

SRF Test Environment at the S-DALINAC

Status and Upgrades



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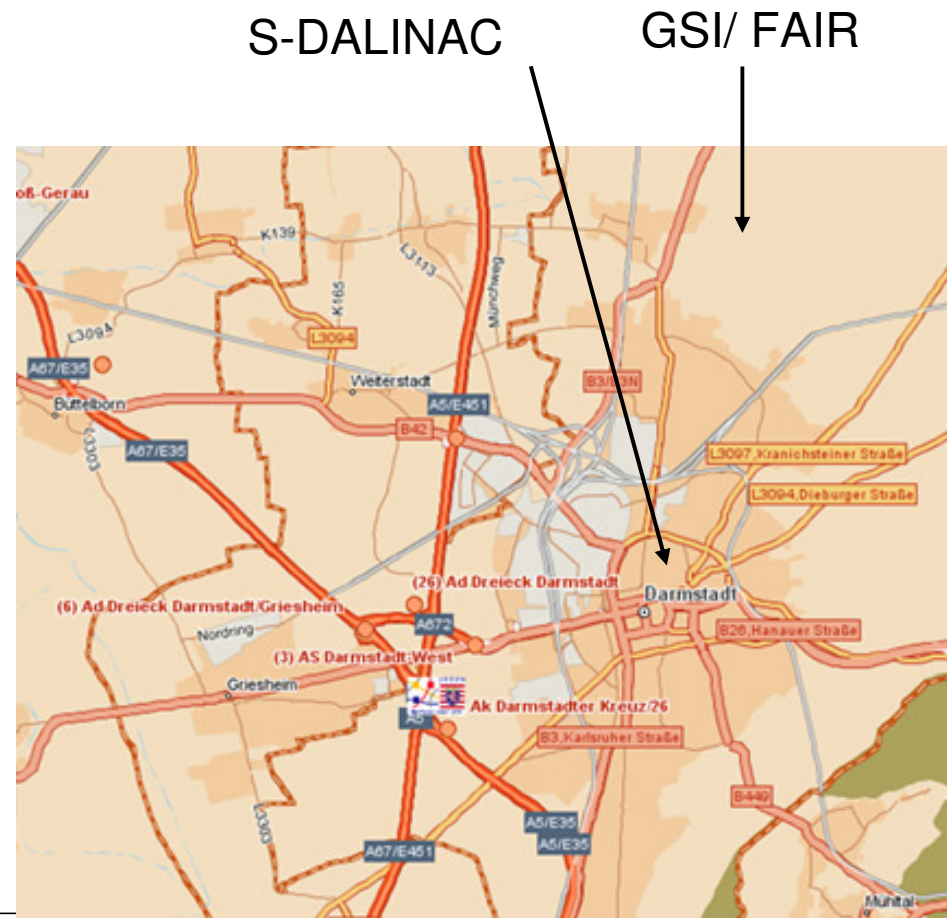
Ralf Eichhorn

TU Darmstadt/ S-DALINAC

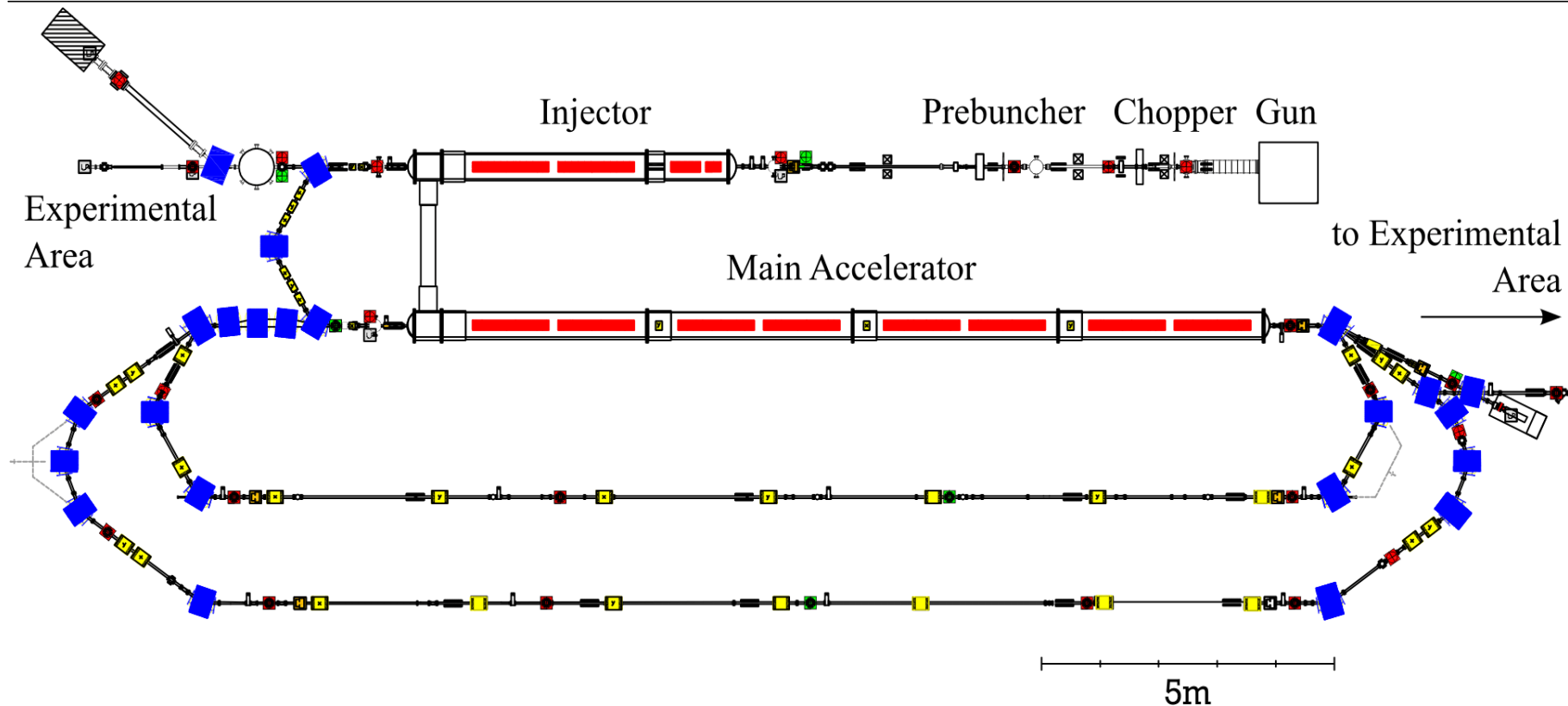
1st annual RFTech Meeting 2010

Hamburg, 29.3.2010

S-DALINAC @ TU-Darmstadt

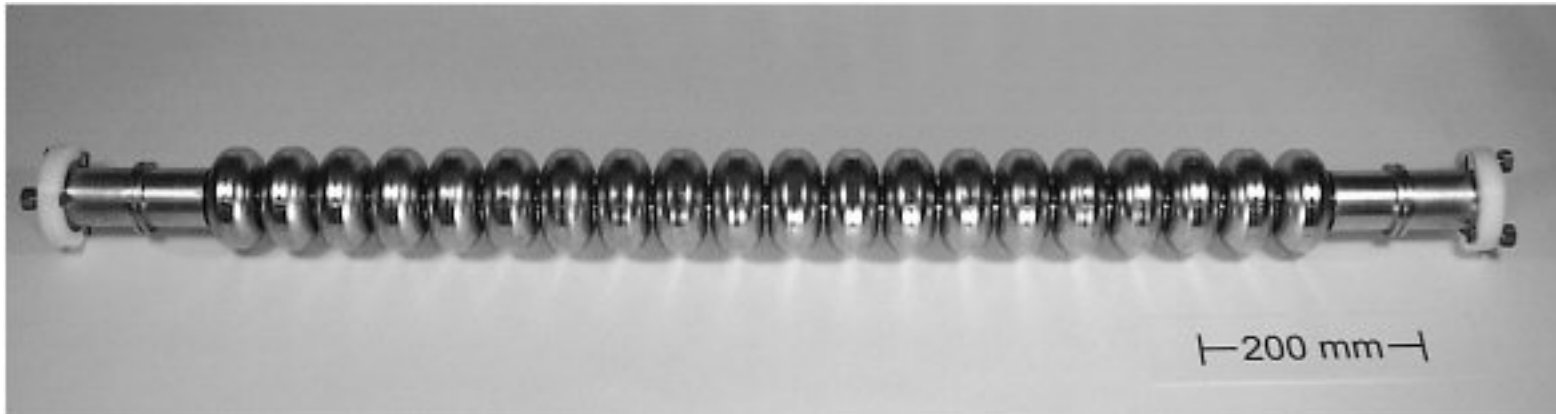


S-DALINAC Layout



Designparameter: Maximum Energy: 130 MeV
Maximum Beam Current: 60 μ A
Mode of Operation: cw

