

antarscam1_antares_fm2_2016-04-05_08:26:46



Exchanging the Plug JMA05 in the Beam Tube SR5 at FRM II

Elbio Calzada

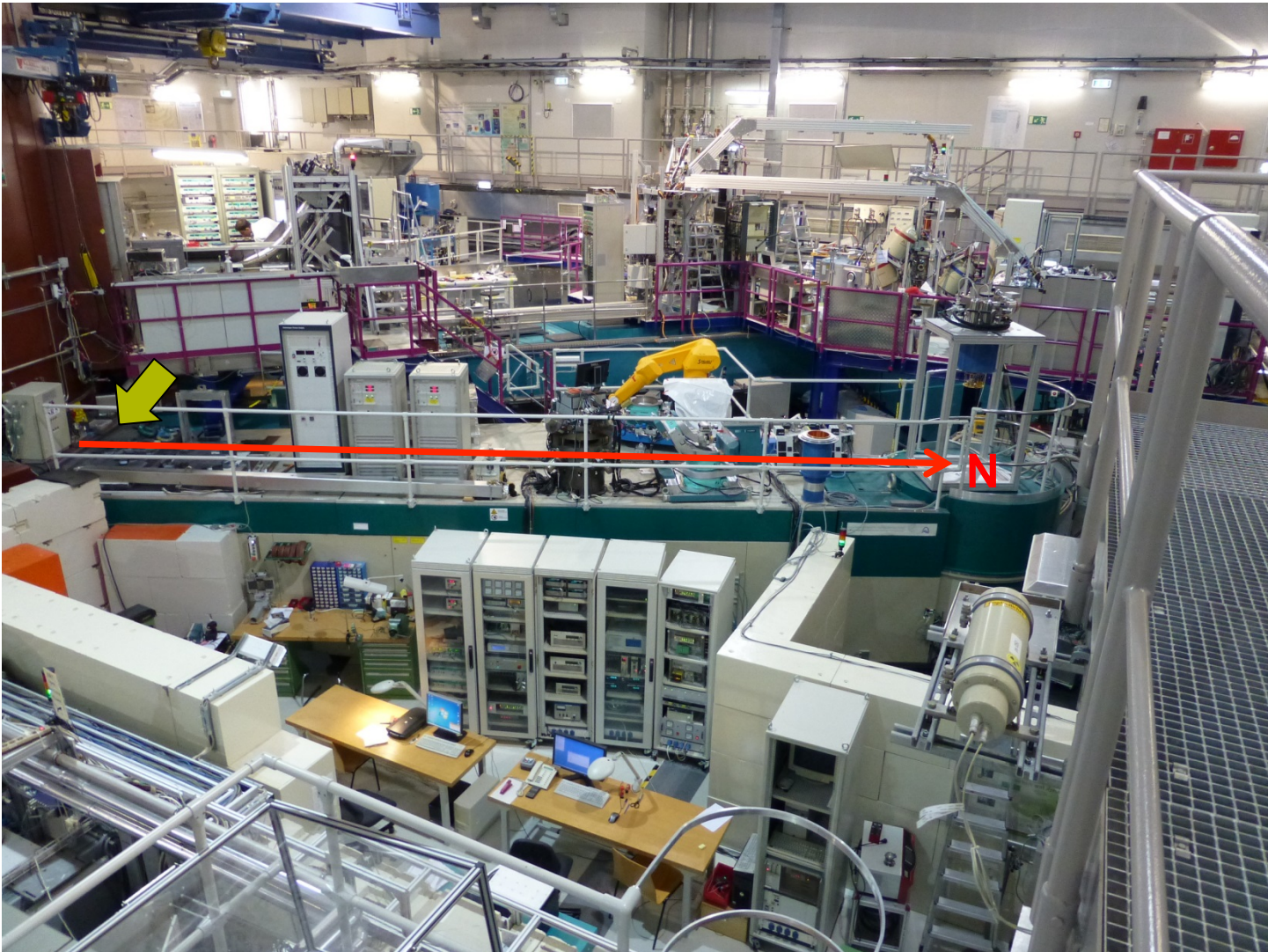
DENIM 2016

19-21 September 2016

ESS- Lund - Sweden

MLZ is a cooperation between:

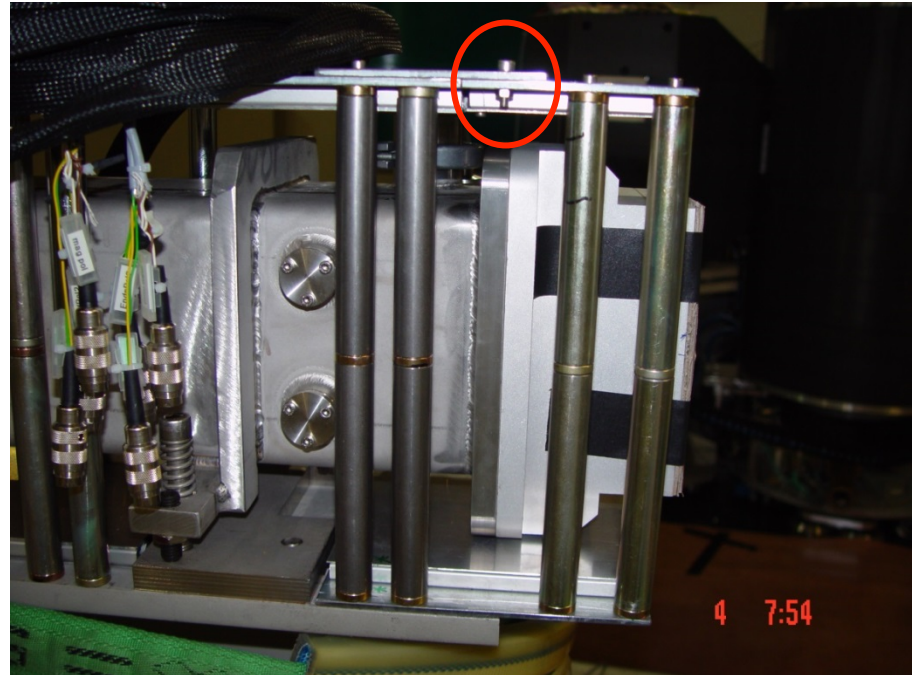
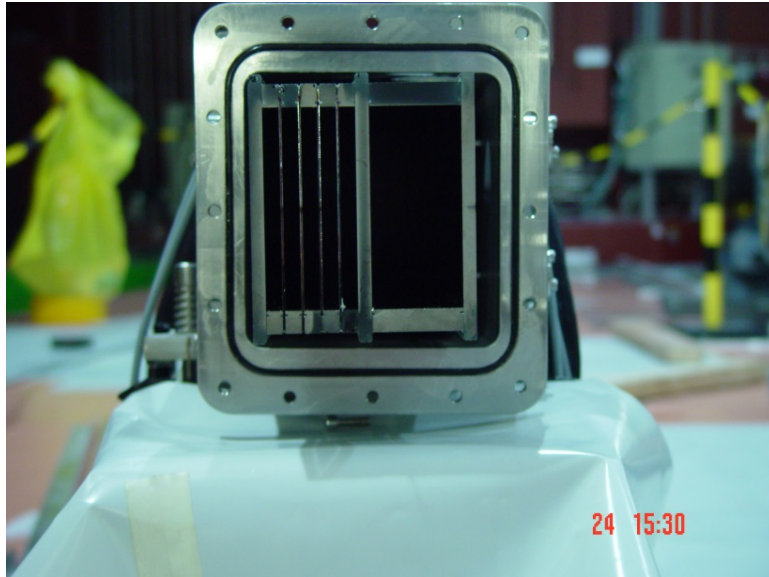
Situation at the Beginning



