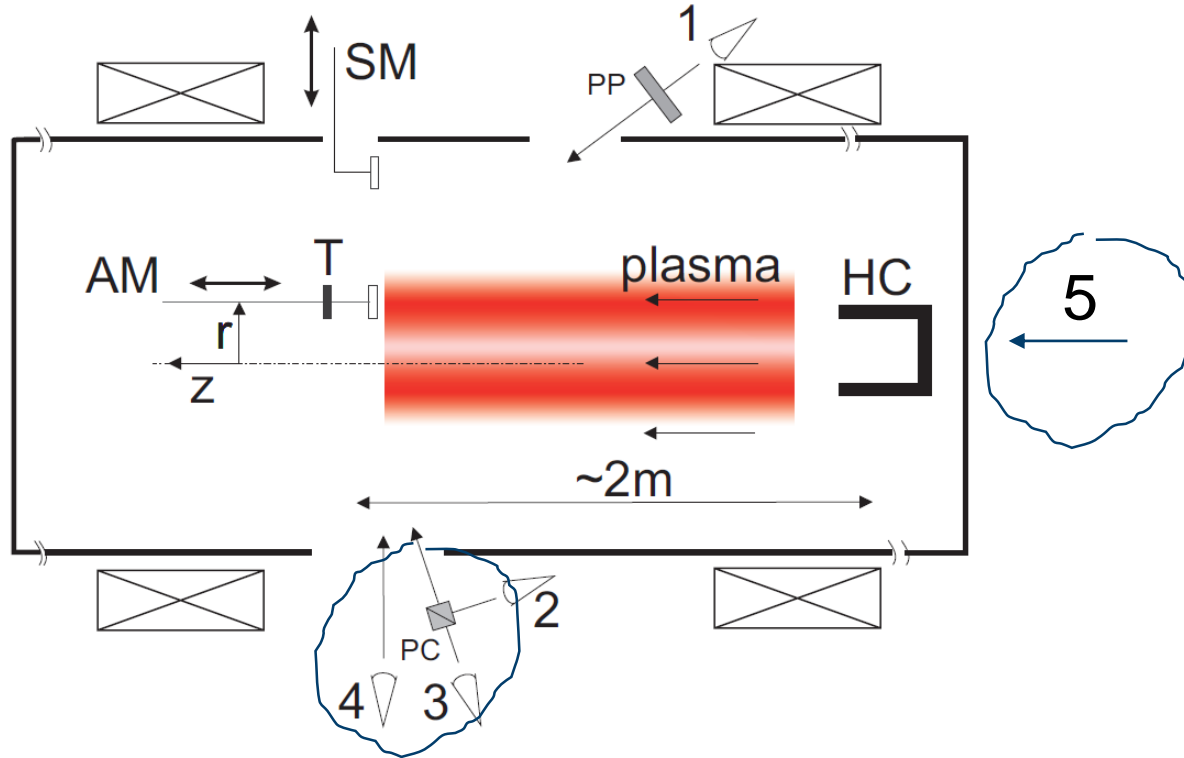# FZJ ACTIVITIES IN 2021: EROSION RATES OF W MODEL SYSTEMS IN PSI-2 - PLANS AND CAPABILITIES
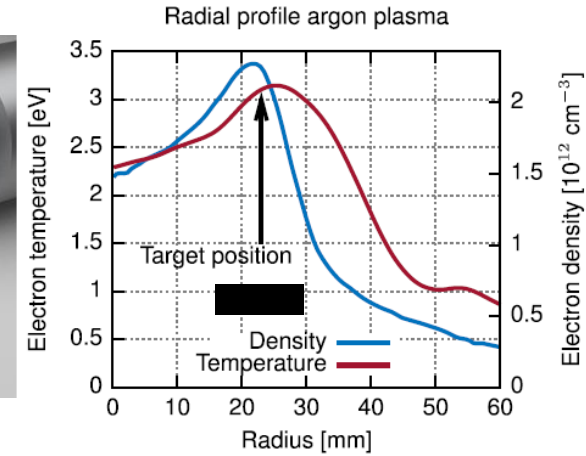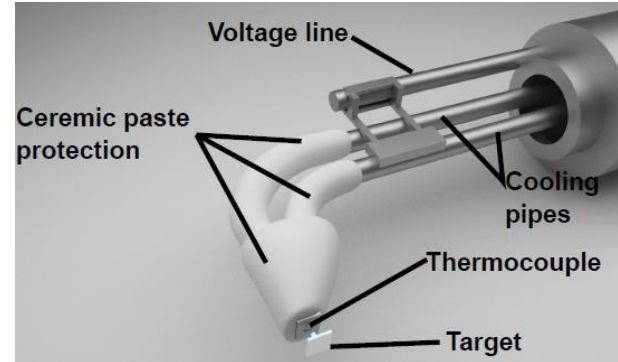
Oleksandr Marchuk