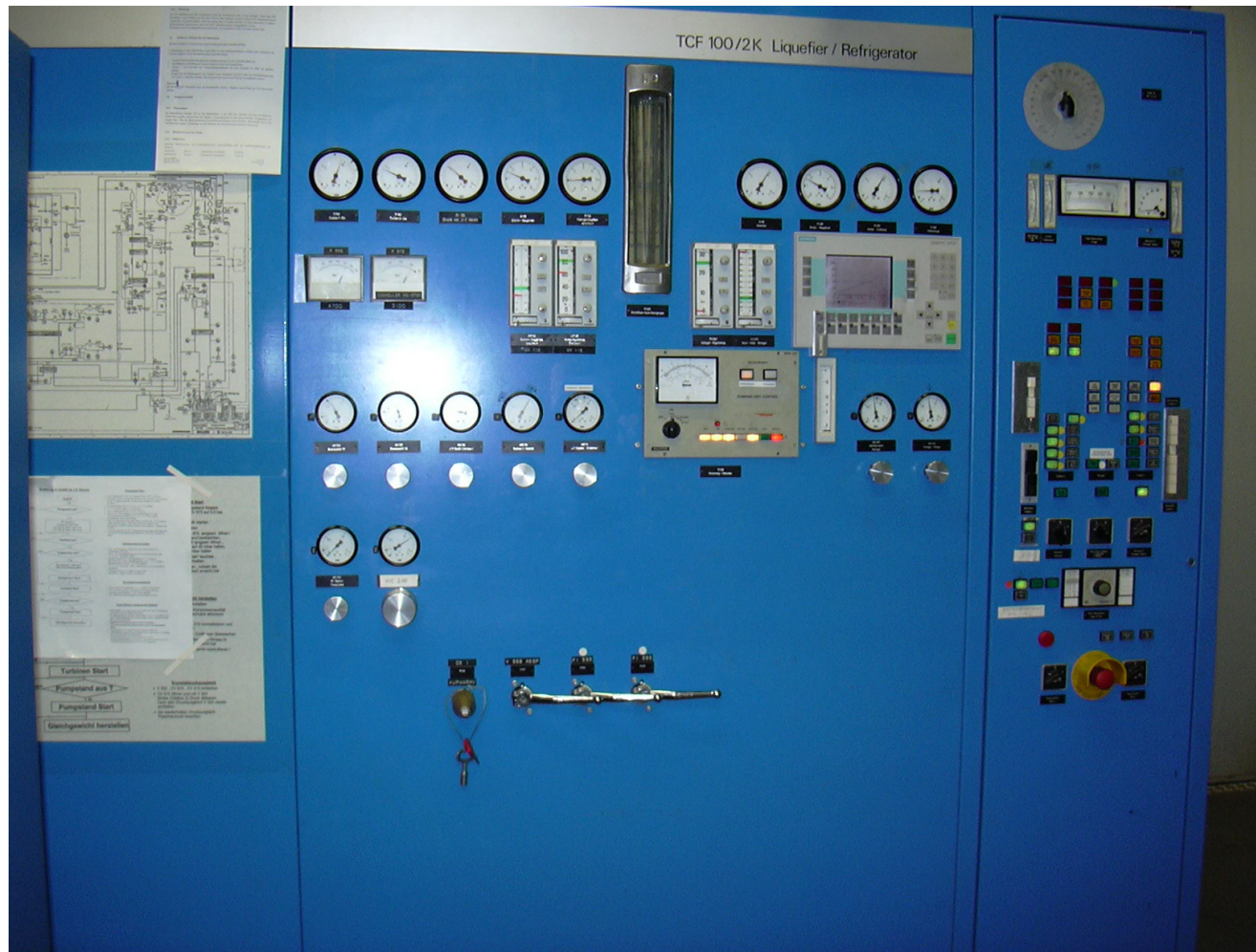
Supraleitende 20-Zeller



Design values

Material	Niob (RRR = 280)
Frequency	3 GHz
Temperature	2 K
E_{acc}	5 MV/m
Unloaded quality factor Q_0	$3 \cdot 10^9$

SRF Installations: He-Liquefier



SRF Installations: 2 K pumping station (8 g/s)



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SRF Installations: laminar flow bench for cavity mounting (old)



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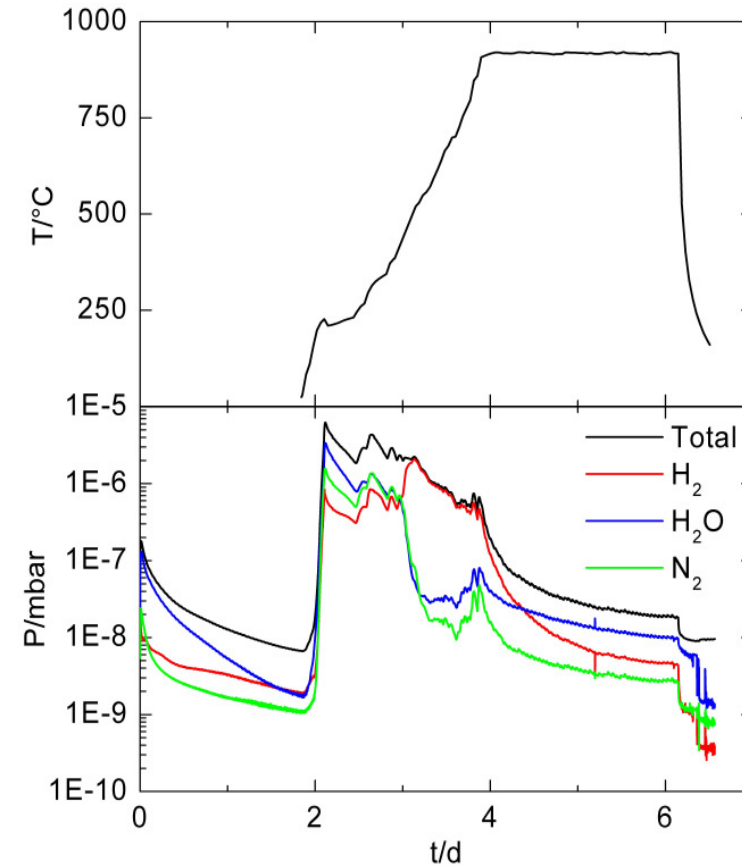
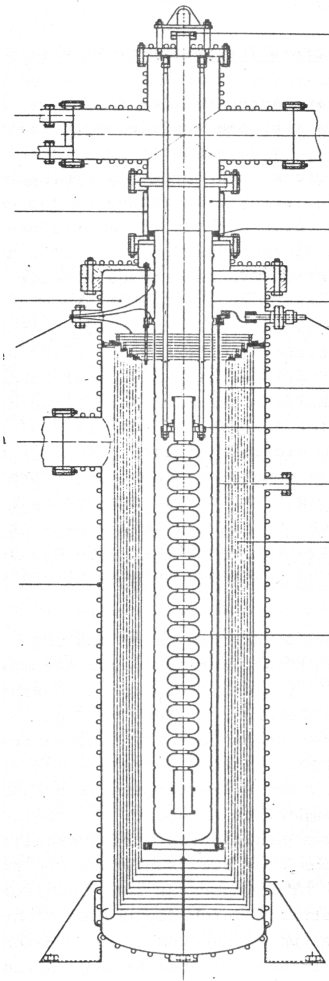
SRF Installations: vertical cryostat (in preparation)



SRF Installations: chemical treatment

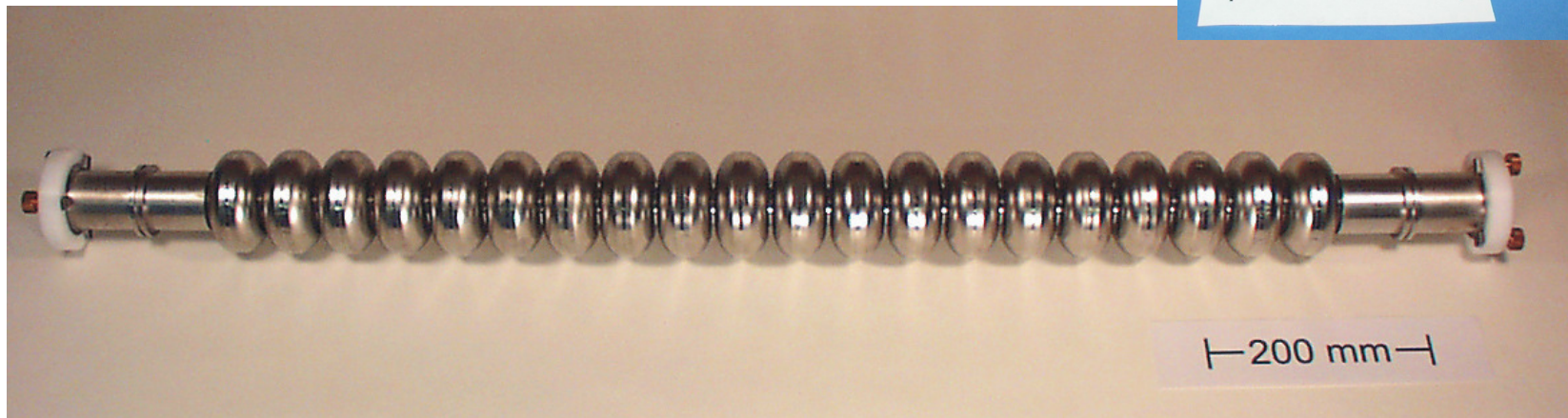
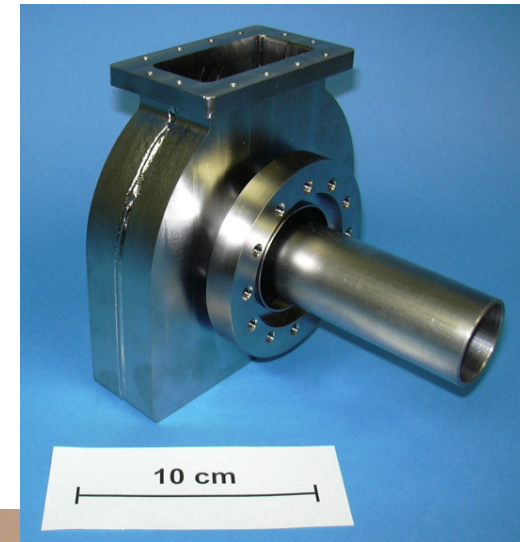


UHV Furnace (relocated from Wuppertal)



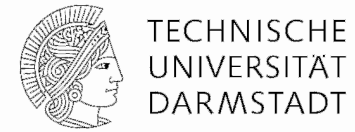
Current SRF Projects

- Tuning and testing of 3 new cavities
- Testing of new power couplers
- “Retuning” of existing cavities
- Continuous surface preparation of all cavities



Improvements since 2008

(FP7-IA-EuCARD Proposal TASK 11.9
“SRF Test Infrastructures” - suppressed)