Dismantling of the Instrument TRISP



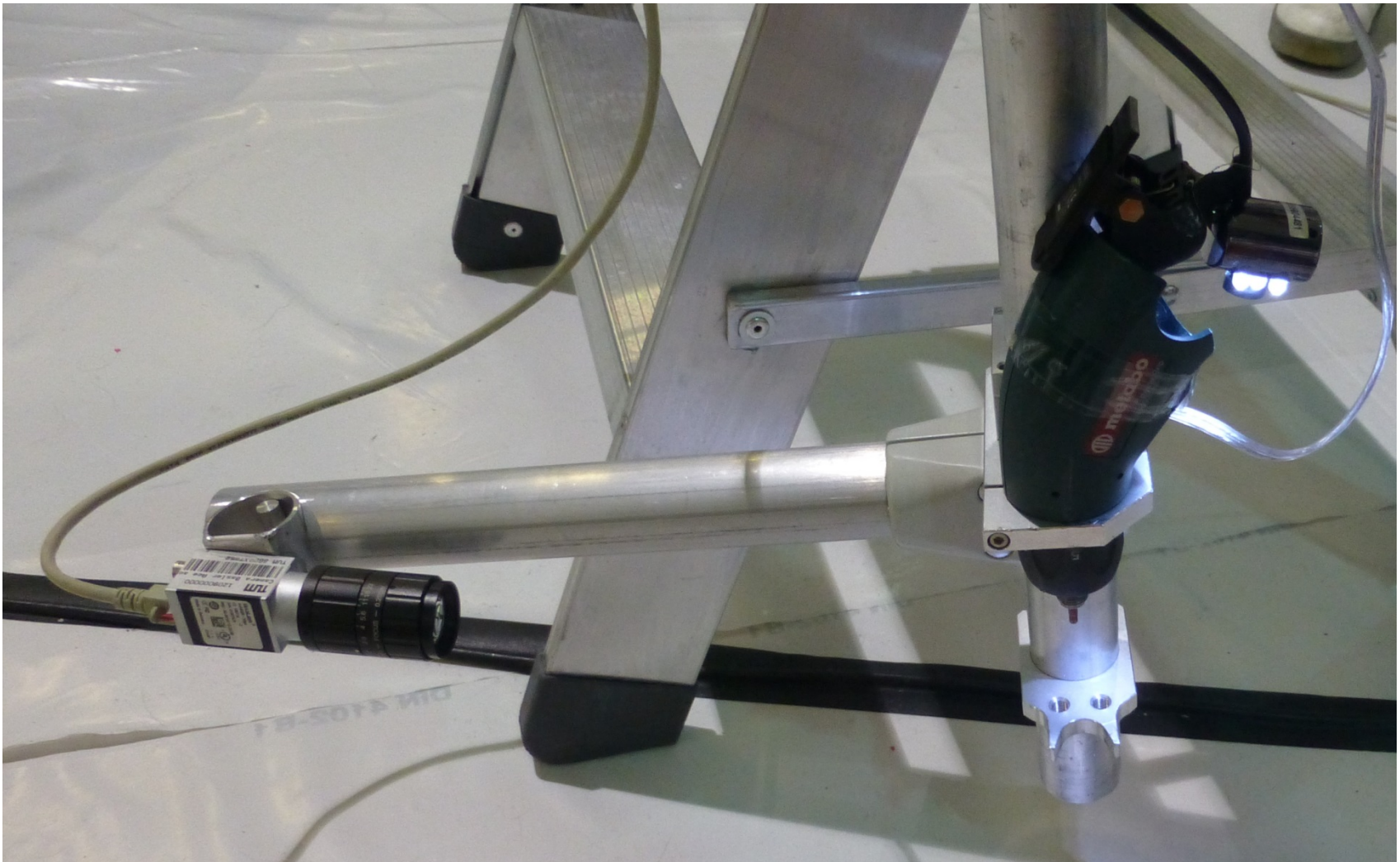
Dismantling of the Instrument TRISP



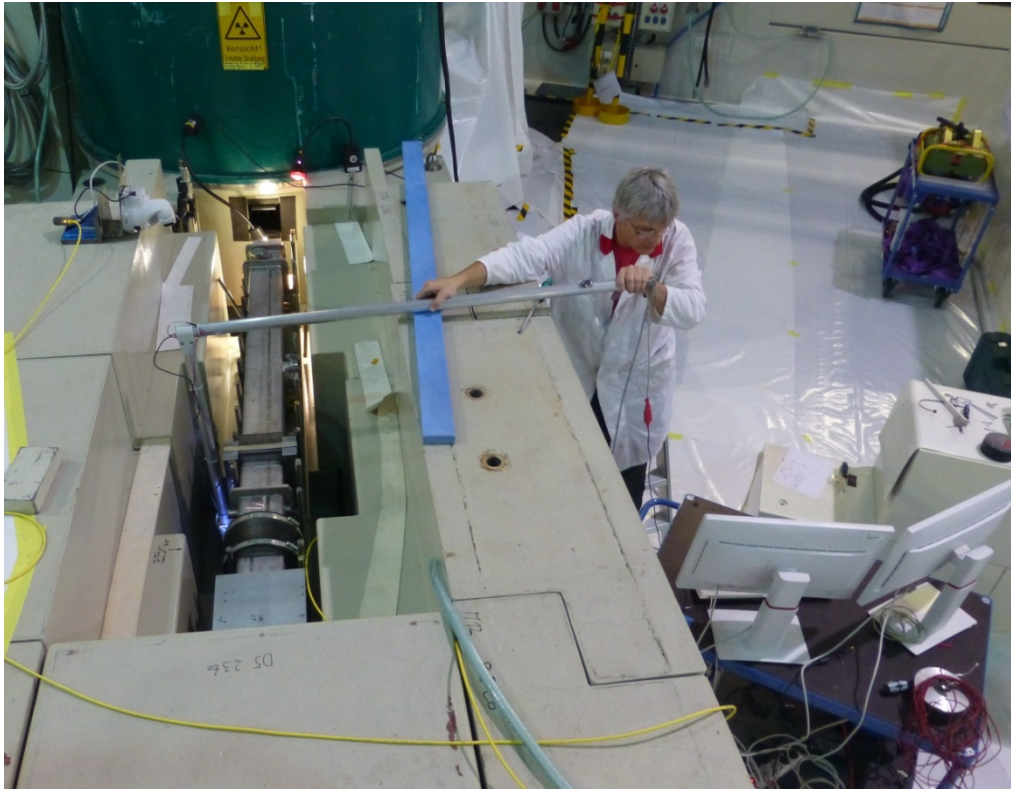
Dismantling of the Instrument TRISP



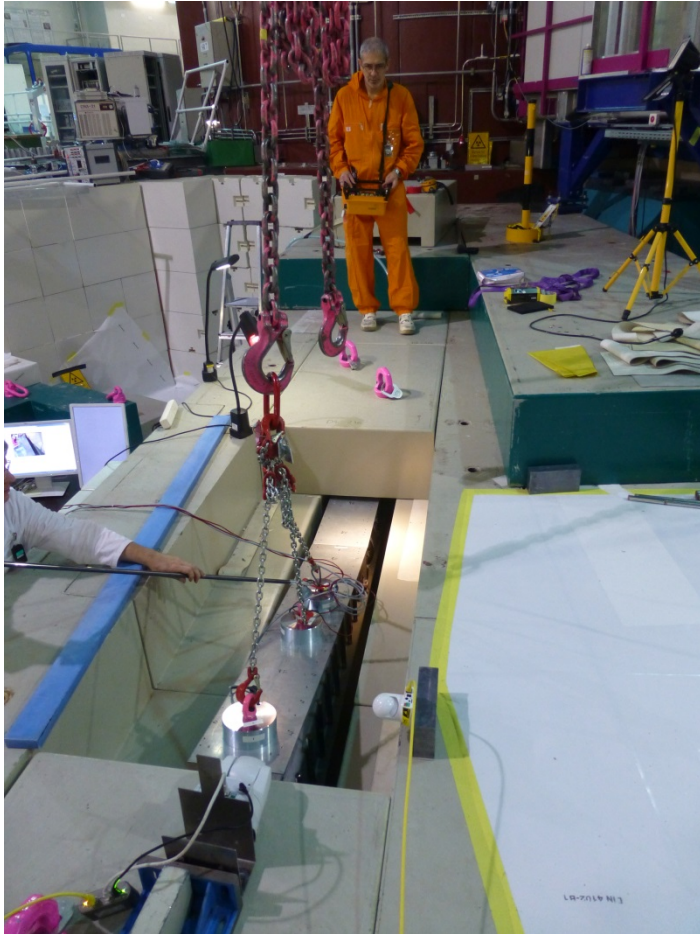
Dismantling of the Instrument TRISP



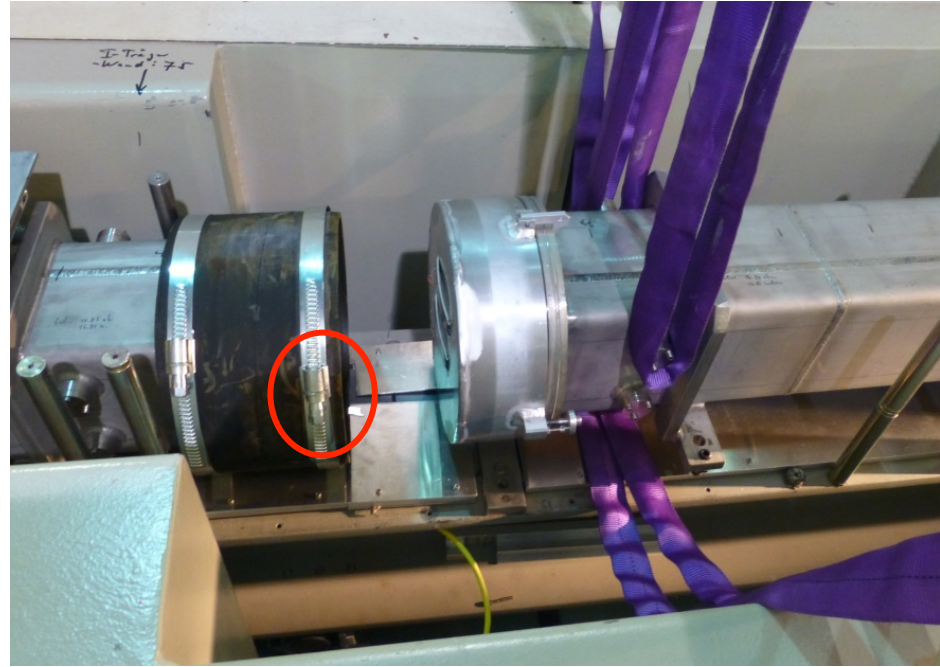
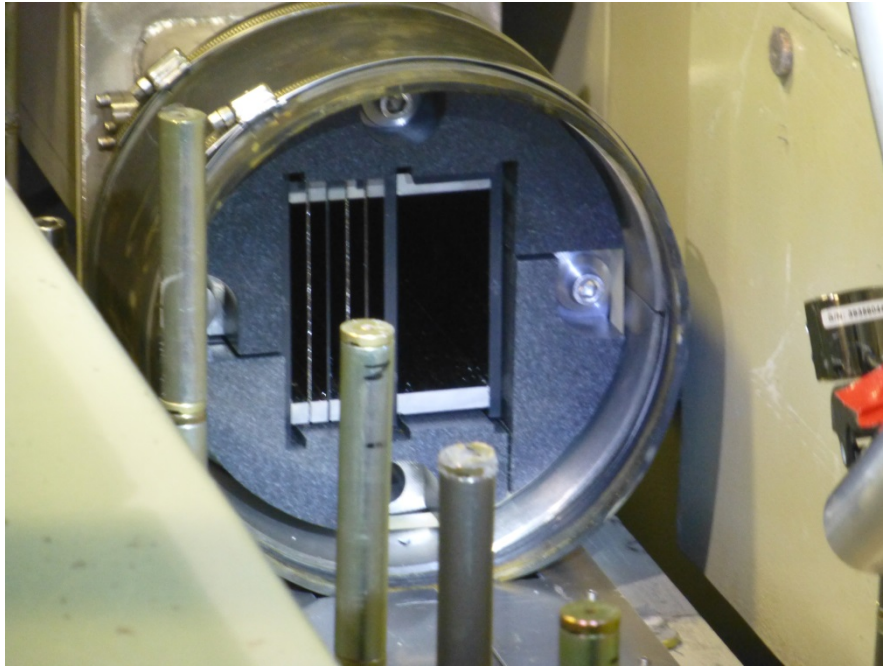
Dismantling of the Instrument TRISP



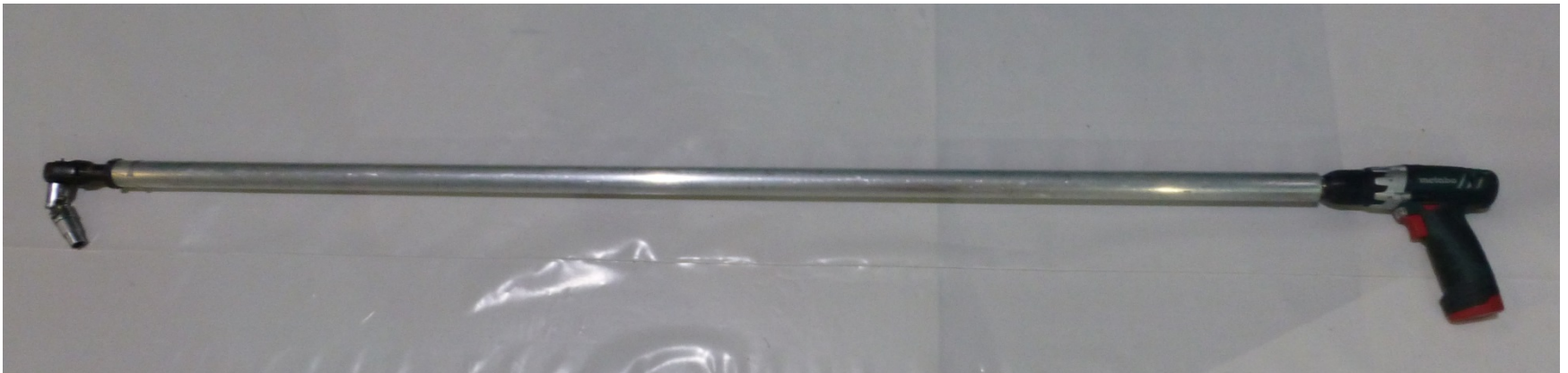
Dismantling of the Instrument TRISP



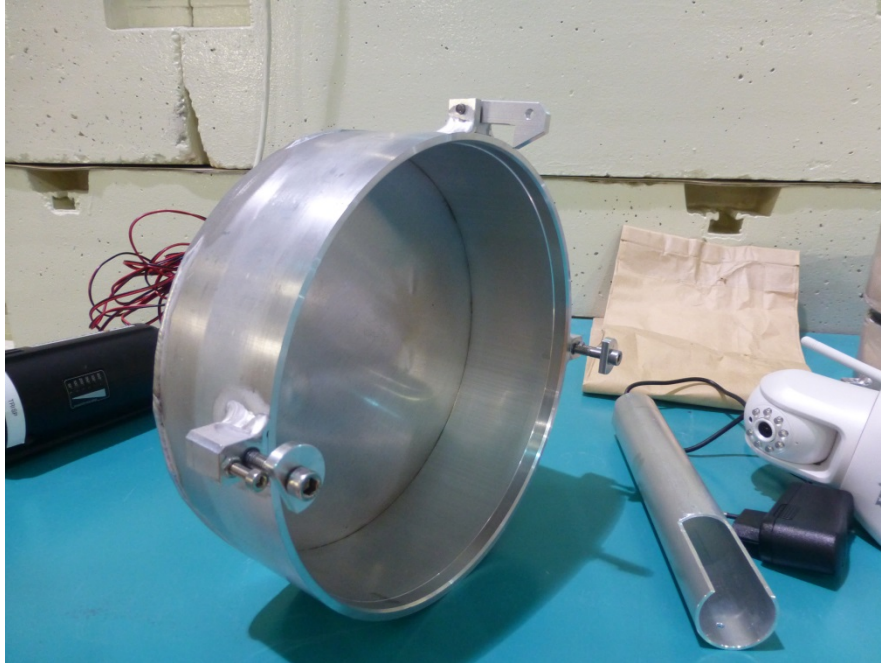
Dismantling of the Instrument TRISP



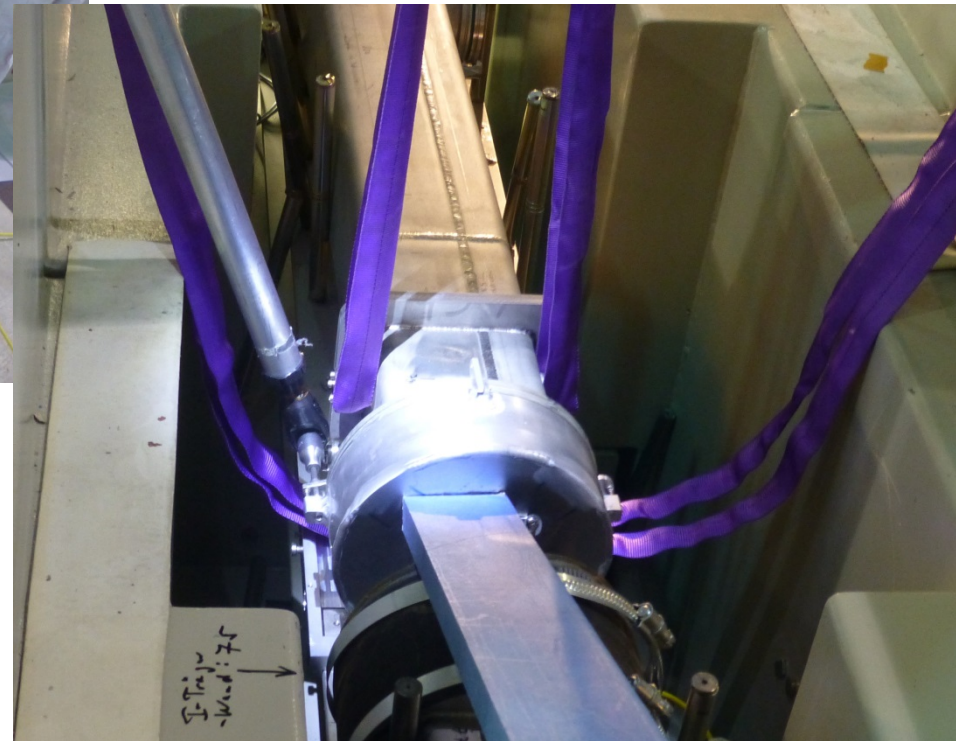
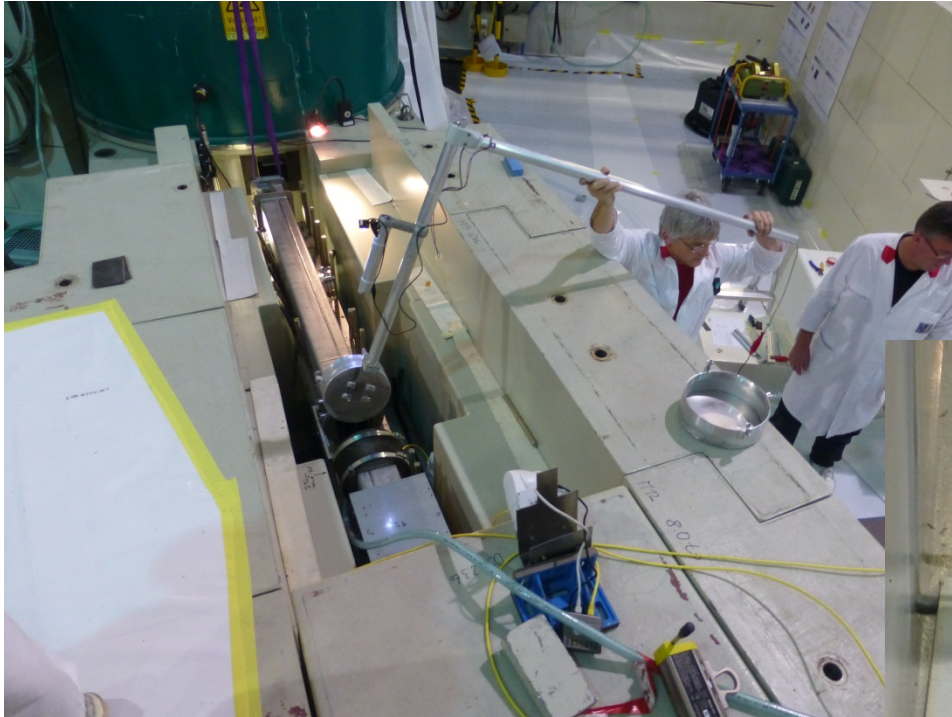
Dismantling of the Instrument TRISP



