

PlasmaLab@CTU for fusion education - chapter 1: upgrades of magnetic diagnostics and lithium evaporator, educational activities

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PlasmaLab@CTU

- CTU has fusion programmes for Bc, MSc, PhD in Czech and English
- International programmes: Double degree with Ghent University (PhD), FusionEP (MSc)
- CTU holds a unique position in terms of the quality of its experimental teaching facilities.

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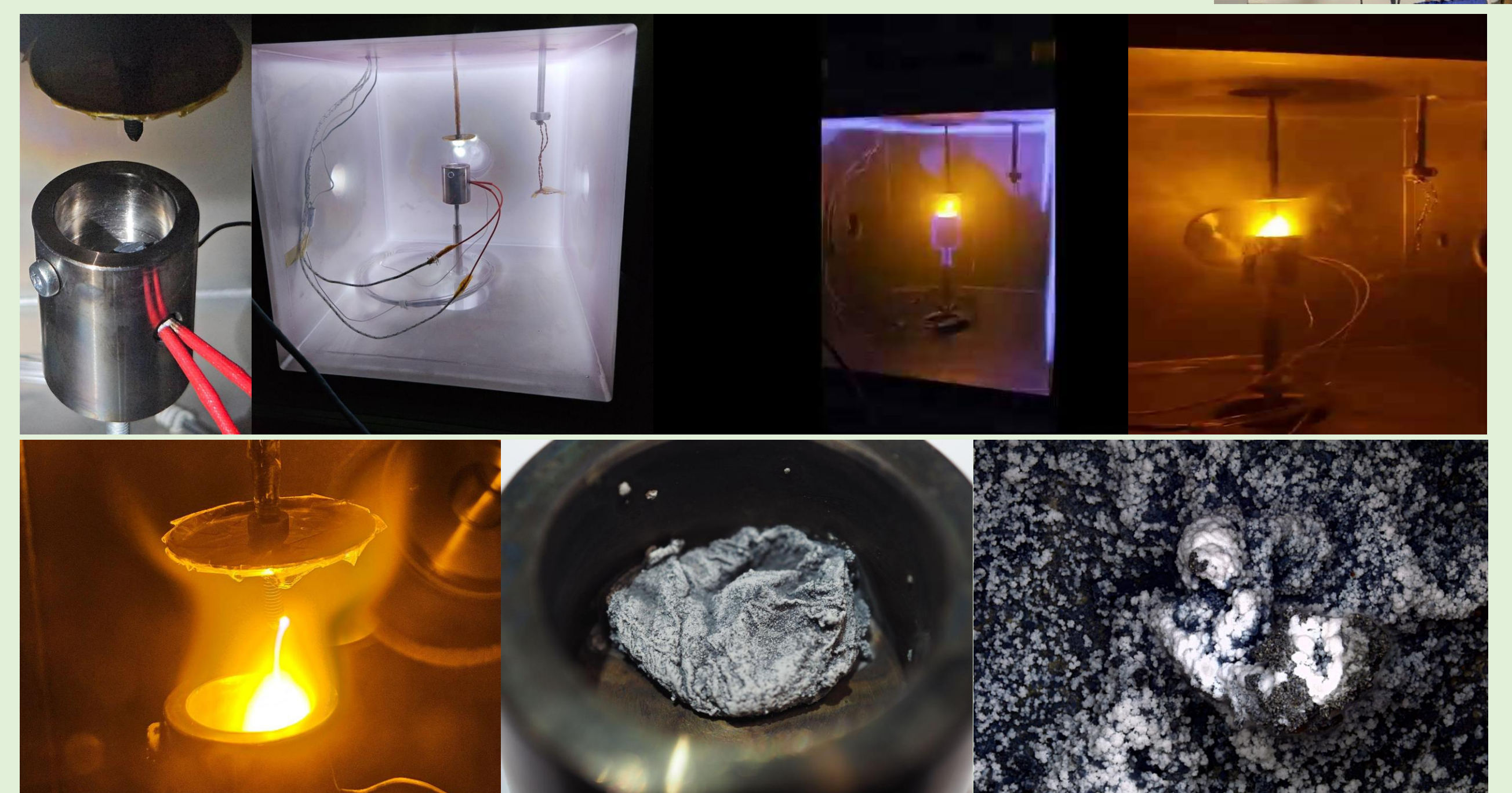
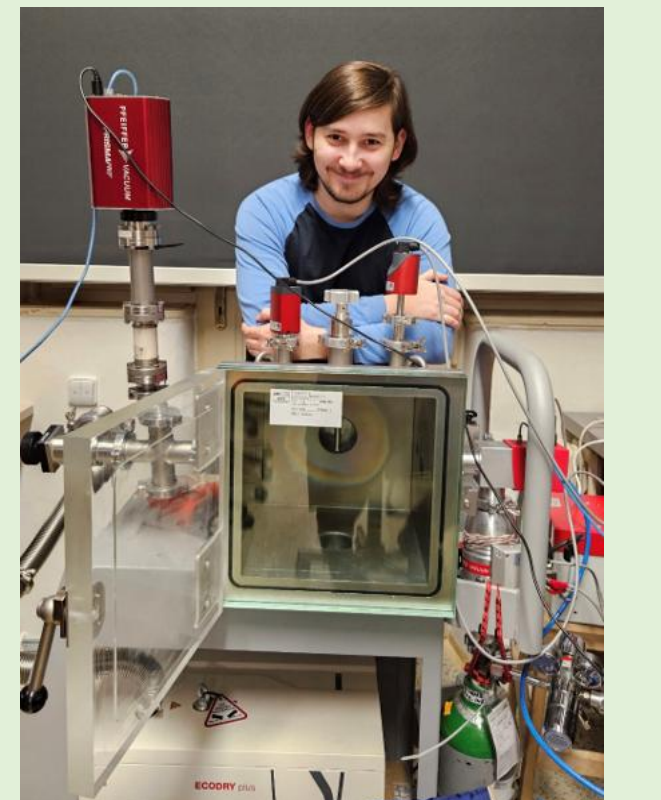
Webpage: www.plasmalab.cz