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Partner of the Trilateral Euregio Cluster (TEC), 52425 Jülich, Germany

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Erosion

(1-5 are the line-of-sights)

- Study of erosion and redeposition of W atoms/ ions using spectroscopy

- W targets: poly W, W (111), W (110), W (100)

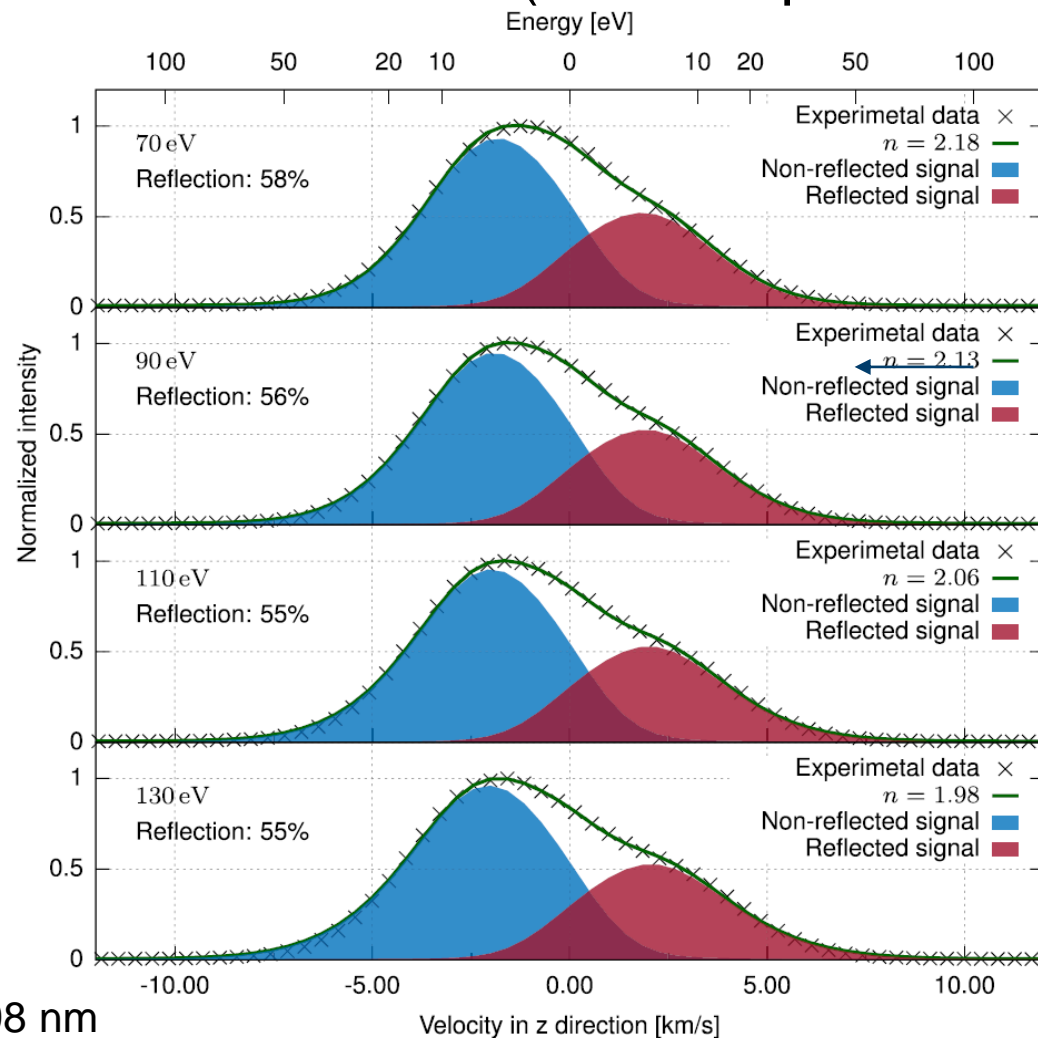Plasma pressure : 0.01…0.1 Pa

Electron temperature: 1..20 eV

Electron density: $10^{10}…10^{12}$ cm^{-3}

Magnetic field: 0.025…0.1 T

Ionization degree: 1-5%

