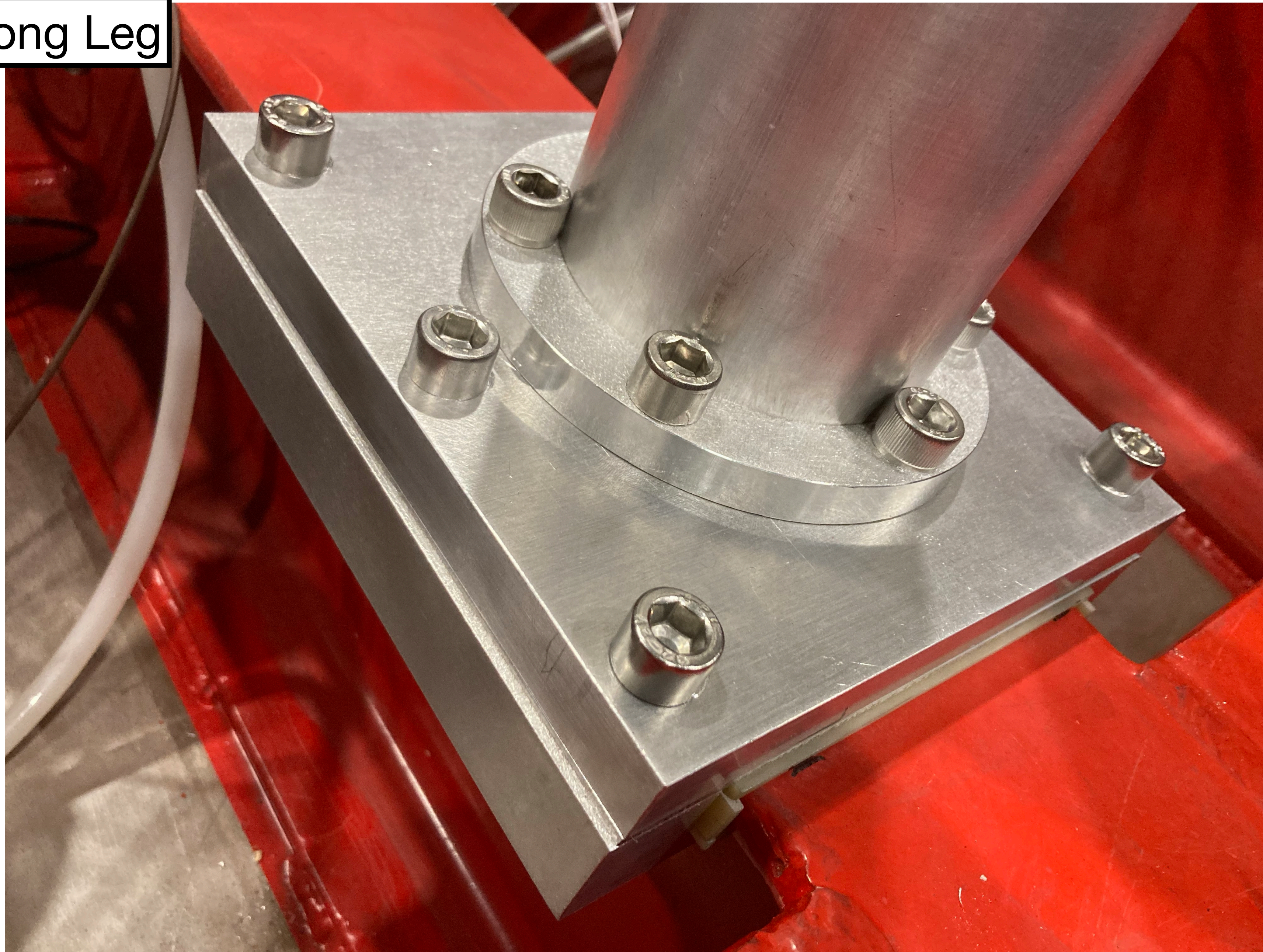


- 2x 2-mm Alu plates
- 1 additional GF10 plate
- Vertical GF10 does not fully shield Alu structure
 - Need to order a new one

Electrical
insulation
OK



P-2 Long Leg

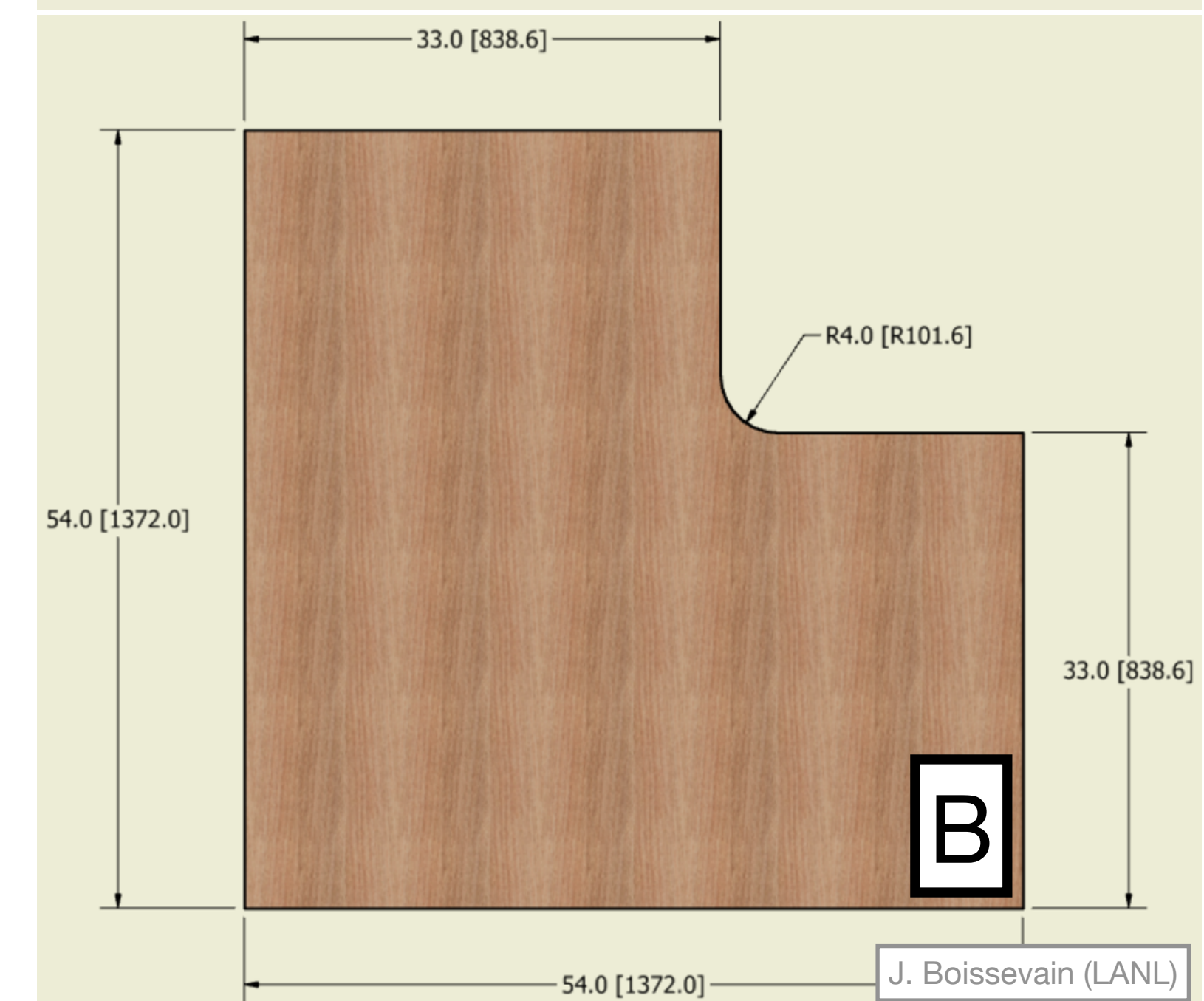
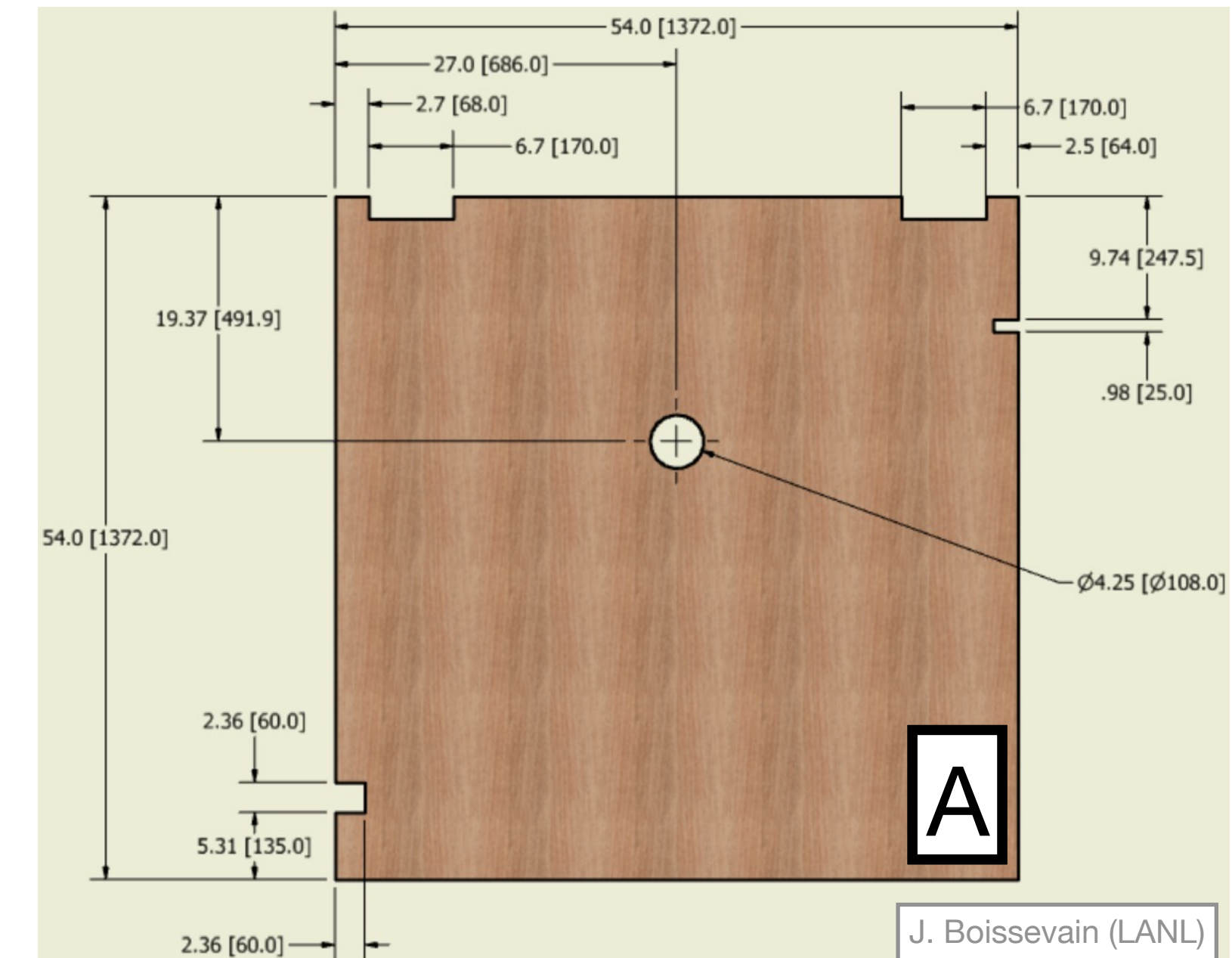