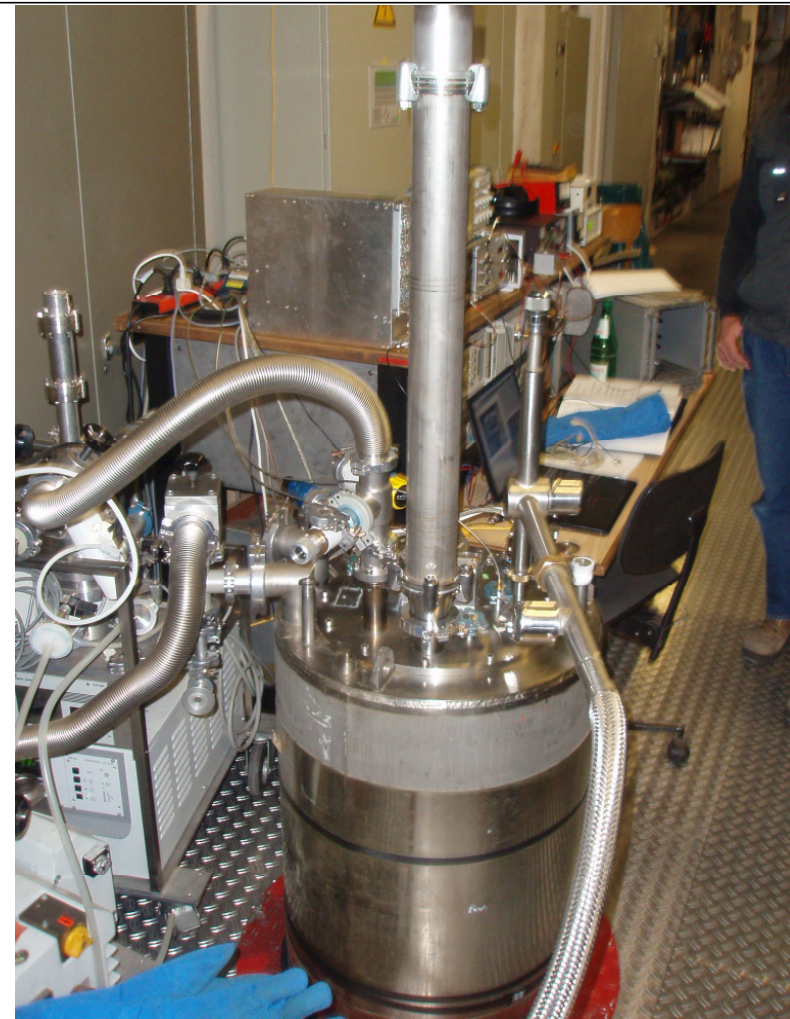
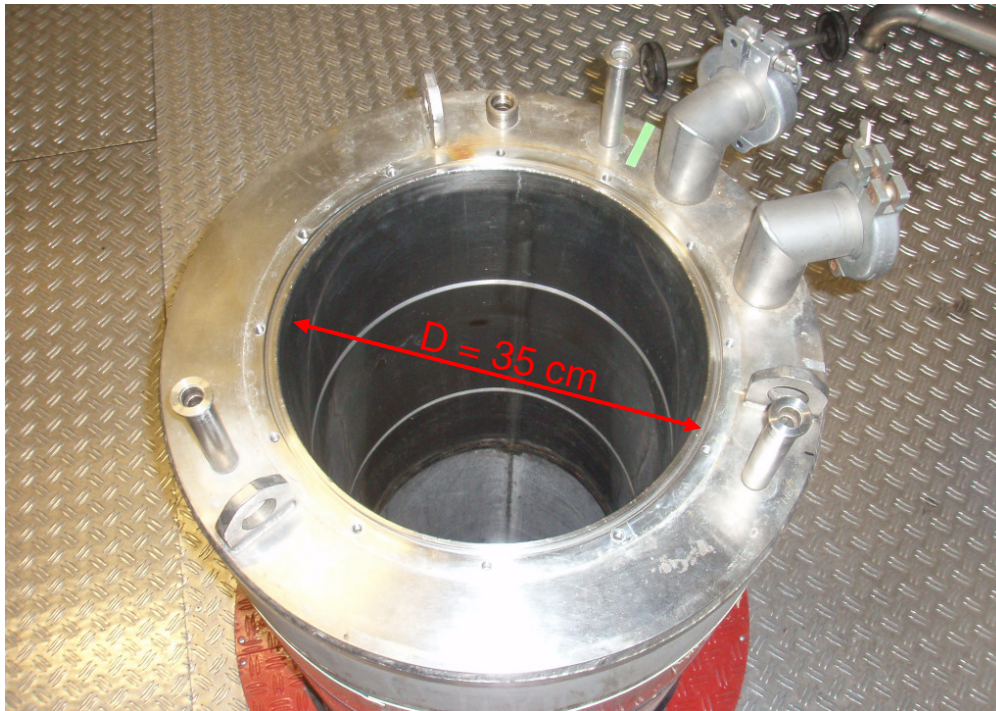


- First cool down of the vertical bath cryostat
- Set-up of a new, spacious clean room (class 10)
- Improvements of the beat-pull measurement set-up
- Refurbishment of the UHV furnace after an electrical short cut

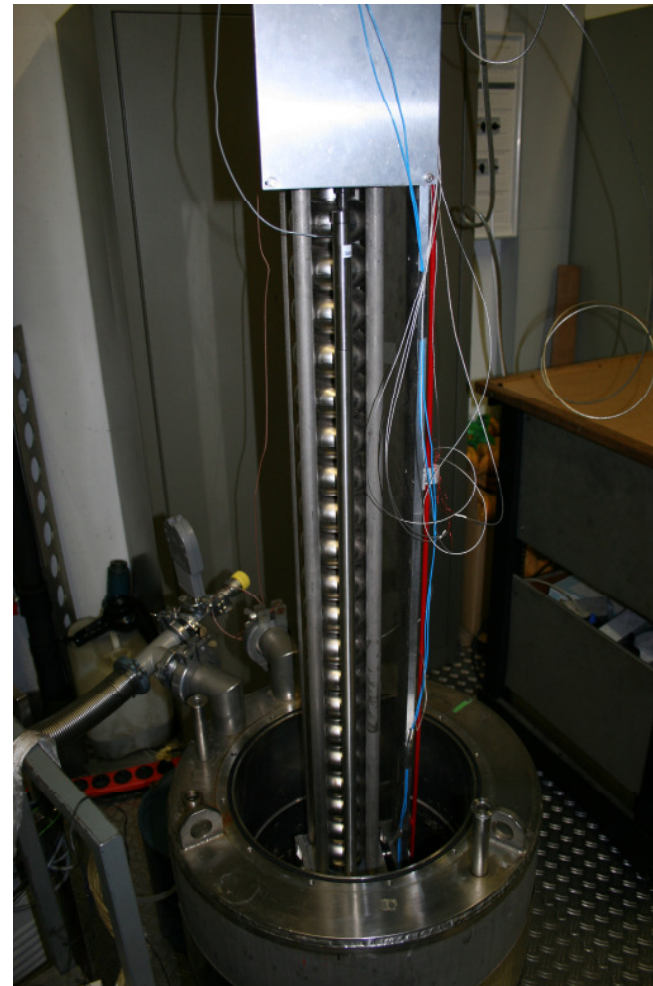
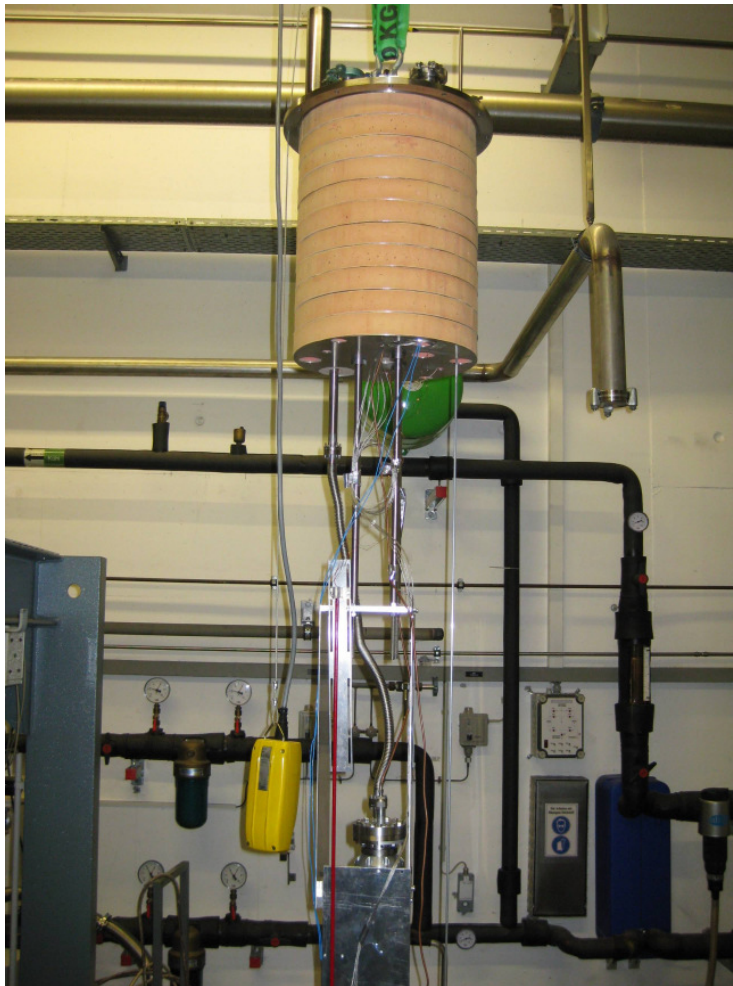
All paid with our own money