Dismantling of the Instrument TRISP



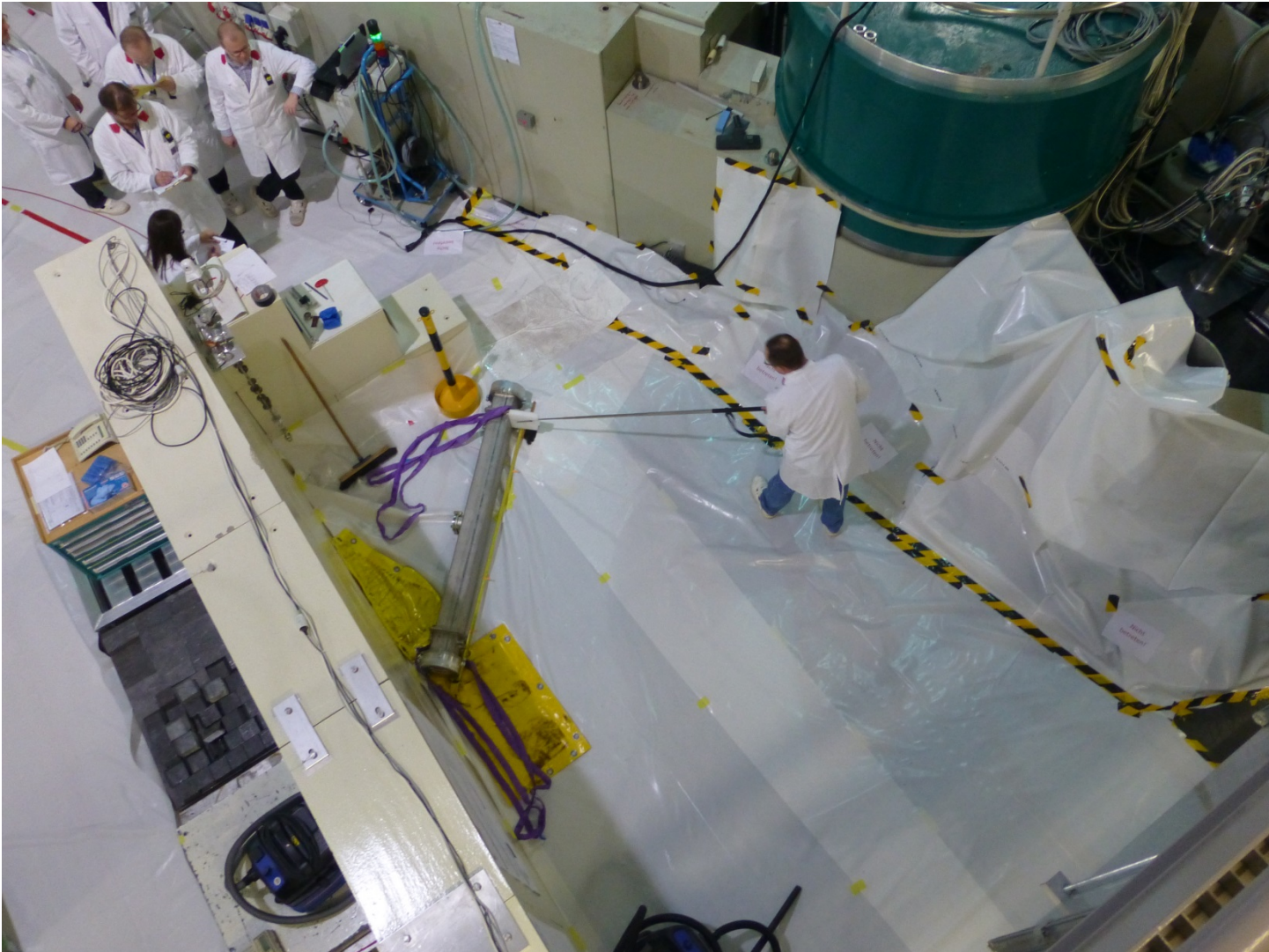
Dismantling of the Instrument TRISP



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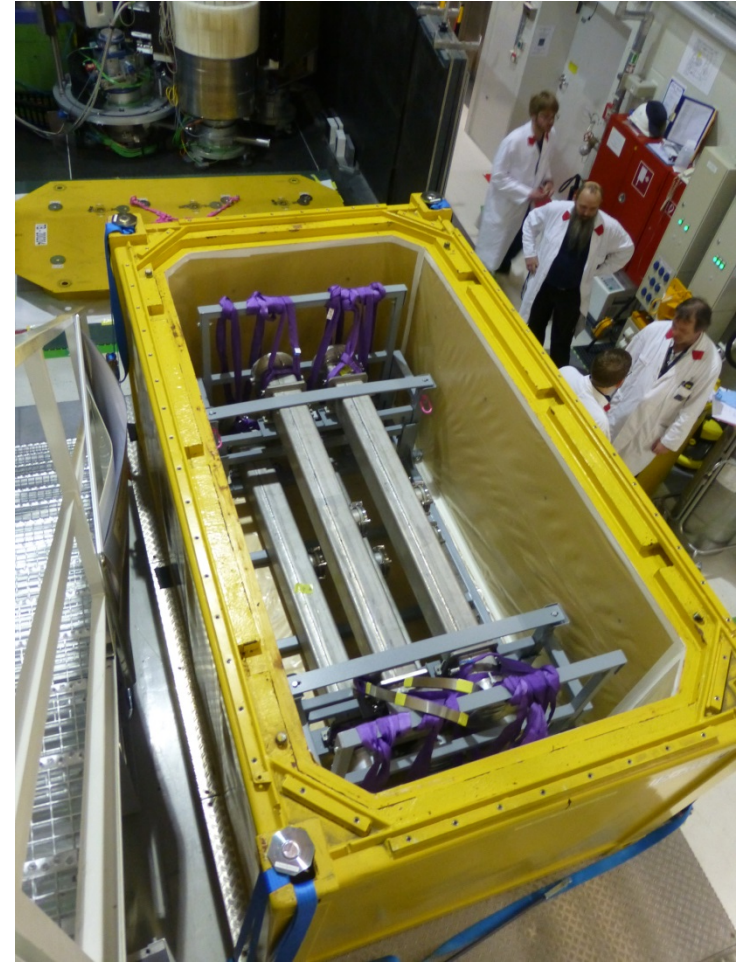
Dismantling of the Instrument TRISP



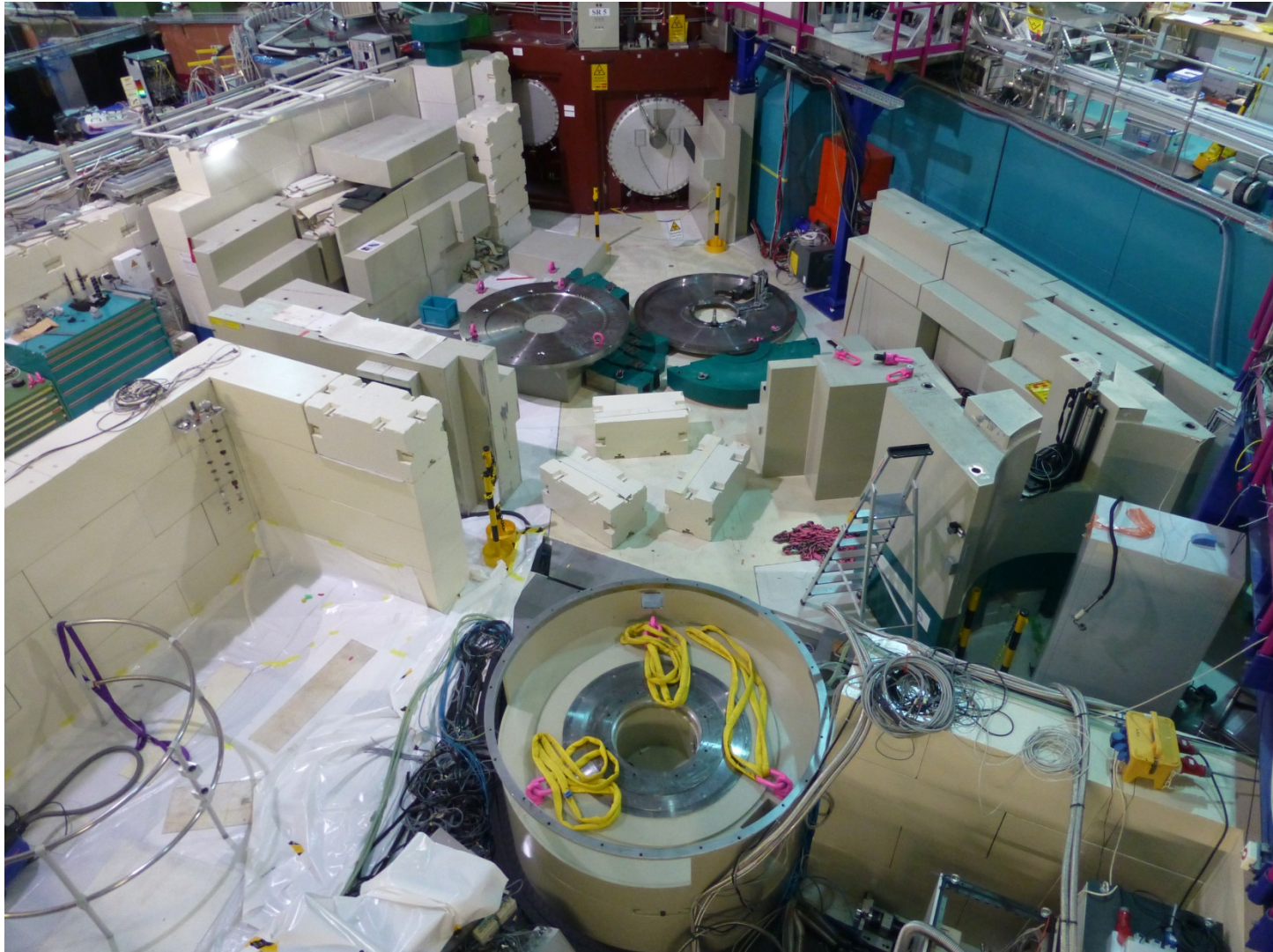
Dismantling of the Instrument TRISP



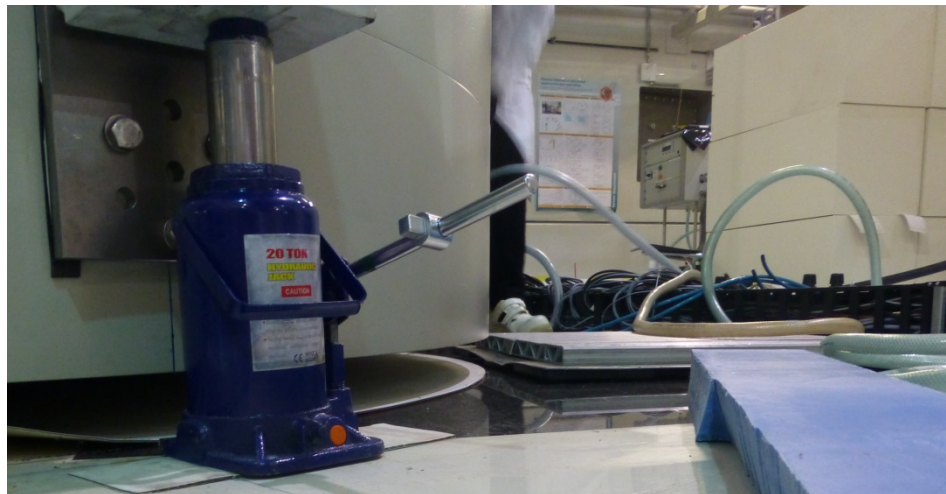
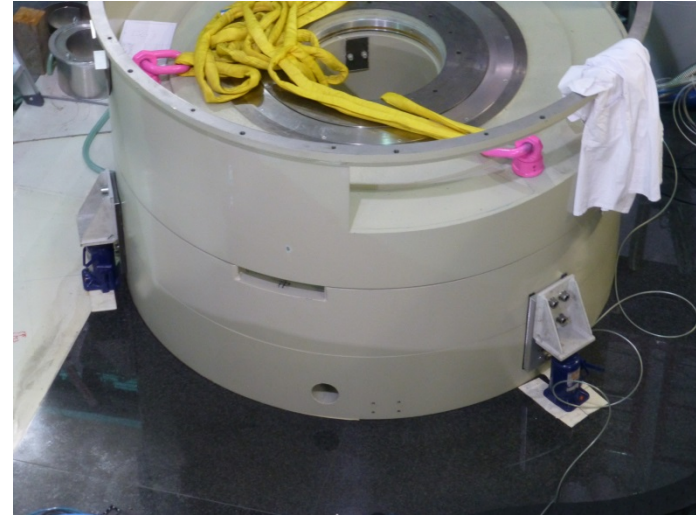
Dismantling of the Instrument TRISP



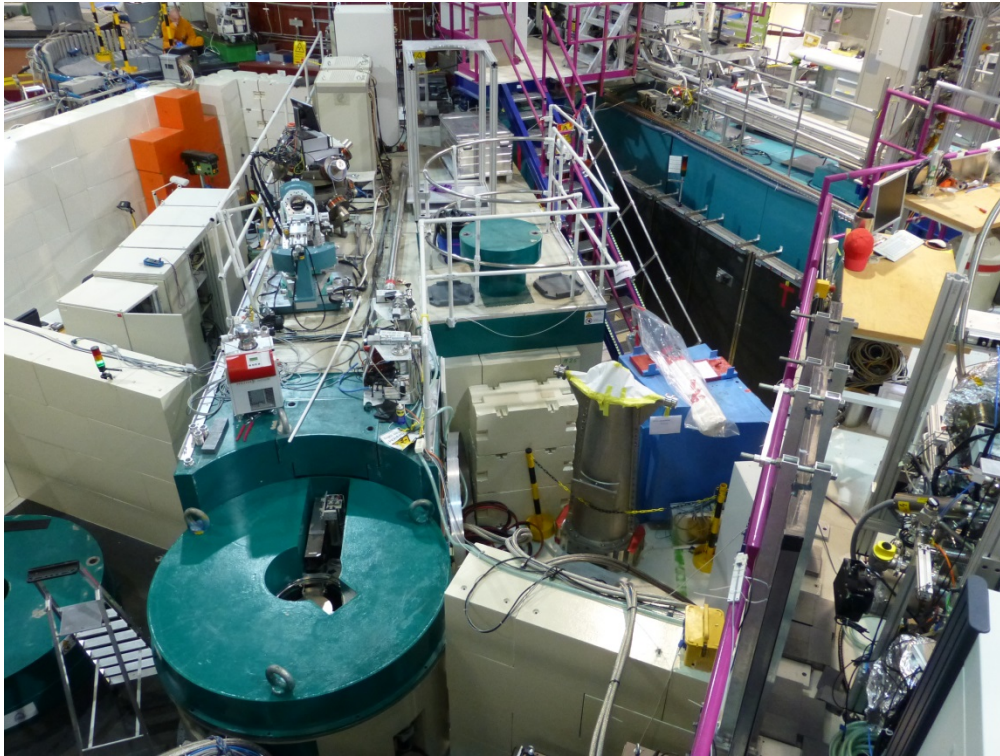
Dismantling of the Instrument TRISP



Dismantling of the Instrument TRISP (Unexpected Issue)



Dismantling of the Instrument TRISP



Dismantling of the Instrument TRISP

Max. estimated individual dosis: 356 μ Sv

Max. measured individual dosis : 180 μ Sv

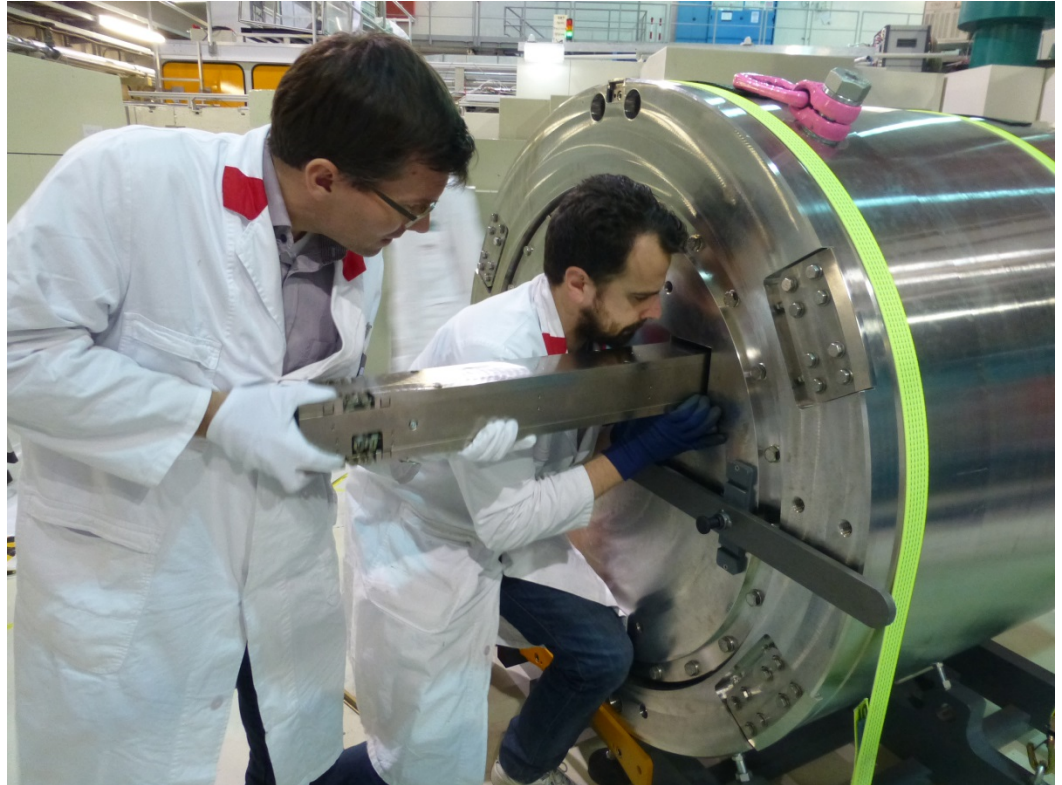
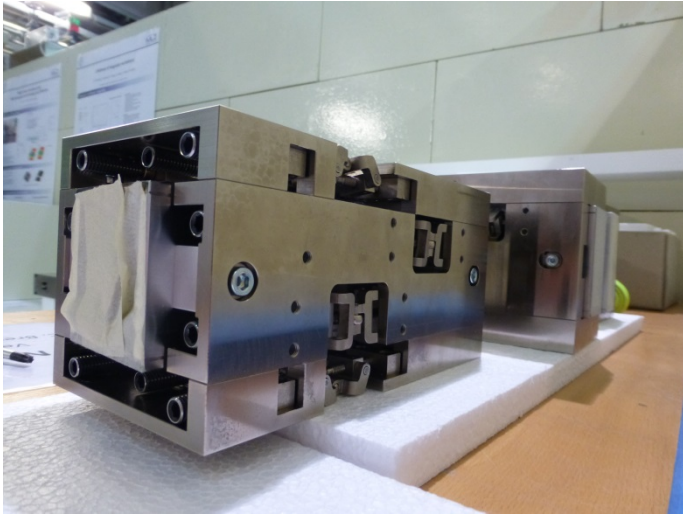
Max. estimated collective dosis: 1081 μ Sv

