MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

SP B.2, PWIE-SP B.2.T-T001 [Material migration in toroidal and linear plasma devices]

D005: WEST campaigns: perform detailed surface analyses (including SEM, RBS, NRA) for selected Phase 2 samples to characterize their erosion and deposition profiles (MPG)

D011: AUG experiments: determine erosion and deposition patterns on samples exposed to AUG plasmas and/or boronizations – project coordination and initial surface analyses (MPG)

Kick-off Meeting 29.04.2026

EUROfusion

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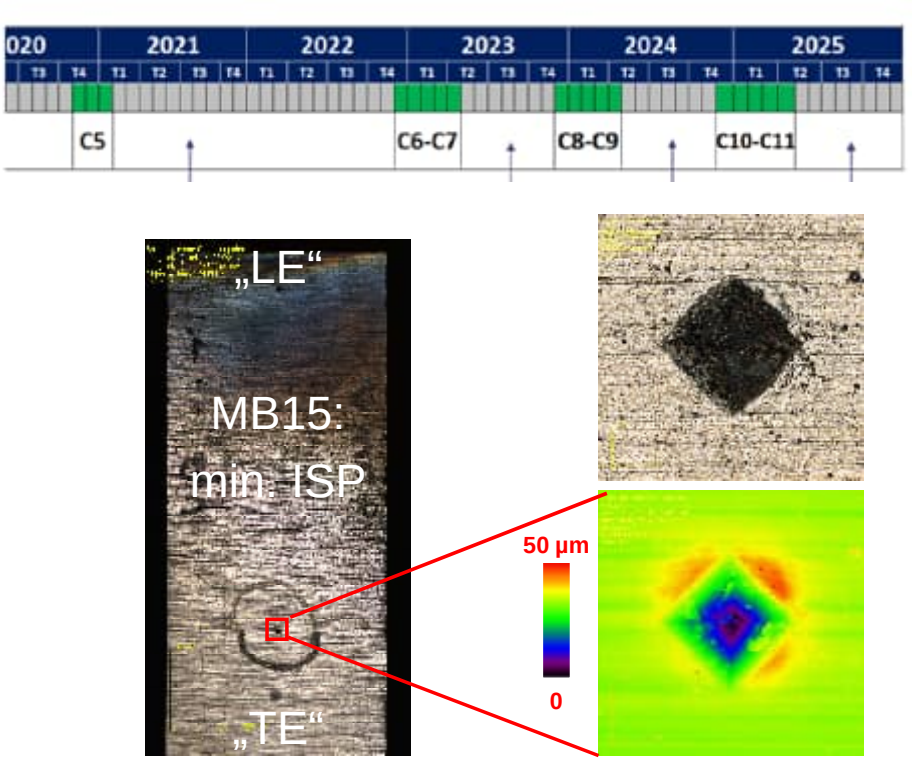
WEST (D005): Post-characterisation of erosion indents PFU357 after C9

- **<u>Idea</u>:** Decrease of depth micro-indents on W-monoblocks as indicator for erosion
- **Pre-characterisation: 2021** (before C6) → *CEA*
- **Intermediate-characterisation:** with confocal microscopy after C7, C9, C11 → *CEA*
- **Cutting of one PFU** (after dismounting C9)
- **Post-characterisation:** CLSM & SEM with EDX & FIB → *MPG*