Vertical Bath Cryostat

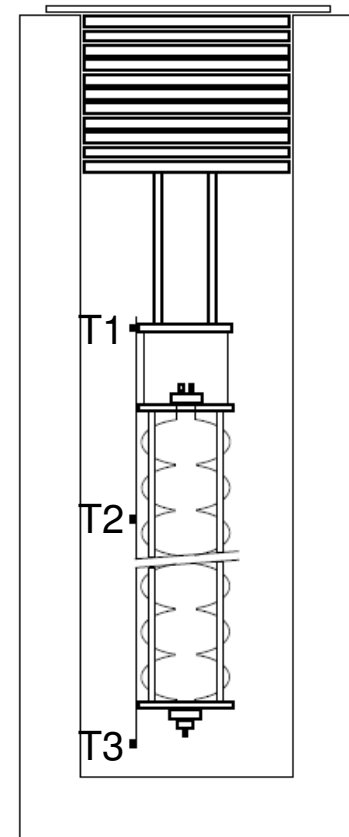
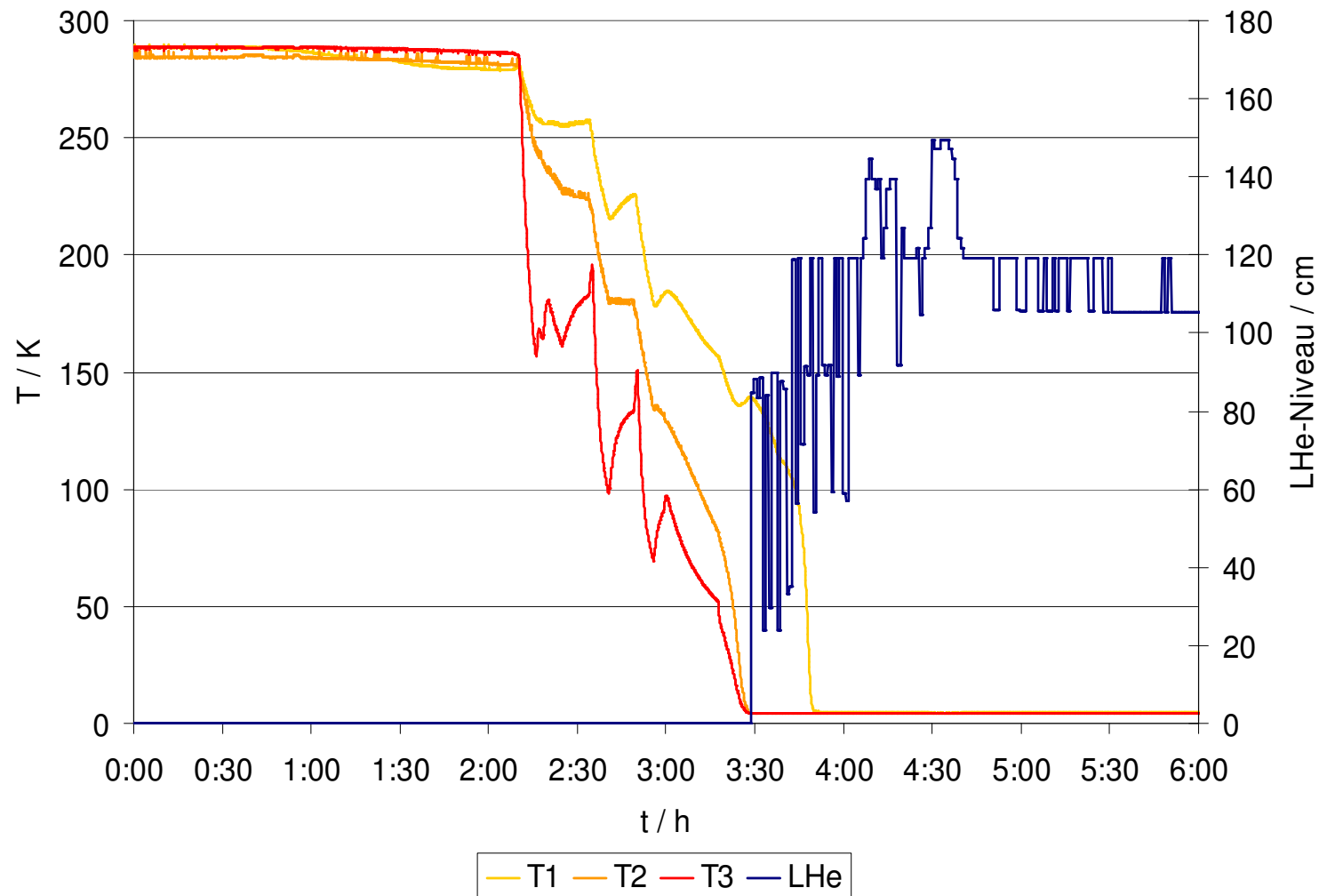
Diameter: 35 cm
Depth: 260 cm
Minimum required LHe-level: 150 cm
Maximum LHe-level: 190 cm



Cryostat Inset

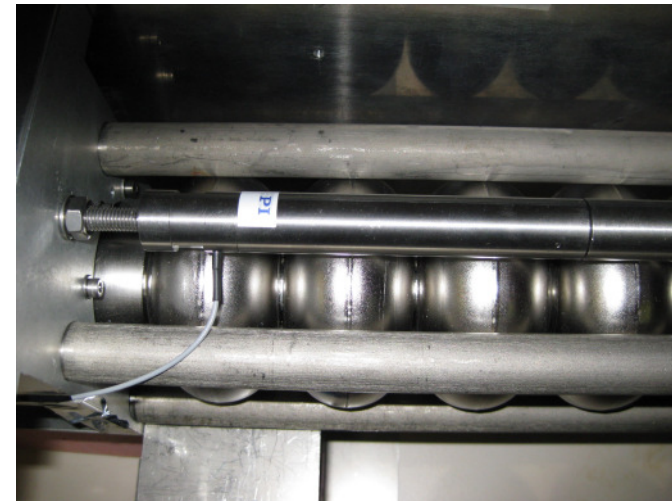


First Cooldown to 4 K



First Measurements

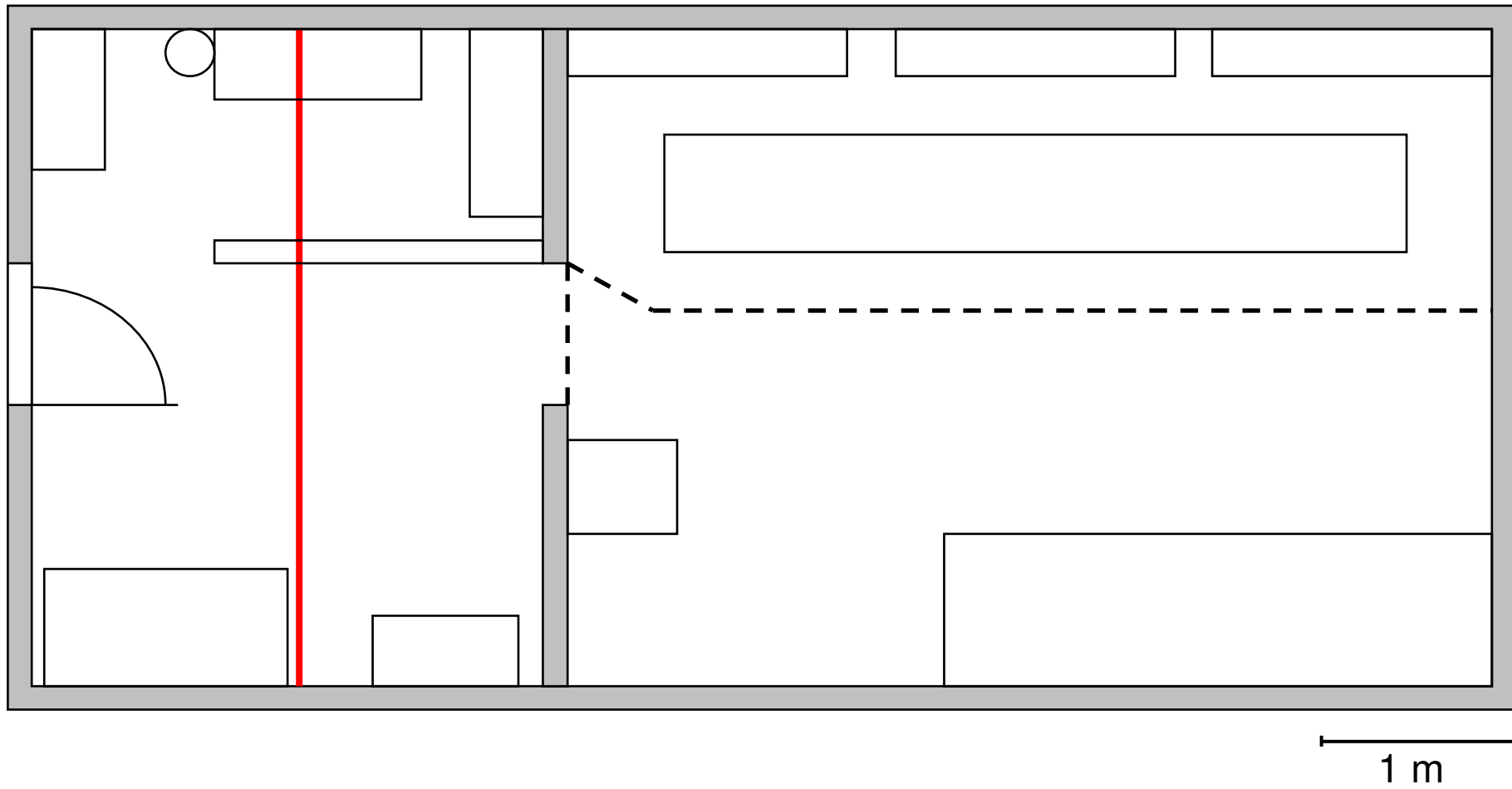
Stroke of piezo-actor @ 4 K
to replace magnetostrictive elements
of fine tuning system