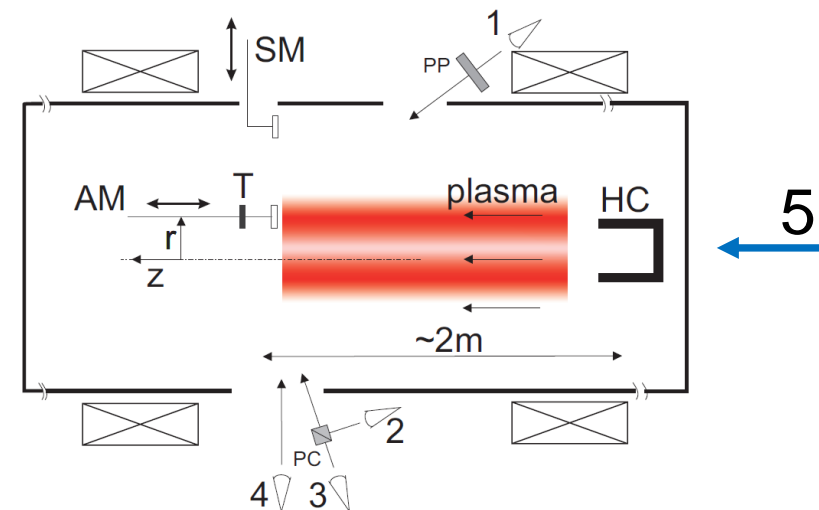Targets: $13 \times 13 mm^2$

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Example of erosion of W (Line shapes of W lines)

Figure 6. Shown is experimental data for different impact energies of the Ar ions in black and the modeled spectra in green. The fitting parameter n increases for decreasing impact energies. The degree of light reflectance was modeled and is displayed in the graph.

W I @ 498 nm
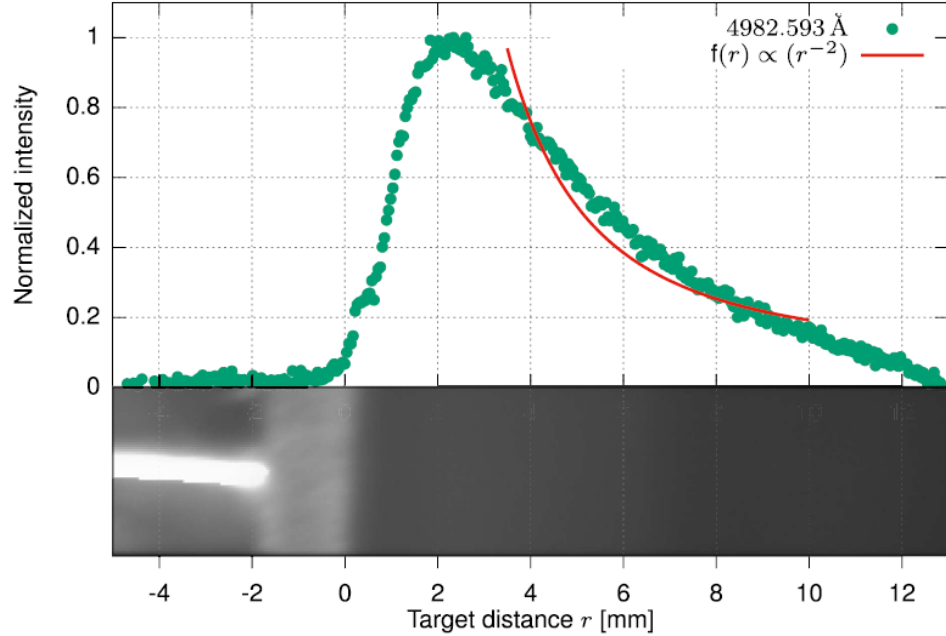
7

Example of erosion of W (Emission Profiles)