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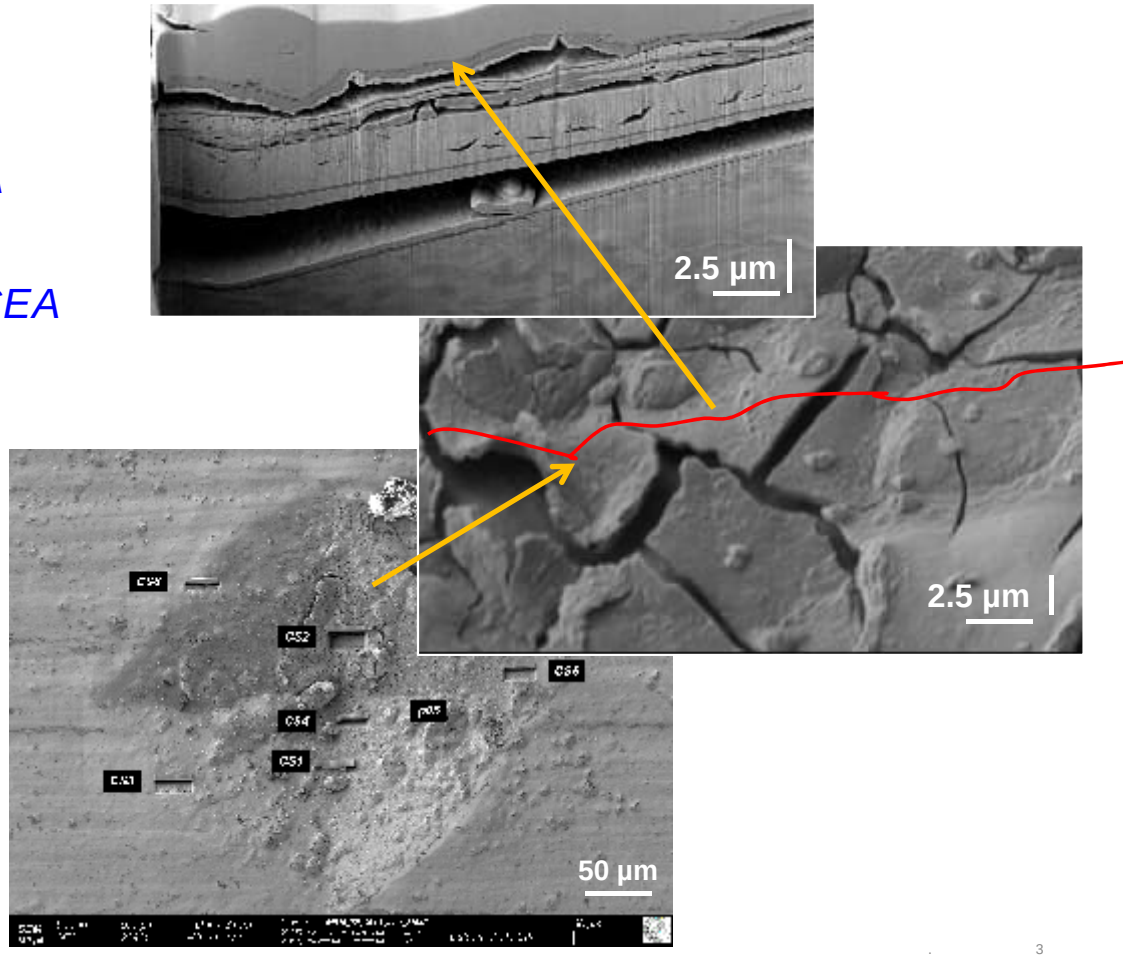
→ Deposition may reduce depth loss (erosion)
→ Deposition preferred in indents

→ **Plan**: SEM/FIB analyses of 4-6 monoblocks
→ assess influence on the intermediate results
→ 1st results

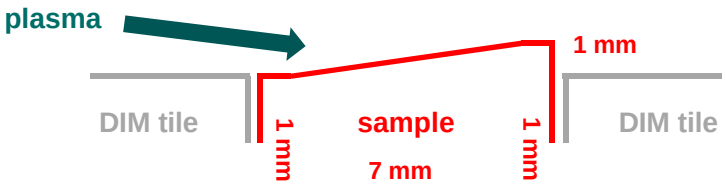
PFU357-MB15: min. ISP – TE

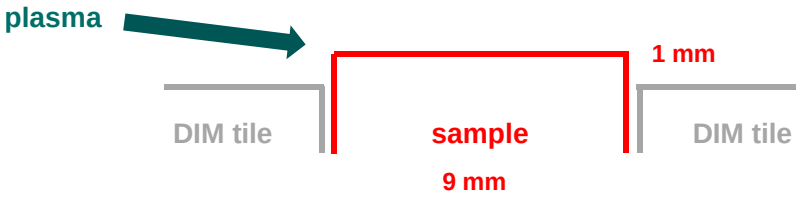


AUG (D011): DIM melting experiments for campaign 2026

- Two pairs of **gap samples** made of **tungsten** with 8° slope (0.5 and 2 mm gap width)
- **AUG exposure spring 2026**
- **Post-characterisation** with CLSM to determine melting volume and shape
- Possibly SEM

