



The LESS beam screen treatment

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On behalf of LESS collaboration

46th TCC meeting

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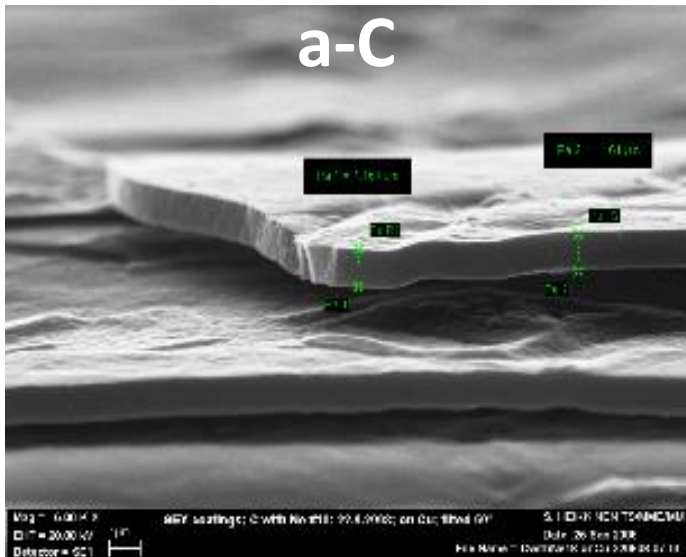
Motivation for LESS treatment

Electron cloud suppression to decrease the heat loads to cryogenic system

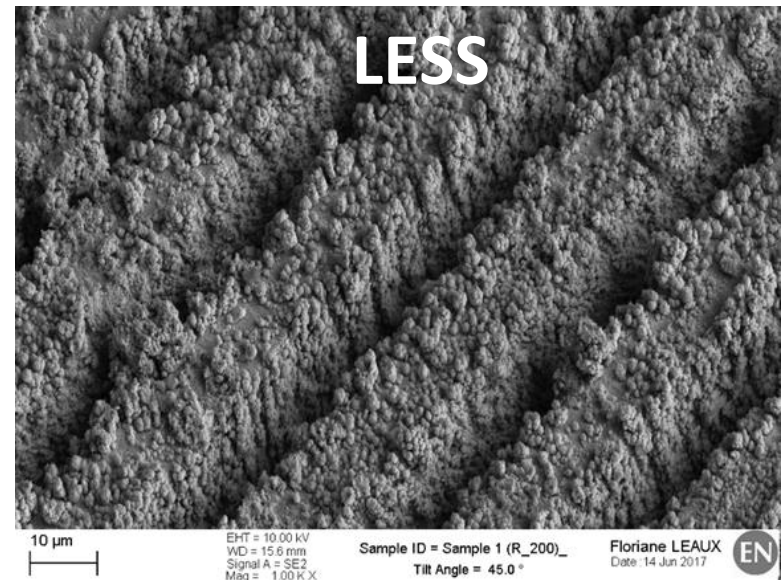
Modification of electronic properties of the surface

Modification of morphological properties of the surface

AMORPHOUS CARBON COATING



LASER ENGINEERED SURFACE STRUCTURES

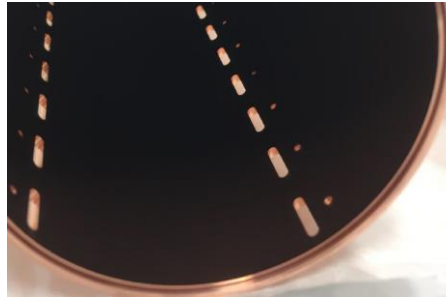
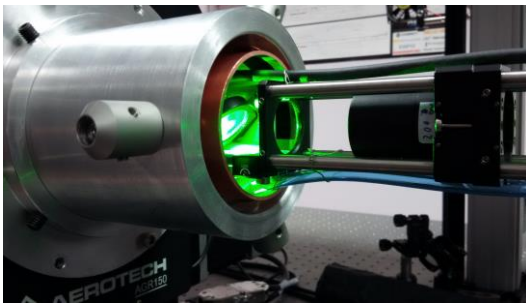