- | | | |
|----------------------|------------------------|----------------------------|
| • 3D microscope | • Paschen curve | • Linear magnetic trap |
| • Laser spectroscopy | • Resonance cavity | • 3D Printer |
| • Sonoluminescence | • Electrostatic probes | • Microwave interferometry |
| • Vacuum cube | • Magnetic probes | • Discharge tubes |



EMTRAIC

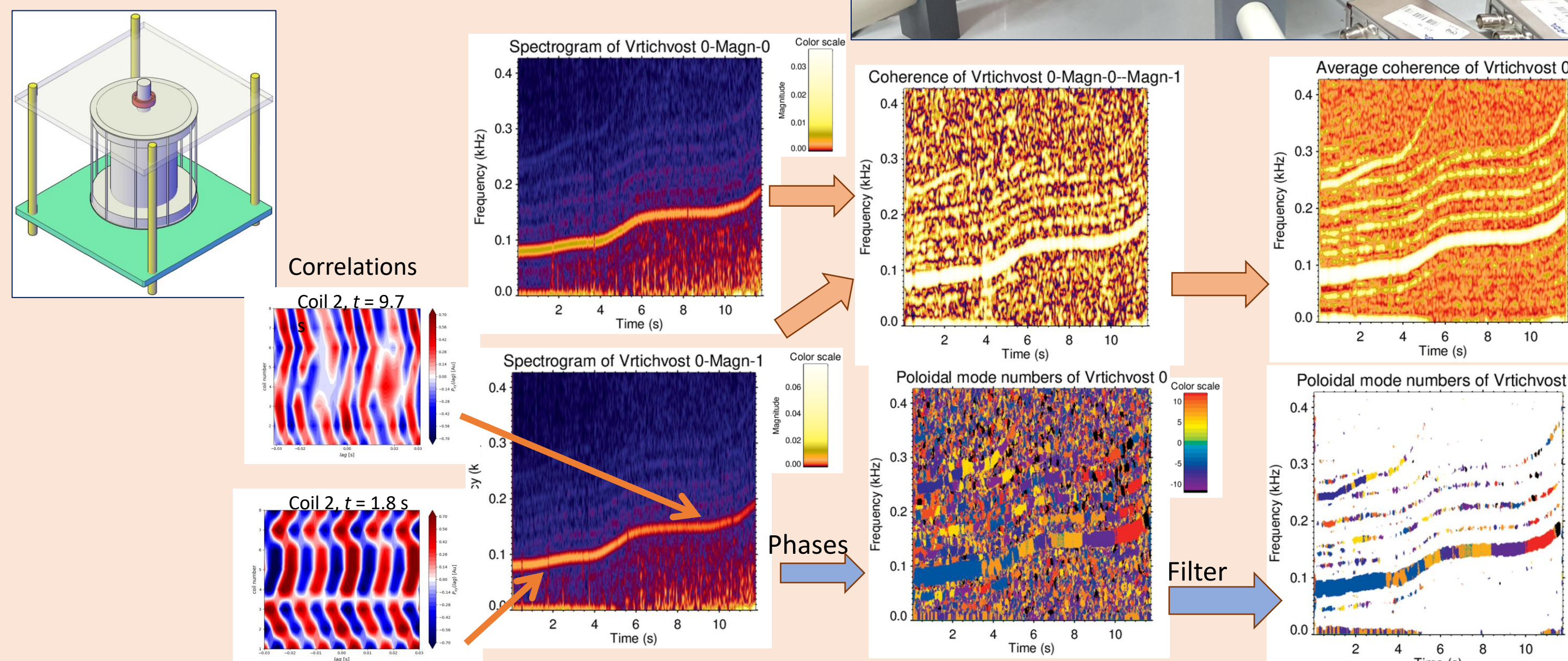
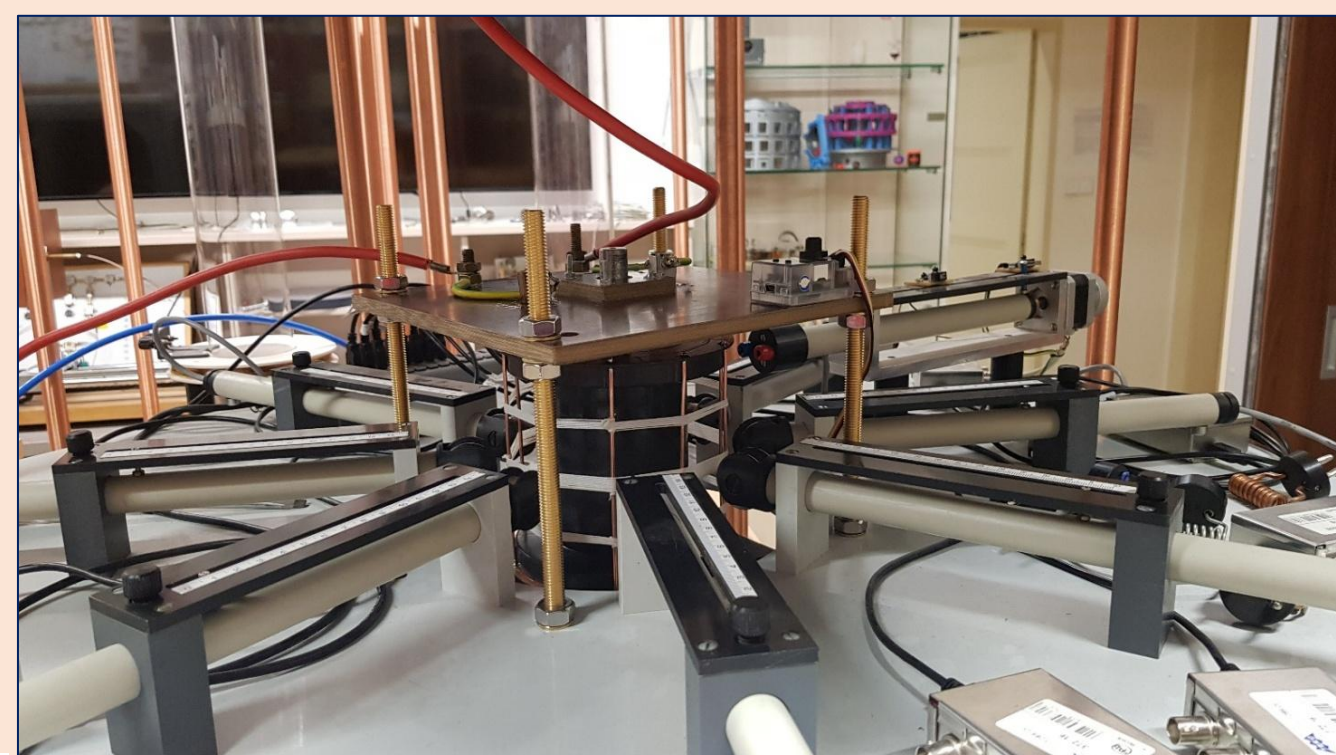
- Winter school for the FUSION-EP international fusion Master degree
- Performed at the IPP Prague at the Compass tokamak
- One task in PlasmaLab for past 3 years
- **2025: Lithium evaporation tests**
 - New glass for The Cube: *Šlososklo*
 - Future use in GOLEM tokamak