Max. measured collective dosis: 660 μ Sv

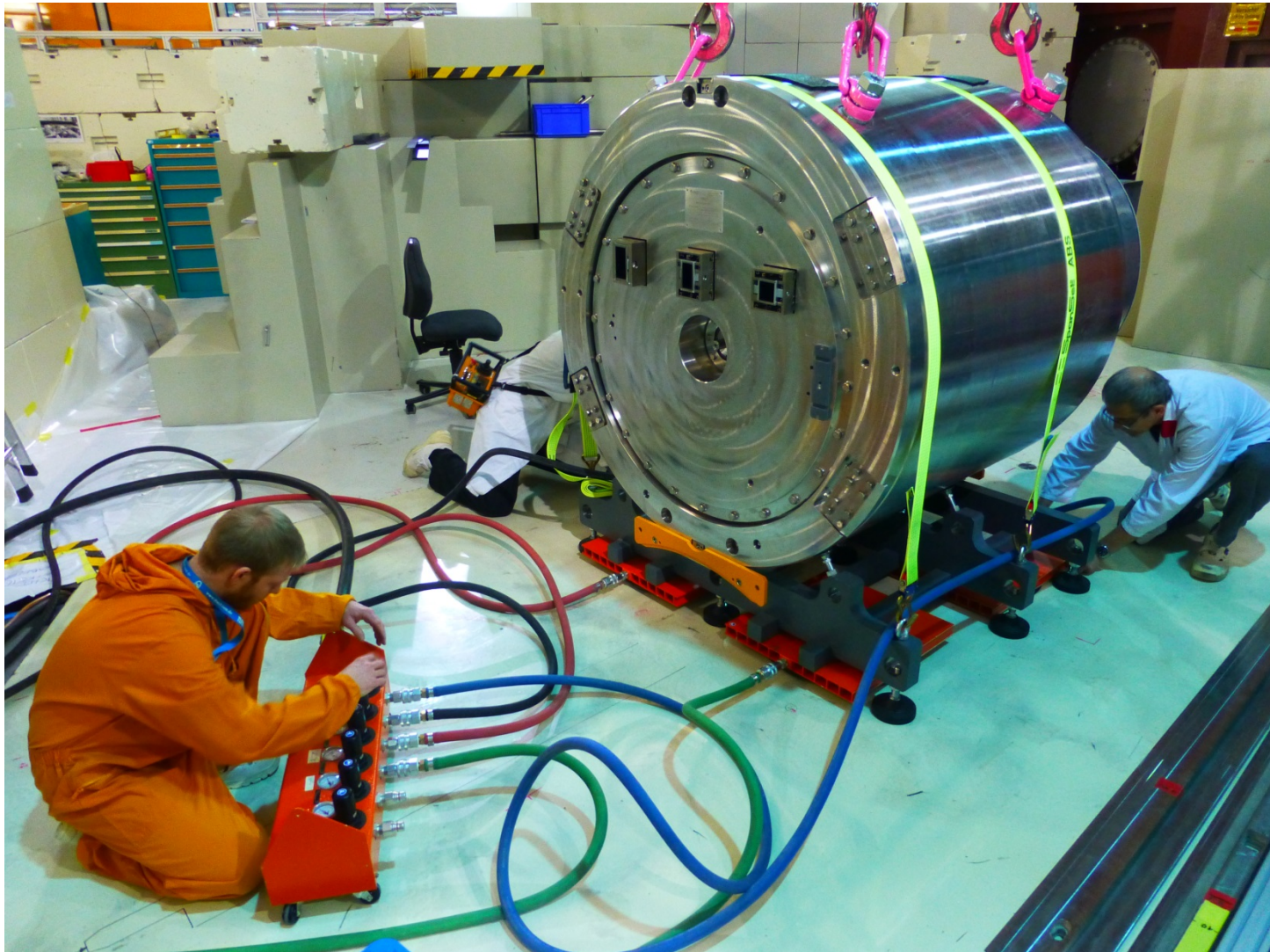
New Plug JMA05



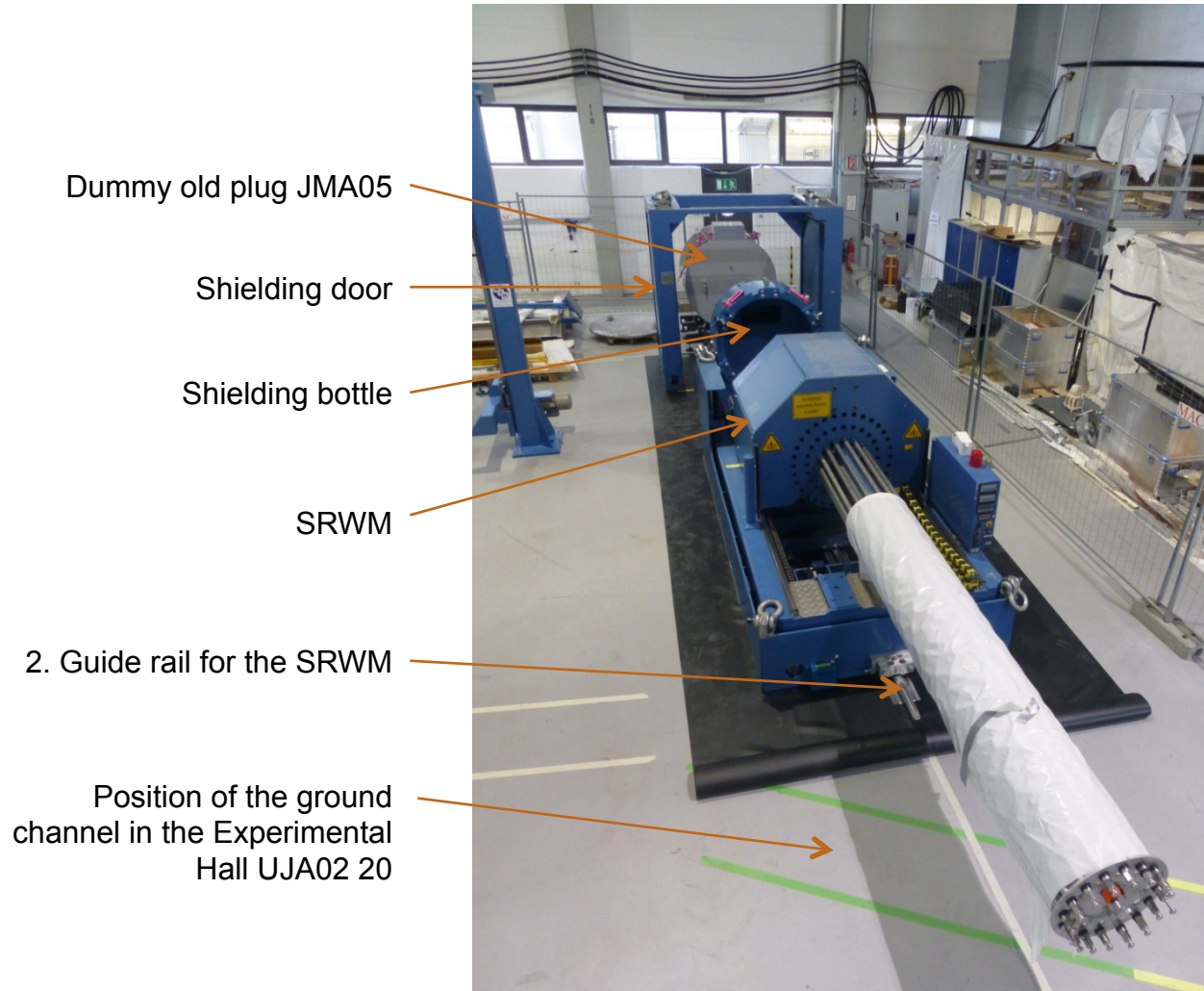
New Plug JMA05



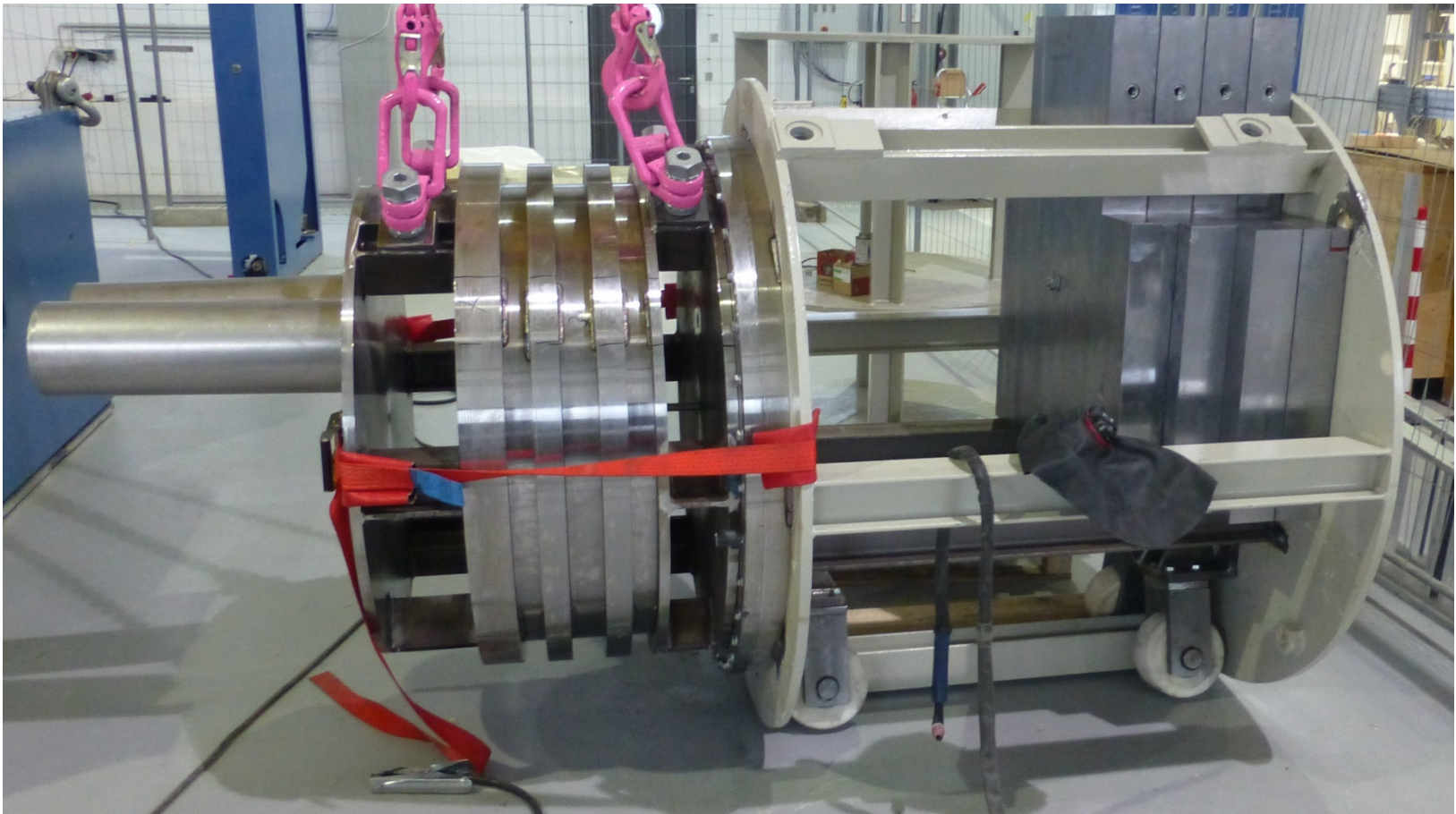
New Plug JMA05



Preparation for the Replacement of the Plug JMA05



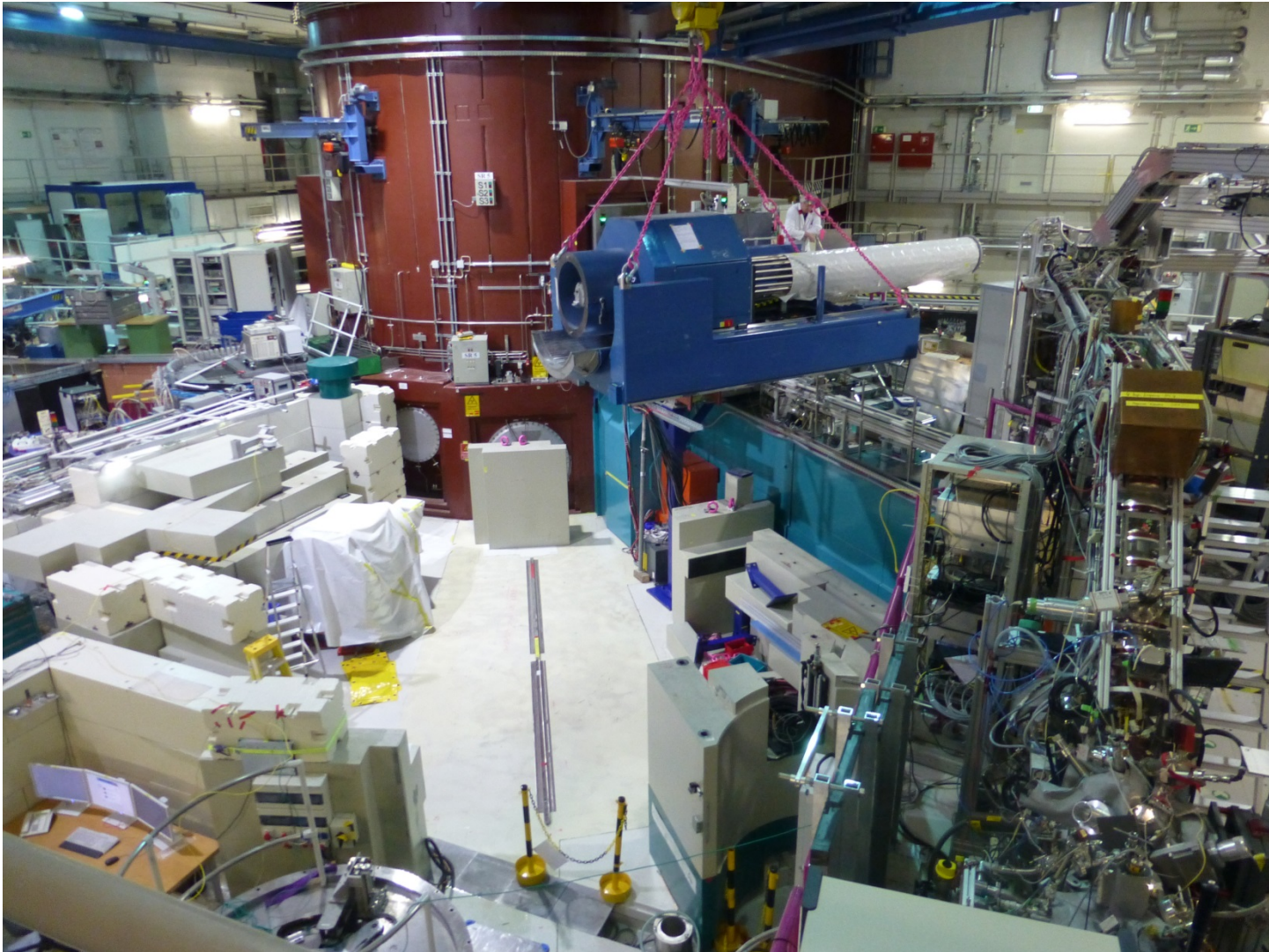
Preparation for the Replacement of the Plug JMA05