LESS project progress

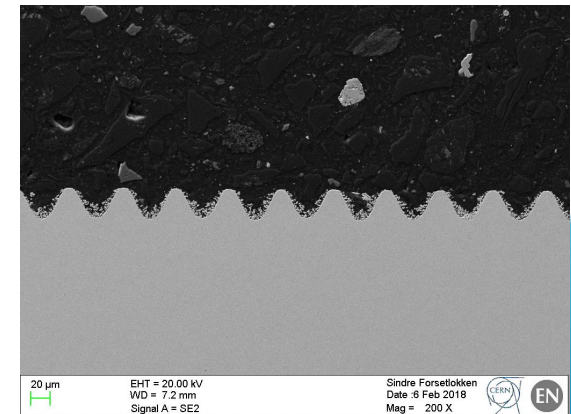
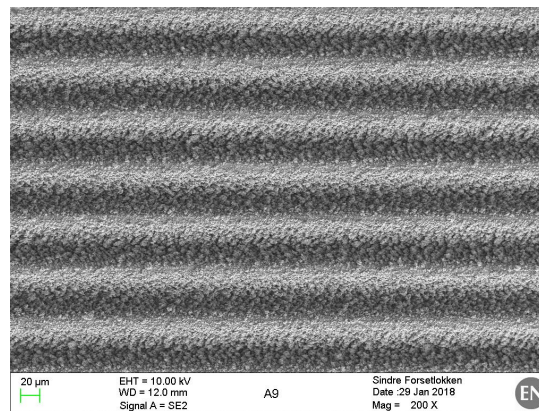
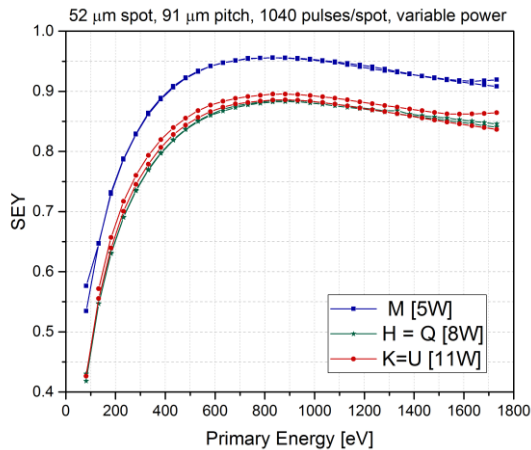


Science & Technology
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➤ Coldex experiment in SPS

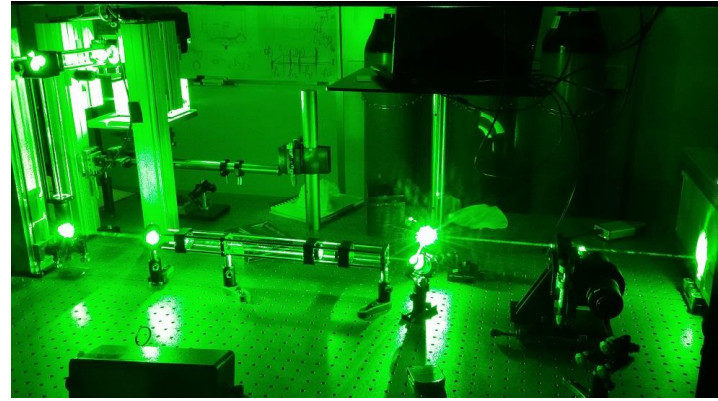
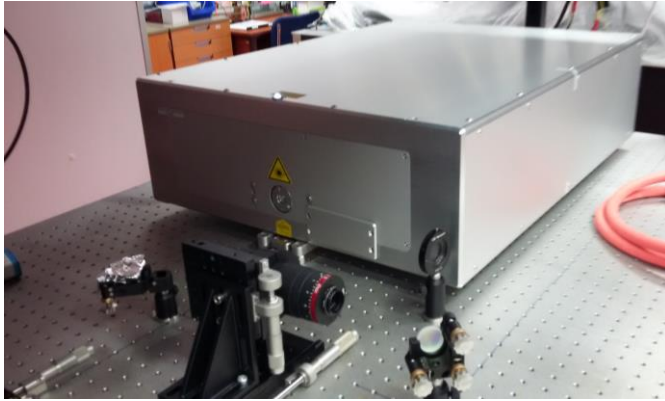