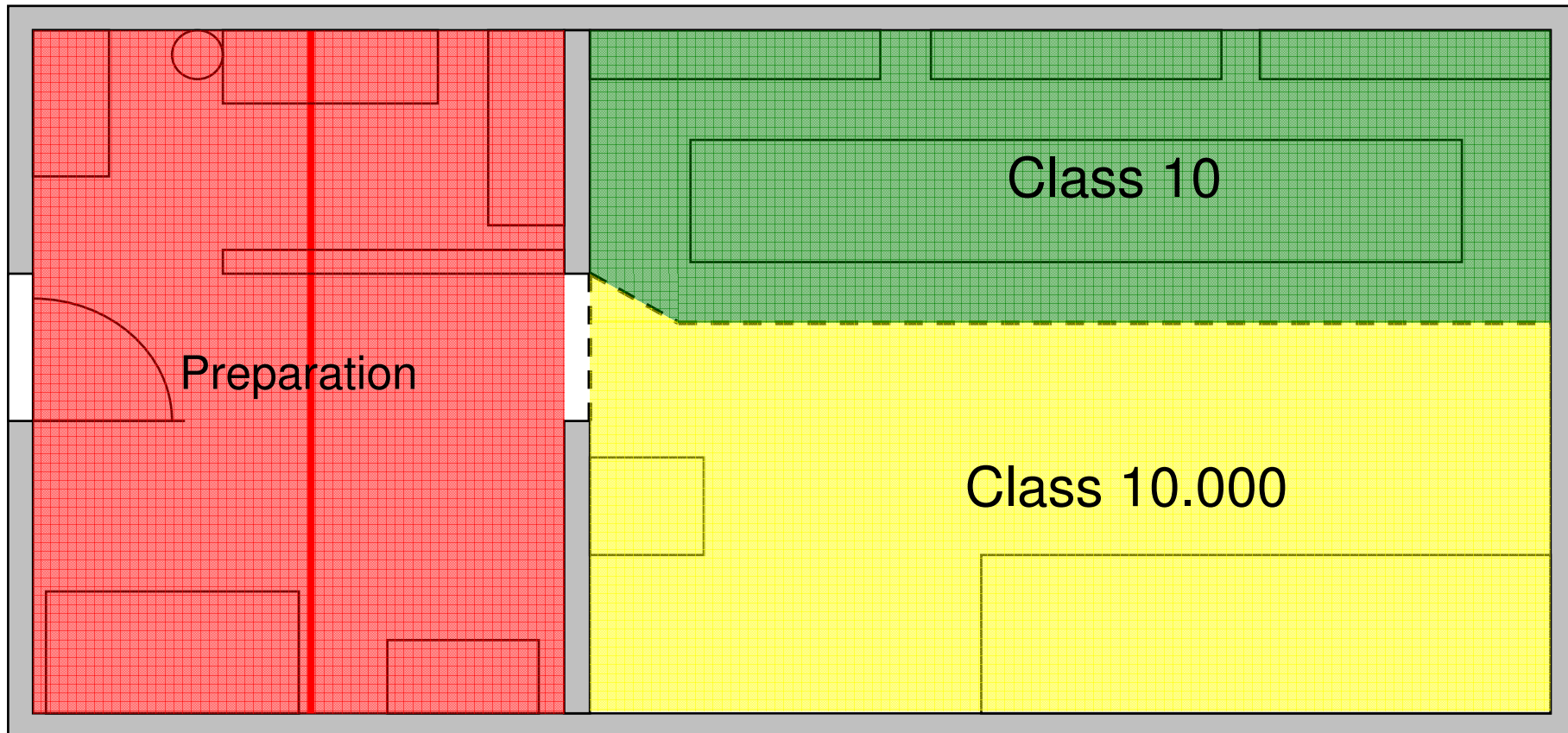
Performance check of the prototype of an
oscillating superleak transducer (OST)
for quench localisation @ 2 K

