



**Do you have a femtosecond @ CERN ?**

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## Content:

- How short is a femtosecond?
- Our experience at CERN
- Ideas for Baltic industry - what to do at CERN?
- Conclusions

HOW SHORT IS A FEMTOSECOND?

384.000km – 1sec



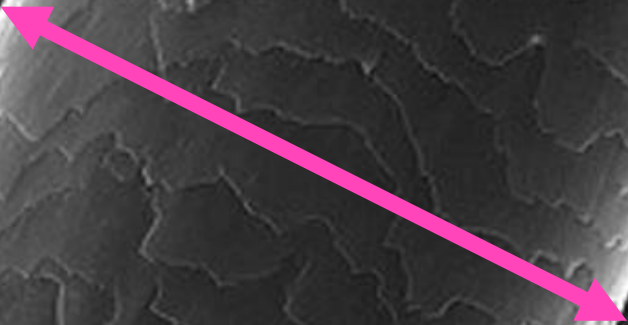
12.740km

3.475km

# HOW SHORT IS A FEMTOSECOND?

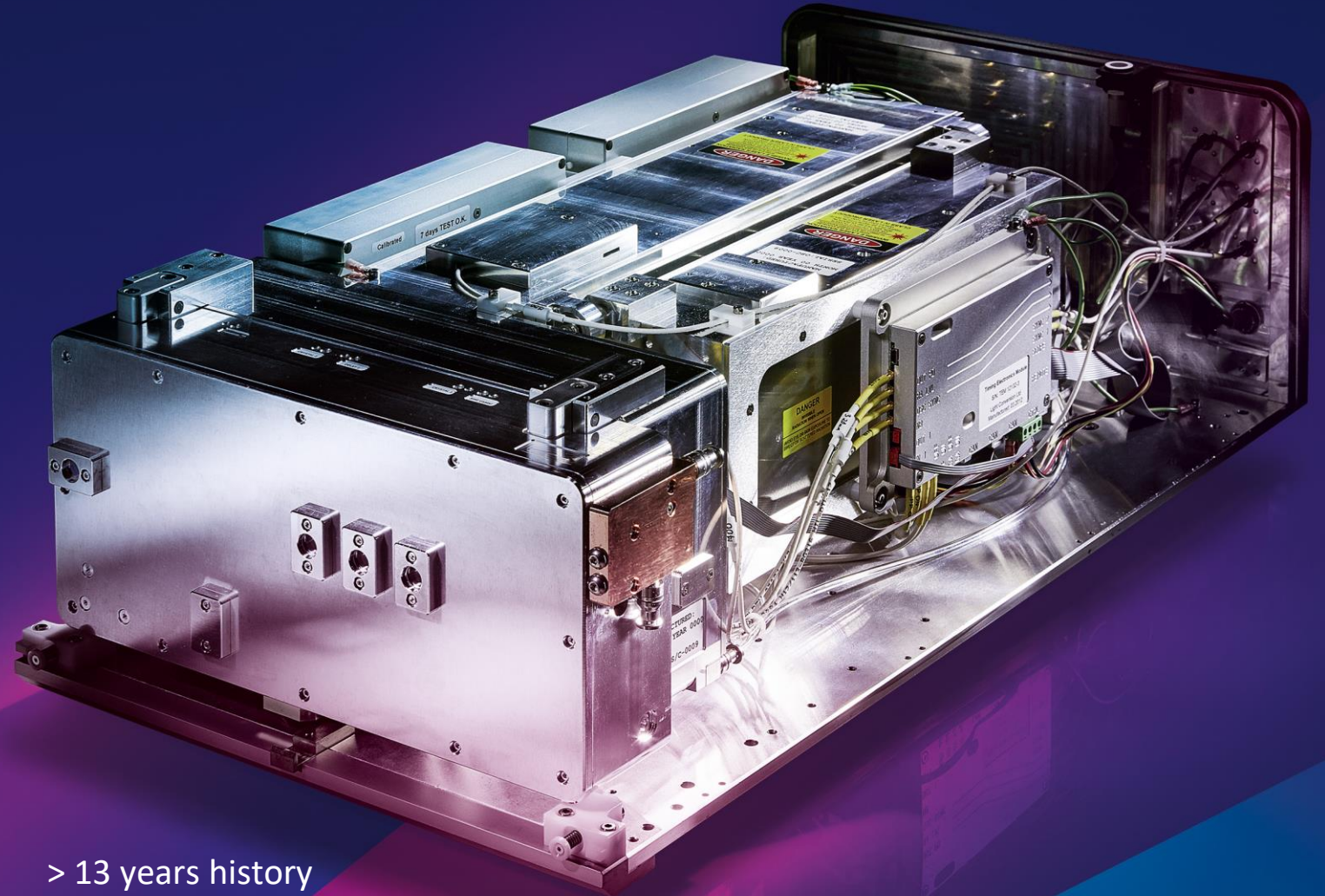
Human hair

80  $\mu\text{m}$  – 200 fsec



# PHAROS

- Industrial design
- Flexible output :
  - pulse duration (190 fs – 20 ps)
  - repetition rate (single pulse – 1 MHz)
  - output power up to 20 W
  - pulse energy up to 2 mJ
  - wavelength converters (UV - midIR)