Electrical
insulation
OK

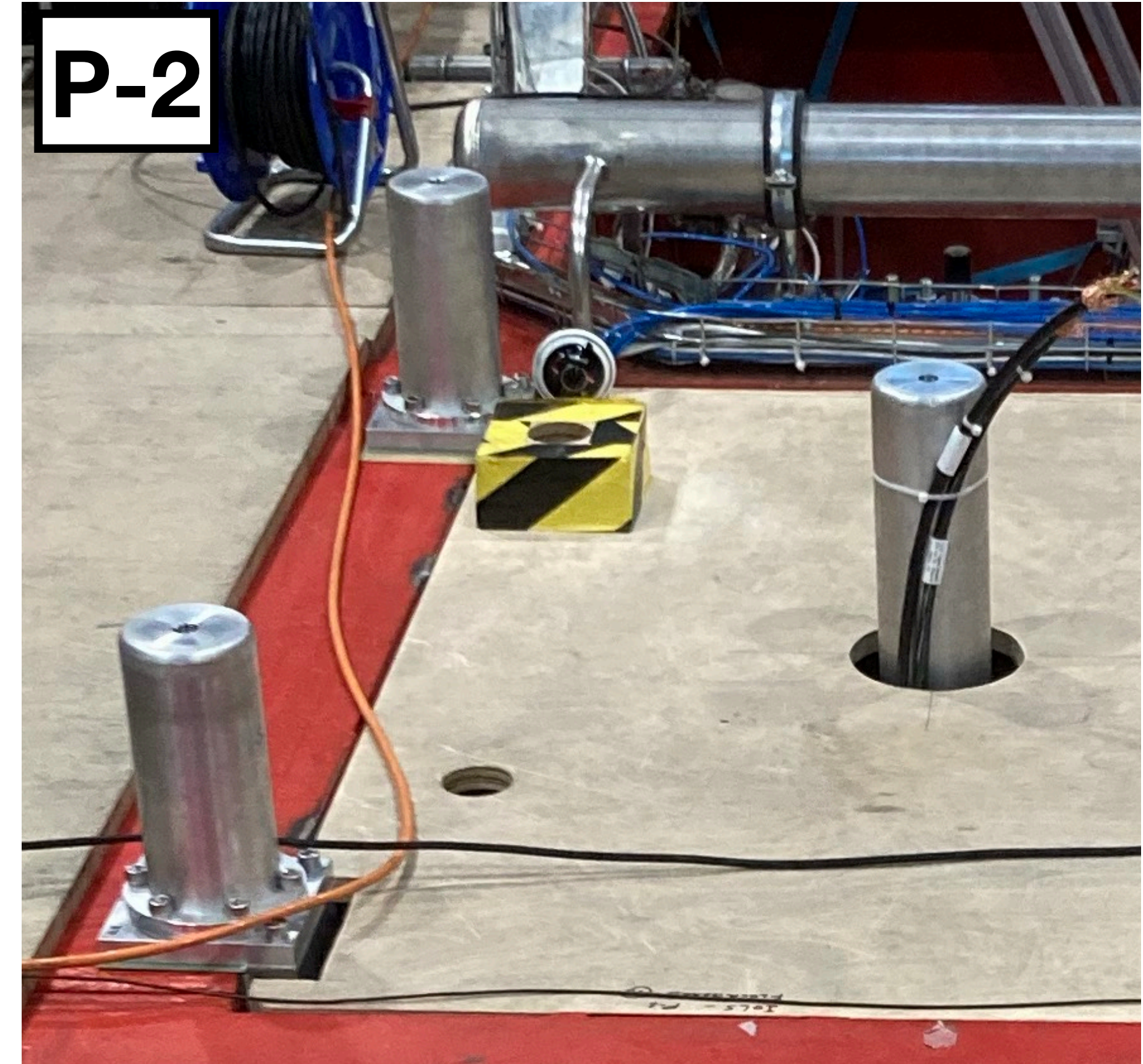
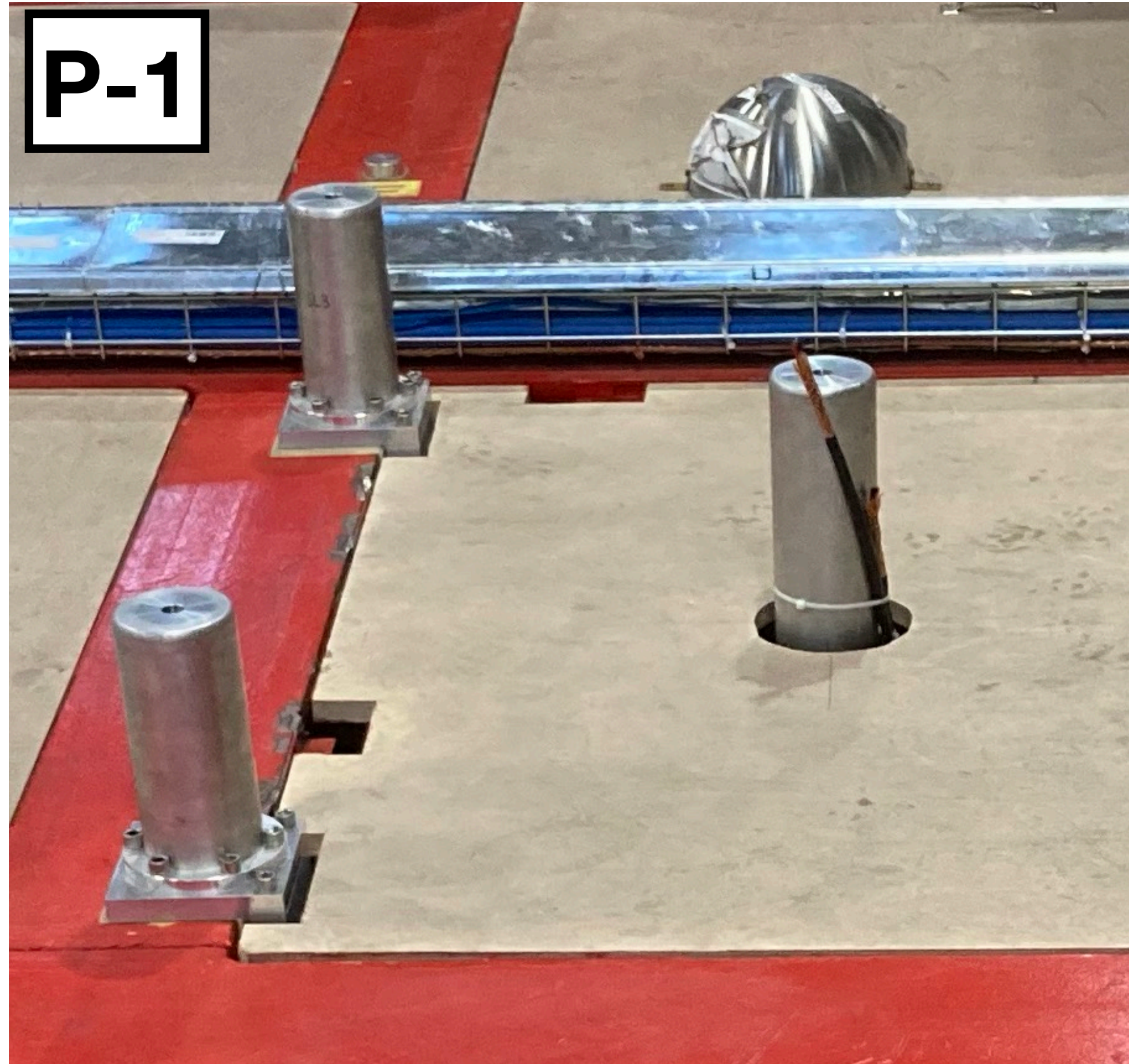
- One additional Alu plate to take into account the increased thickness of short legs

Floorboard installation

- Floorboard supports on I-beams modified in July
- Floorboard modification requested earlier this month, after completion of laser stand support installation
- A buffer space was added to allow corrections
- Sufficient room for cable routing from elect. racks
 - Possibility of additional openings
- Additional modification required - currently under way
 - Allow access to underneath the laser stands
 - Floorboards need to be split
 - Requires installation of additional supports



Current status of IoLS stand installation

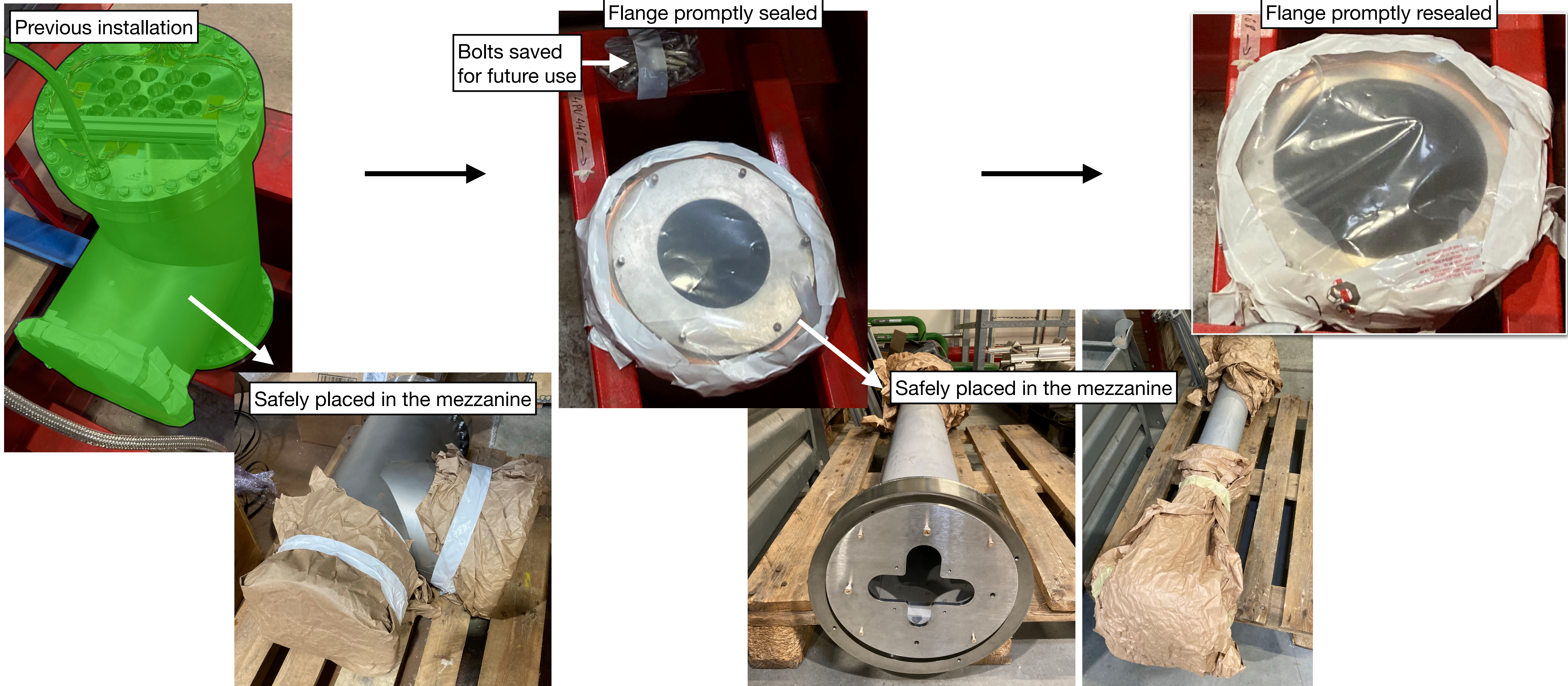


Hardware work around periscope locations completed

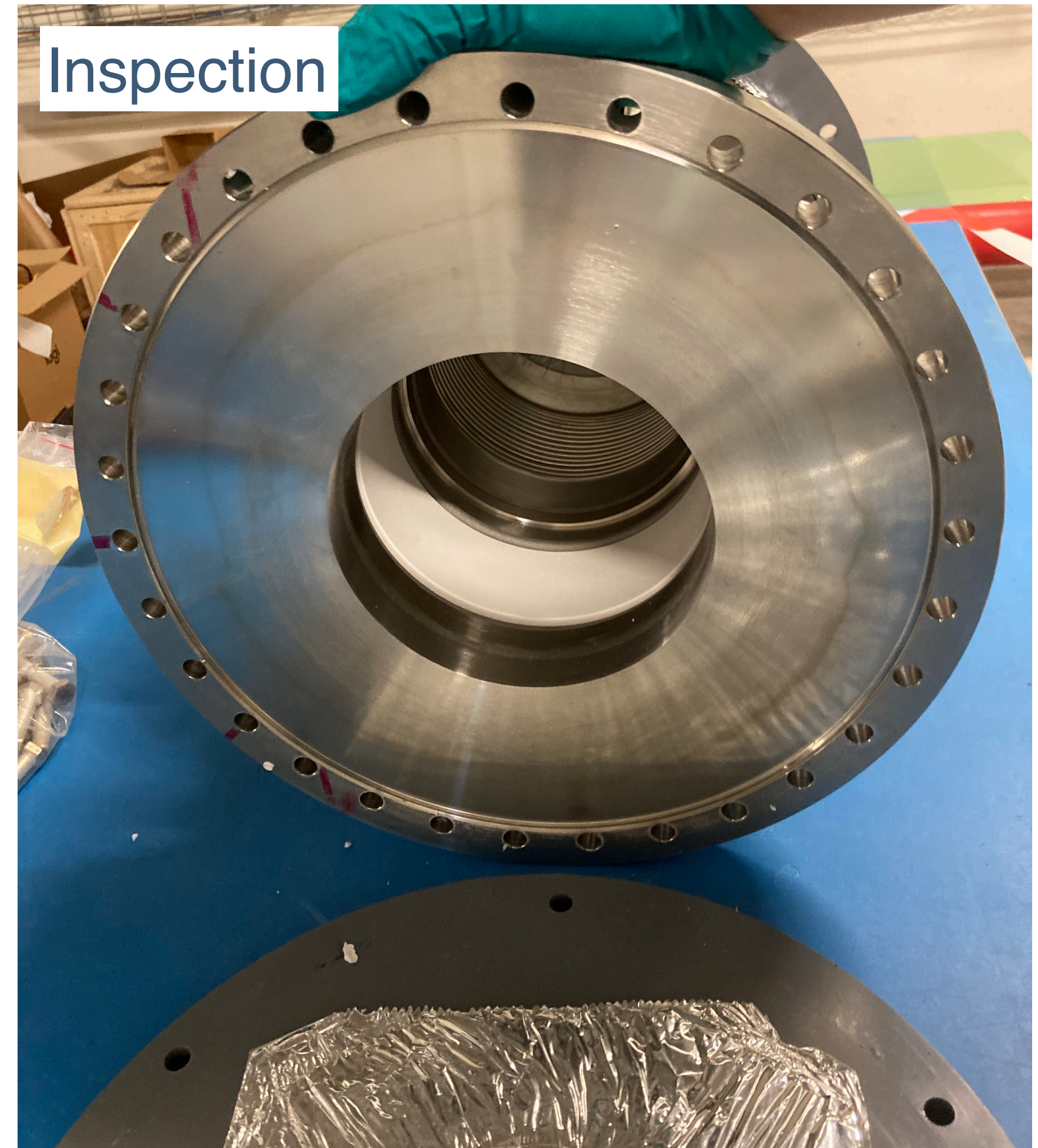


Feedthrough installation SAFE

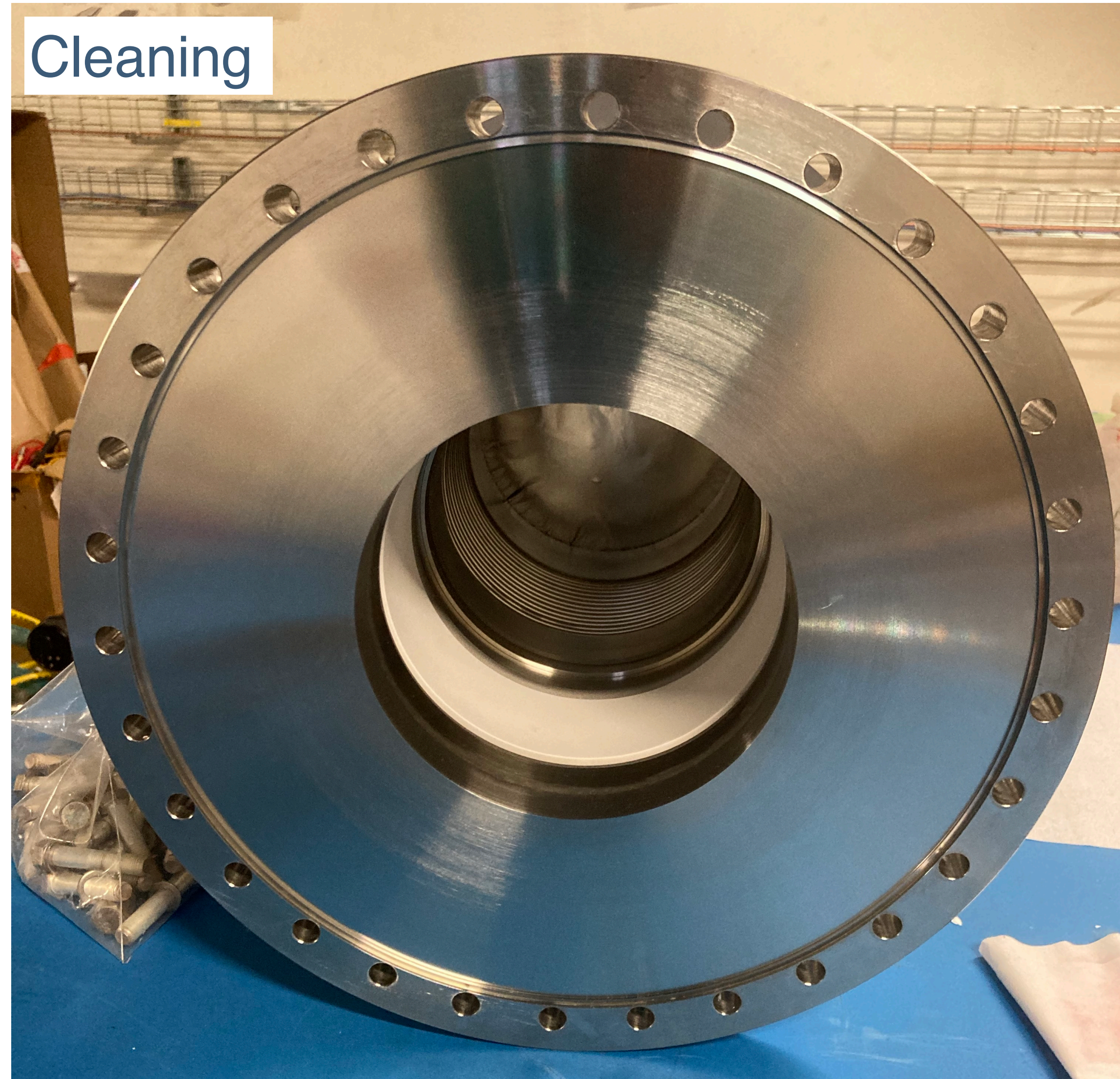
P-1 Flange preparation for feedthrough installation