- Two pairs of samples made of **heavy alloys** with **leading geometry** (1 mm)
- **AUG exposure spring 2026**
- **Post-characterisation** with CLSM to determine melting volume and shape
- Possibly SEM





AUG (D011): Ion beam analysis of tokamak samples Boronization

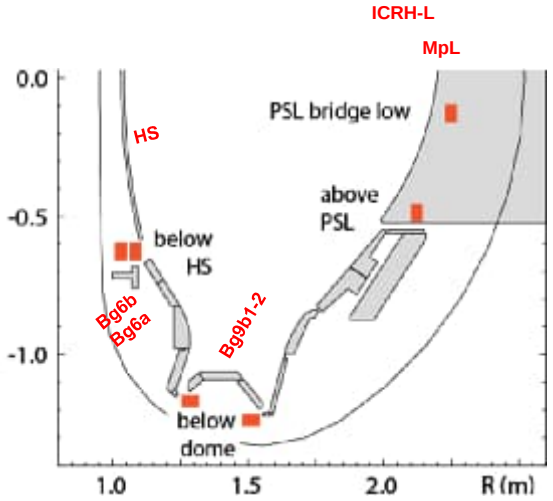
- **2026 AUG and WEST campaigns include GDB and boron IPD studies with exposure of witness samples (**SS316, Mo, W substrates**)**

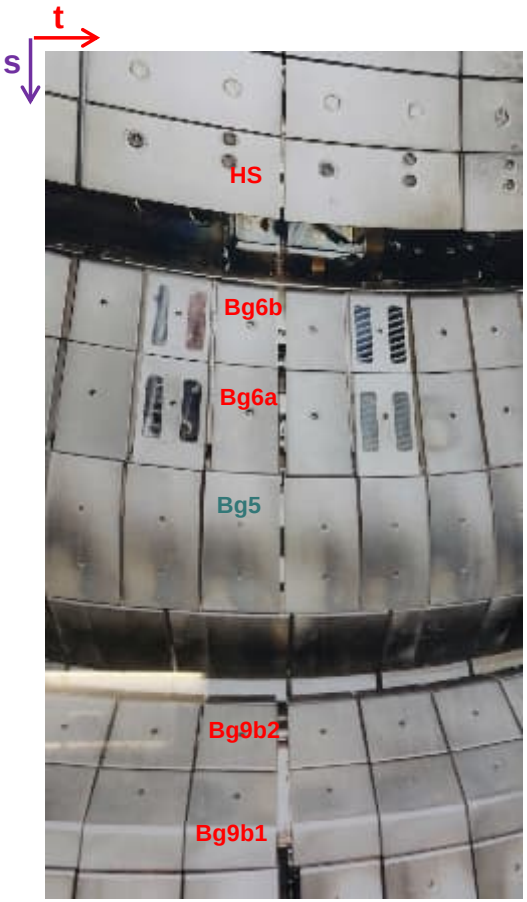
- **Samples will be analysed for B, D and low-Z residual impurities (C, O) using ^{3}He induced nuclear reactions (**K. Krieger**)**
- **Accelerator time budget ~ 4 days (AUG samples) + ~2 days (WEST samples)**
- **Complemented by SEM/EDX and FIB analysis (**M. Balden**)**

AUG (D011): Ion beam analysis of tokamak samples
Deposition / erosion

- 9 new pre-characterised tiles mounted before AUG campaigns 2024/25
- Post-characterisation mostly done (NRA and SEM)
- Data evaluation still ongoing
- 1st results presented at PSI

- 7 new tiles and 2 tile (ICRH) remounted for AUG campaign 2026
- Tiles probably available after AUG summer opening 2026 for post-characterisation