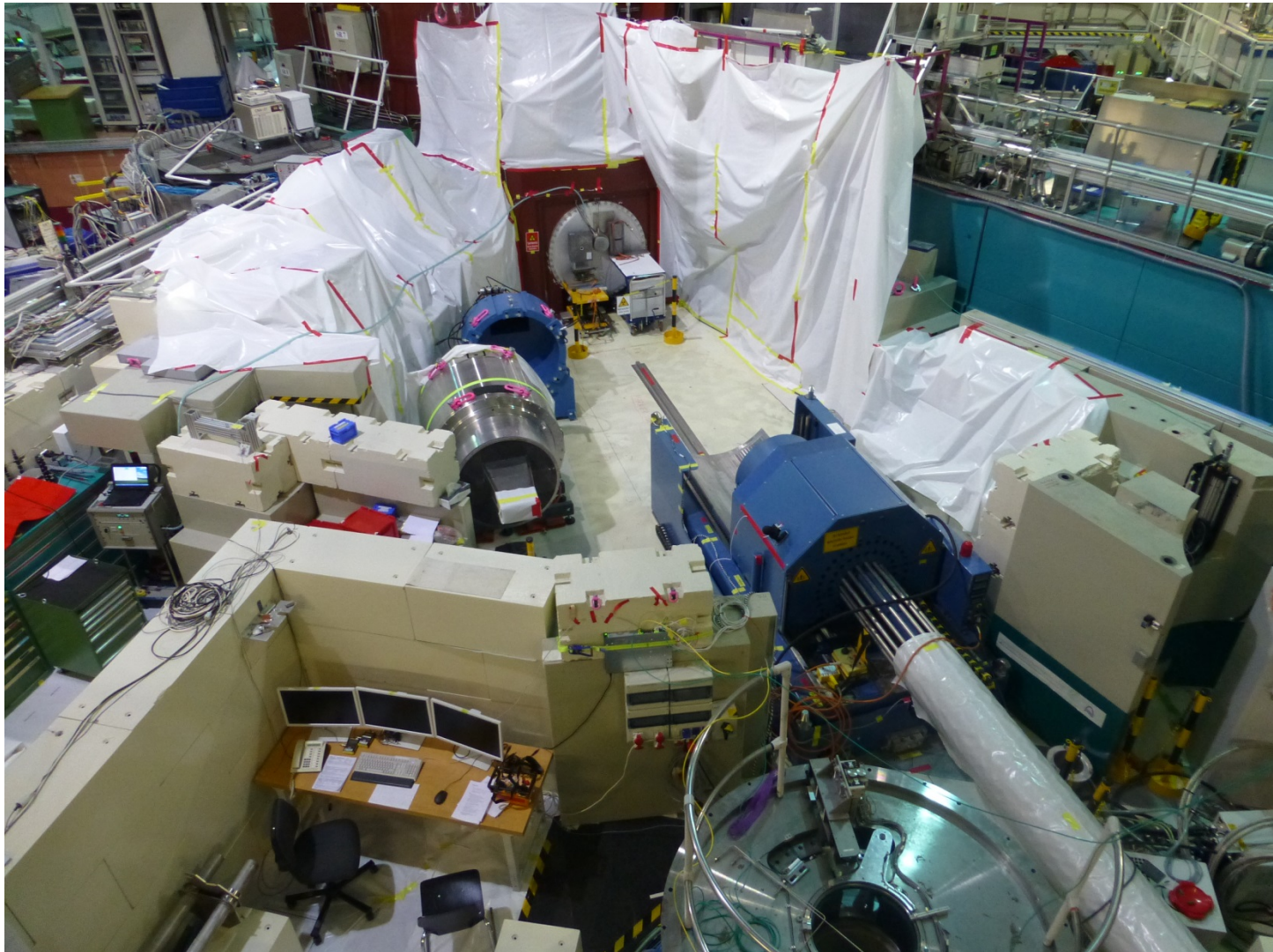
Preparation for the Replacement of the Plug JMA05



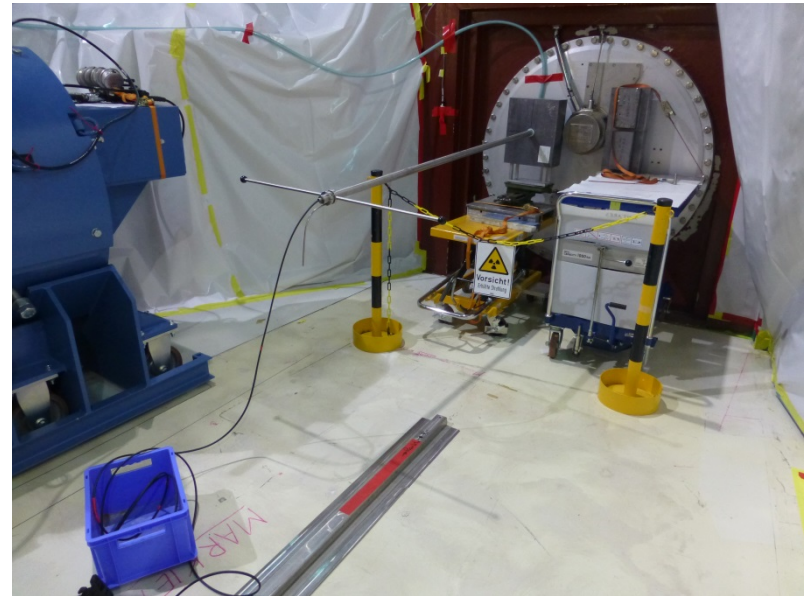
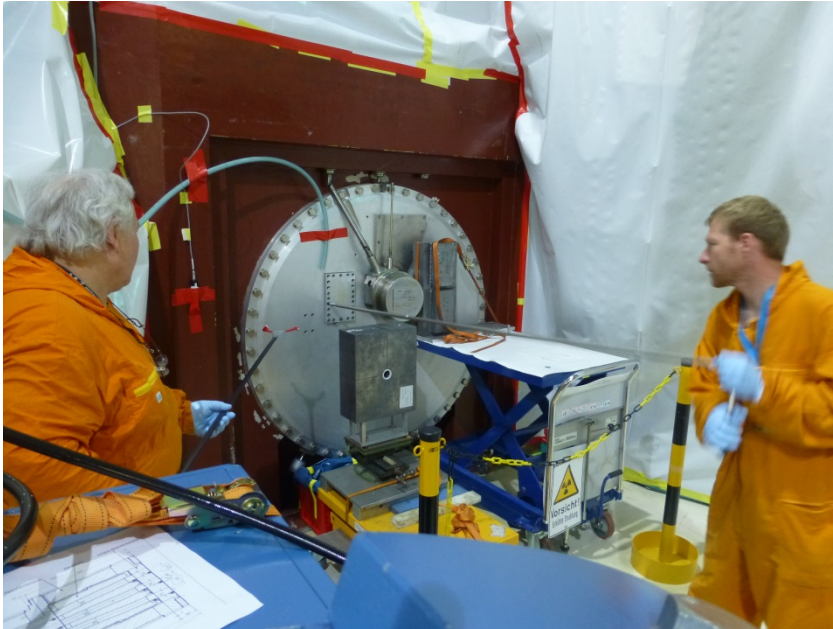
Preparation for the Replacement of the Plug JMA05



Preparation for the Replacement of the Plug JMA05

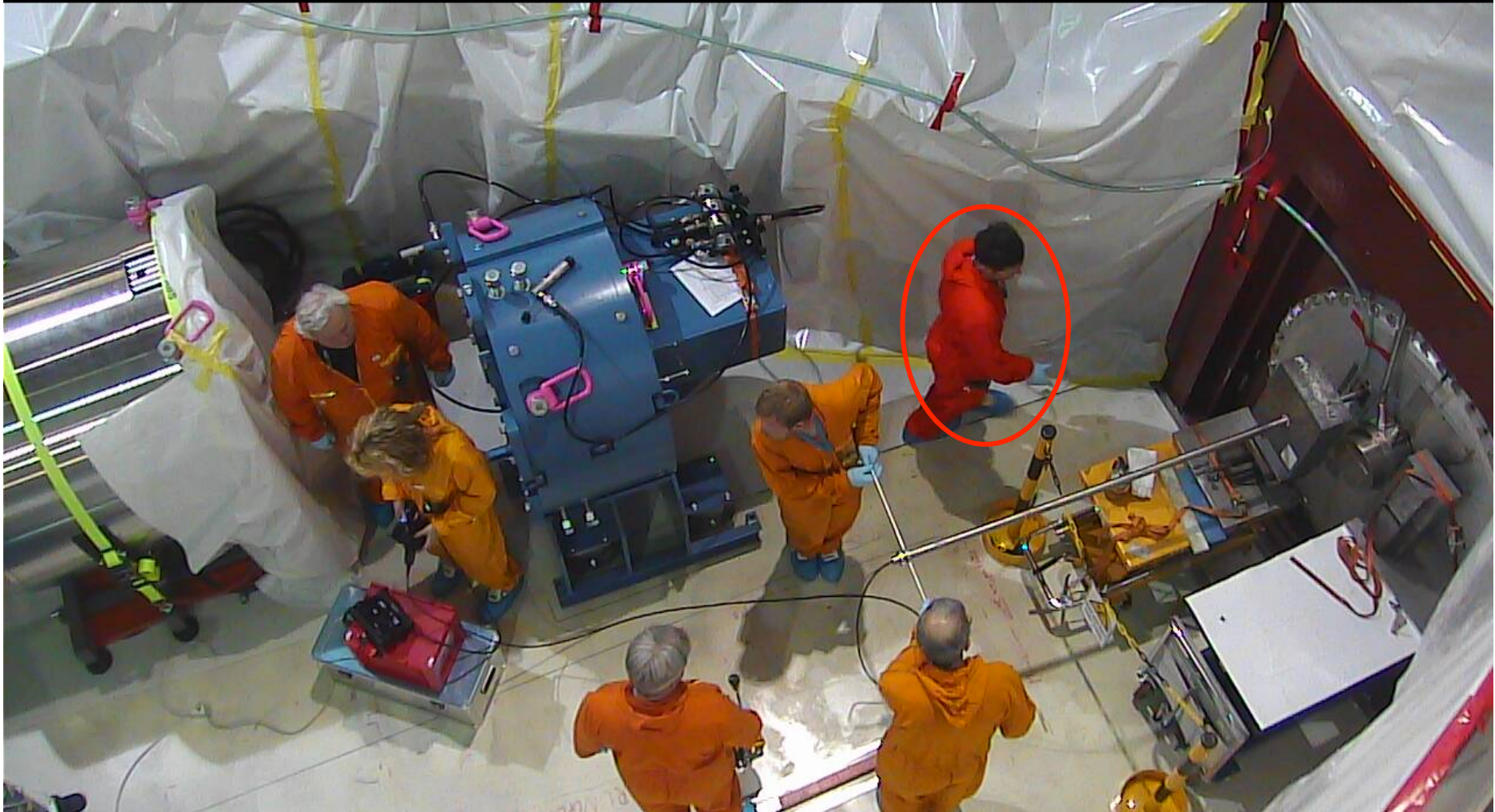


1st Inspection of the Beam Tube SR5



1st Inspection of the Beam Tube SR5

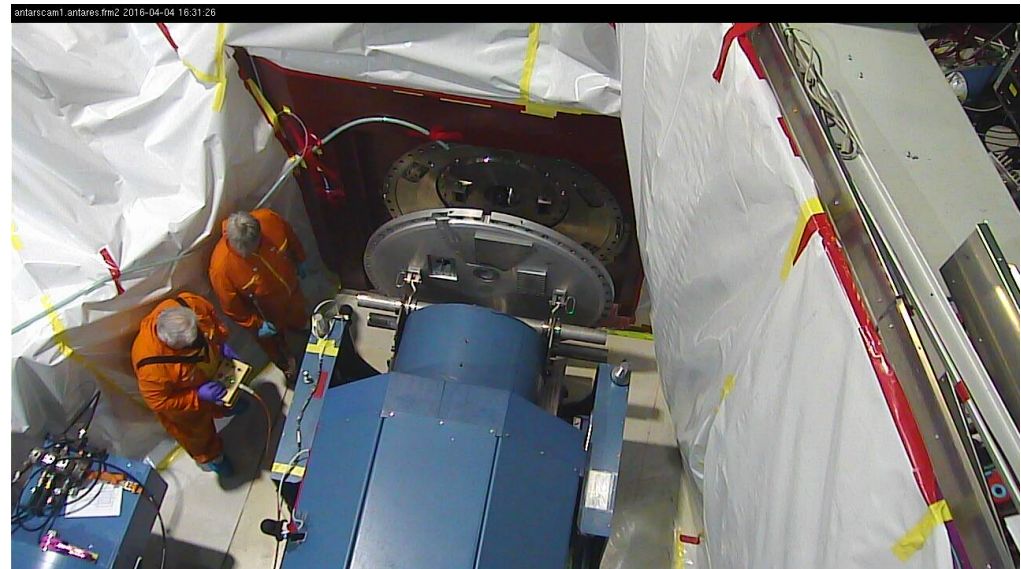
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Dismantling the Plug JMA05