P-1 Electrical Break installation



P-1 Electrical Break installation

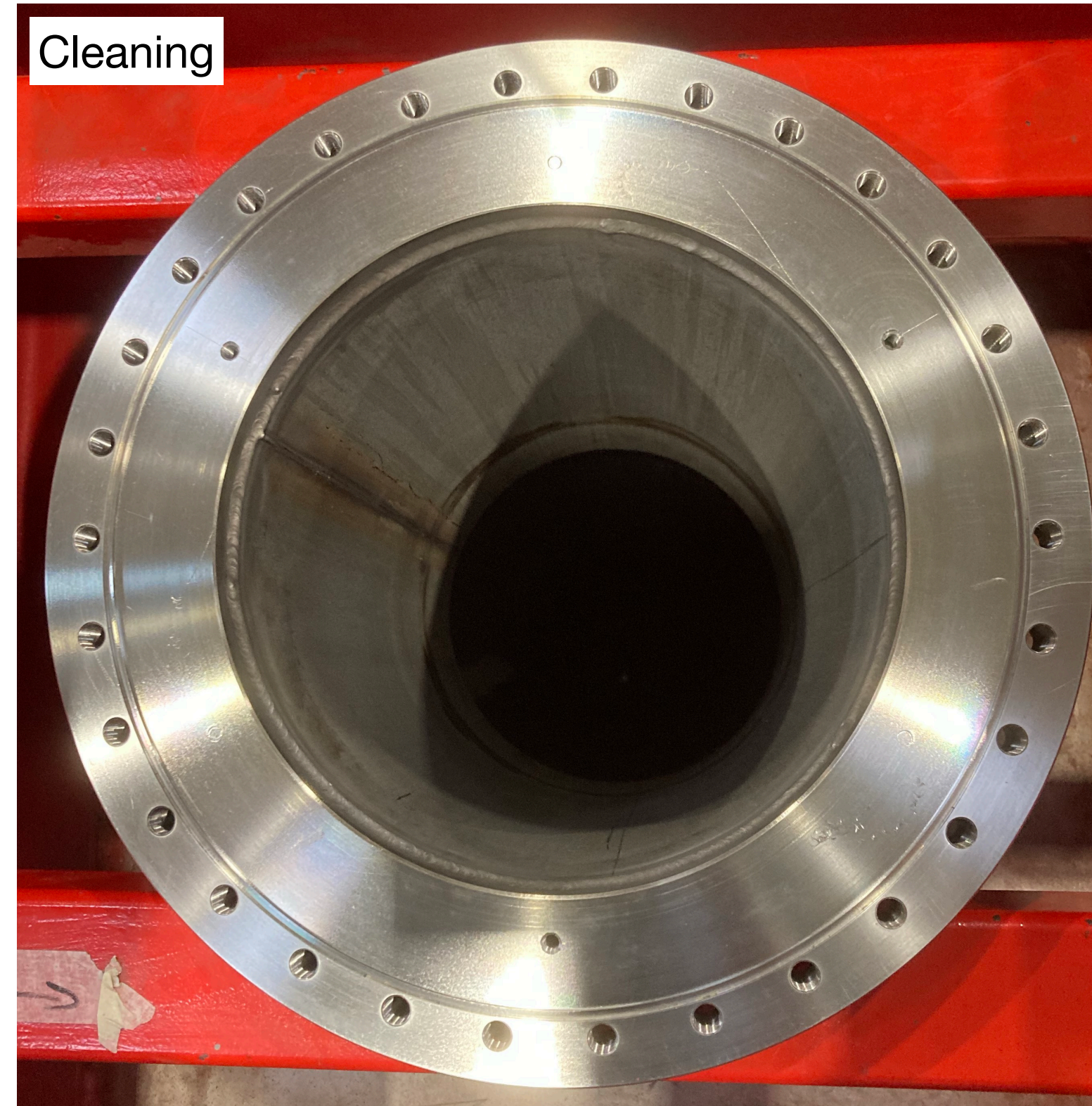
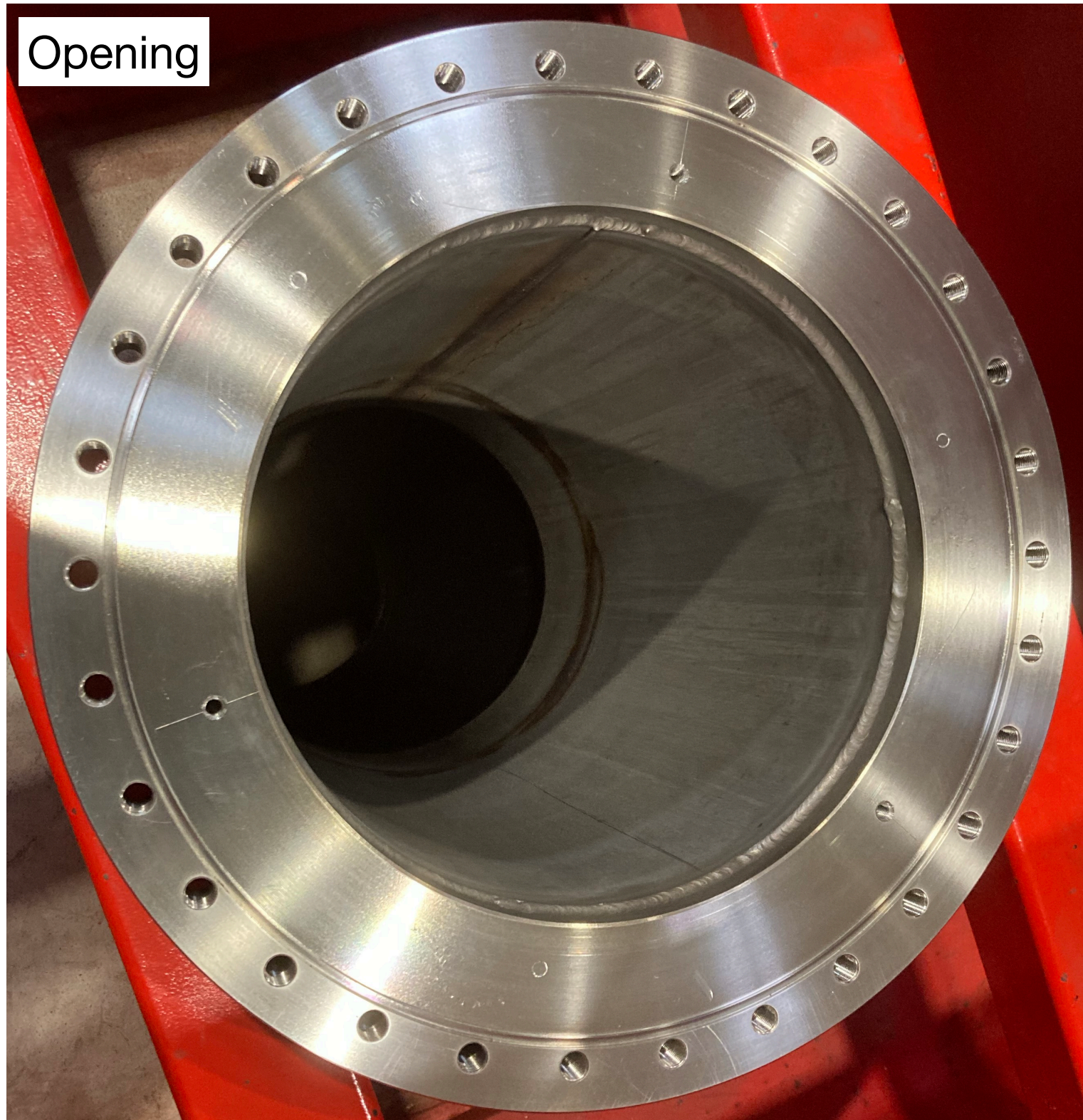


P-1 Electrical Break installation

- Support table outside
- Bottom plate
- Soft interspace to protect flange
- Aluminum (from shipping)
- Bolts + washers in place



P-1 Electrical Break installation



P-1 Electrical Break installation



P-1 Electrical Break installation

- Installation OK!
- Reused bolts from previous installation
- Bolts not completely tightened down
- Brand new bolts will arrive from LANL
- Dimensions are imperial (confirmed)



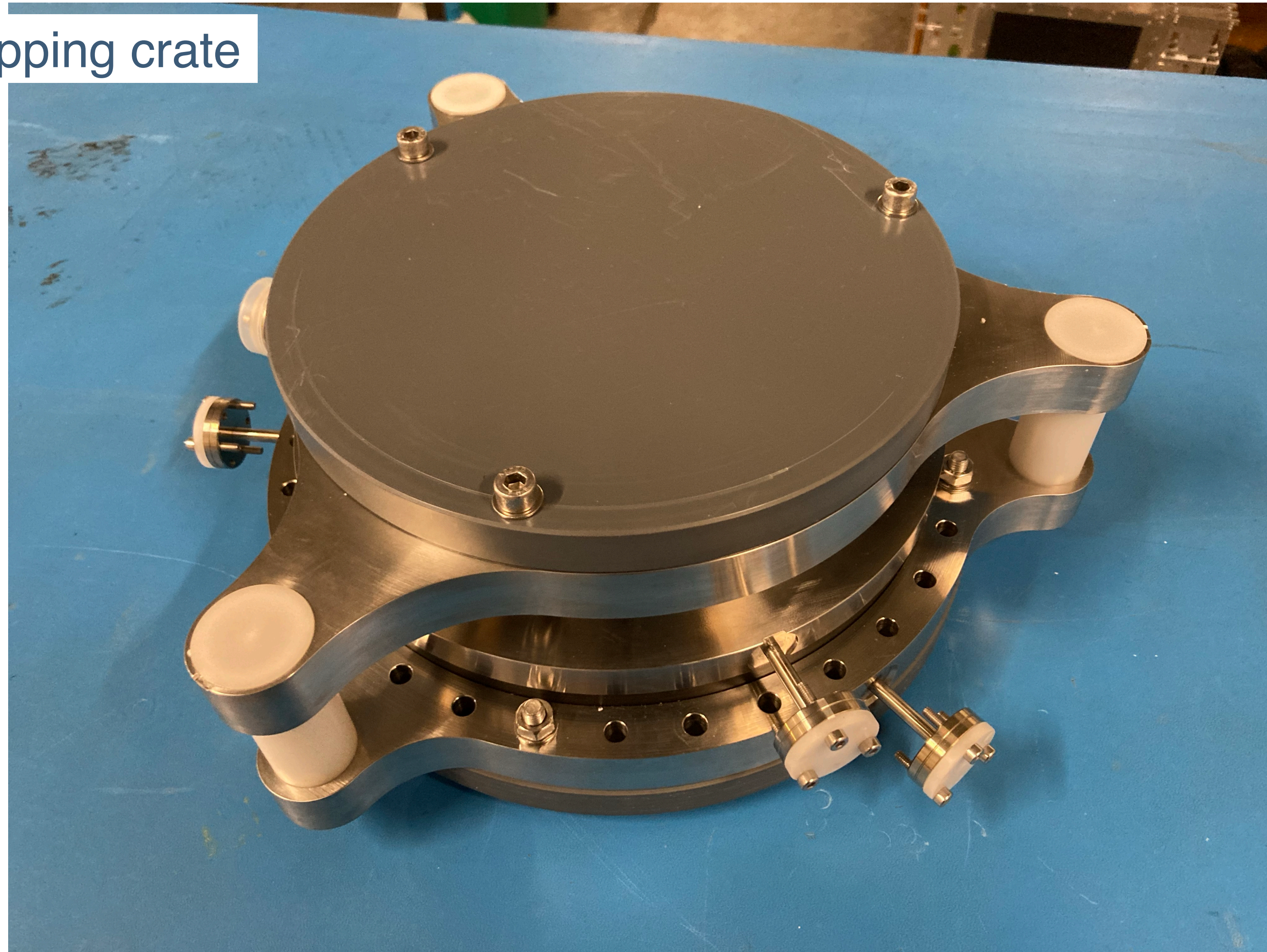
P-1 Electrical Break installation

- Significant air flow was present at the flange opening
- No perceivable air leak already with electrical break in place, w/o plastic bag
- Plastic bag to prevent dust deposit, also sealed at the bottom