> 13 years history

30 % - scientific, 70 % - industrial

> 1500 systems installed

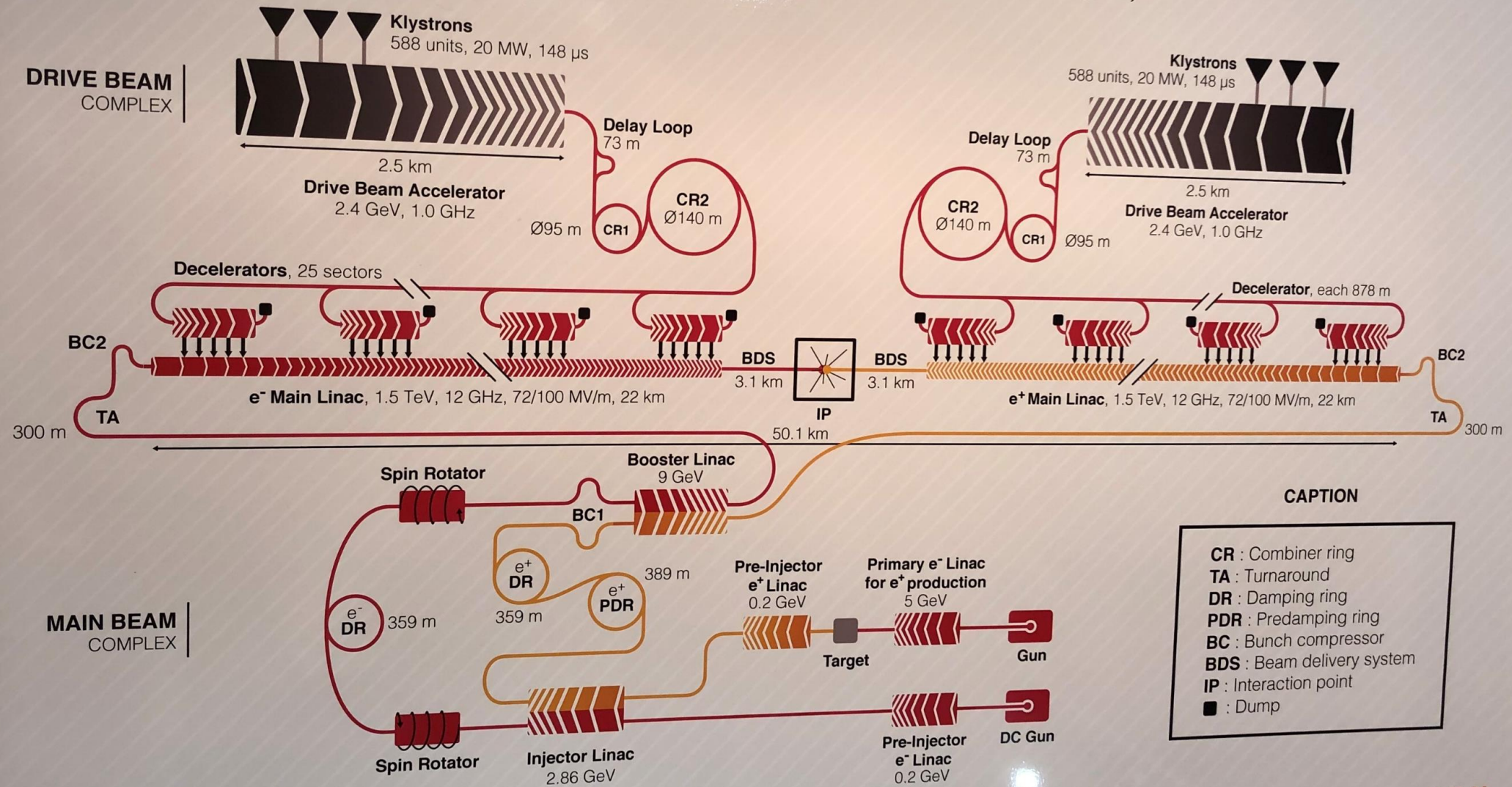


# CLIC - Compact Linear Collider

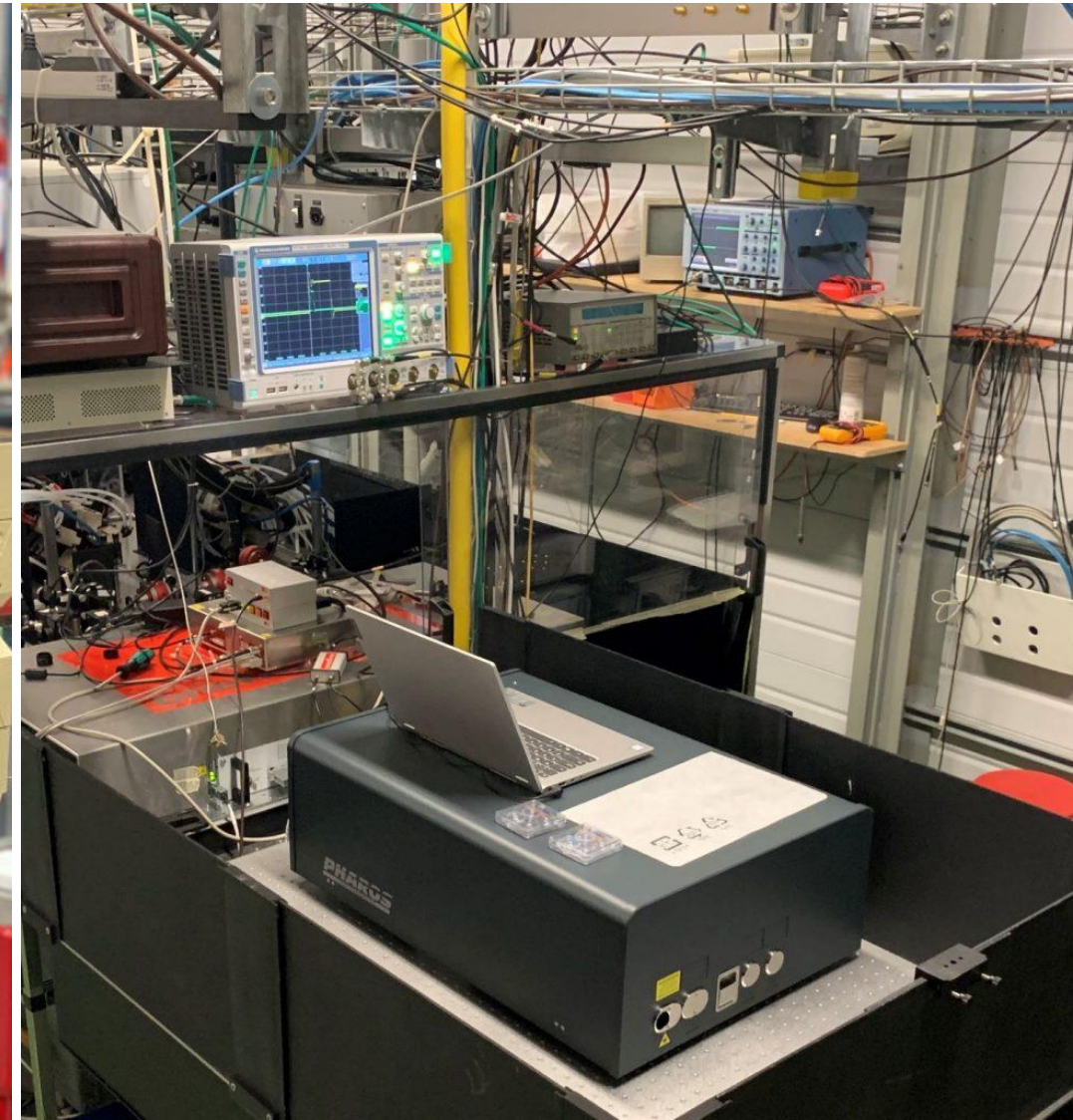