Vrtichvost

Simulates magnetic islands/ MHD structures

- 10 wires connected instead of one central
- The structure rotates
- First test connection: in series ~ mode number = 5
- Current: DC up to 4 A ~ comparable to current perturbations in tokamaks
- Mode frequency = rotation frequency x 5:



Events

Nigerian Summer school

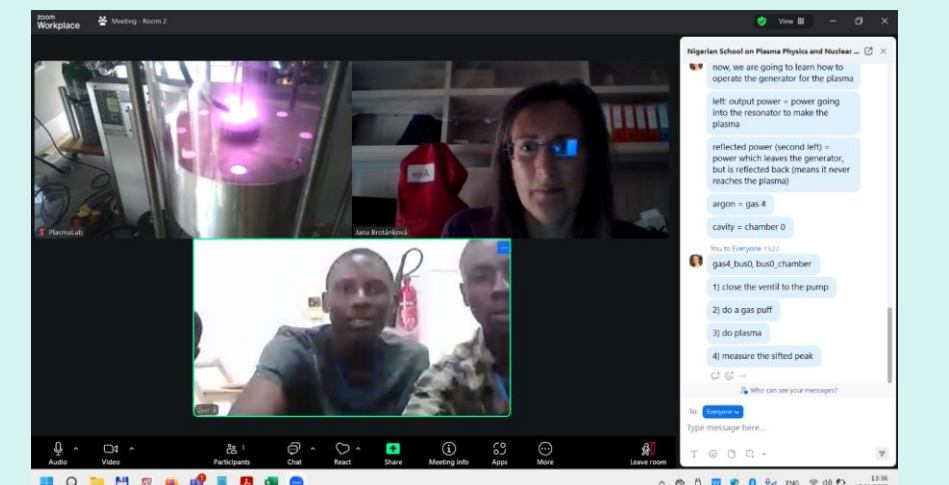
- First Nigerian Summer School
- Organized FULLY by students of Fusion EP
- Main organizer from Prague (Bohouš – *Godsfavour Amanekwe*)
- PlasmaLab@CTU contributed by doing one task remotely – resonance cavity
- Recognized by the Nigerian embassy in Prague