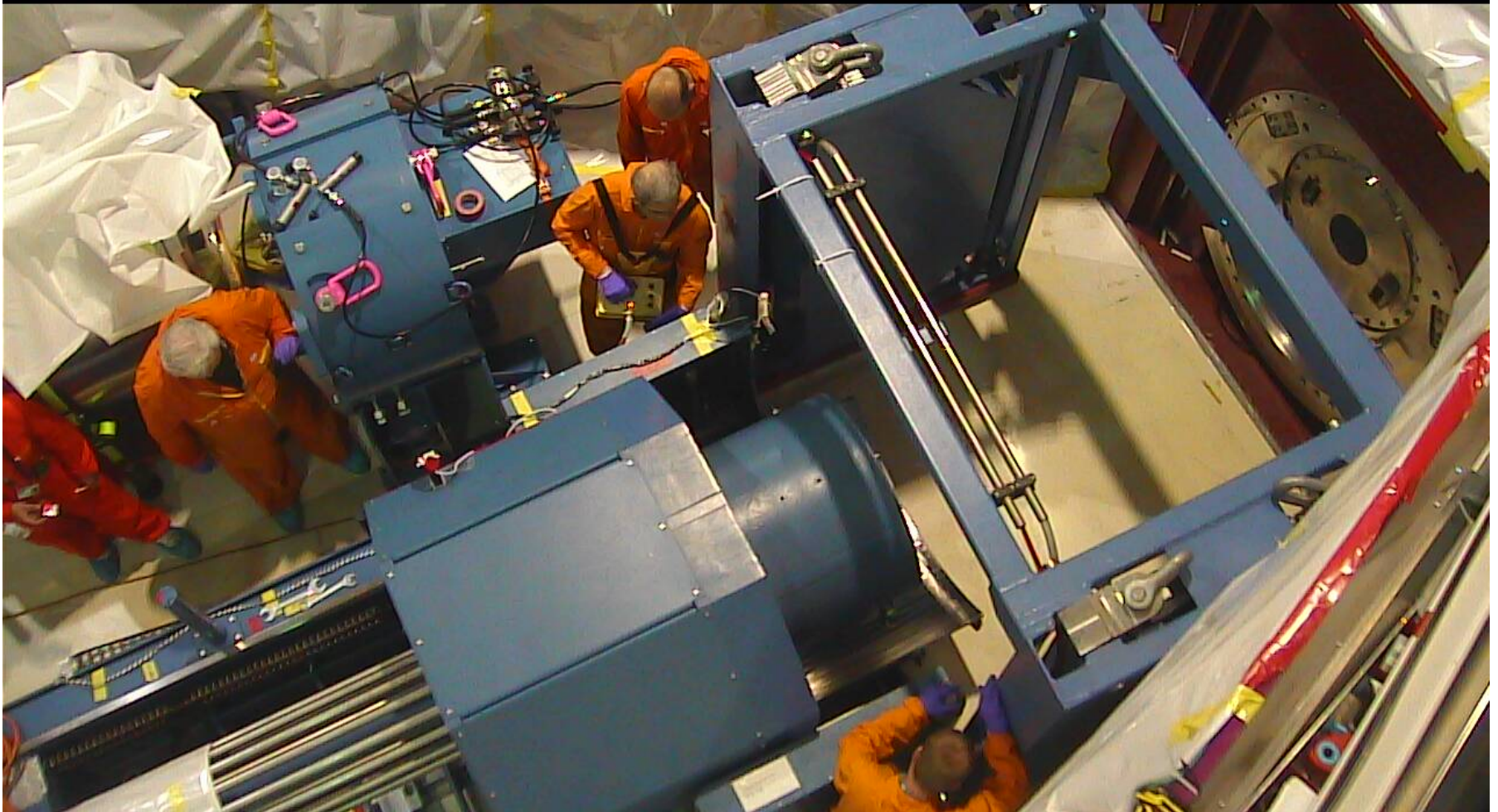


Dismantling the Plug JMA05

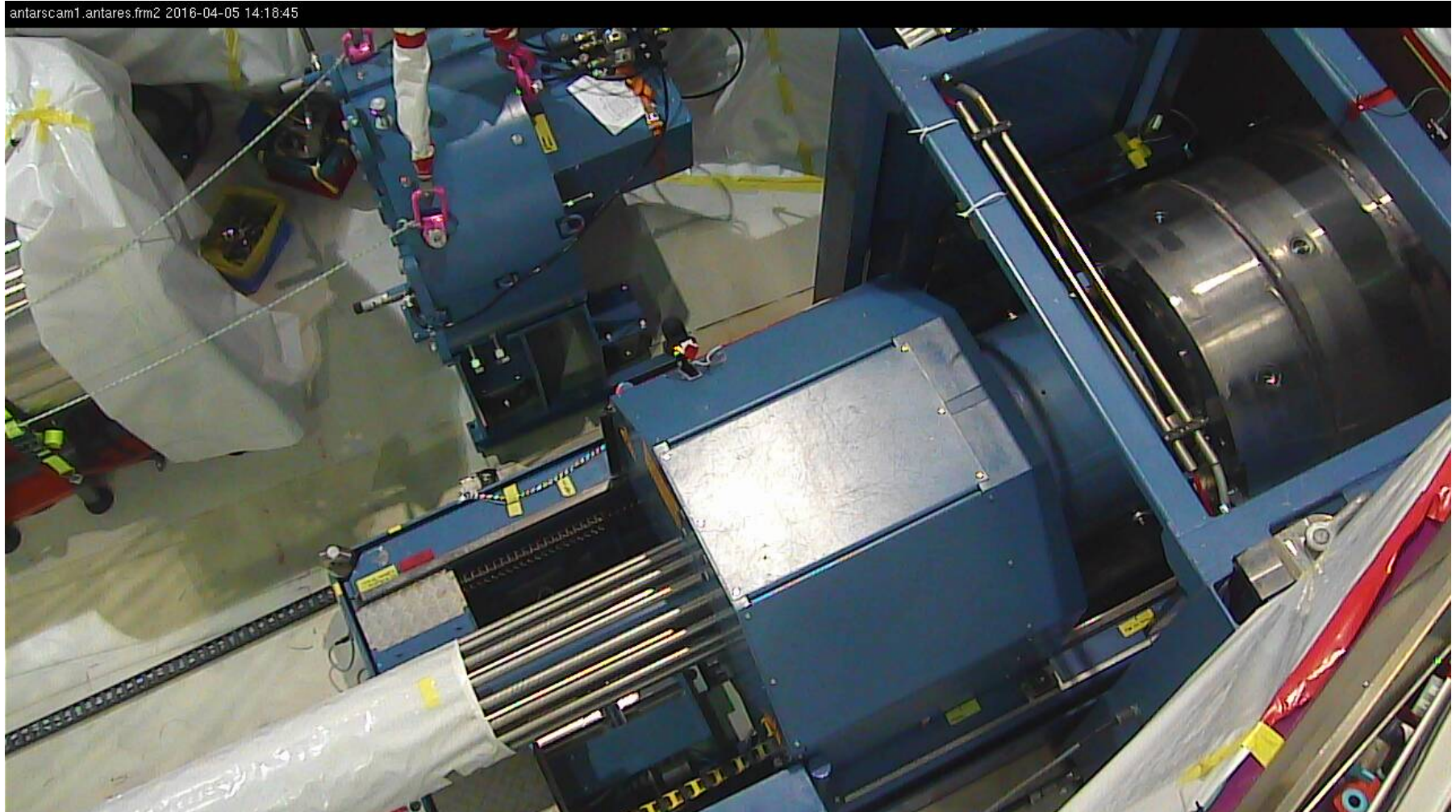


Preparation for the Replacement of the Plug JMA05

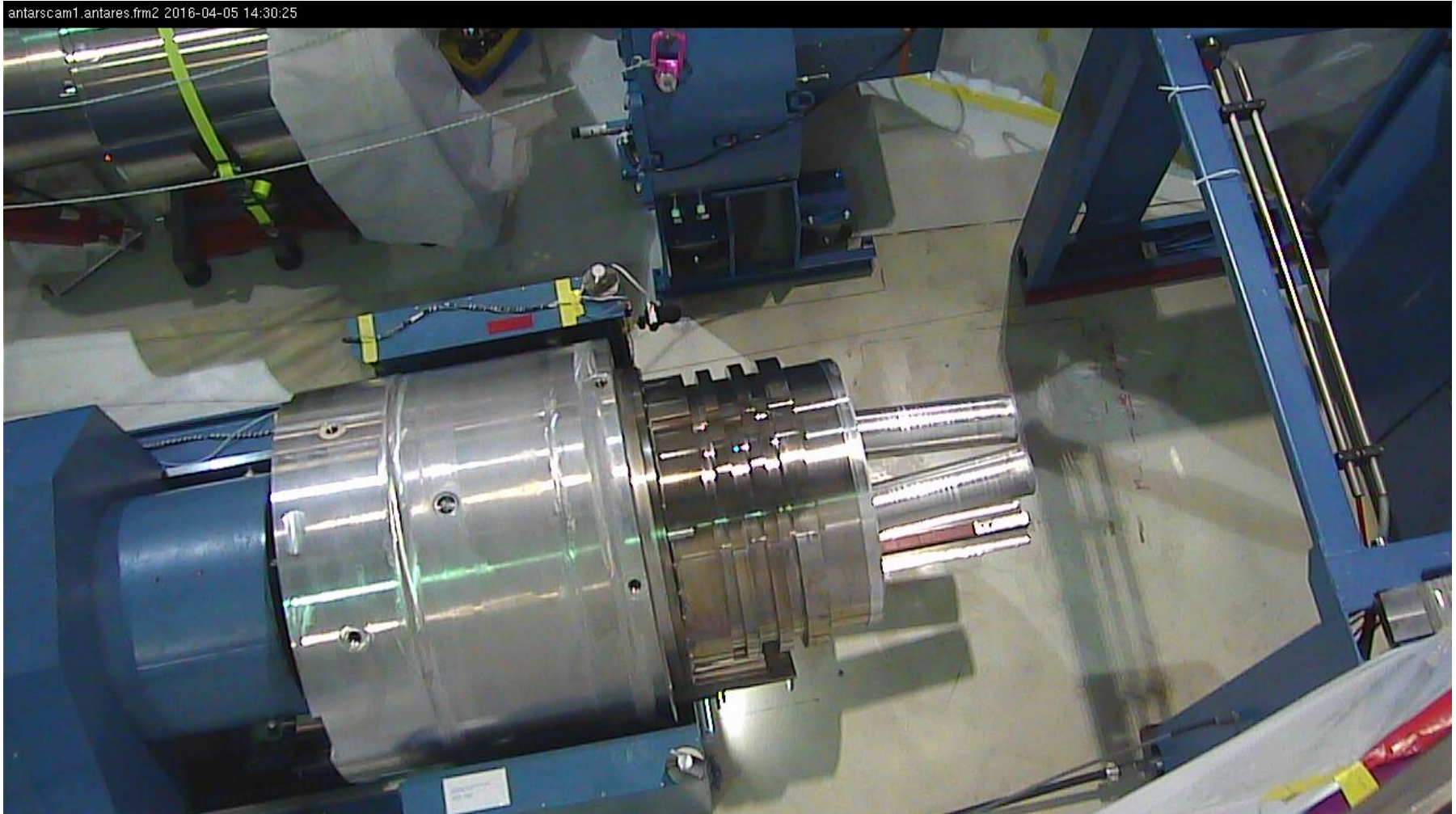
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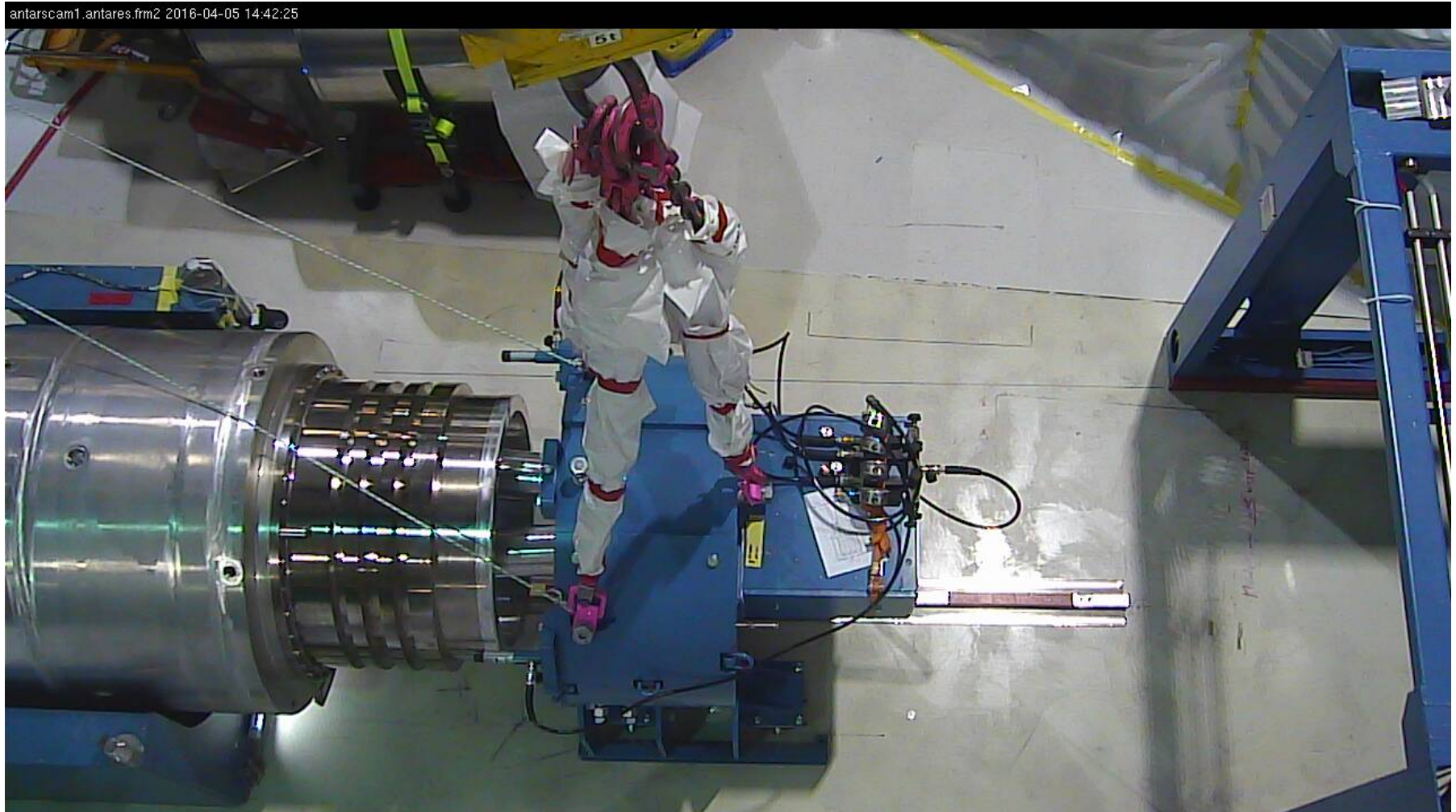
Plug JMA05 is Pulled out