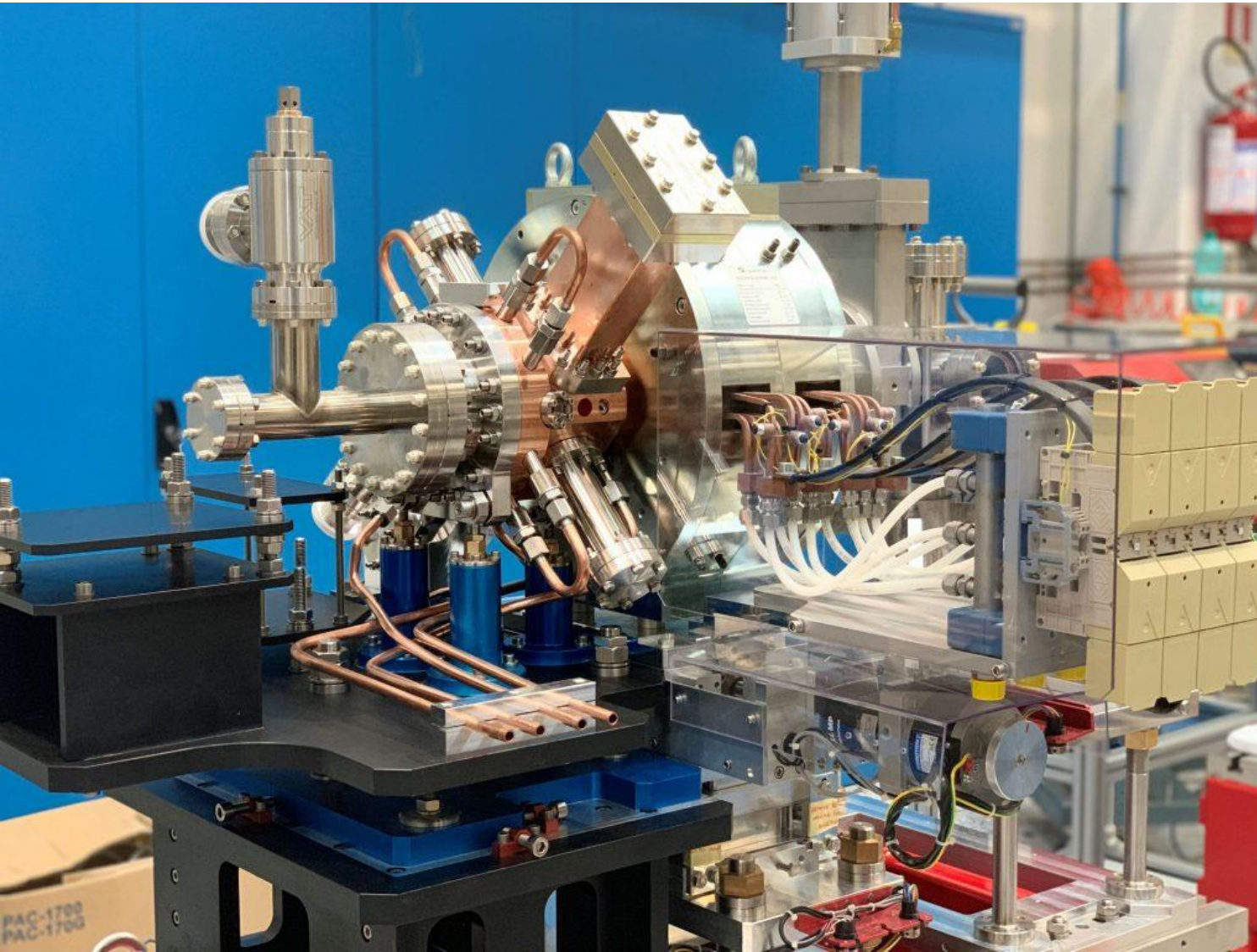
## CLIC - Collisionneur Linéaire Compact