Week of science at the FNSPE

- One week event for high school students interested in physics
- Training in fusion diagnostics; contribution in a student conference

Become a woman scientist for one day

- PR one day event for high school girls interested in physics
- One afternoon in the lab with an experiment in fusion
- 2 minutes shot in Nova evening news (significant part from PlasmaLab) 😊



High School project - fusor

SOČ – Inclusion of High School students

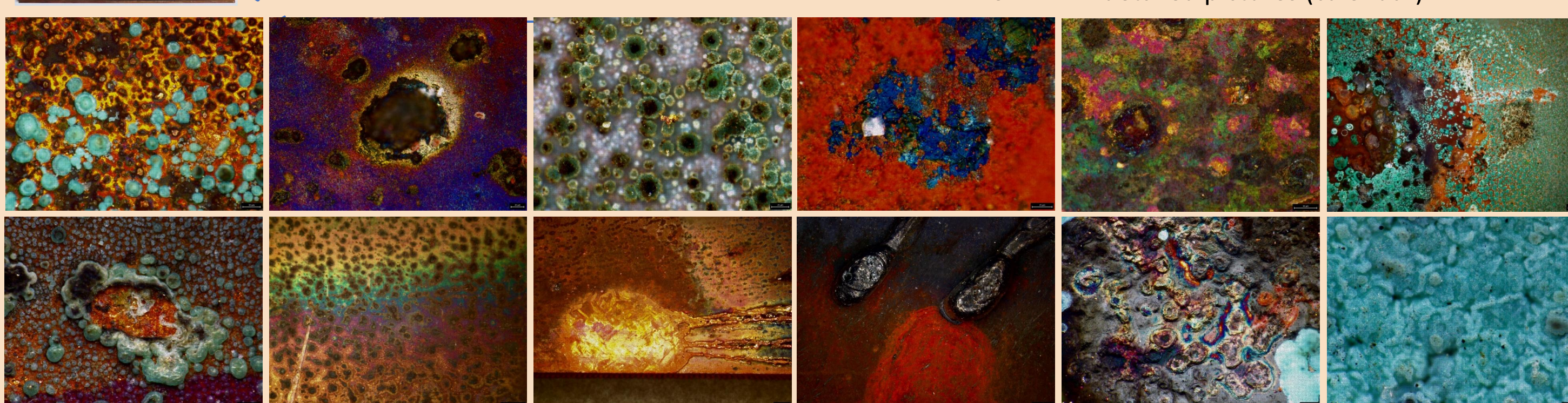
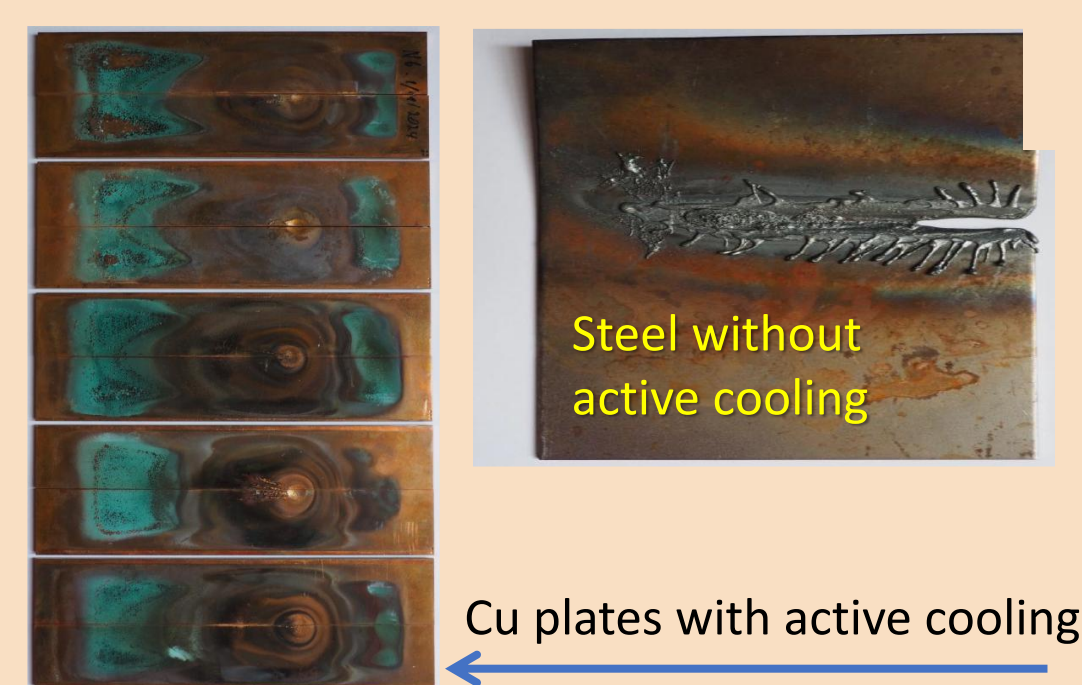
- *David Havelka*, 2nd grade
- Plan: to make a fusor which will achieve fusion reactions in deuterium
- First step: tests of the configuration in Argon
- Manufacturing of a new source up to 30 kV
- October 2025: presentation of the experiment (and fusion) at a seminar in his school