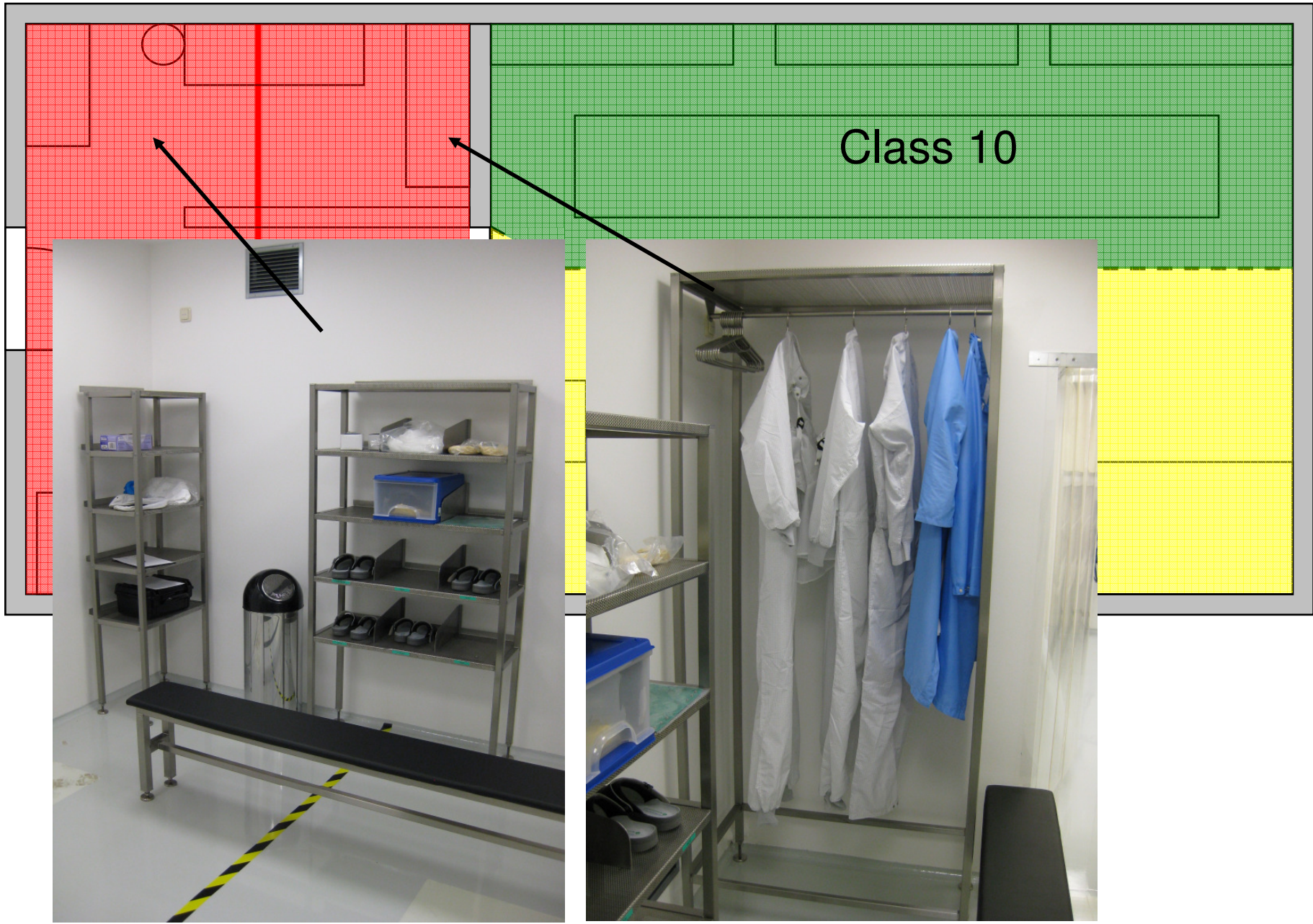


Cleanroom

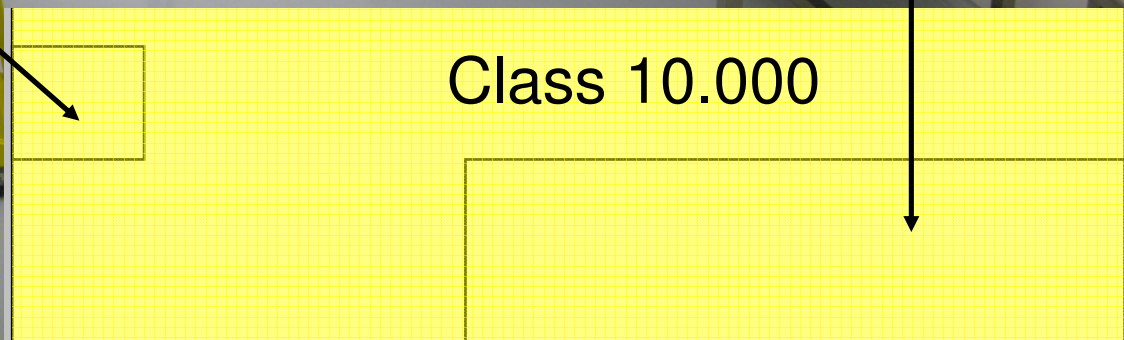


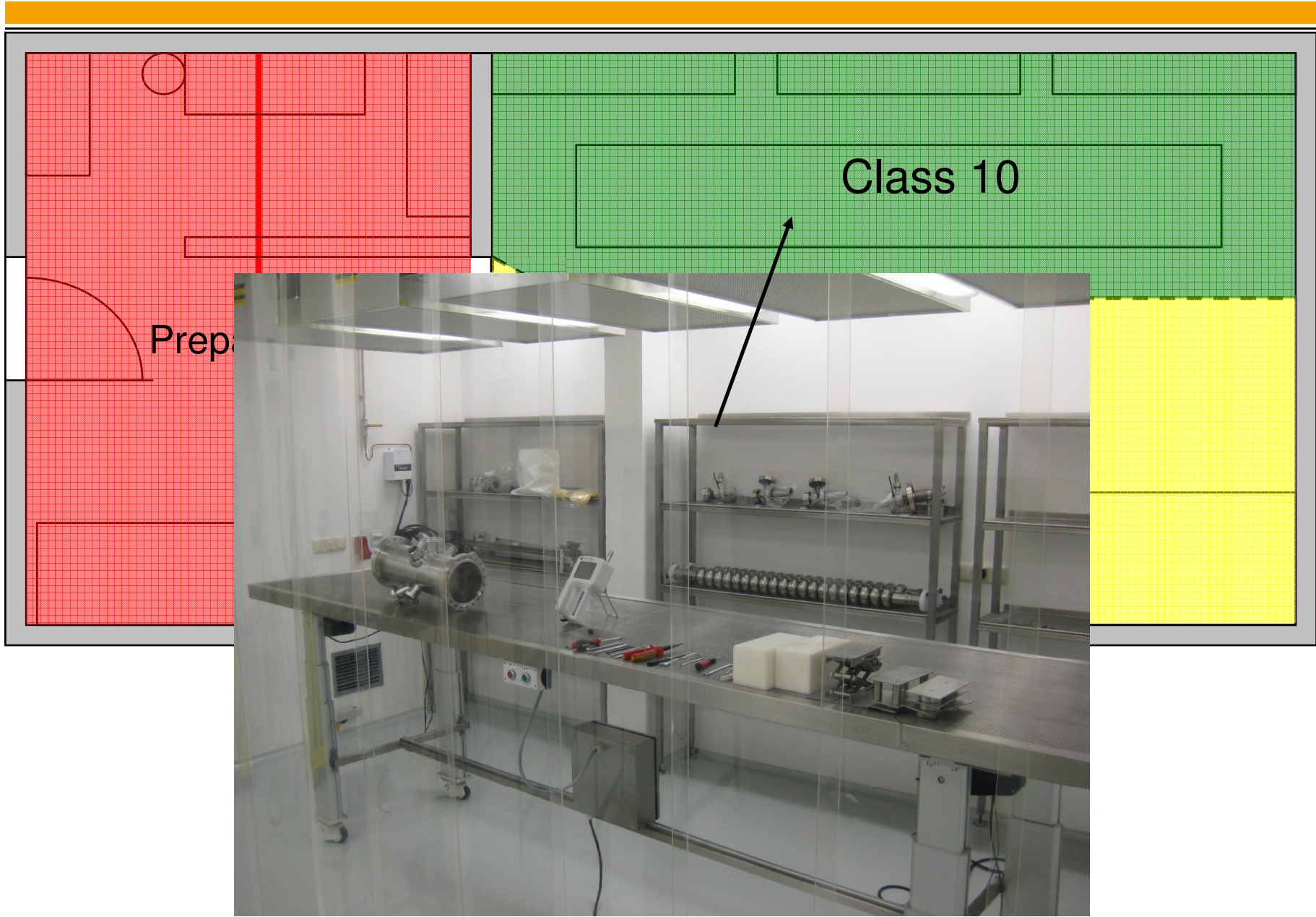
Cleanroom



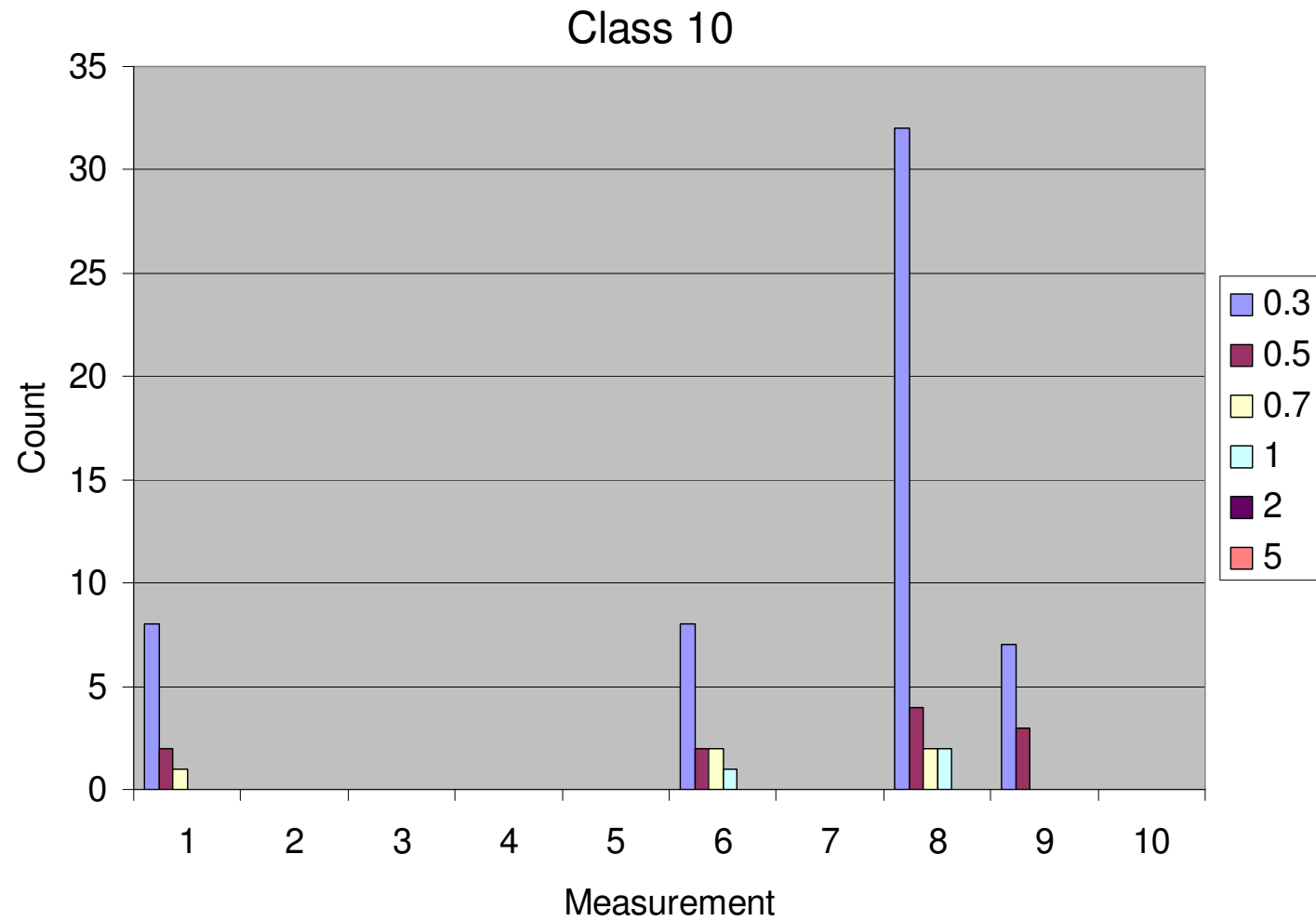


Cleanroom

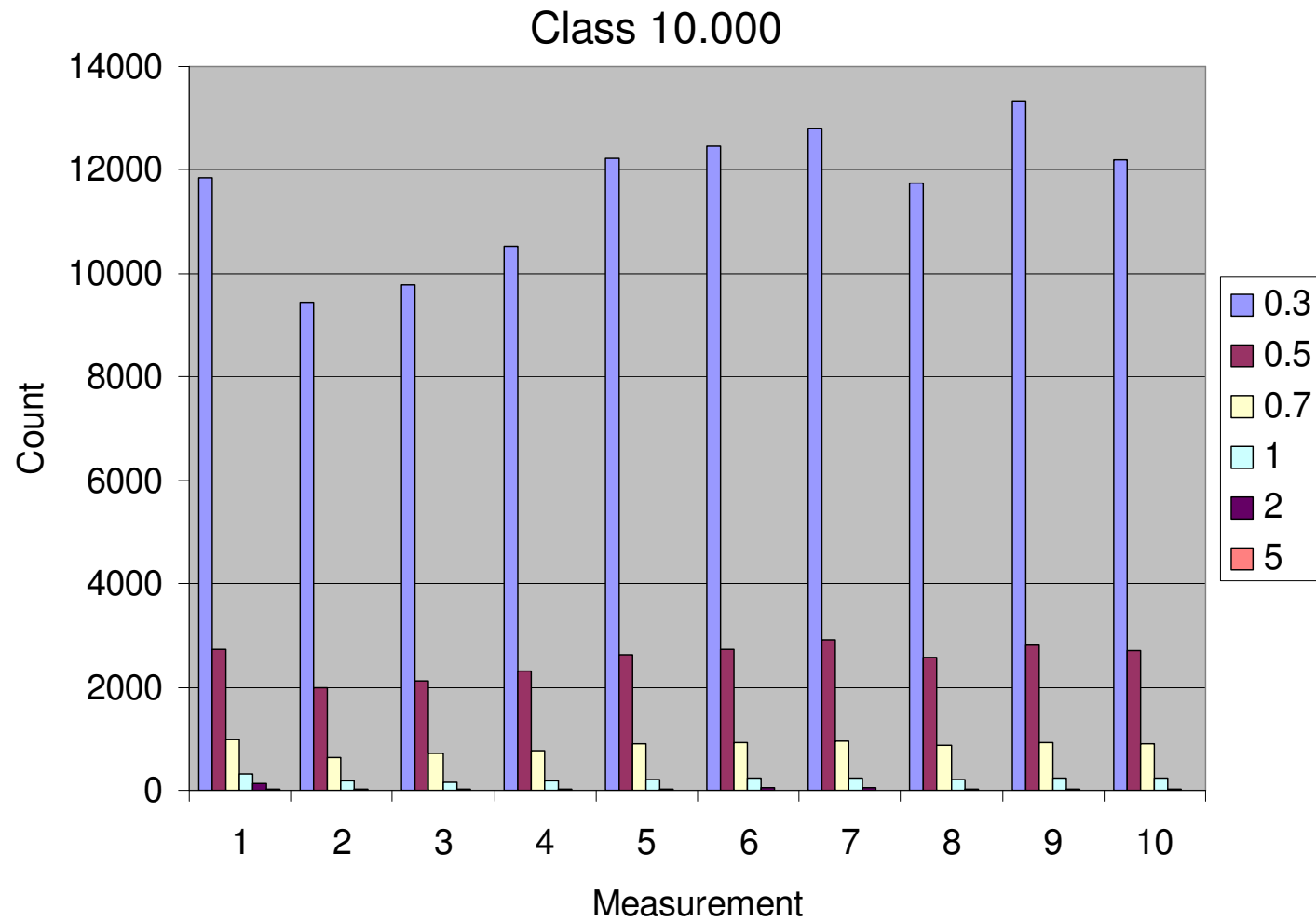




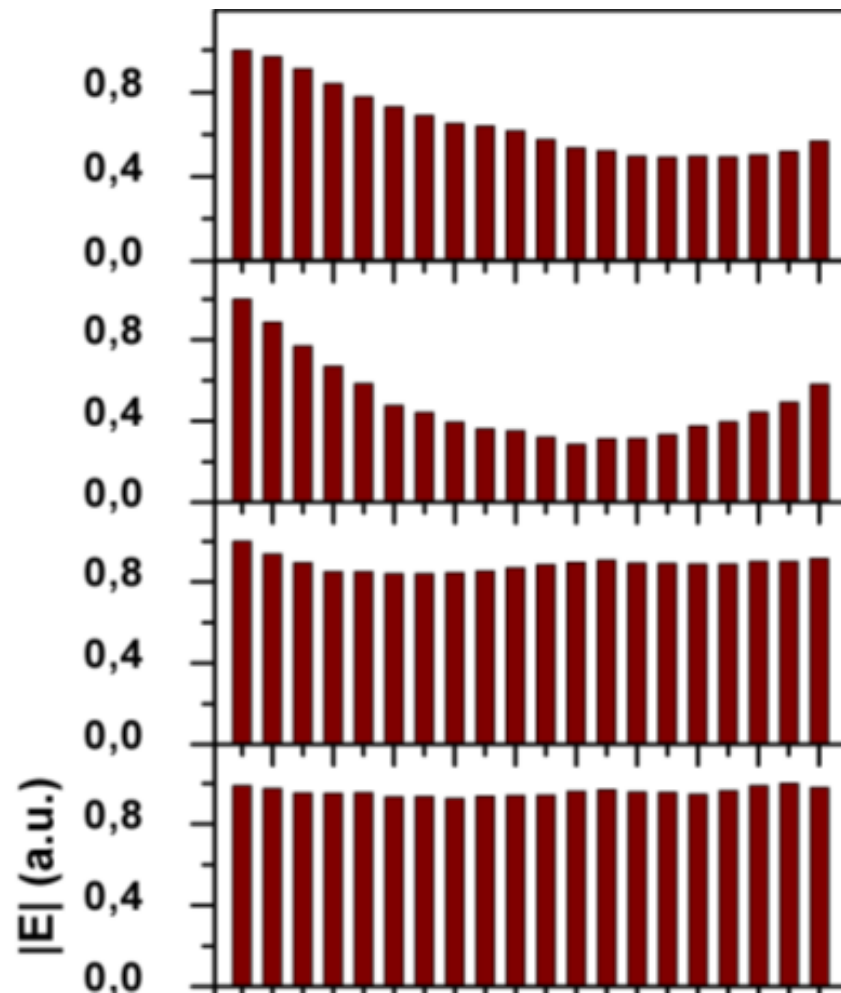
Cleanroom Measurements