A future accelerator to go beyond the findings of the Large Hadron Collider (LHC)  
 Un futur accélérateur pour aller au-delà des découvertes du grand collisionneur de hadrons (LHC)







Source of photoelectrons for CLIC. Dr. Eduardo Granados



FEMTOSECOND LASER  
INDUCED PERIODIC  
SURFACE STRUCTURES  
(LIPSS)

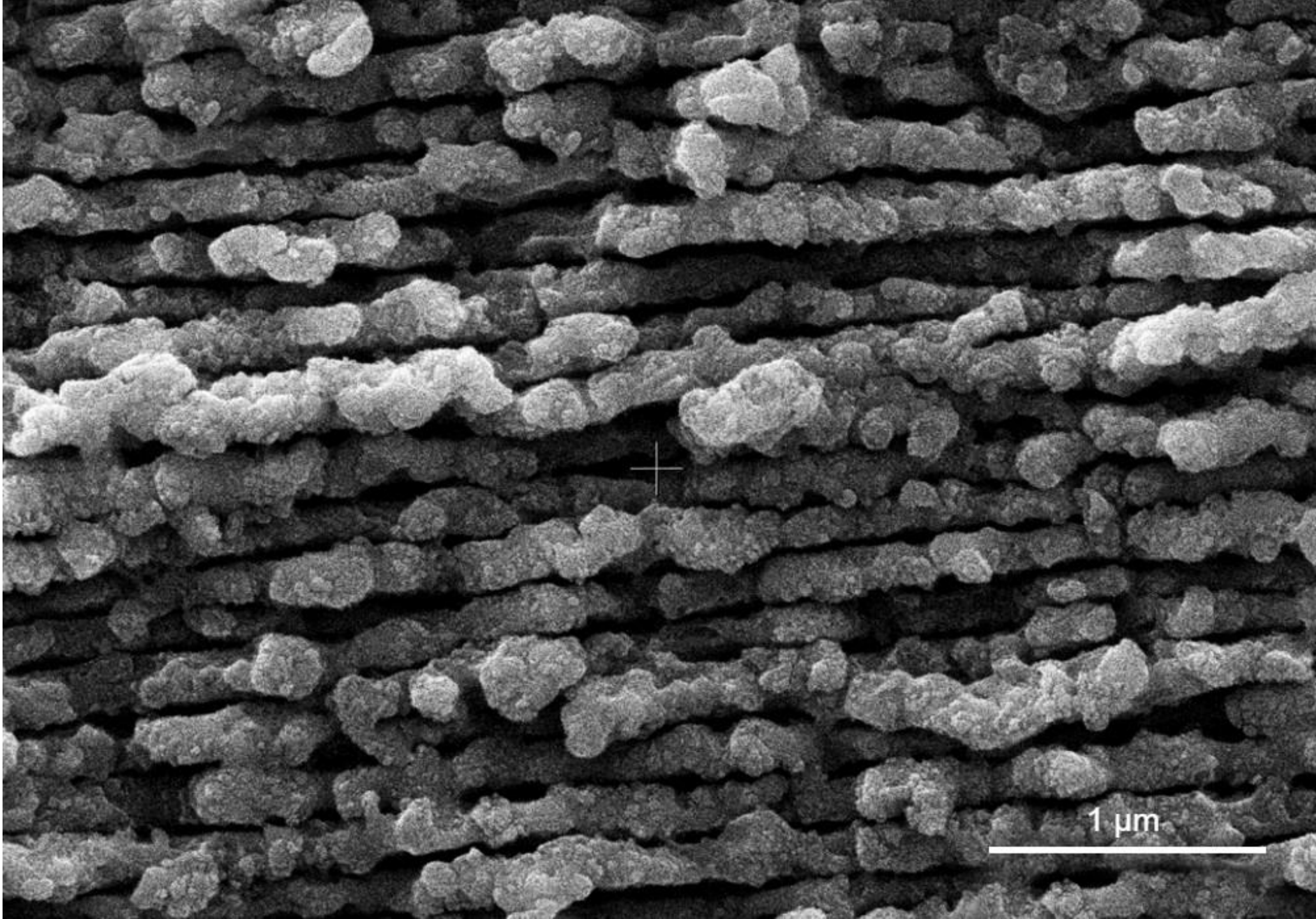
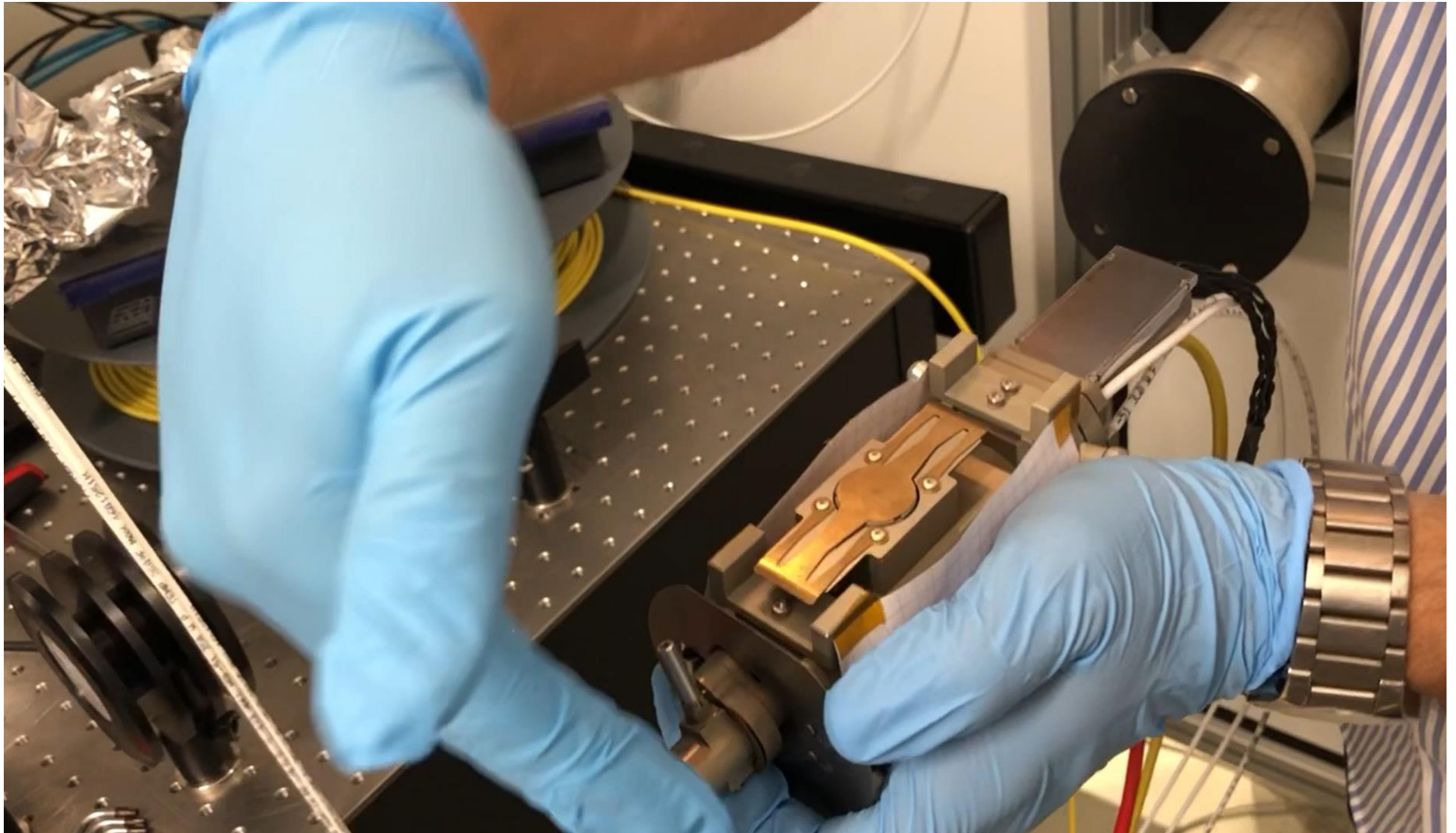