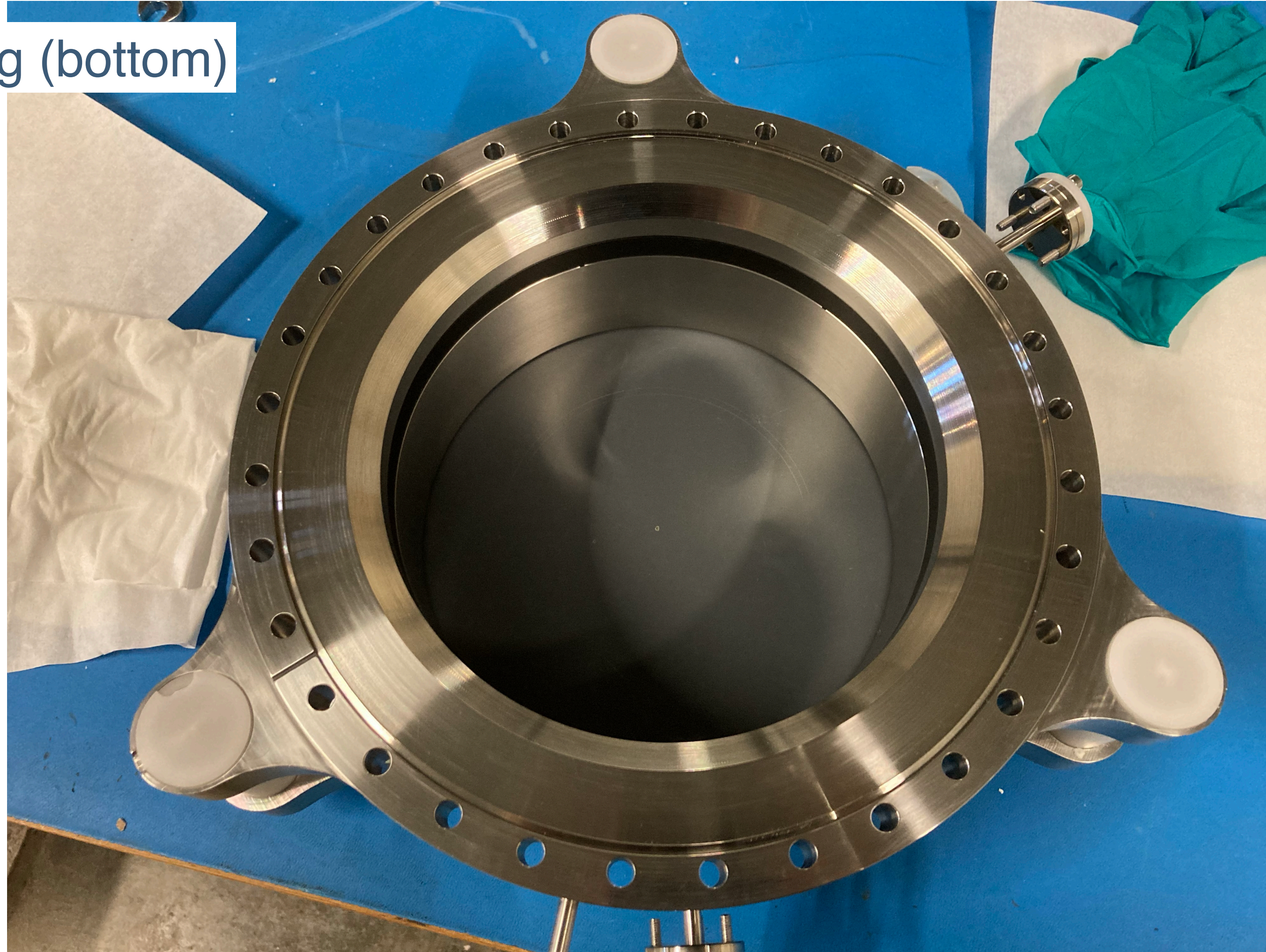
P-2 Electrical Break installation

Extraction from shipping crate



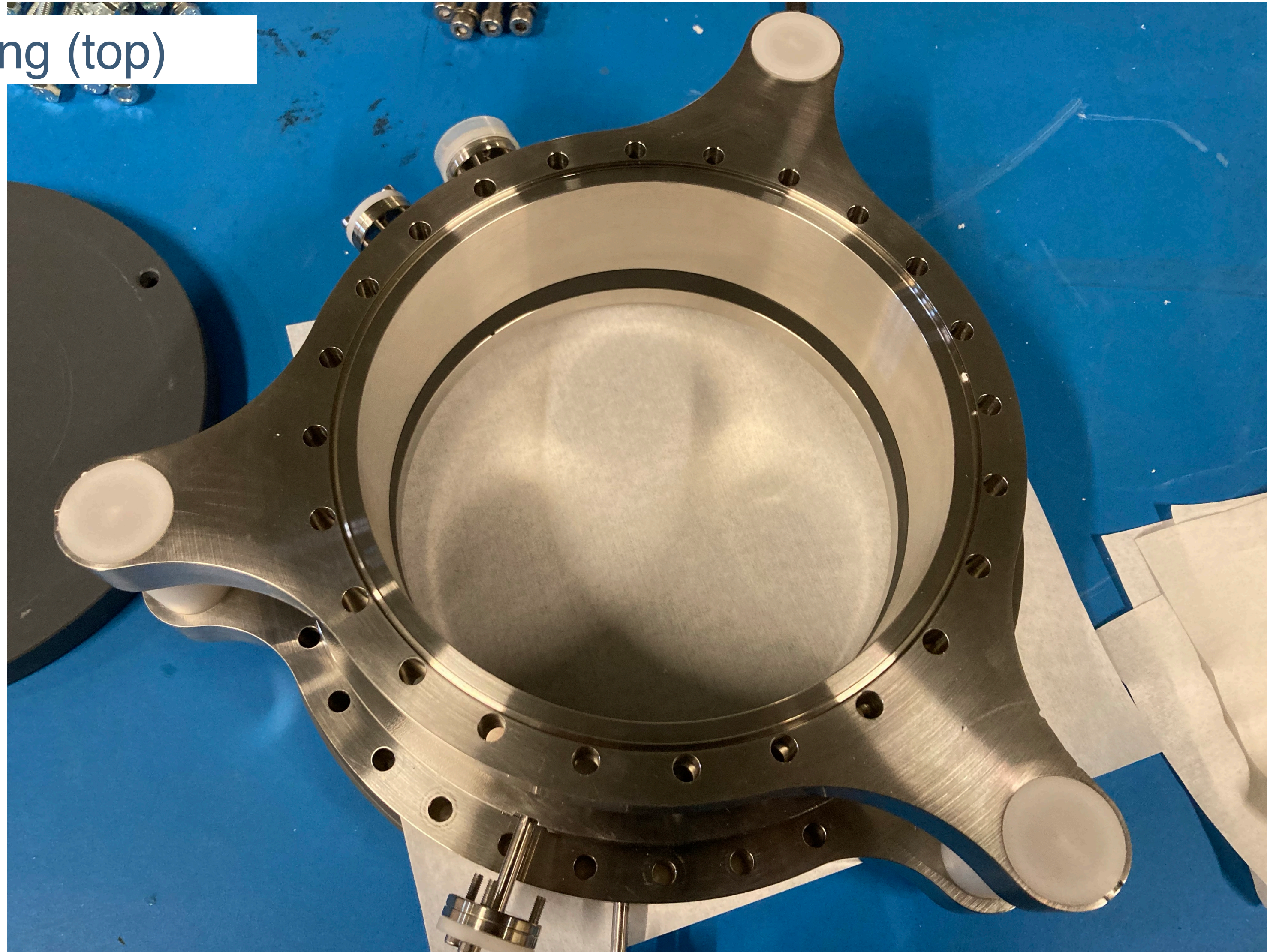
P-2 Electrical Break installation

Inspection + cleaning (bottom)



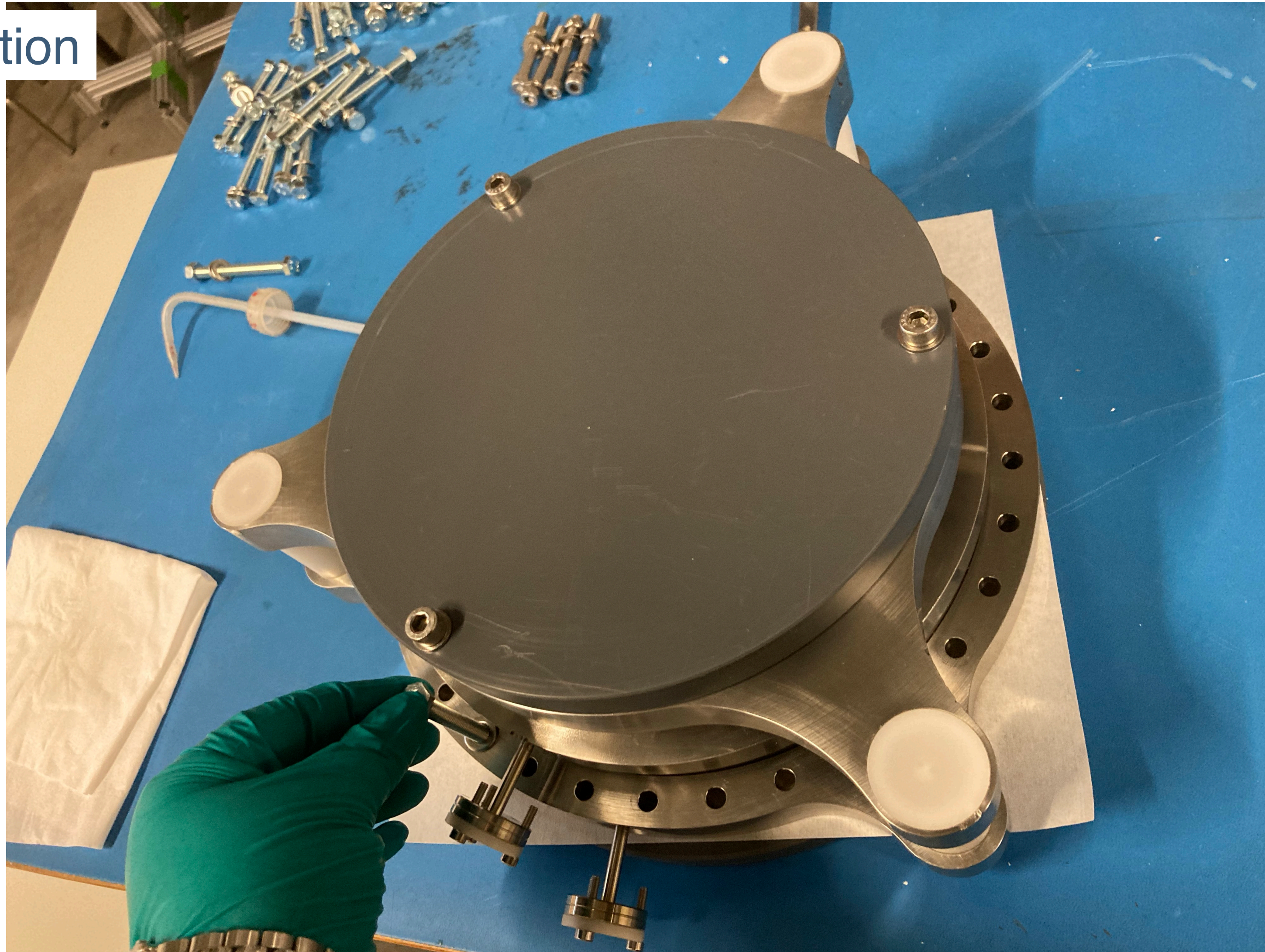
P-2 Electrical Break installation

Inspection + cleaning (top)