Cleanroom Measurements

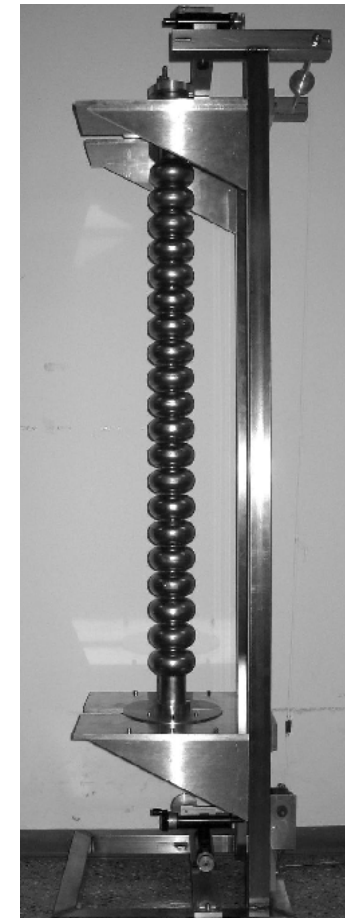
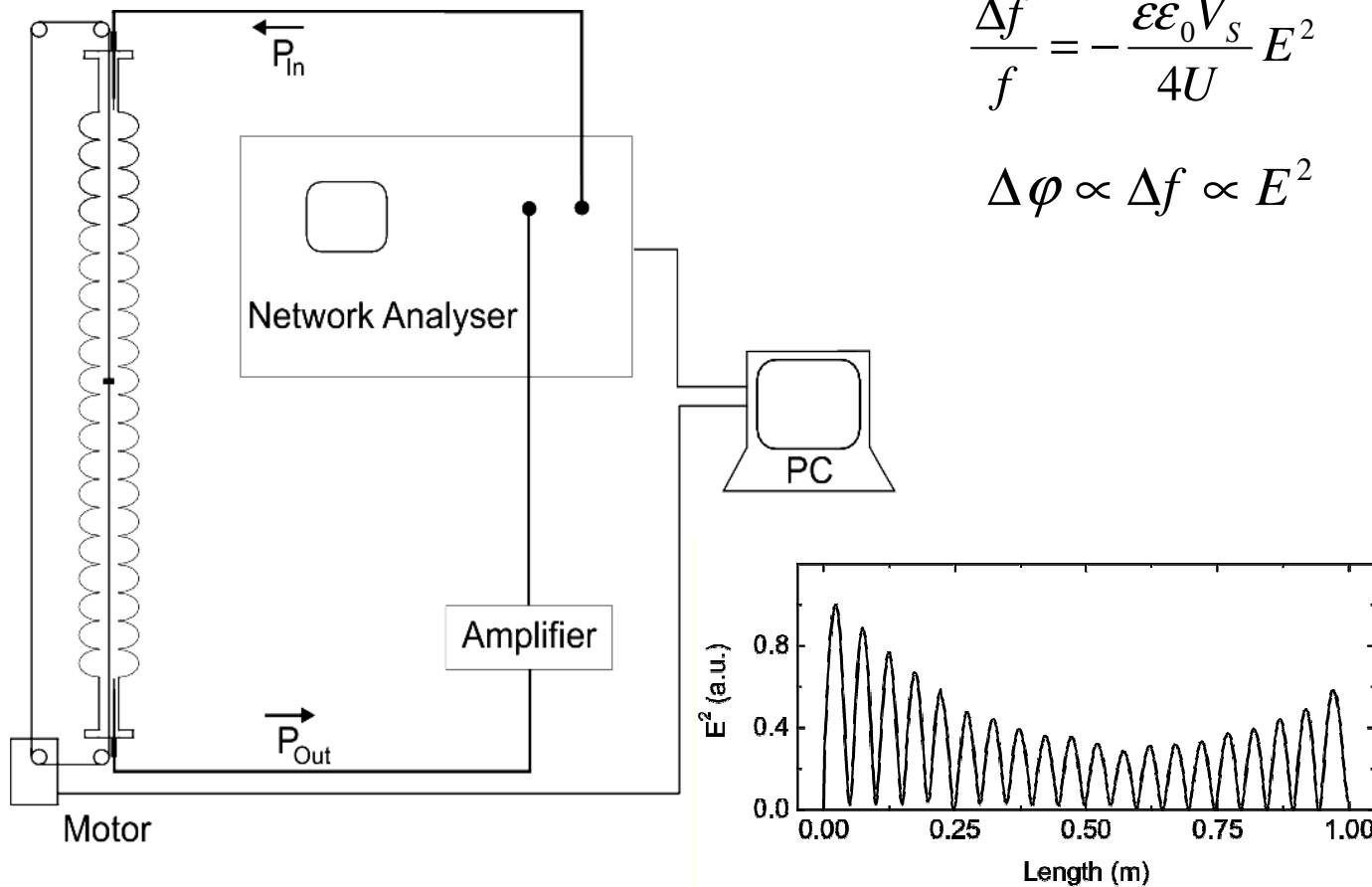


Field Flatness retuning

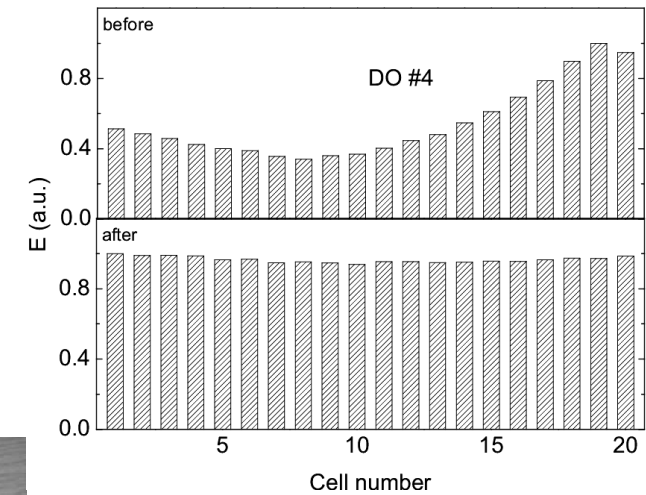
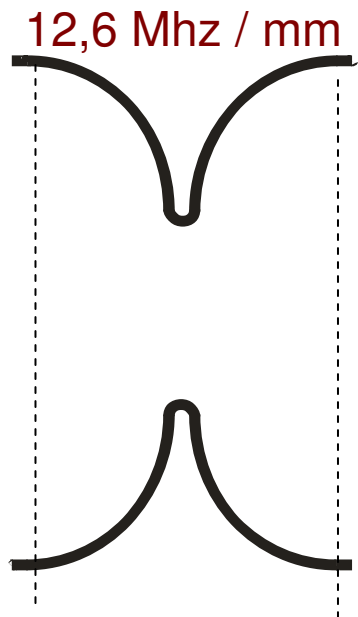


All cavities were tuned to flat field
when installed in the 90s
10 years later that's how they look like