➤ Laser parameter adaptation to LHC beam screens

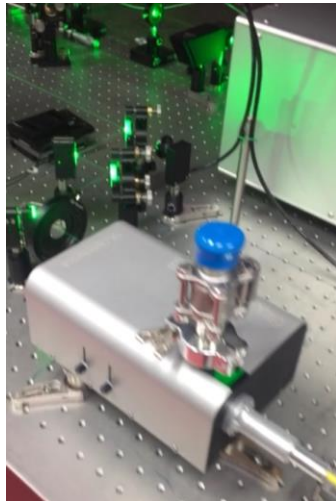


Components of the LESS treatment system

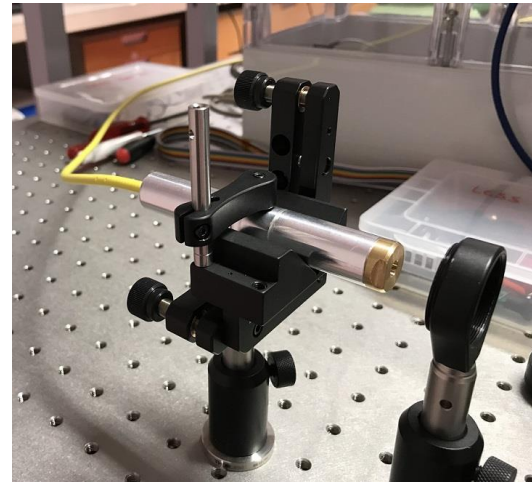
HyperRapid green light laser



Beam delivery system



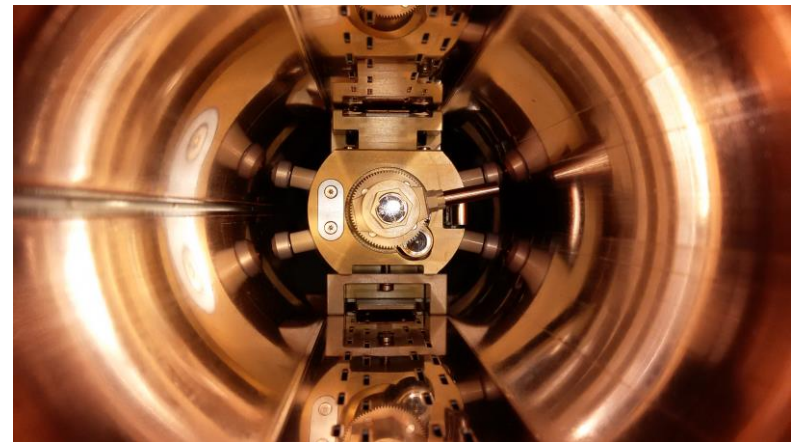
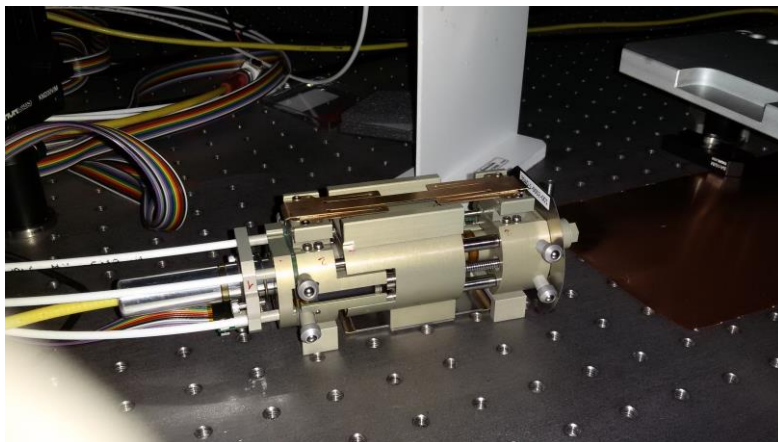
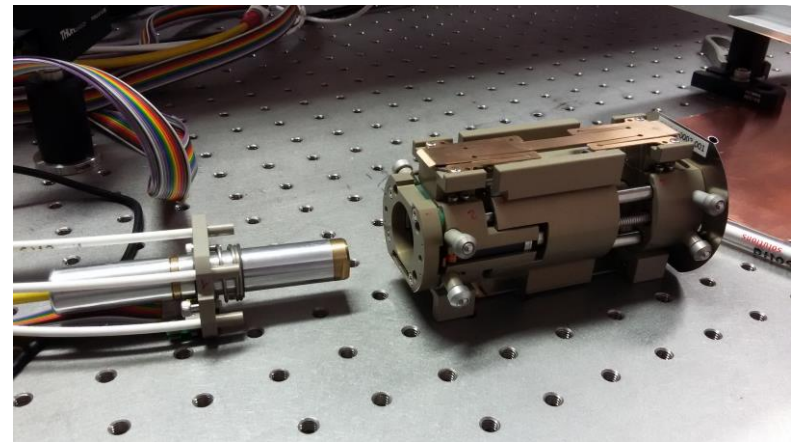
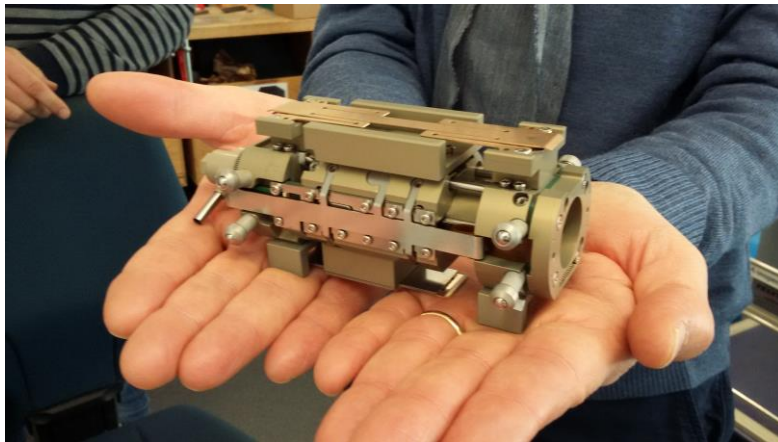
Fibre and fibre head