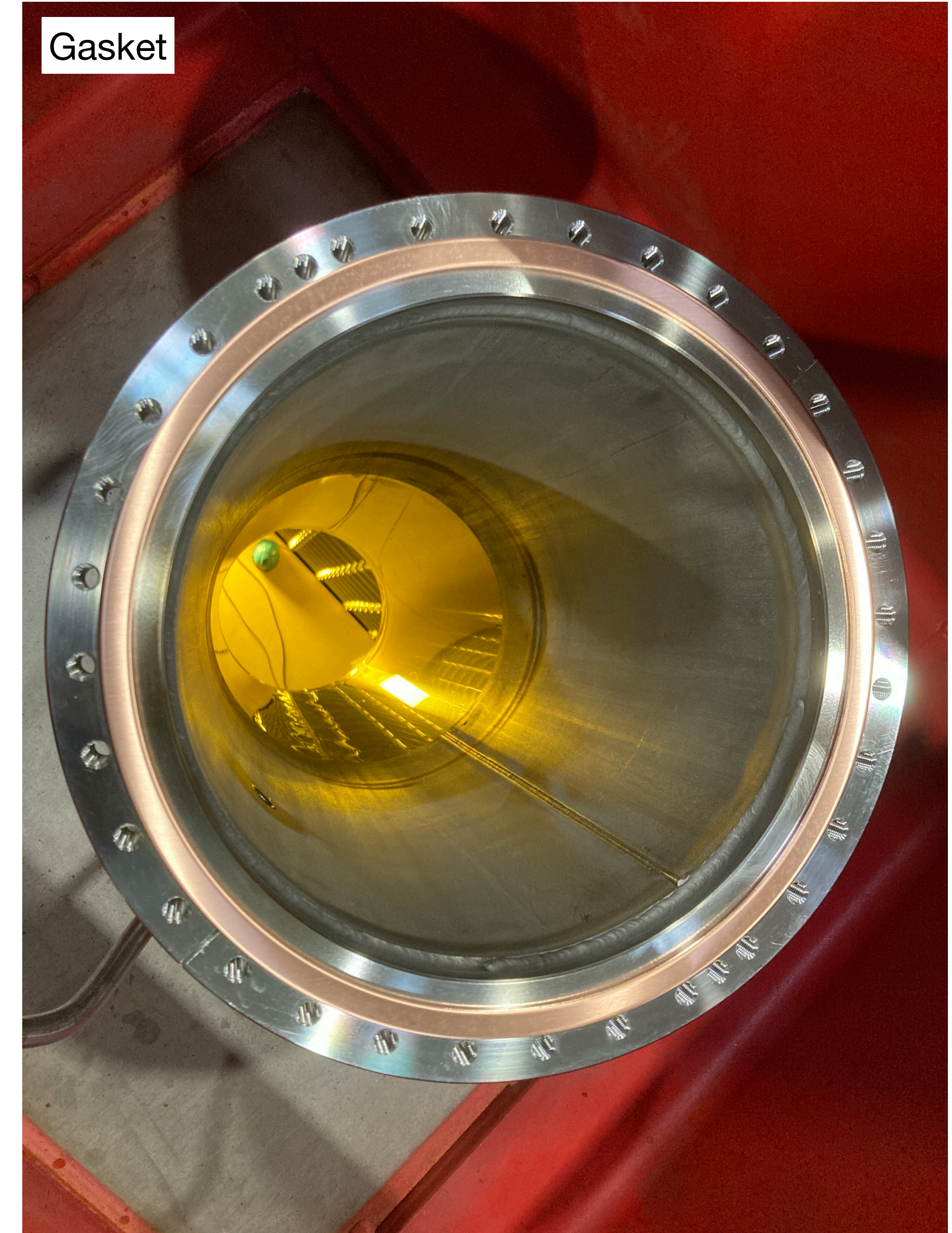
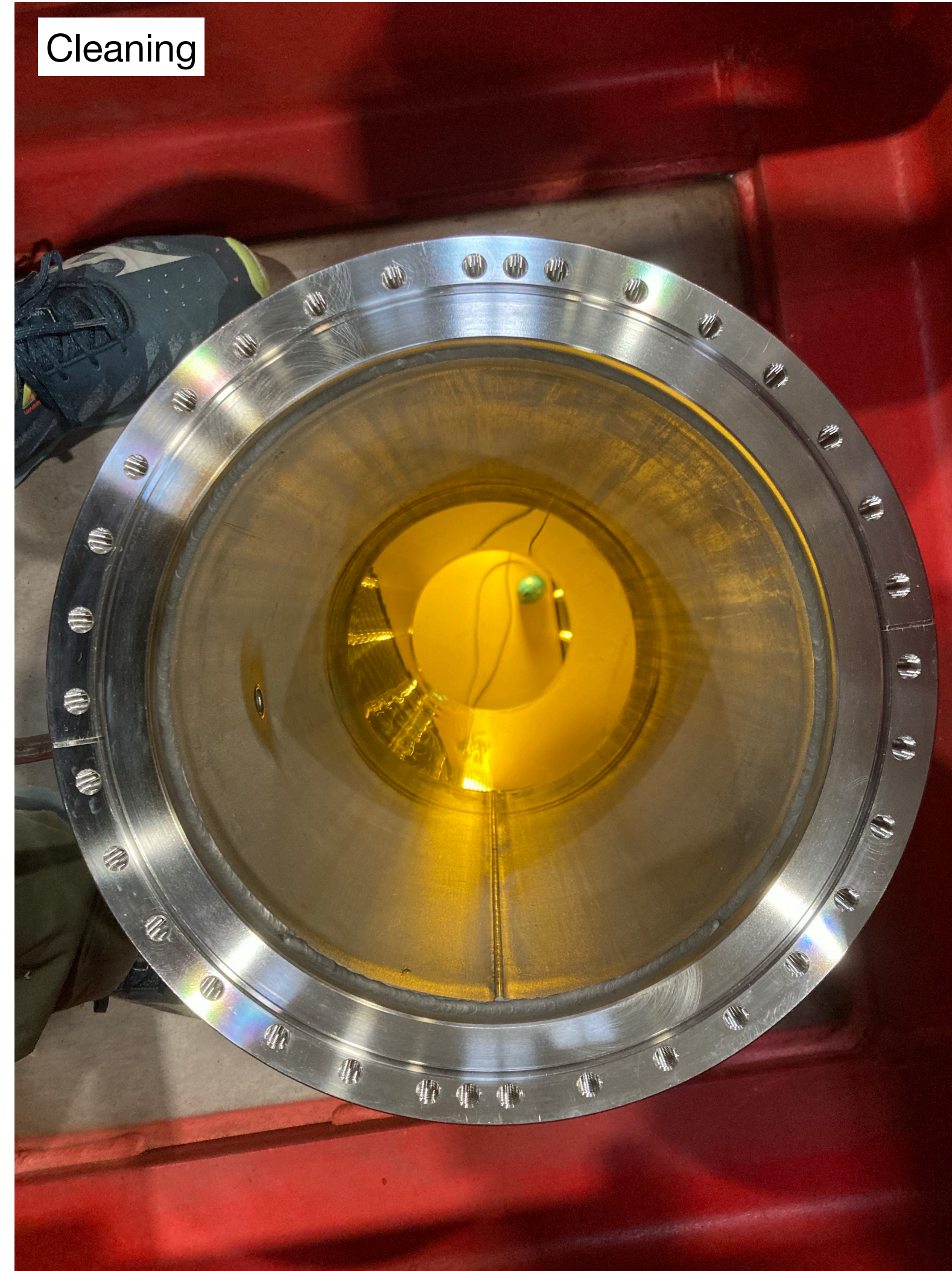
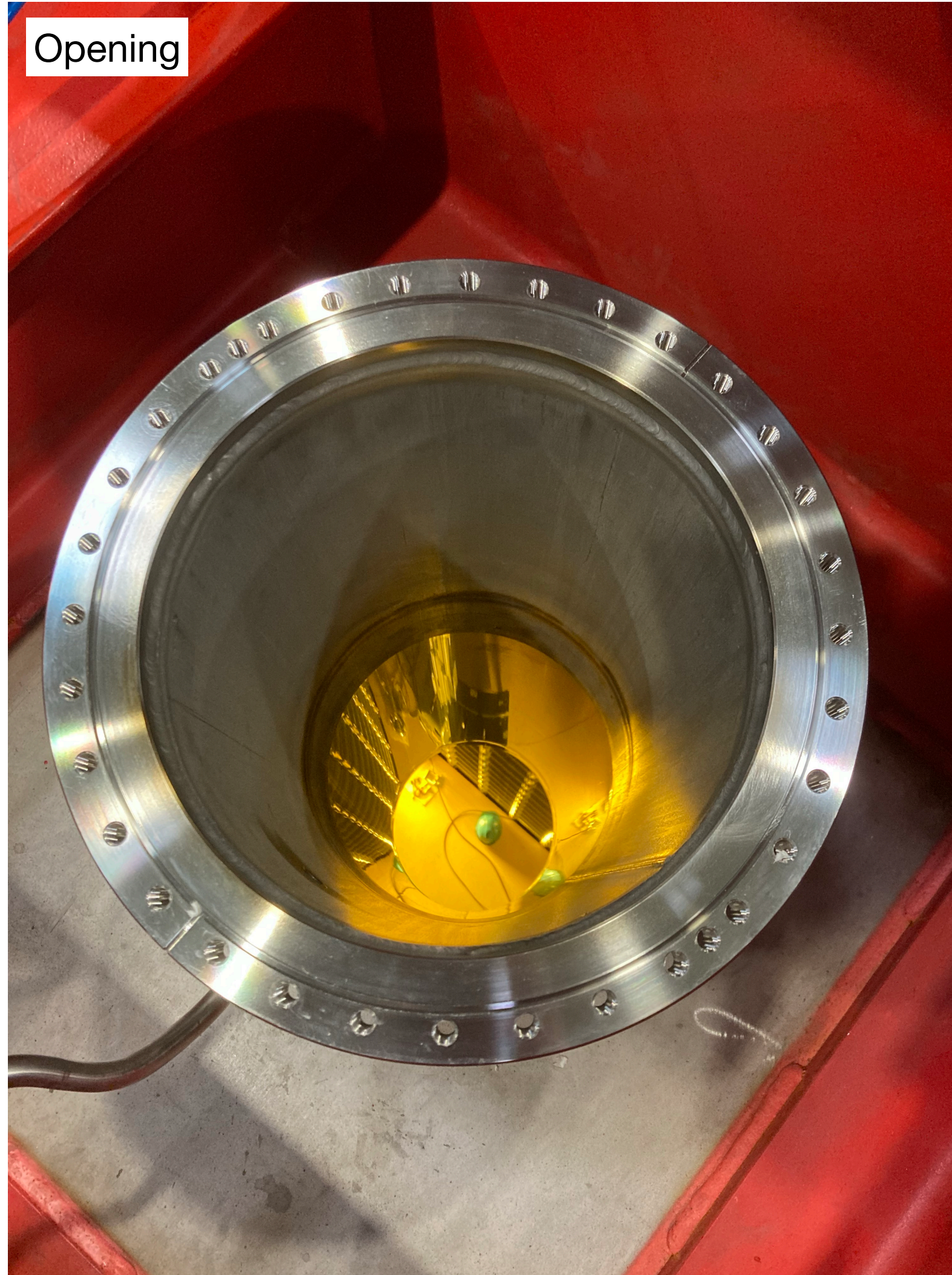


P-2 Electrical Break installation

Installation preparation

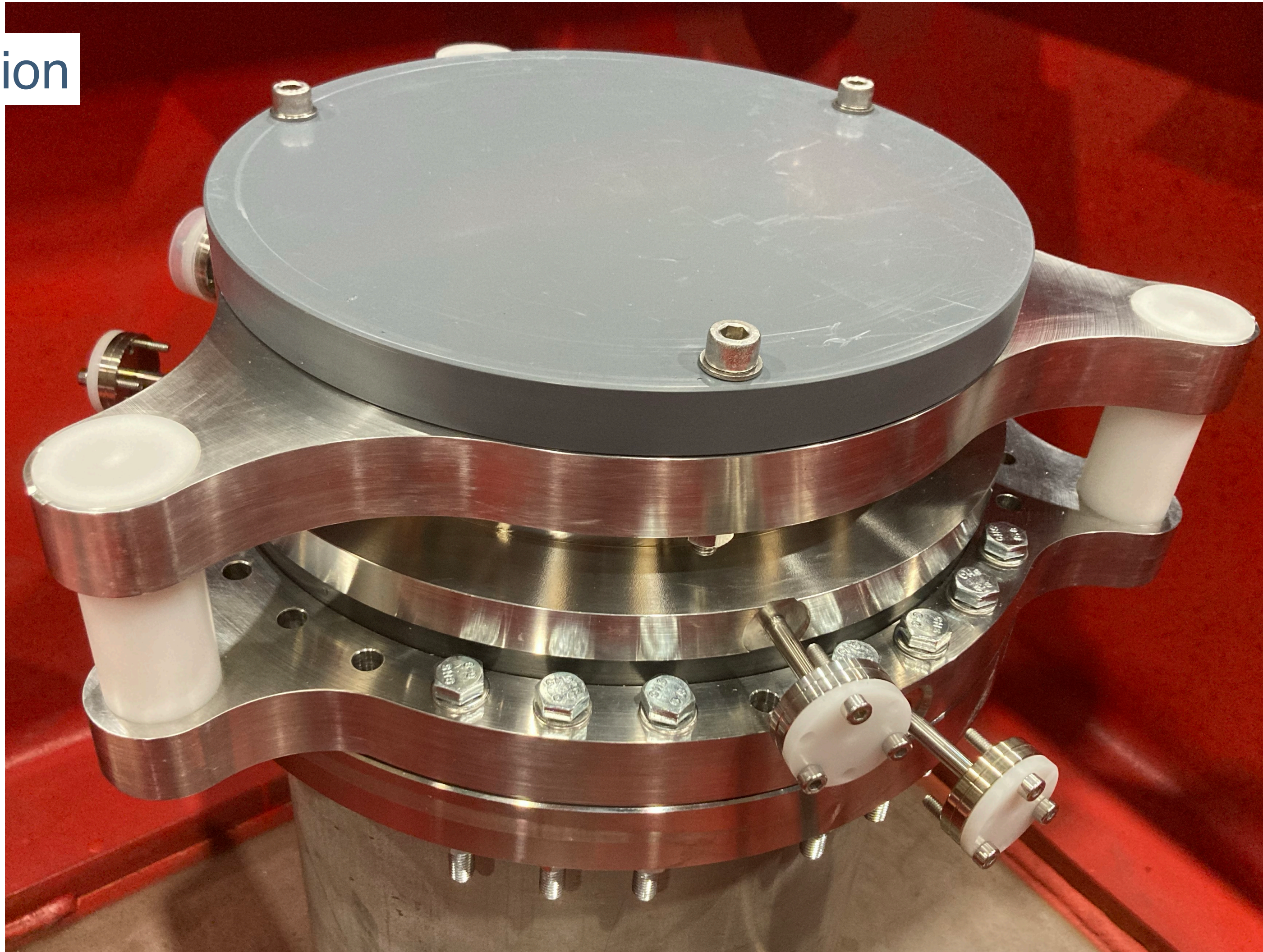


P-2 Electrical Break installation



P-2 Electrical Break installation

Installation



- Significant air flow was present at the flange opening
- No perceivable air leak with electrical break in place
- Bolts not fully tightened down
- Needed 10 shorter bolts (now in place)