Plug JMA05 is Pulled out



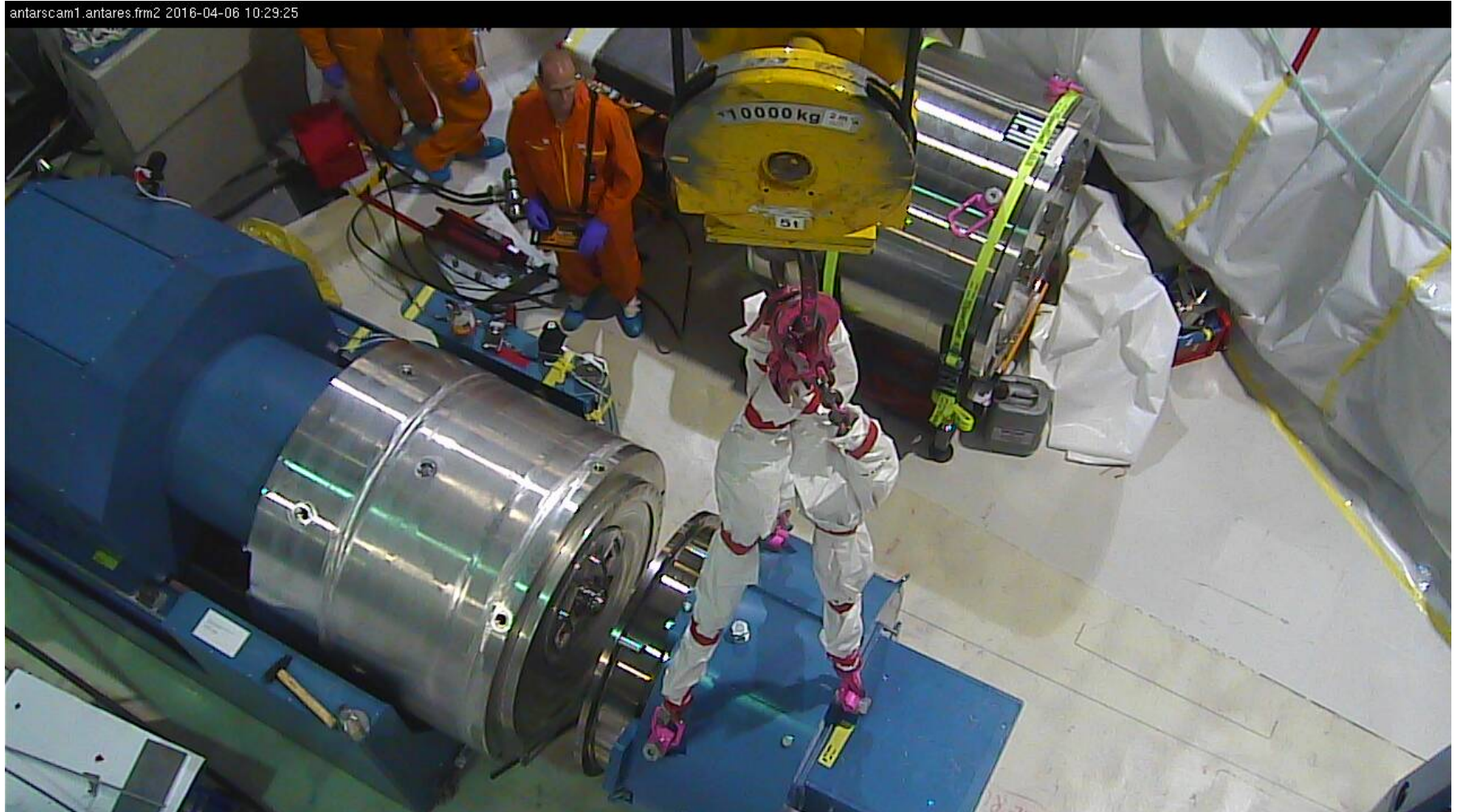
Plug Nose Being Covered with Shielding Bottle



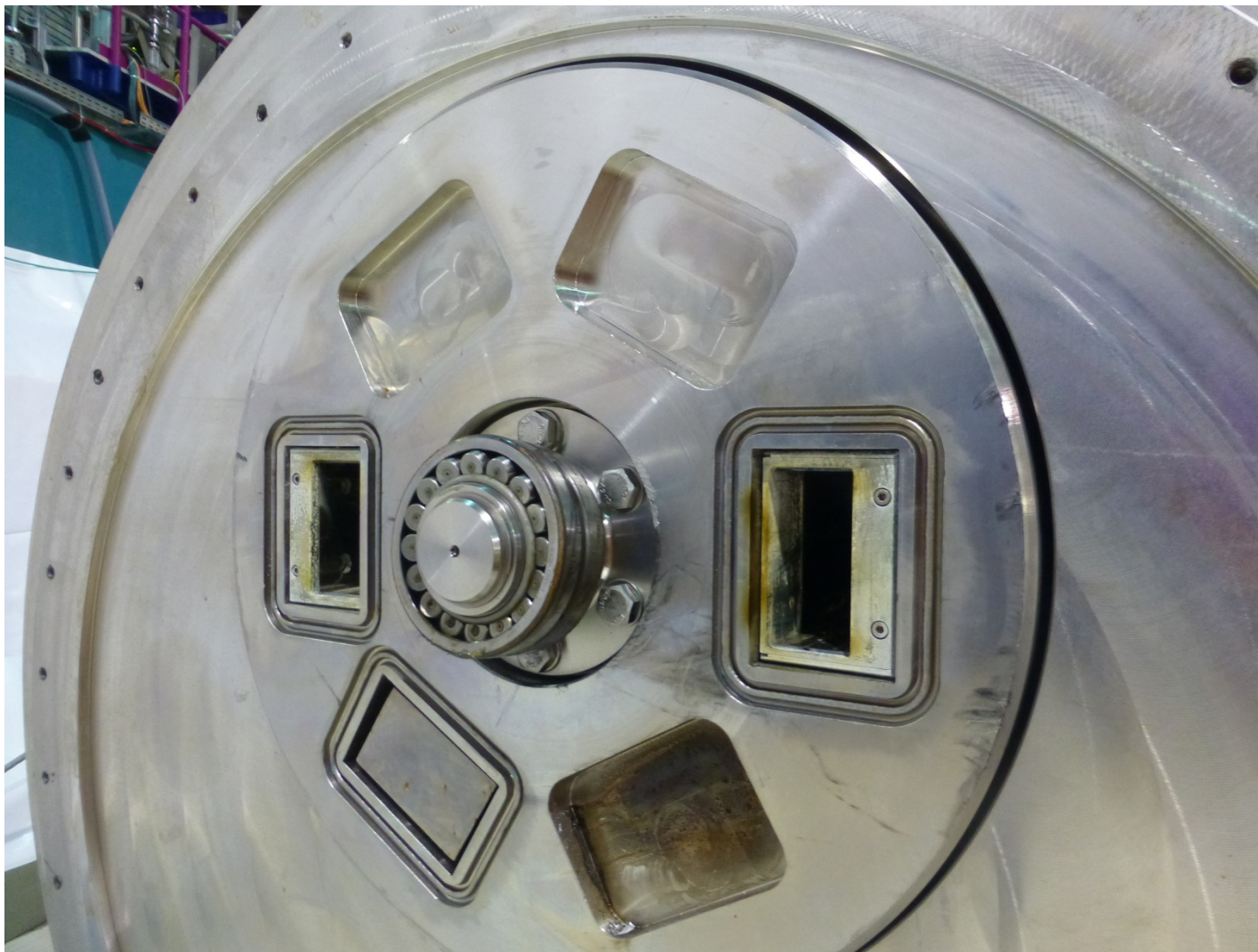
Plug Nose, Fixed with Shielding Bottle, Being Separated from Shielding Body



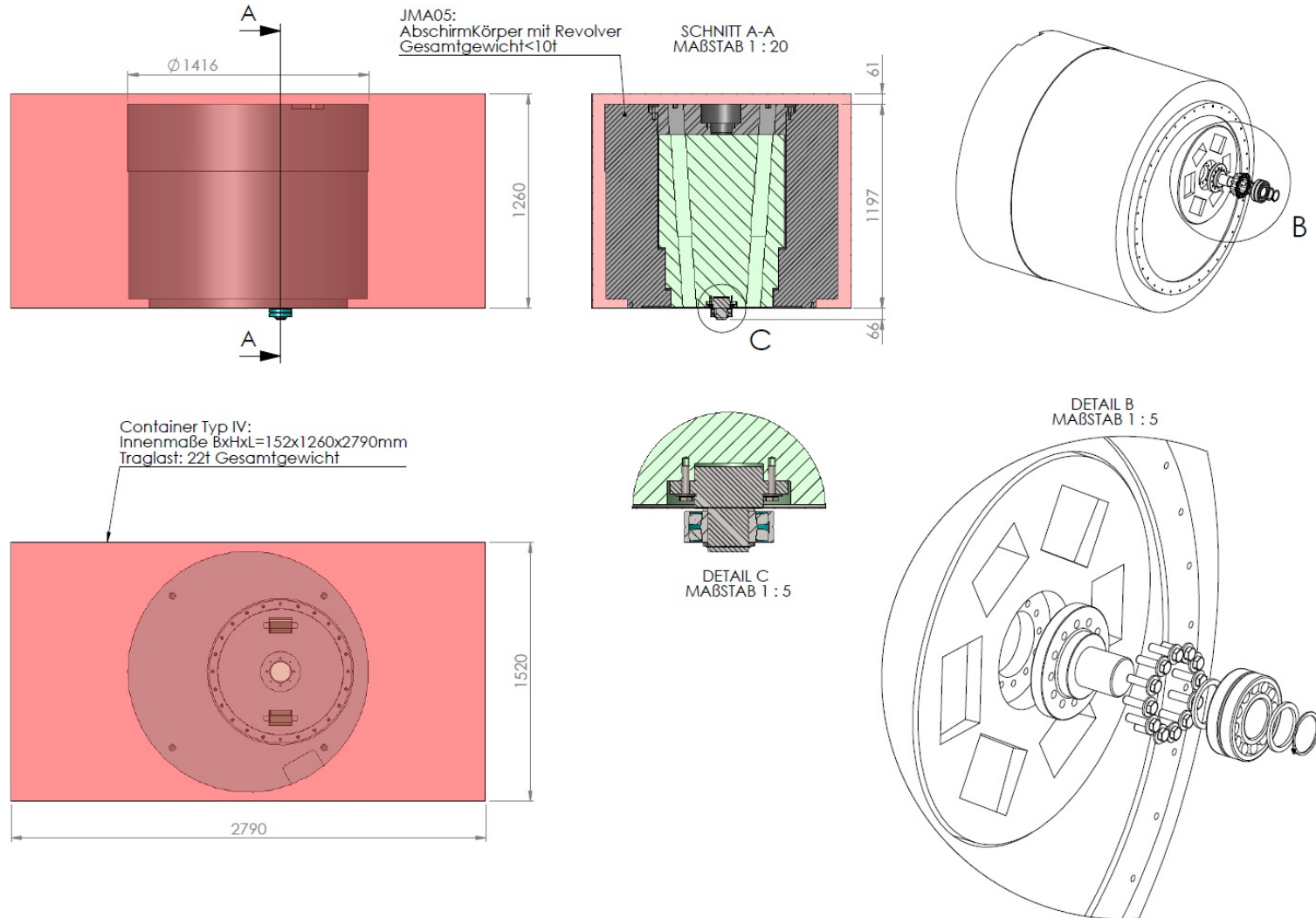
Plug Nose and Shielding Body Separated



Drum Shutter Detail



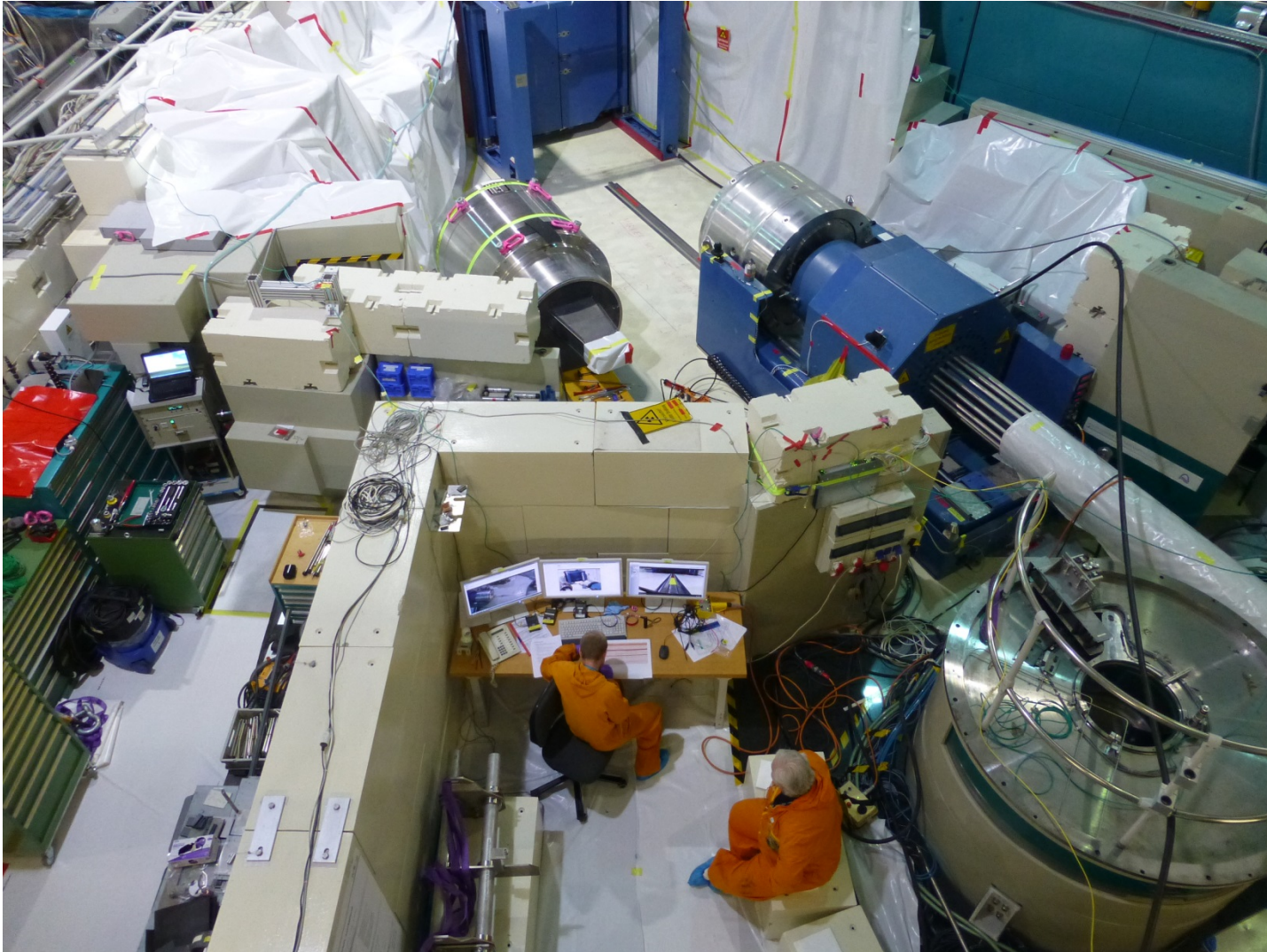
Drum Shutter Detail



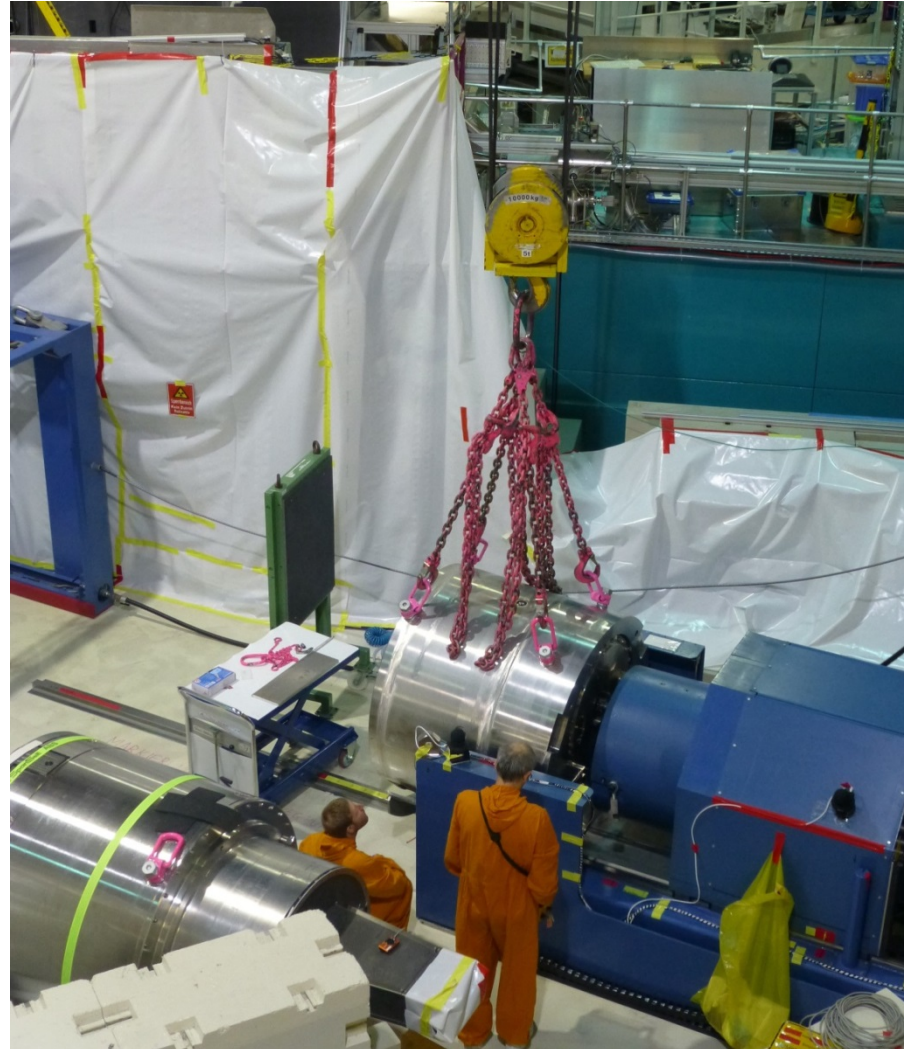
Dismounting Spherical Roller Bearings and Shaft