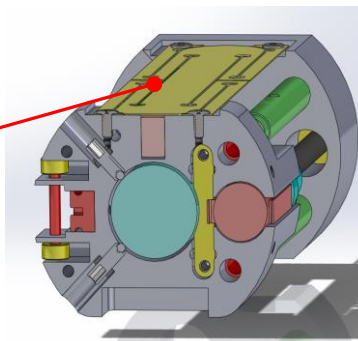
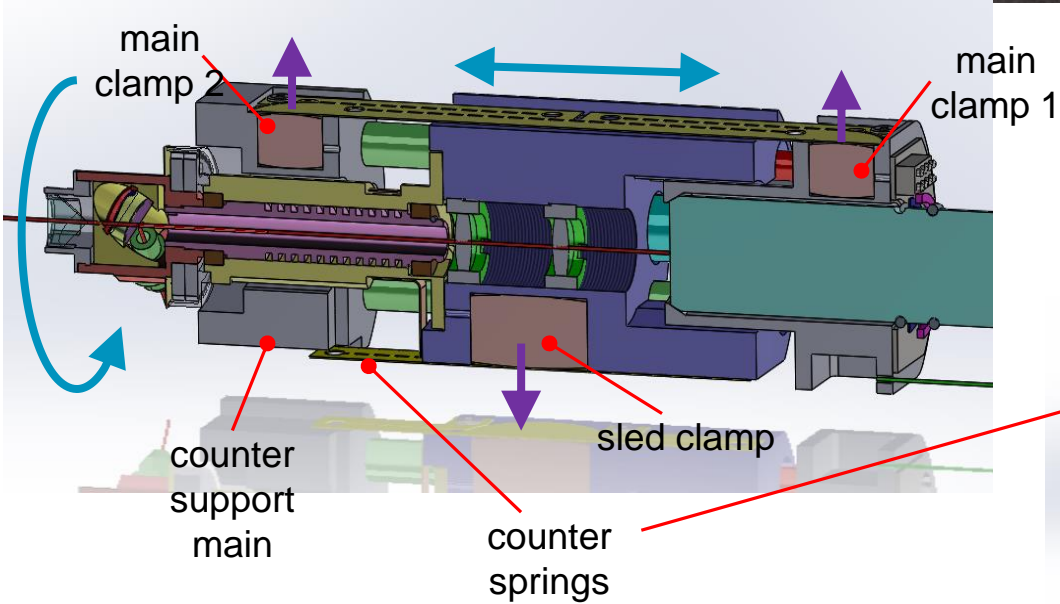
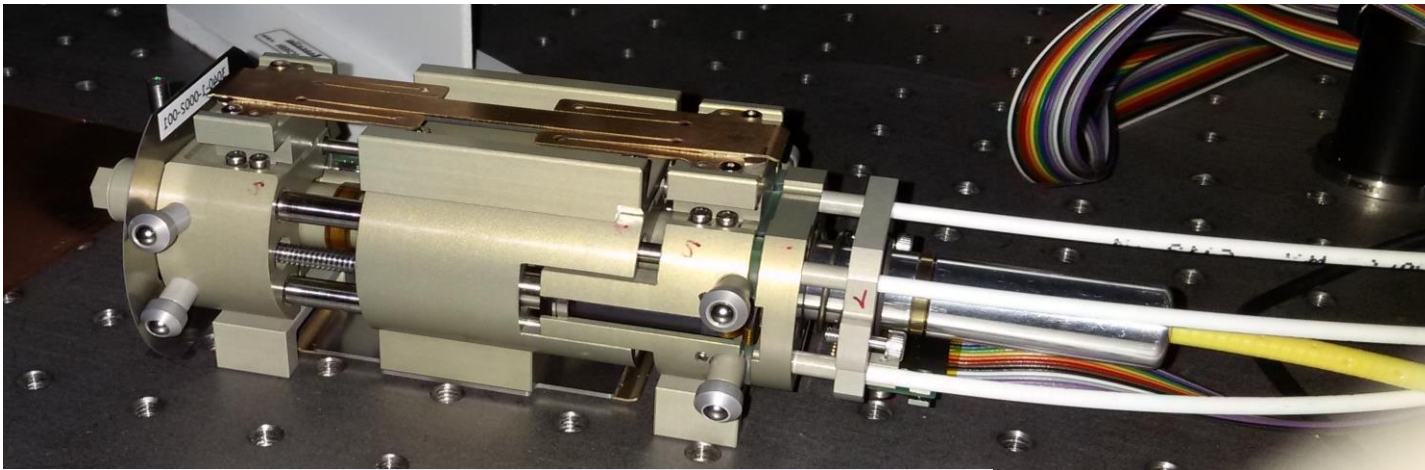
Robot for LESS treatment