P-2 Electrical Break installation

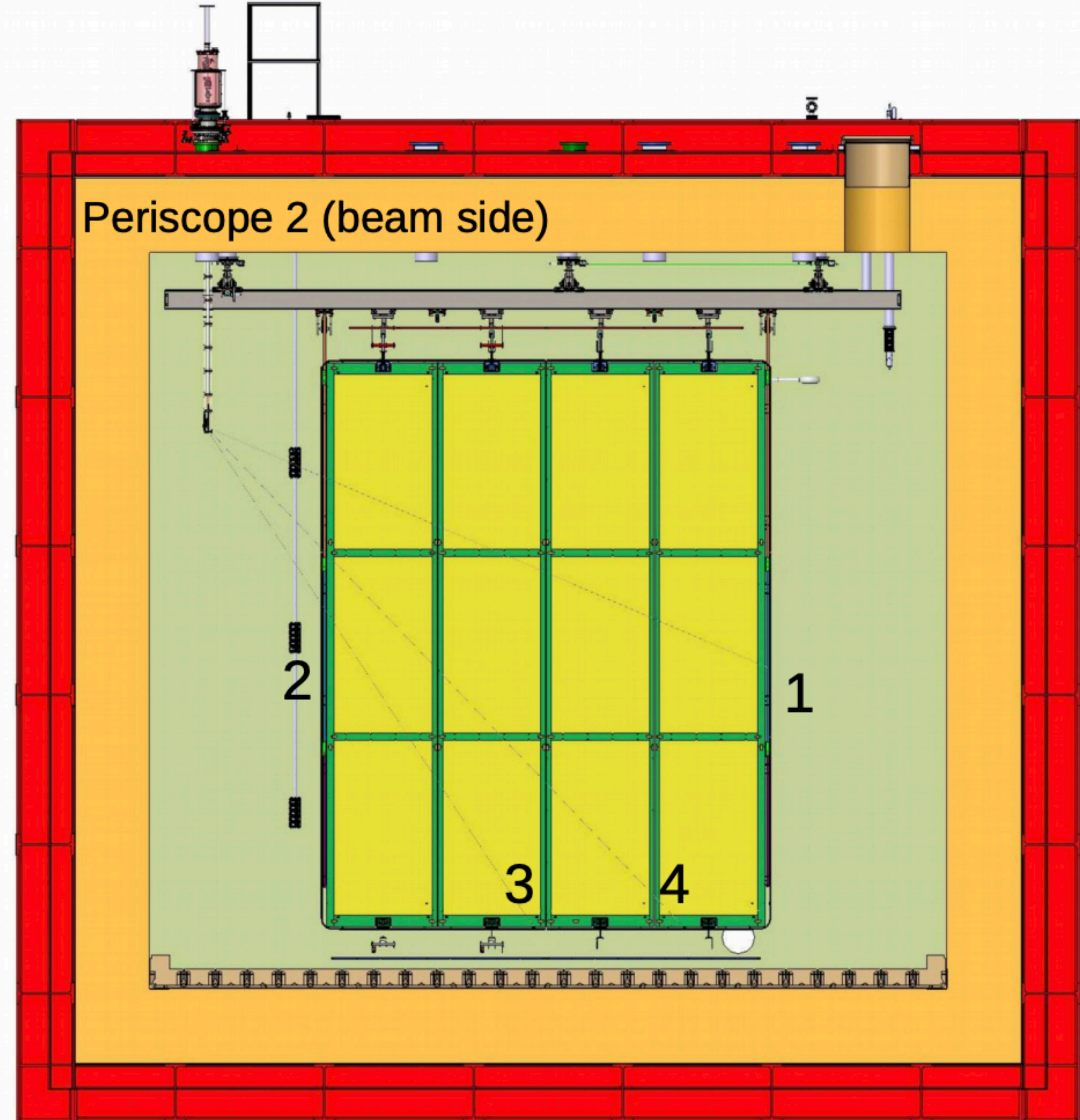


Status of periscope locations



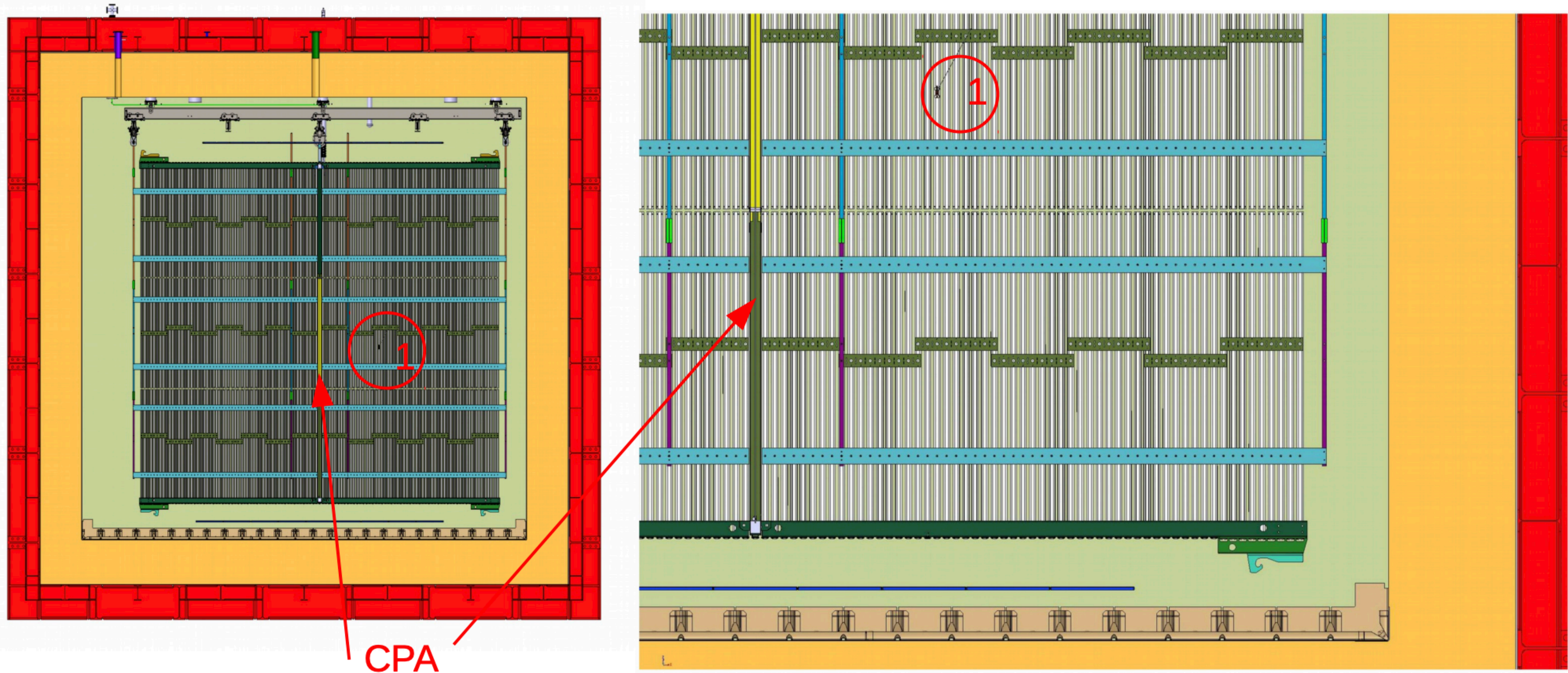
LBLS Mirrors installation

- Installation of LBLS Mirrors complete with Mirror #2 installation
- Mirrors #1, #3, #4 installed before my arrival at CERN
- All details, installation directions available <https://edms.cern.ch/document/2736687/1> (R. Alves, J. Maneira, F. Neves - LIP)
- NP04 Coordinator aware that I need to remove protecting caps before FC deployment
 - Clear request: last operation before deployment