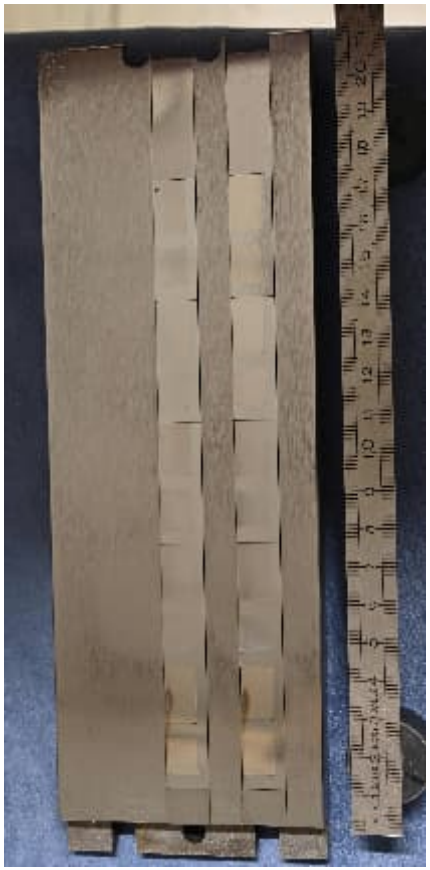


AUG (D011): Erosion of Pt-marker samples after H-mode and L-mode exposure on the DIM-II (2025)

- **Two DIM experiments: L- and H-mode**
- **Stripe of 6 samples with Pt marker with 30 nm and 120 nn thickness**

- **Post-characterisation with SEM techniques**
- **1st run** (*Feb*)**: Focus on H-mode samples with 120 nm Pt to support µ-NRA at RBI** (*March/April*)
- **Samples at RBI**
- **2nd run: increase data base & tackle issues arose from NRA/RBS results gained**
  (e.g. higher W on Pt marker than beside)

H-mode

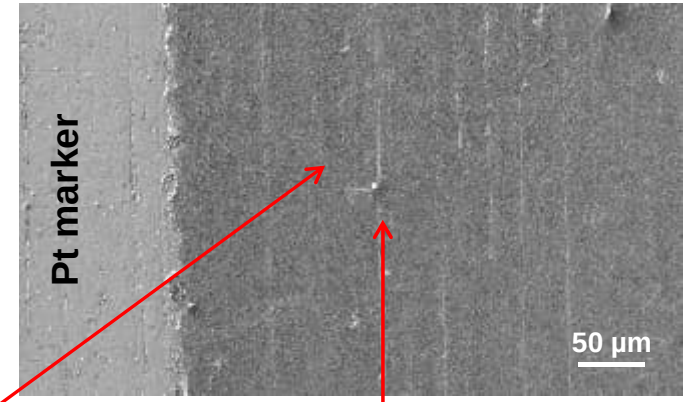


30 nm 120 nm Pt

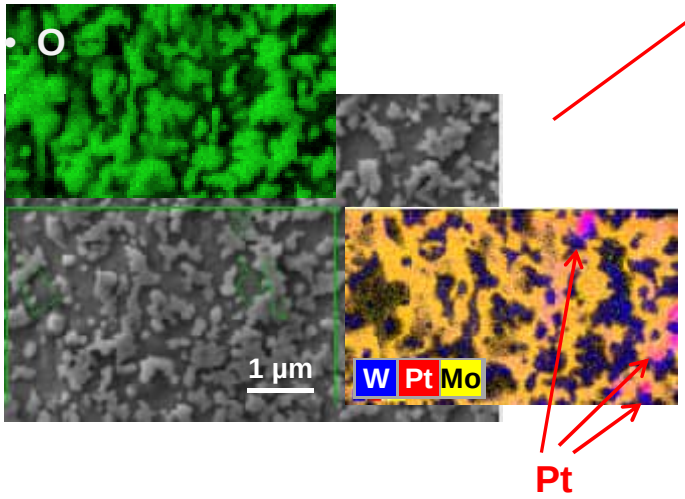
Samples mounted on holder for SEM

AUG (D011): Erosion of Pt-marker samples after H-mode and L-mode exposure on the DIM-II (2025)

- Example from L-mode sample with 120 nm Pt marker
- Analysed position: at S=1056 mm about 200 µm away from marker edge



Fine structure (oxygen)



Pt in grooves