STEAM

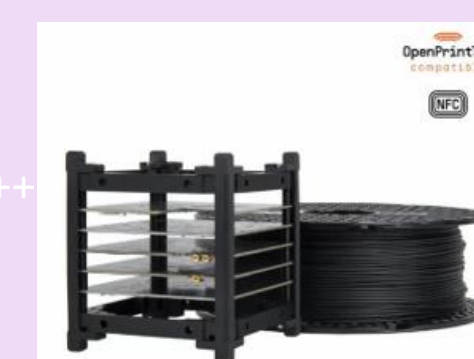
STEAM - Cu tiles for active cooling in divertor

- GOAL: New type of cooler for extreme heat-fluxes above 100 MW/m²
- STEAM (Super-Thermal Exchange via Advanced Micro-boiling) Technology for heat resistant plasma-facing components, TAČR project
- Microscopy analysis of oxidized surface and lamellas
- Byproduct: PR items - exhibition pictures, calendar



3D printer – vacuum tests of a new space filament

- Producer: Czech company Prusa
- Filament used in space satellites
- Suitable for vacuum
 - Tested for outgassing and mechanical robustness
 - Not for outgassing in vacuum chambers
- **Our task: check whether we can use it in our systems**



PRUSA RESEARCH
by JOSEF PRUSA

References

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- J. Horacek et al., Innovative STEAM Heat Shield Withstanding Steady-state Extreme Heat Fluxes ~ 80 MW/m² tested for 1/2 hour, poster at PFMC-2, 2025
- V. Muralidhara Srivatsa, S. Sabu, Testing of Lithium source function in a vacuum box, EMTRAIC report 2025
- https://mzv.gov.cz/abuja/en/news_events/czech_tokamak_golem_helps_advance_fusion.html
- <https://fjfi.cvut.cz/tyden-vedy-na-jaderce>
- <https://fjfi.cvut.cz/cz/stan-se-na-den-vedy>
- FUSION-EP: <https://www.em-master-fusion.org/>

Public Relation

Faculty PR movie

PR – underestimated underrated mission



PF 2026 of the faculty 😊

- Took good 3 days with the movie makers in the lab
- Result: 59 sec movie as a faculty teaser for high school students – the headlight movie at the main faculty page

Cooperating laboratories

PlasmaLab@TU/e

- Laboratory with the same concept
- Eindhoven University of Technology, Netherlands
- Remote laboratory
- Instituto Superior Técnico, Lisbon, Portugal

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