Work Documentation



Removal of Shielding Body



Sampling for Disposal Documentation



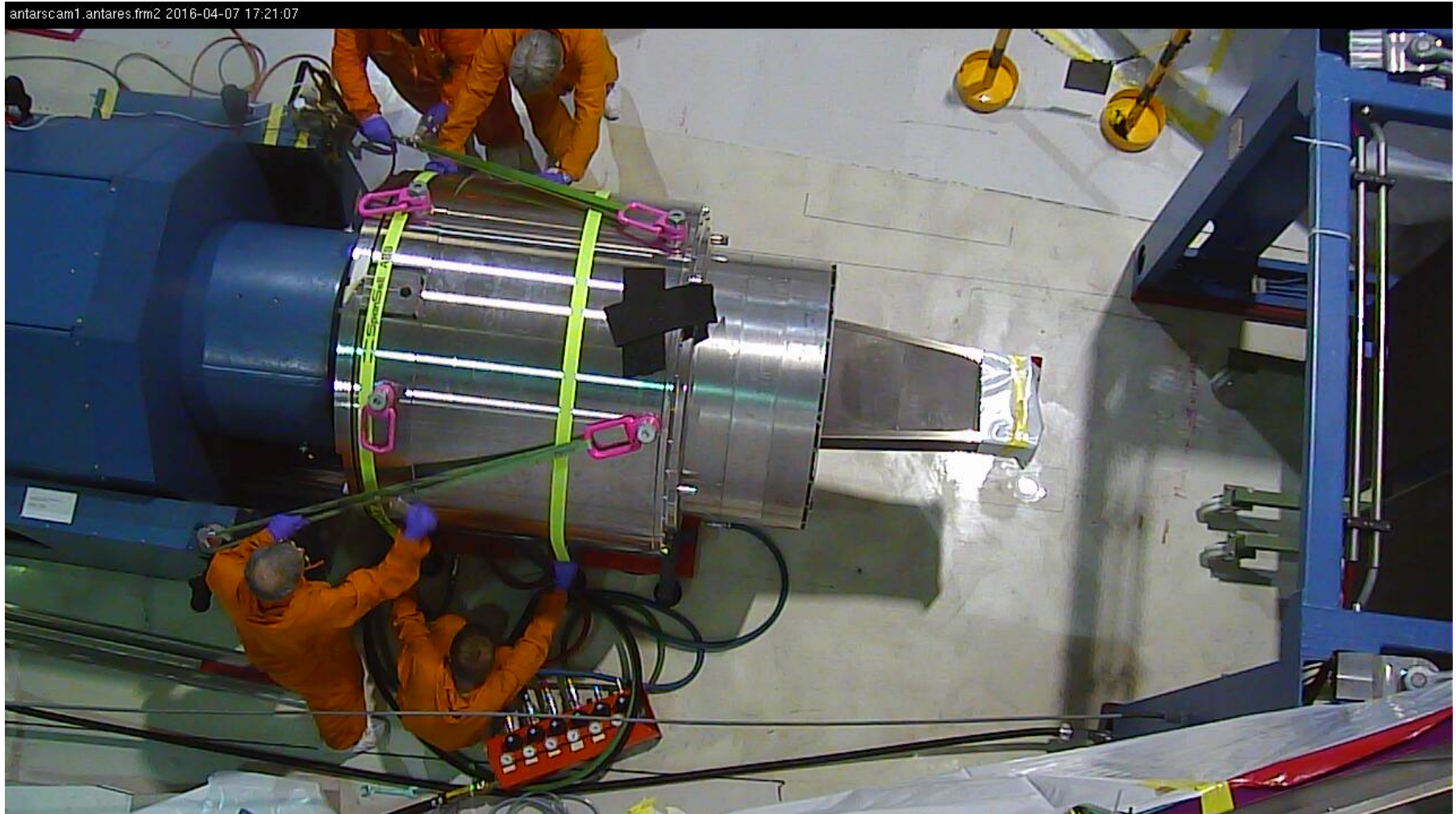
2nd Inspection of Beam Tube SR5



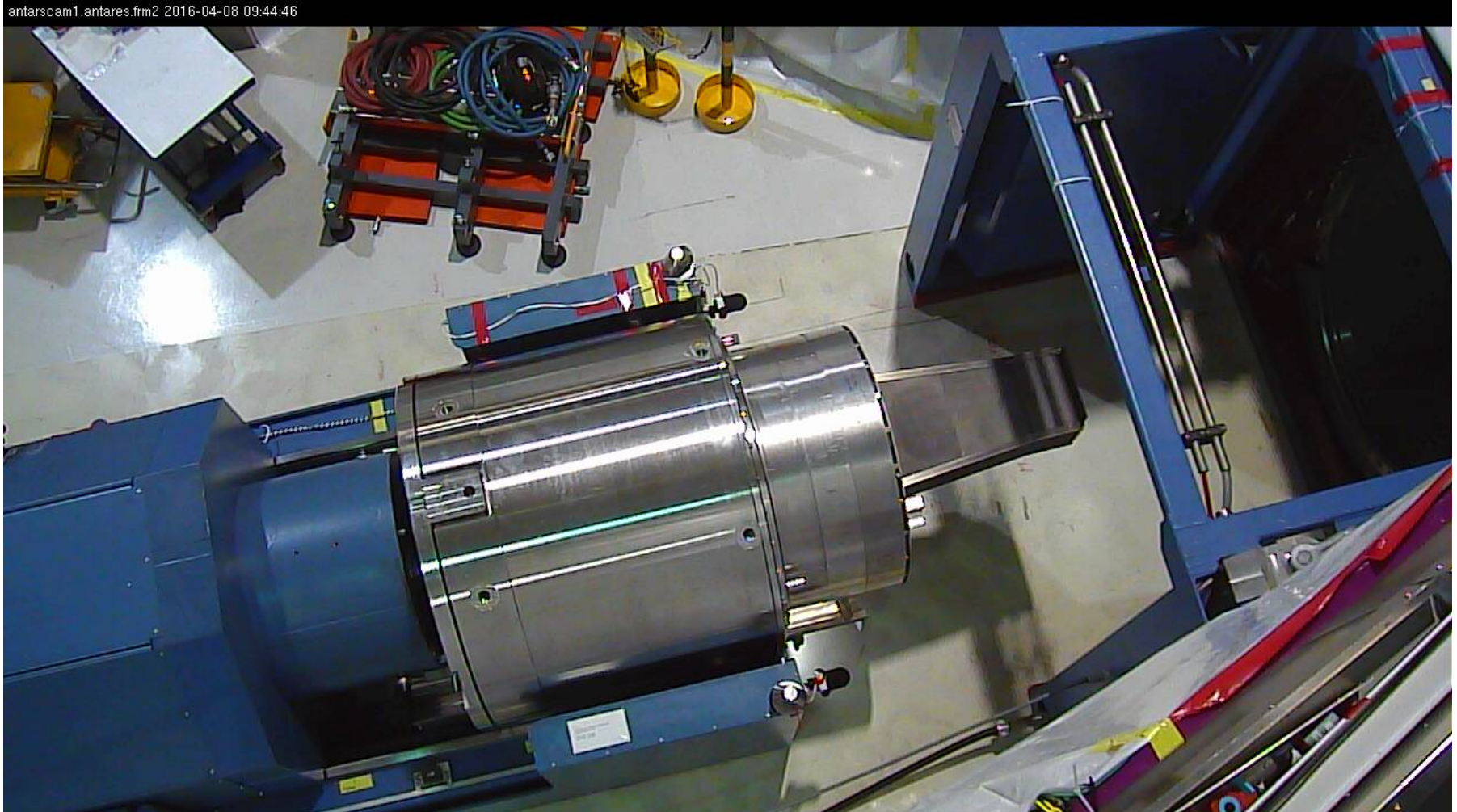
Preparation for the Assembly of the New Plug JMA05



Preparation for the Assembly of the New Plug JMA05



New Plug JMA05 Being Pushed into Beam Tube SR5



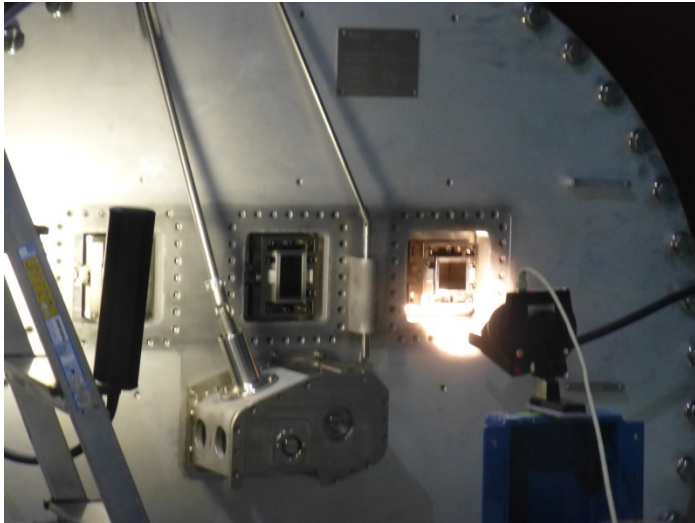
New Plug JMA05 Placed into End Position – a Successful Installation!



Adjustment of the Three New Beam Axis



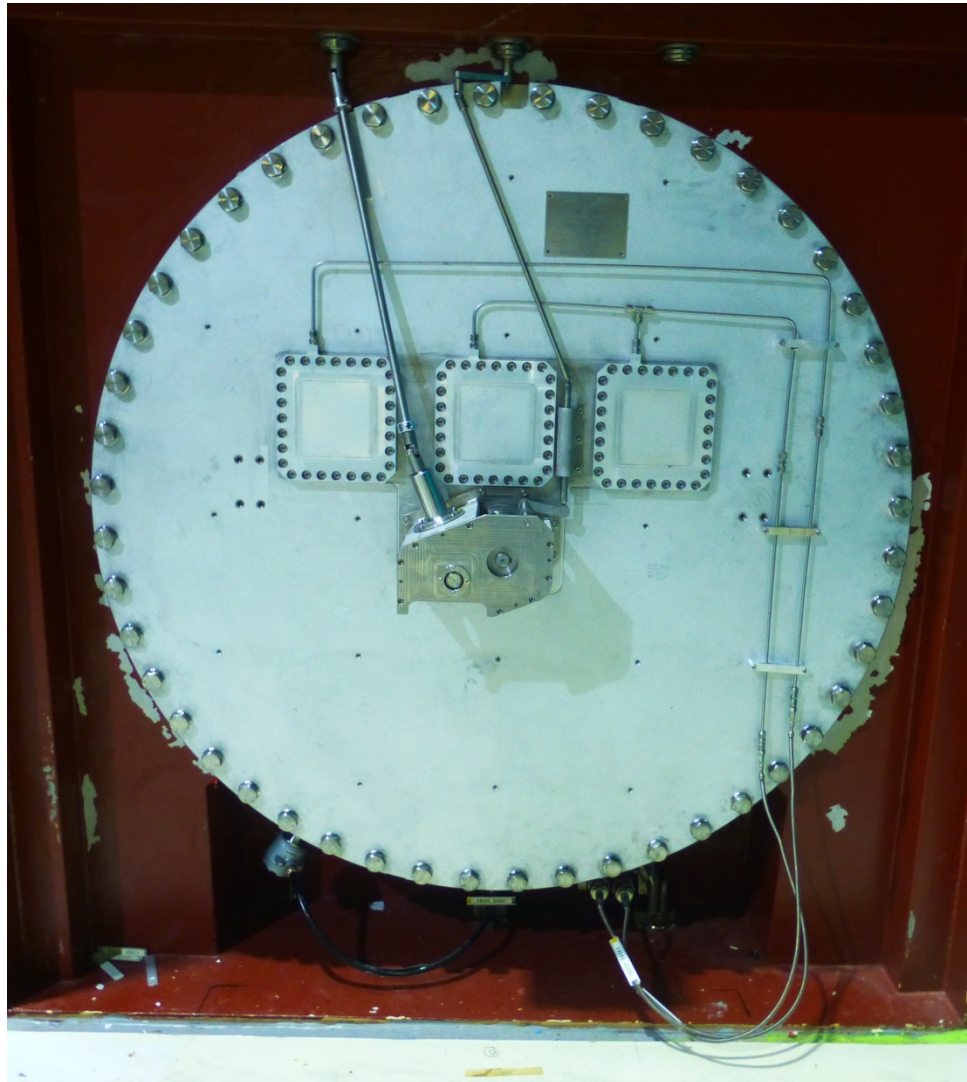
Adjustment of the Position „Shutter Open“



mounting neutron windows



Situation on May 06, 2016



What went not so well?

- **Paperwork:** The development of the documentation for the internal approbation and the permit from the German Authorities took at least 60% of the man days. Don't underestimate the paperwork!
- **Drawings:** Don't trust them! If possible double-check all relevant dimensions!
- **Material Certificates:** A small deviation in the amount of Cobalt makes a big difference in the activation of stainless steel!

What went well?

- No accidents
- No contamination in Experimental Hall
- All newly developed handling devices worked perfectly
- Highly motivated crew eager to face new challenges, to learn, and get the job done
- Small and well-trained crew: only 4 operators and 2 radiation protection people. Each operator was assigned a specific job but was able to do each of the tasks.
- Clear communication (exchange of ideas).
- Very good teamwork with the colleagues from JCMS Institute (responsible for the fabrication of the new plug)
- Respect for each other.

- About the radiation dosis:
 - Max. estimated individual dosis: 391 μSv
 - Max. measured individual dosis: 140 μSv

 - Max. estimated collective dosis: 2381 μSv
 - Max. measured collective dosis: 1120 μSv

Lessons Learned

Radiation Protection:

Adequate shielding elements reduce the dose received.

Sometimes, however, working at a larger distance from the radioactive source or reducing the net working time is more efficient than implementing a shielding element.

The increased distance can be reached with appropriate tools.
The net working time can be reduced with training.

Zero-Mistake Strategy:

Each and every work task needs to be diligently documented and optimized during training.

Only written tasks are executed in the prescribed order and checked off the list in order not to forget any steps.

Always be alert and flexible to handle unexpected issues.

The Team (The Survivors)



Thank you for your attention!