Overview on Position 1

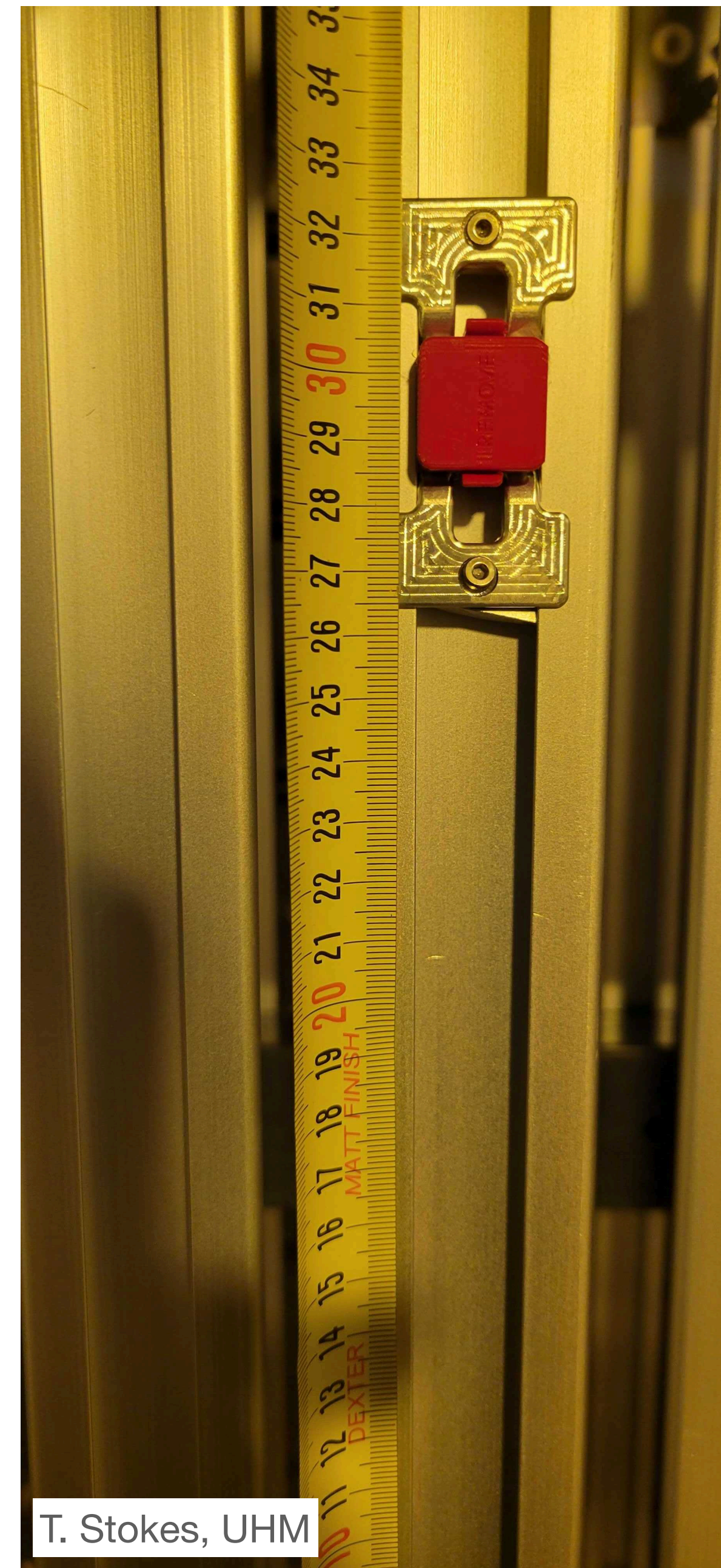
Analogue to position 2



Mirror #2

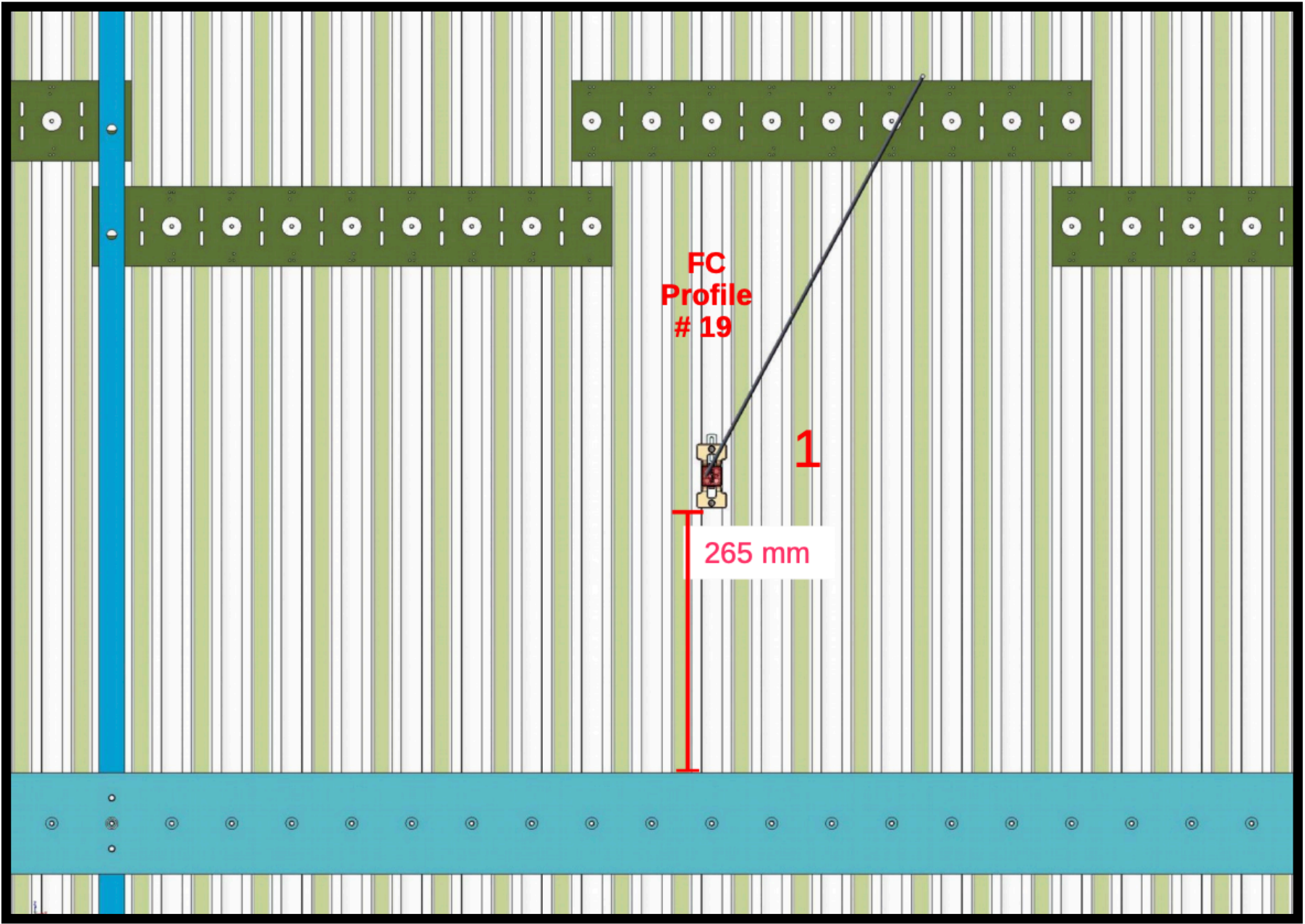


T. Stokes, UHM

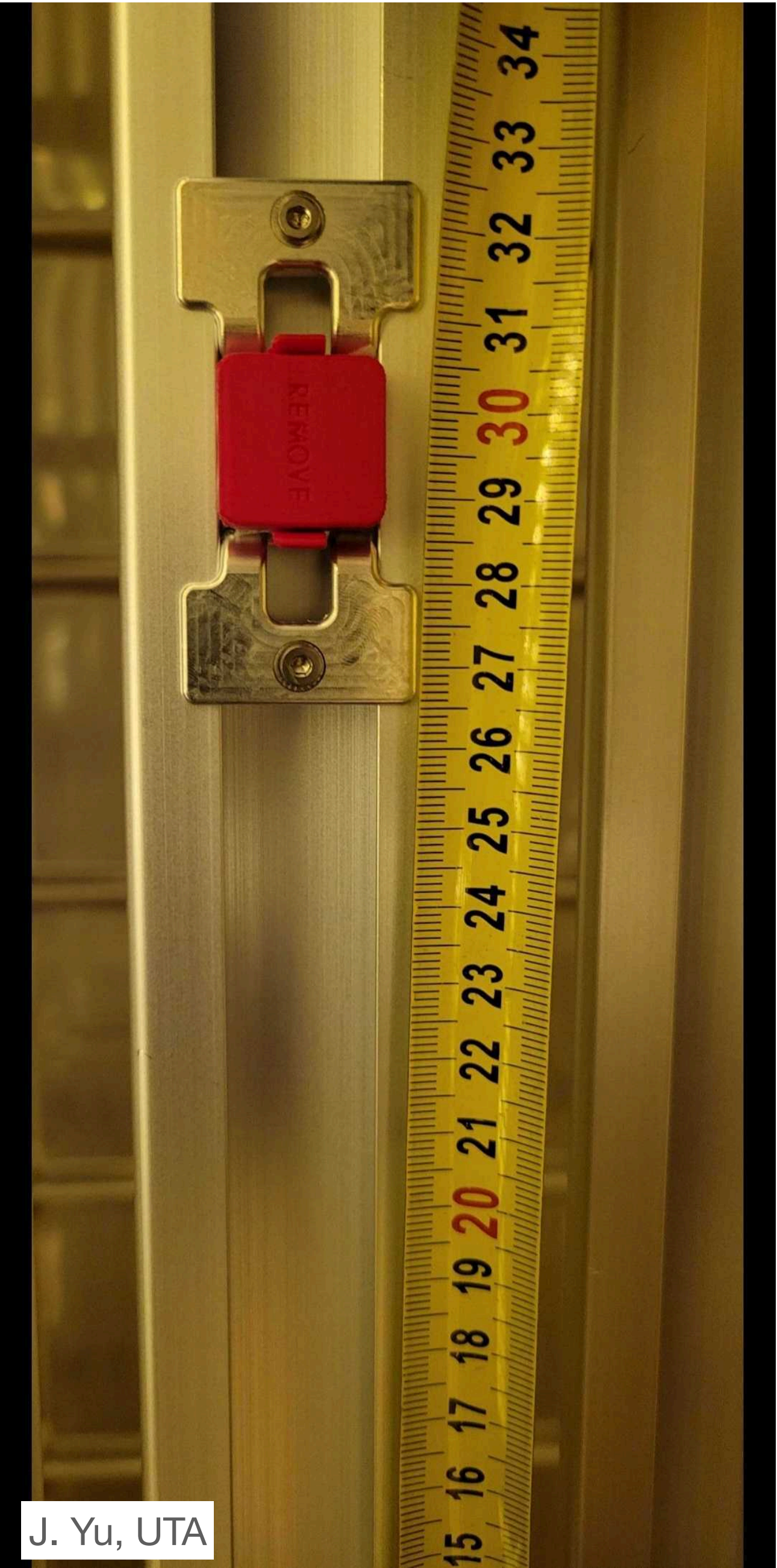


T. Stokes, UHM

Mirror #1



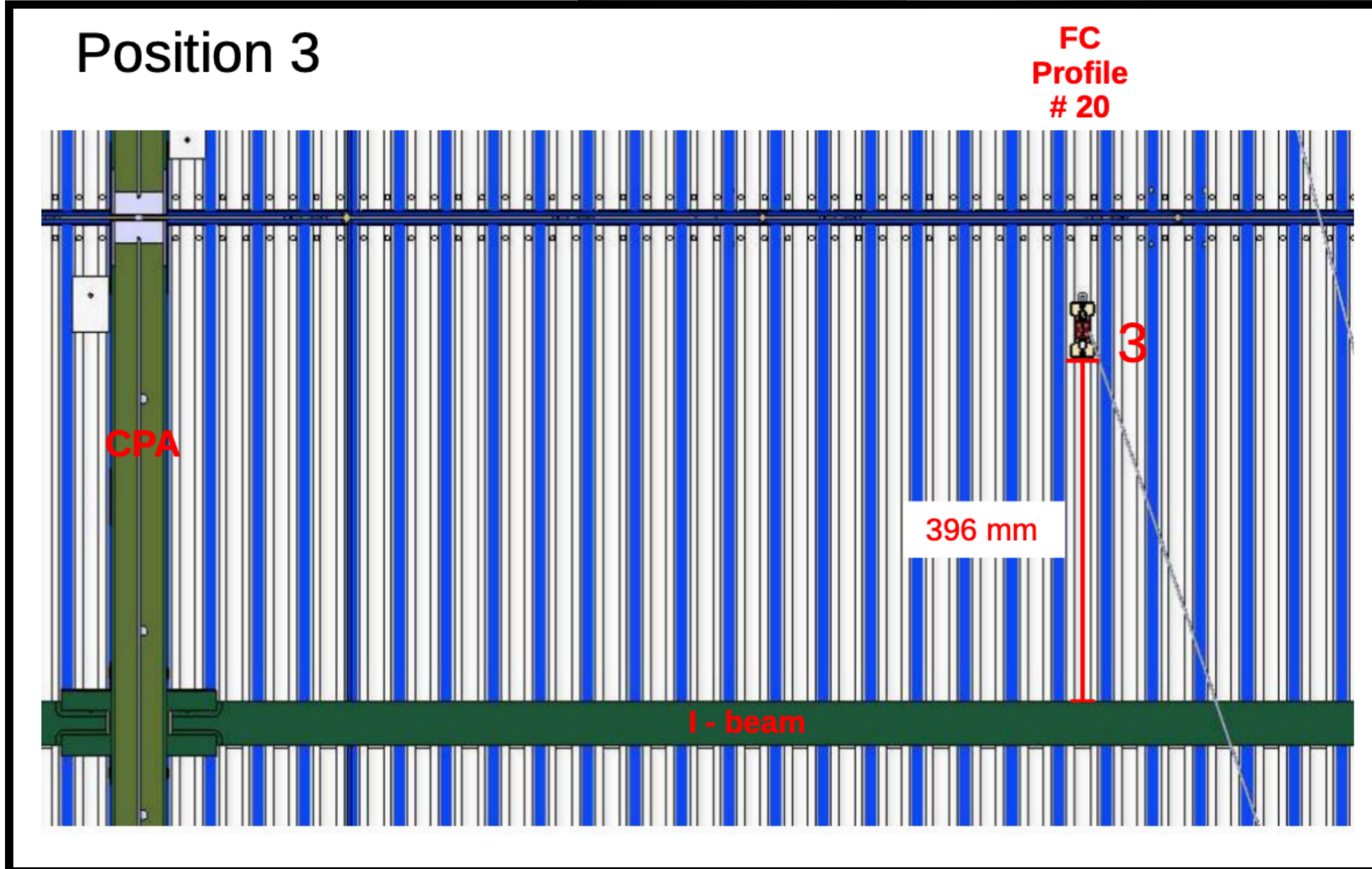
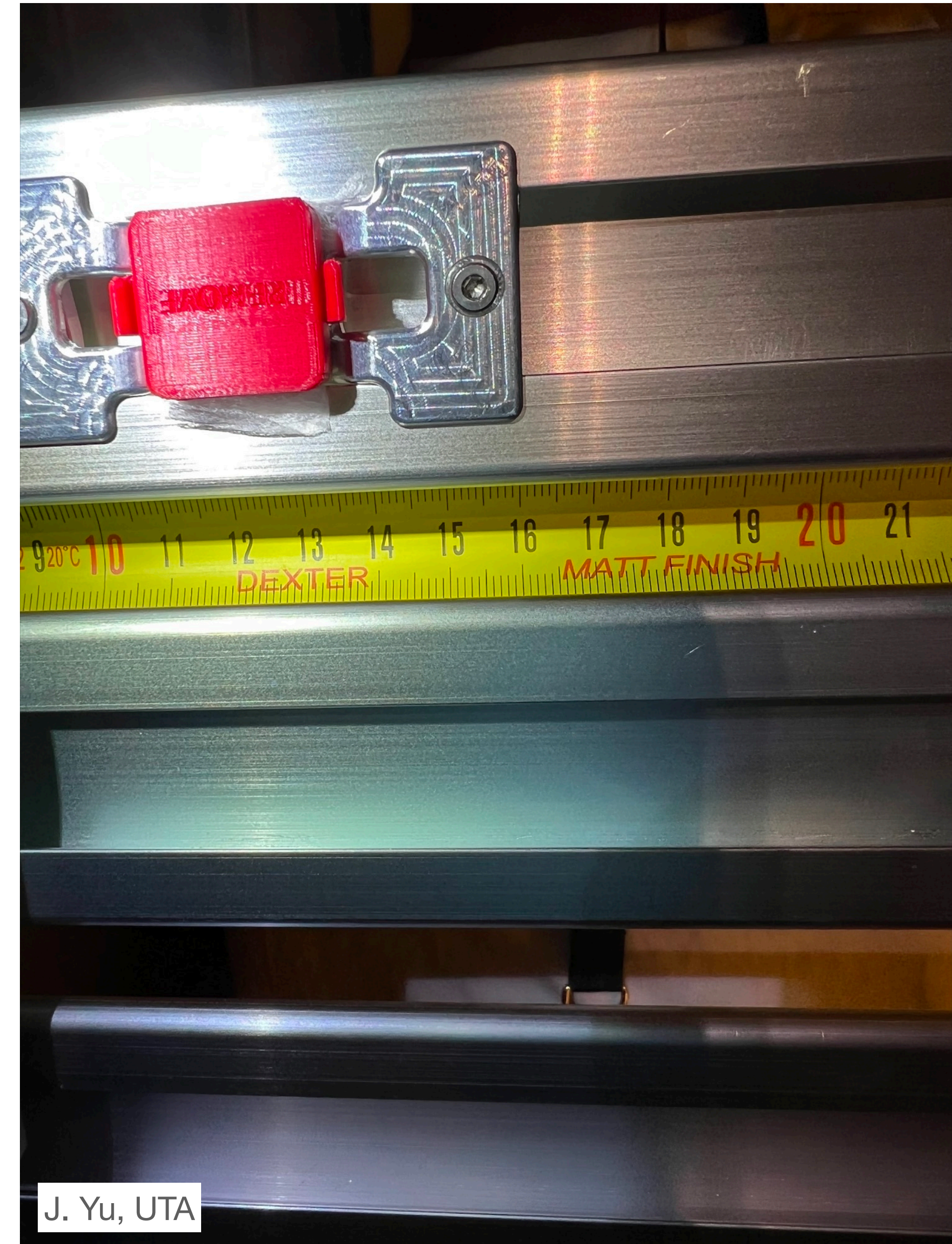
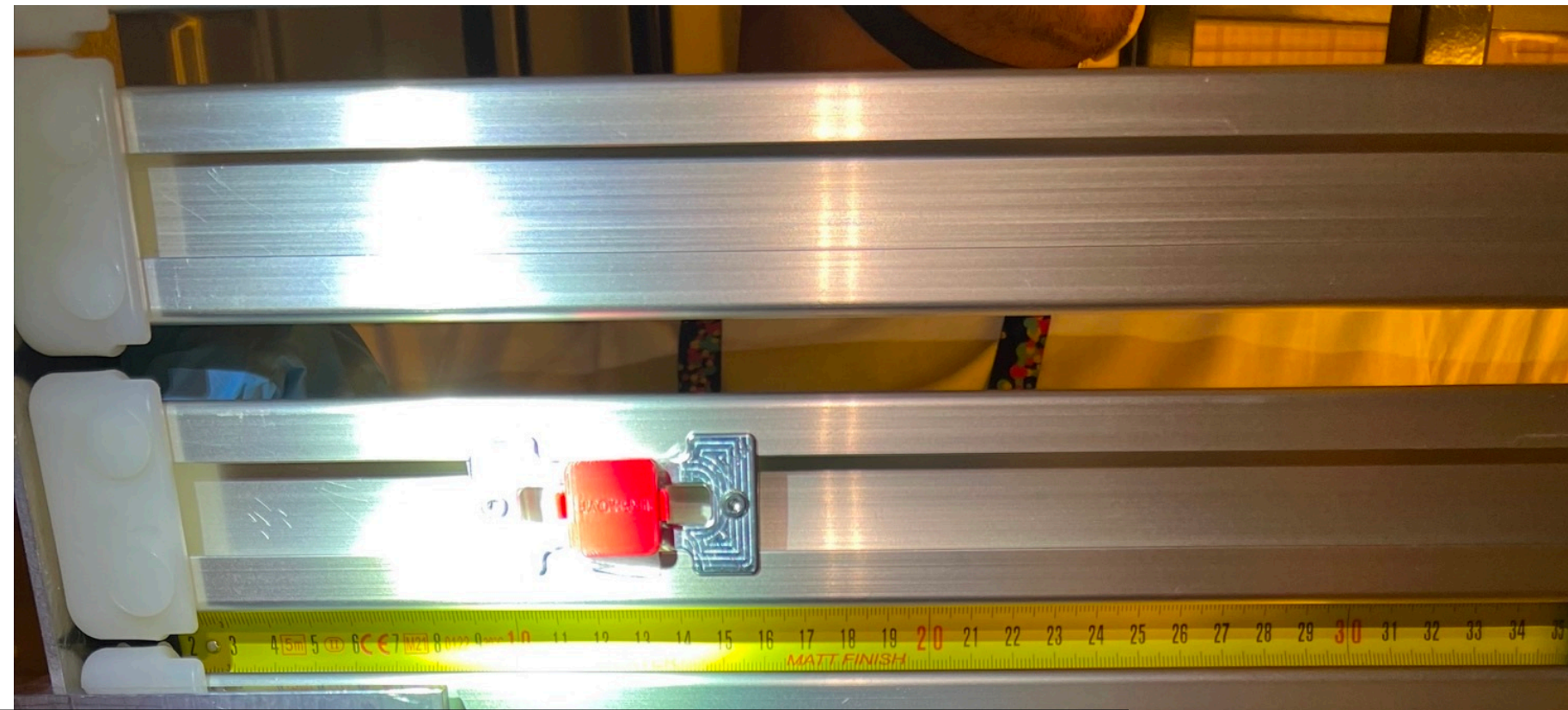
J. Yu, UTA