Photo credit: *Workshop of Photonics*

<https://wophotonics.com/applications/surface-structuring/>

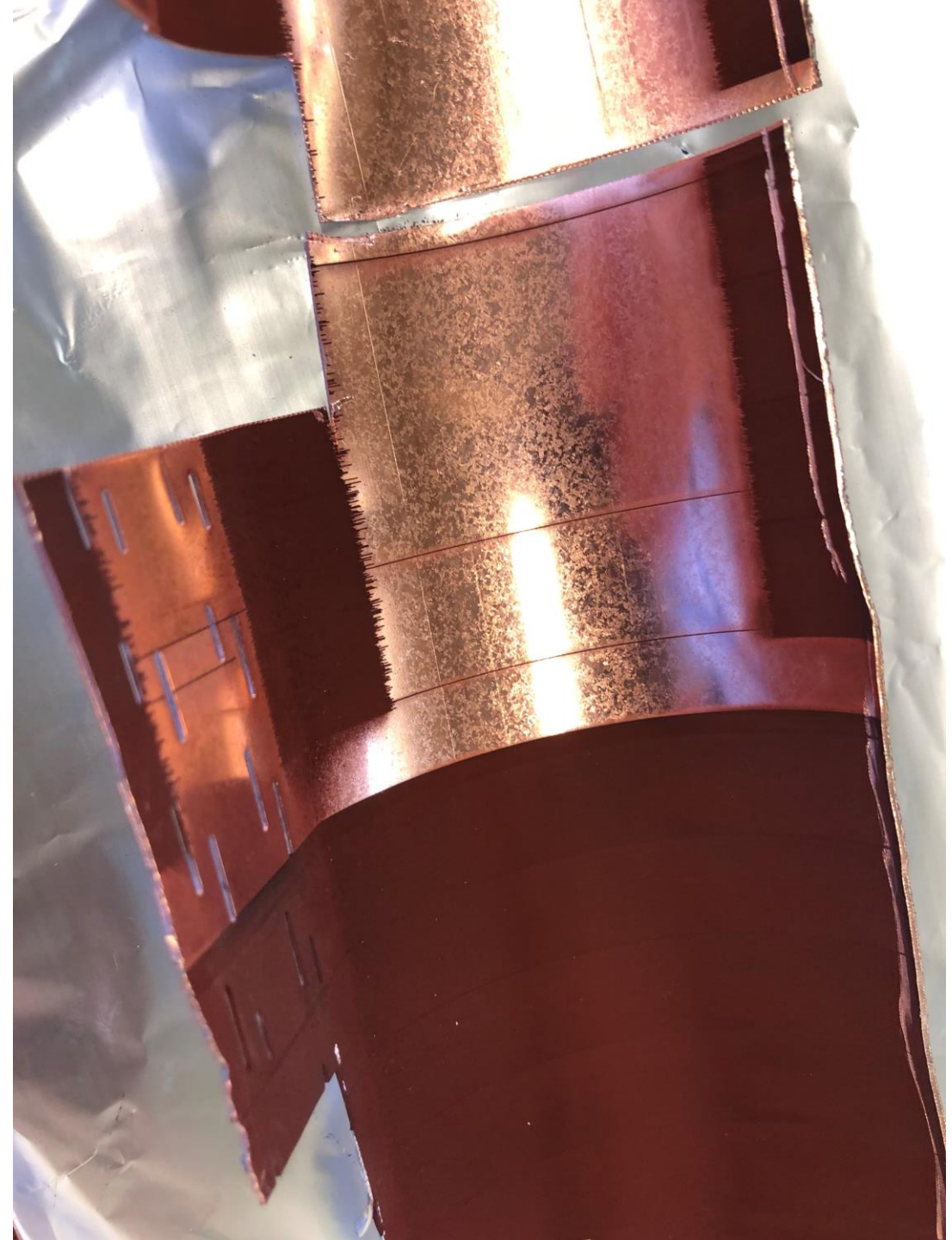


# ROBOT (WORM) FOR LASER PROCESSING OF INNER SURFACE OF THE TUBES





# LASER SURFACE STRUCTURING OF INNER SURFACE OF COPPER TUBE





UHF and SHF  
electronics for driving  
a prototype of CLIC





Copper parts for  
transferring energy  
from GHz  
electromagnetic  
waves to accelerating  
particles