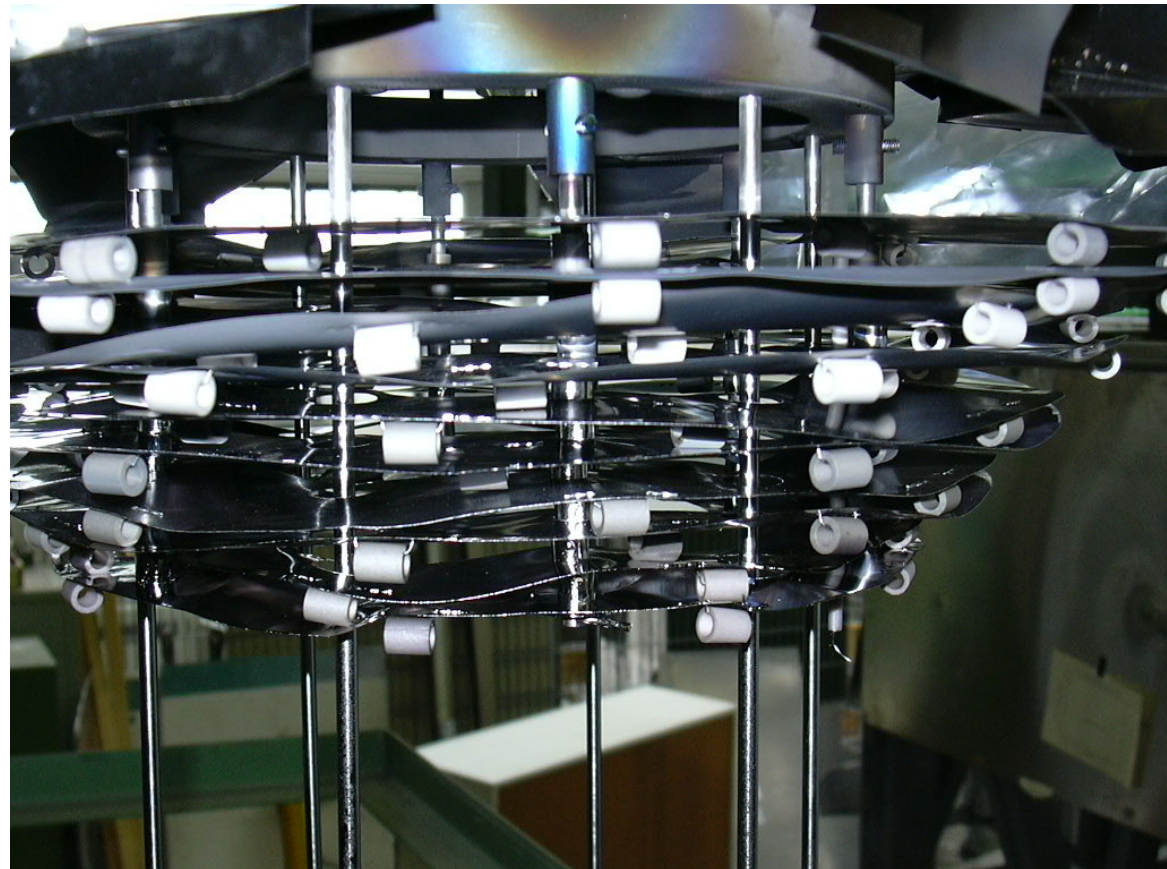
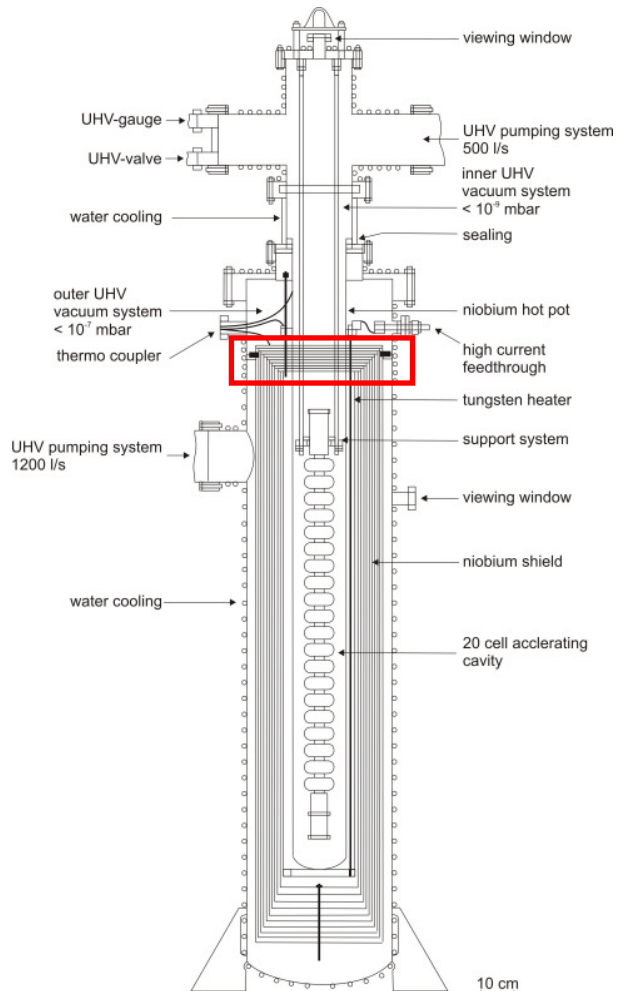
Field profile measurement bead pull set-up, clean room design



Cavity tuning

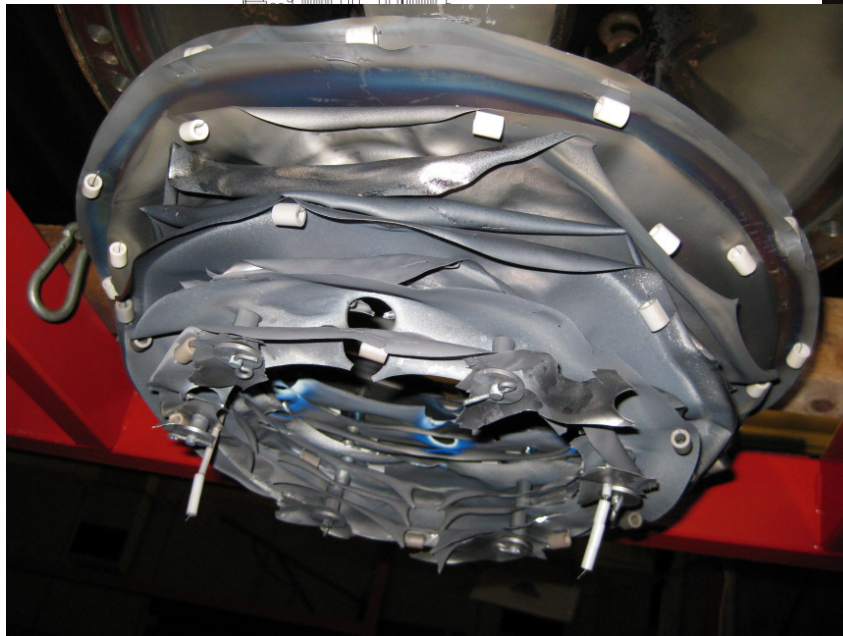
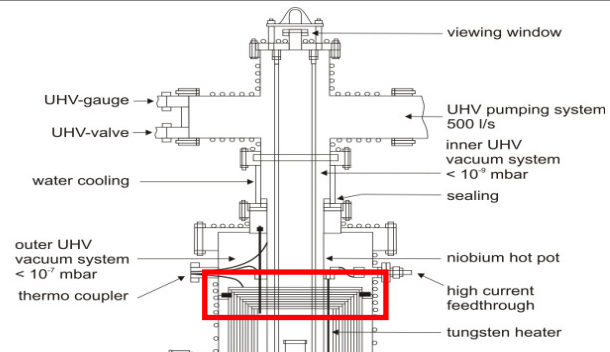


UHV-Furnace



Before Incident

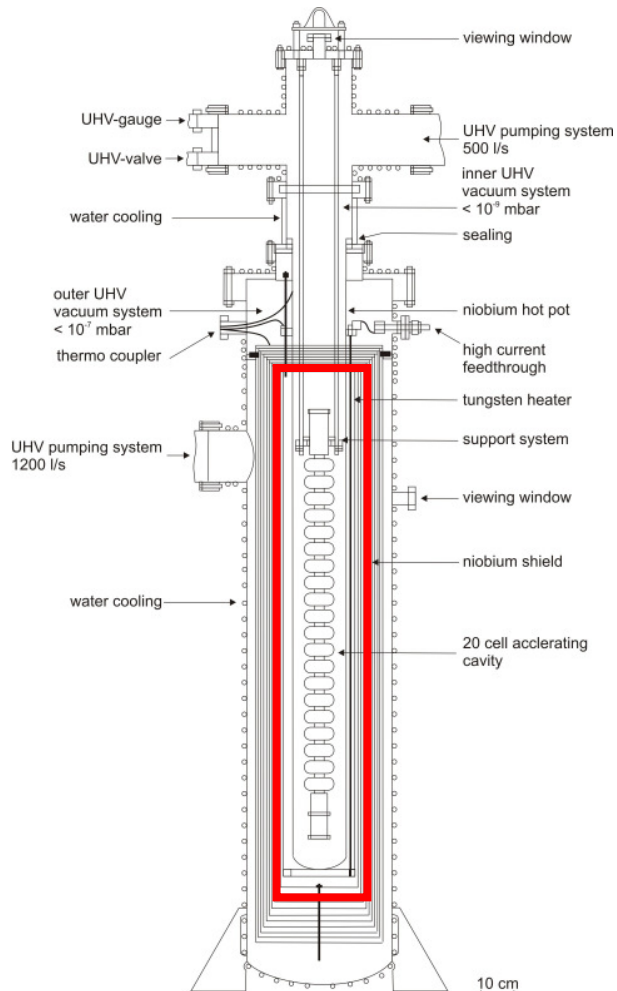
UHV-Furnace after electrical short-circuit



UHV-Furnace



UHV-Furnace Repair



- Innermost radiation shield was damaged (niobium)
- Heaters were broken (tungsten)
- Current feeds were un-tight

- All parts are currently replaced
- Furnace back online by mid April 2010

Our role within the community



- What we have:
 - UHV furnace (up to 1800 C)
 - Bead pull set-up inside clean room
 - Clean room
 - Vertical cryostat
 - Manual chemical treatment (HNO_3 & HF)

- What we would like to have/ need:
 - Advanced chemical treatment (H_2SO_4 & EP)
 - High pressure water rinsing