J. Yu, UTA

Mirror #3

2022-06-16



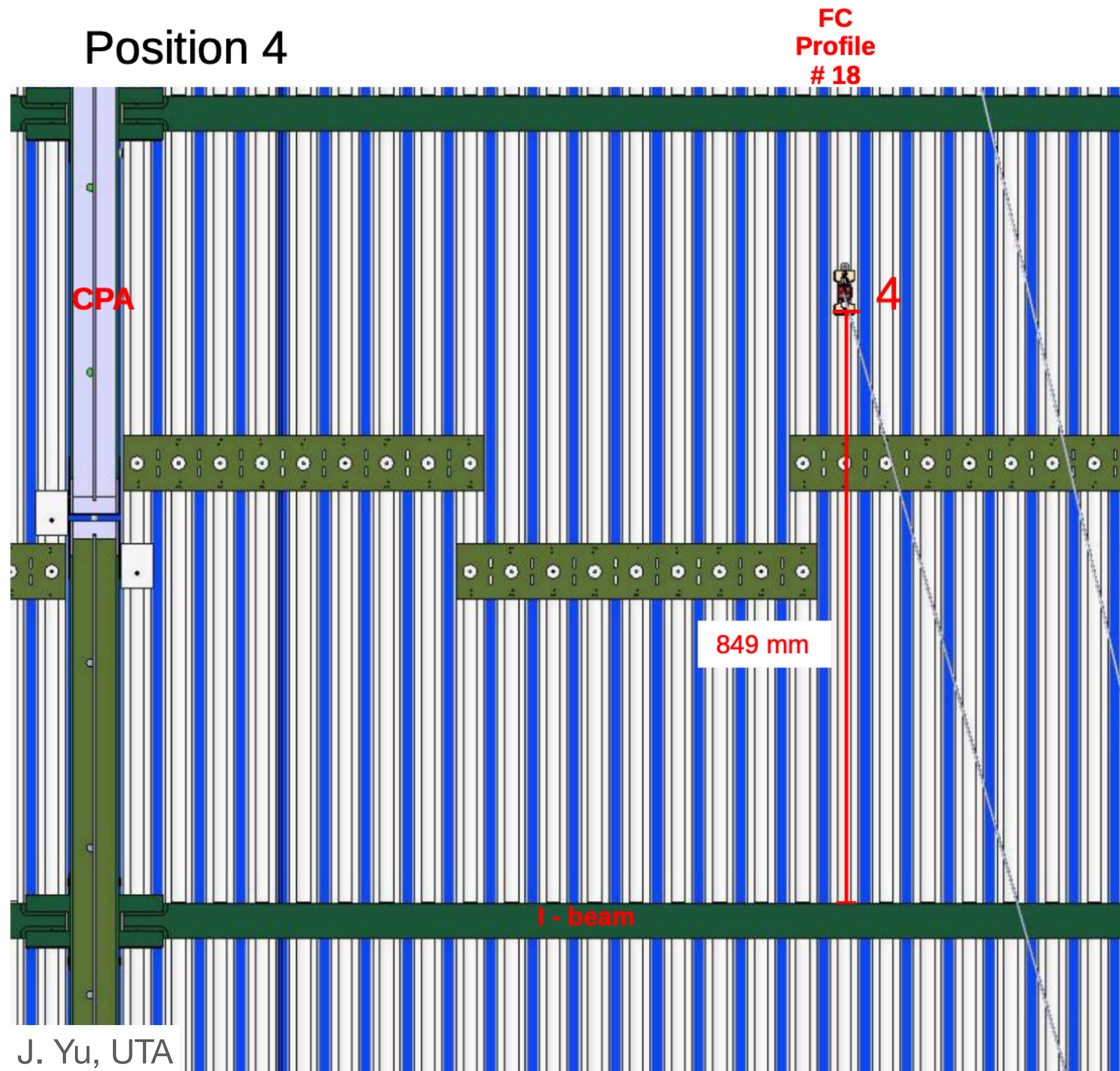
J. Yu, UTA

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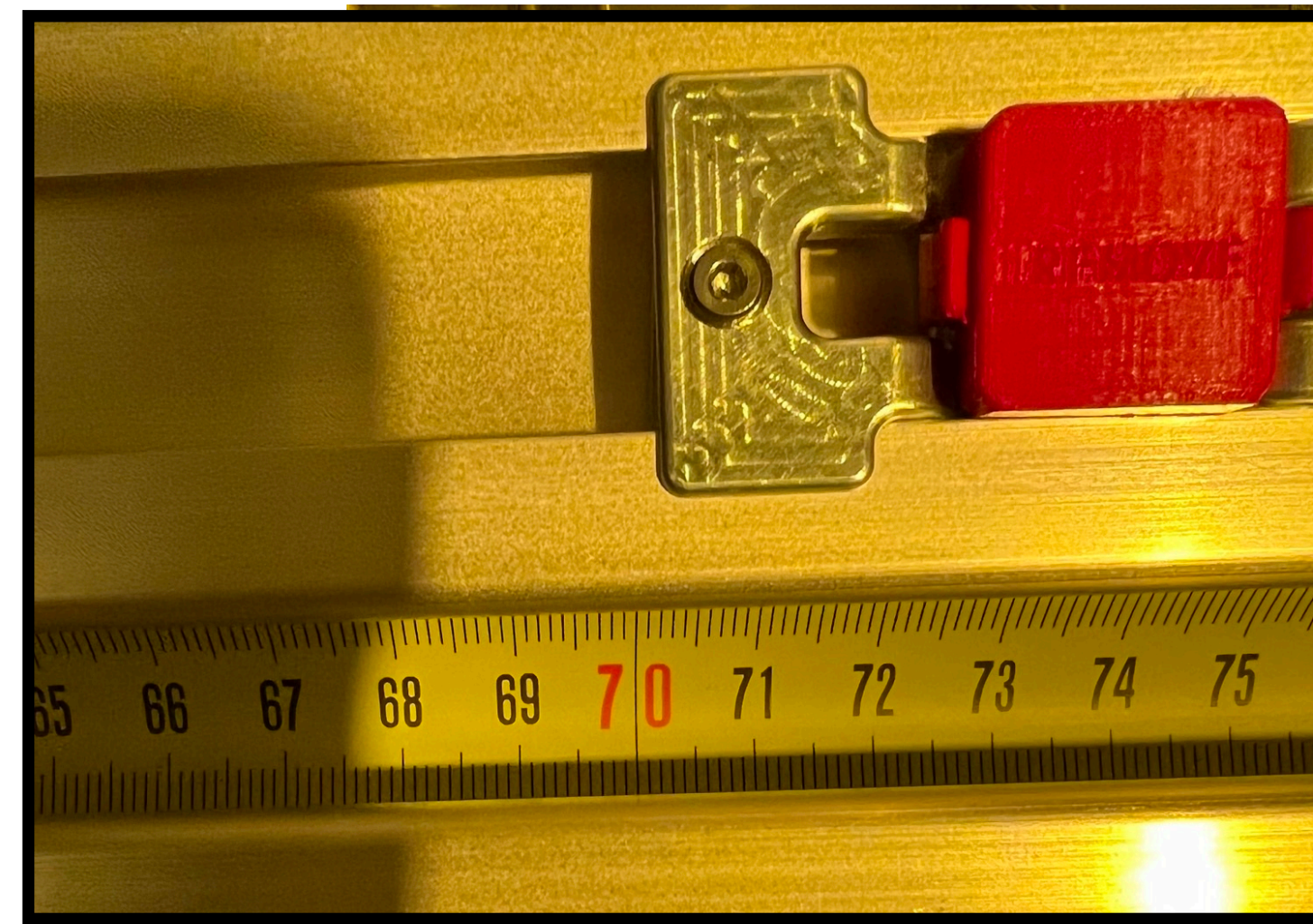
Mirror #4

2022-06-16

Position 4



J. Yu, UTA



J. Yu, UTA

IoLS Assembly Room



IoLS Assembly Room

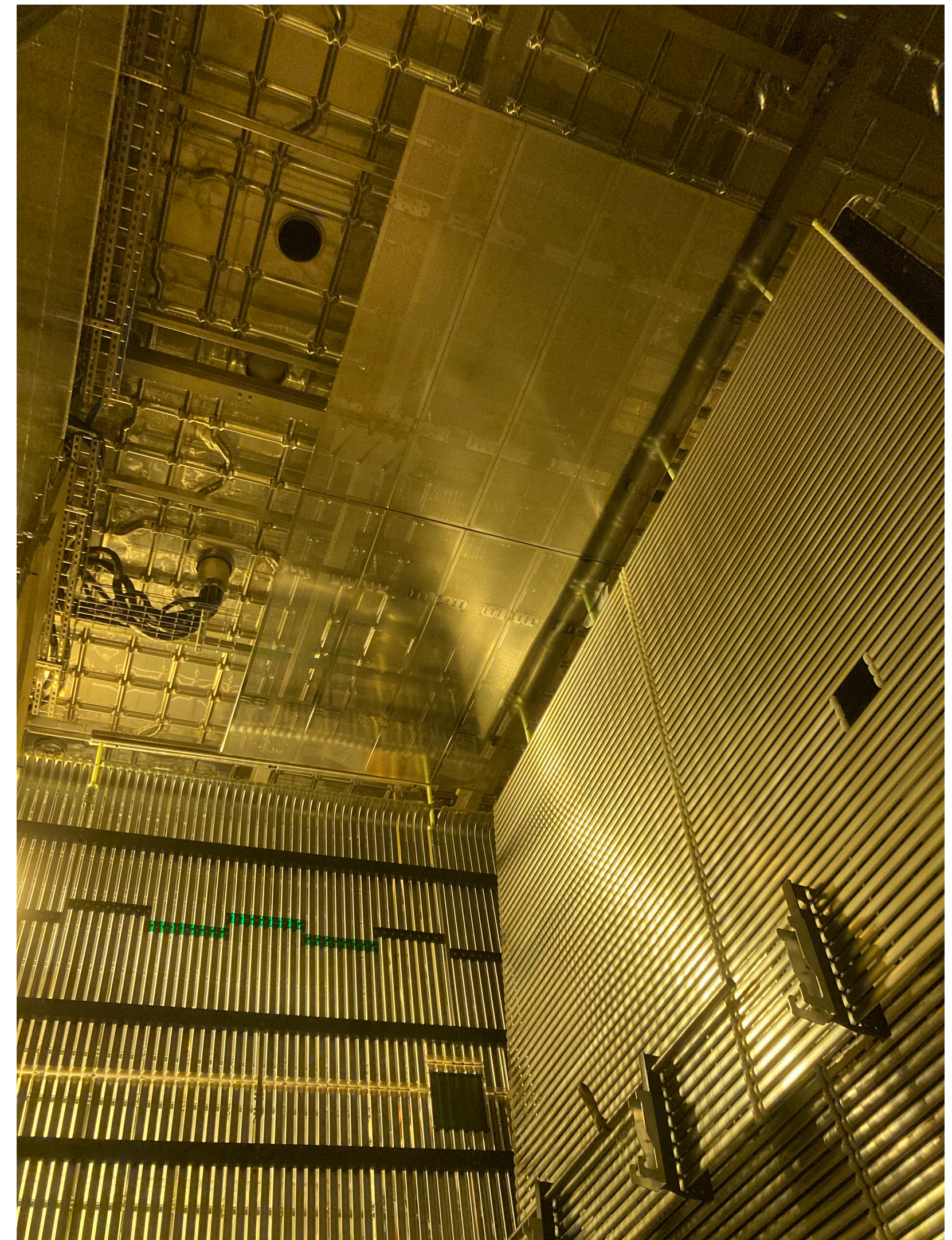
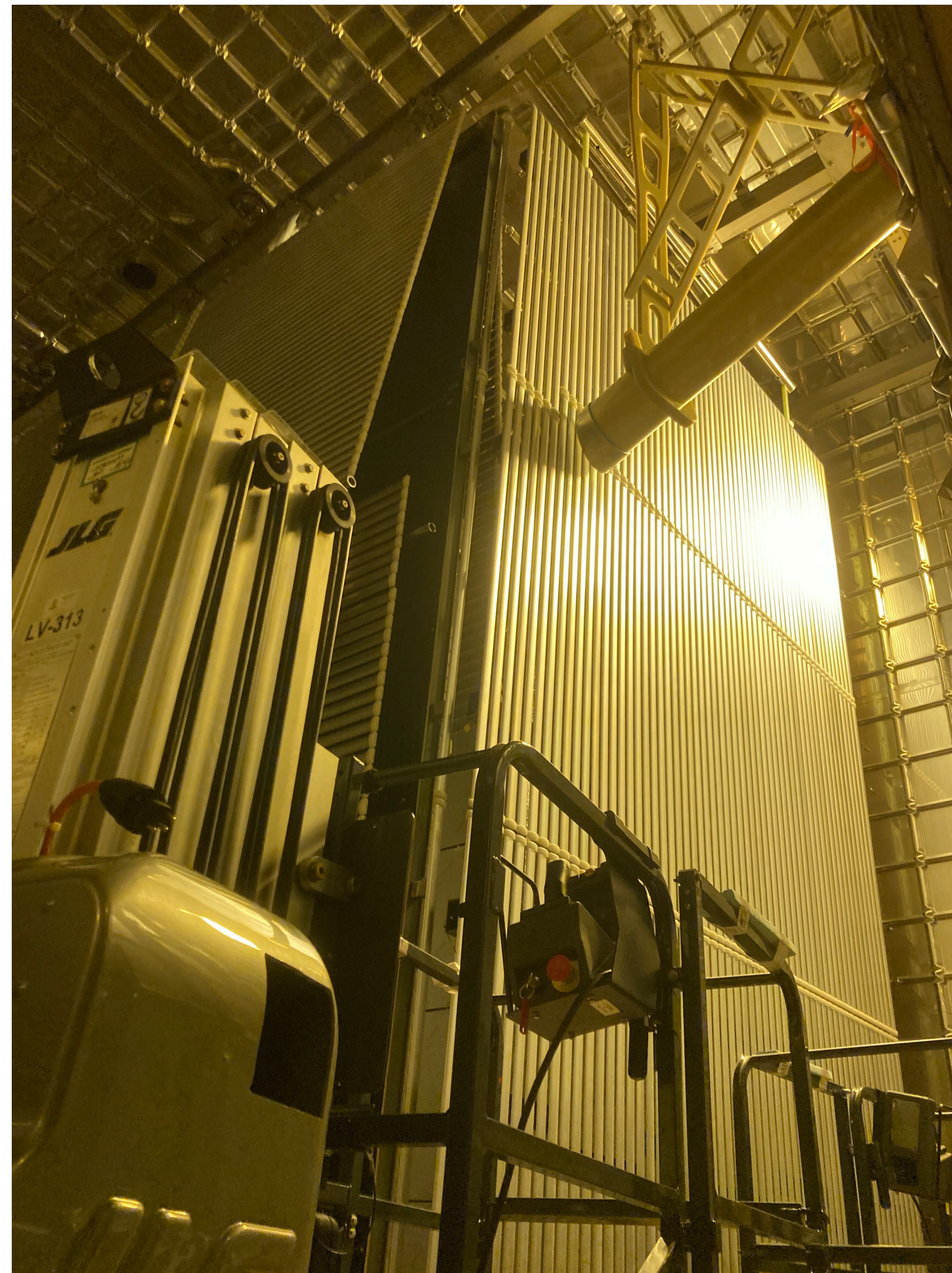


IoLS Storage Room

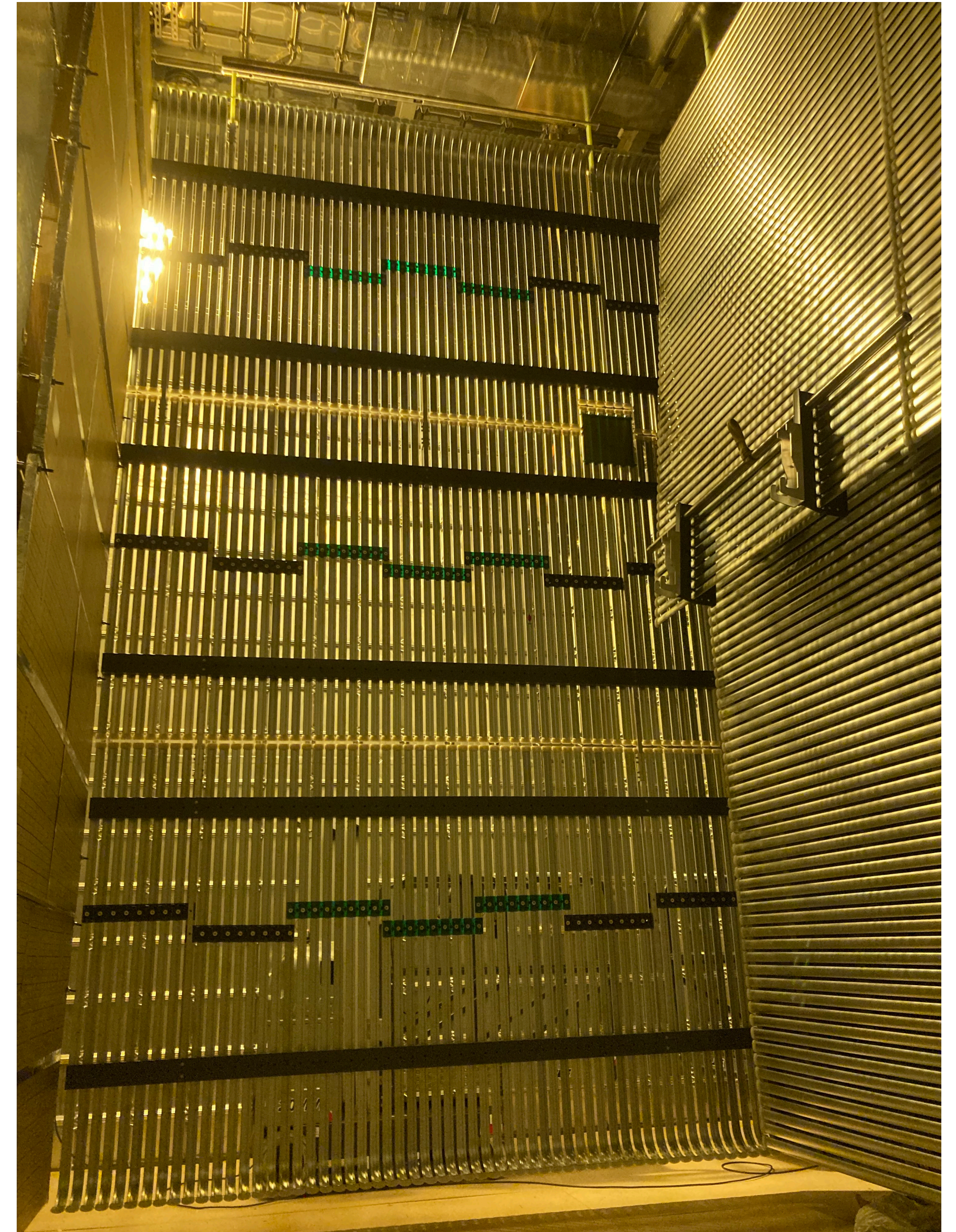


Sturdy assembly table for heavy-weight components

Current status of NP04



Current status of NP04



Summary

- IoLS locations have been cleared. All possible interferences have been checked and solved. Safety evaluation successful. Ready for feedthrough+periscope installation
- Laser stand supports are in place. Floorboards modified. Additional modification was requested and is ongoing
- Both electrical breaks have been installed. All NP04-IoLS compatibility issues have been successfully addressed
- LBLS Mirrors in place. Protections will be removed right before FC deployment