General Electric
Inspection Robotics



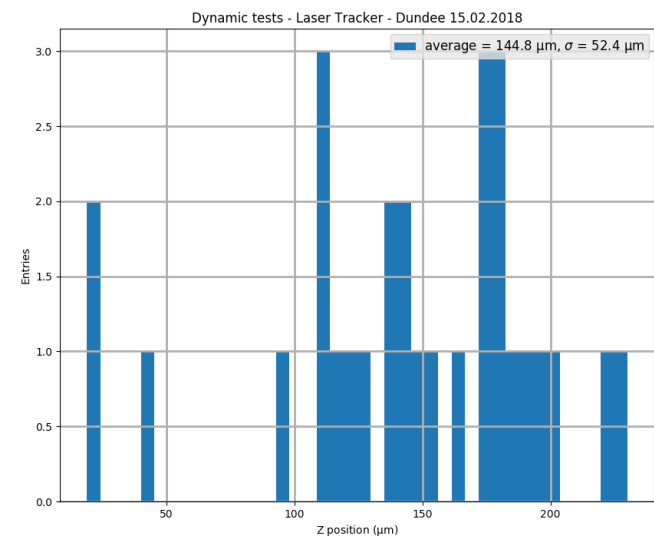
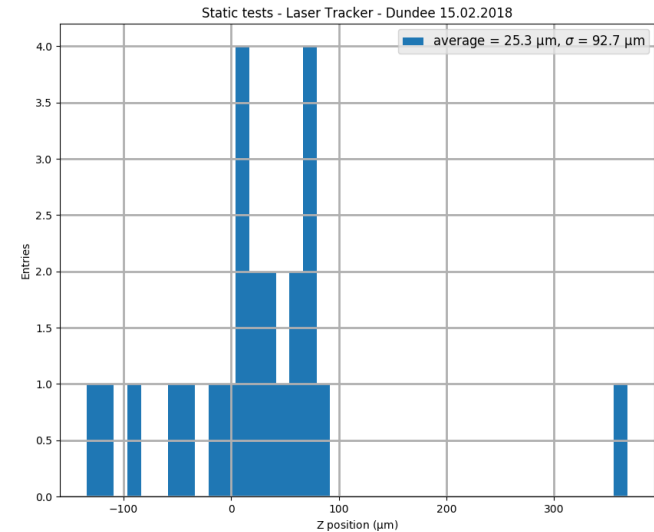
LESS robot working principle