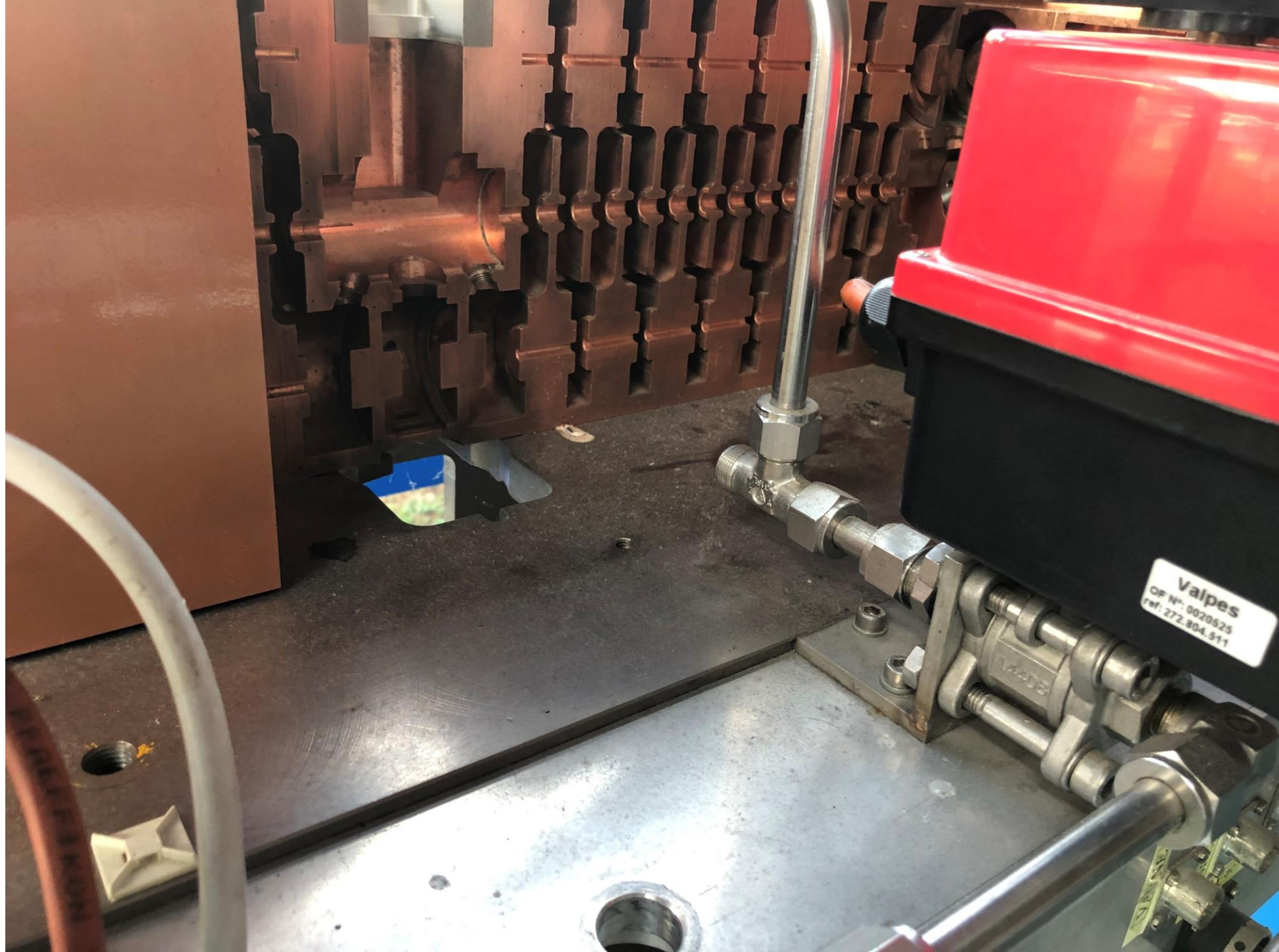


Photo from CERN museum



## Conclusions

1. CERN needs very specific scientific equipment which requires a lot of investments to design it.
2. May be this is a chance for Baltic universities and scientific institutes if we manage to organize cooperation between companies and academia.



**Thank you!**

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**Do you have a femtosecond?**