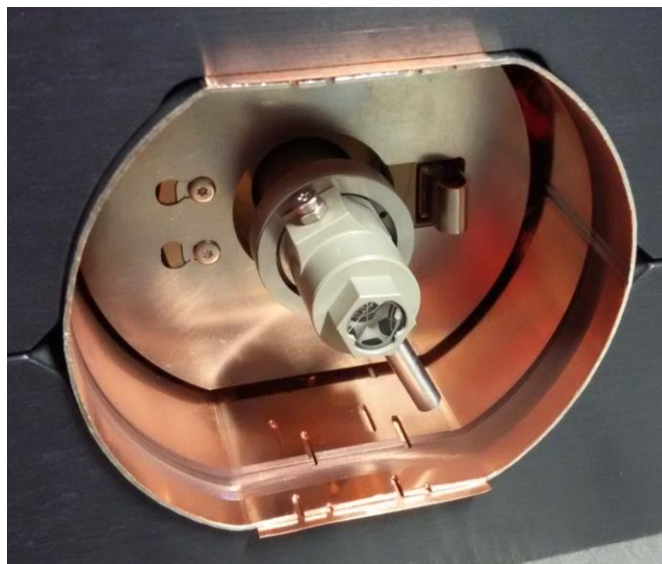
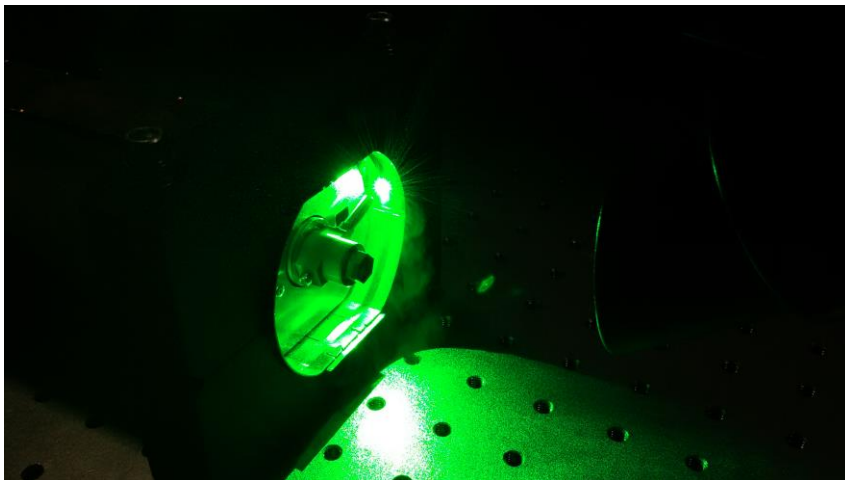
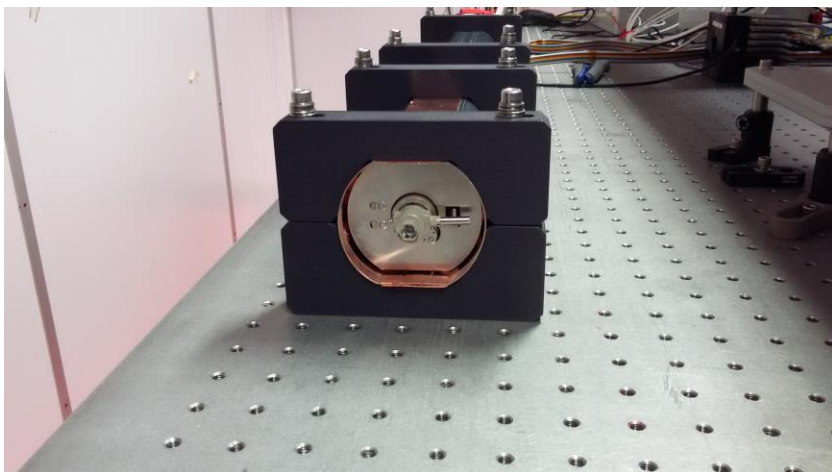
Robot – longitudinal movement accuracy measurements

The tests were done inside the beam screen in several points along its length. Measurement accuracy $\sim 20 \mu\text{m}$.

1. Static clamping test: sequence main clamps \rightarrow main & sled clamps \rightarrow sled clamp \rightarrow main & sled clamps \rightarrow main clamp.
2. Dynamic clamping test: robot crawling in the beam screen.



First LESS treatment done by the robot



Next steps in LESS treatment

- Laser parameters optimization taking into account the geometry of the beam screen and the experience gained w.r.t. groove depth vs. best SEY.
- Nitrogen flow optimisation.
- Treatment of 700 mm beam screen to finalise parameters.
- Treatment of 2.2-meter long beam screen.



Thank you