Figure 3. Shown is the spatial development of line intensity emitted by sputtered W at 4982.593 Å, as a function of distance to the target. The atoms were sputtered by Ar ions with 80 eV in the linear plasma device PSI-2 and the emission was observed via an imaging spectrometer. Further details on the setup can be found in [12]. The lower part of the figure shows the target detected by the spectrometer in zeroth order.
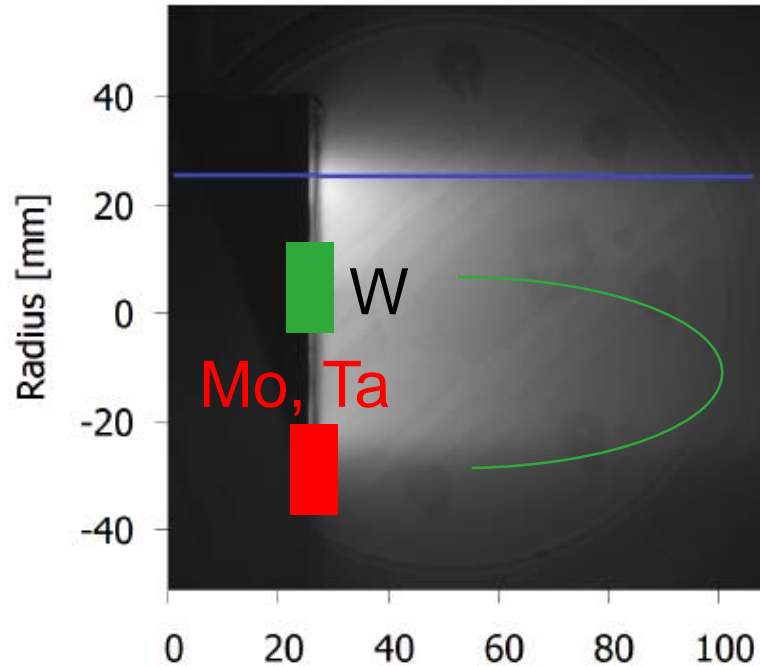
Ertmer et al, J. Phys. B: At. Mol. Opt. Phys.54(2021) 025401 (9pp)
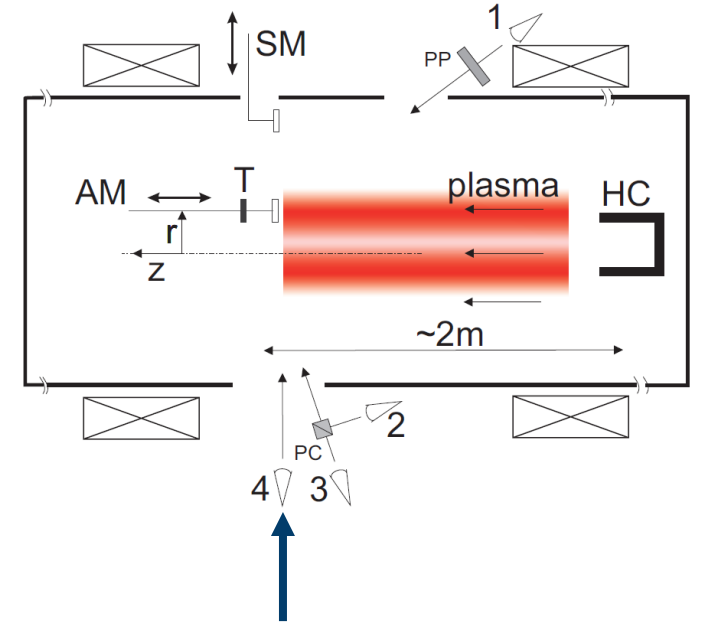
- Population distribution of W I by erosion

- Benchmark of atomic codes (ERO, ..) and CRM models

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Erosion and redeposition (small magnetic field B)

I. Targets on the holder

II. Targets on the holder + small target
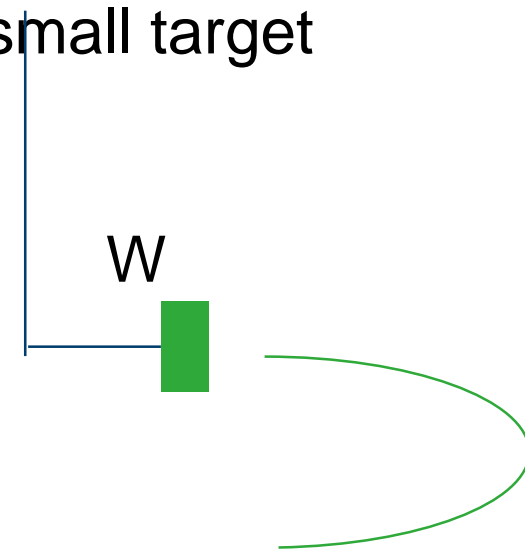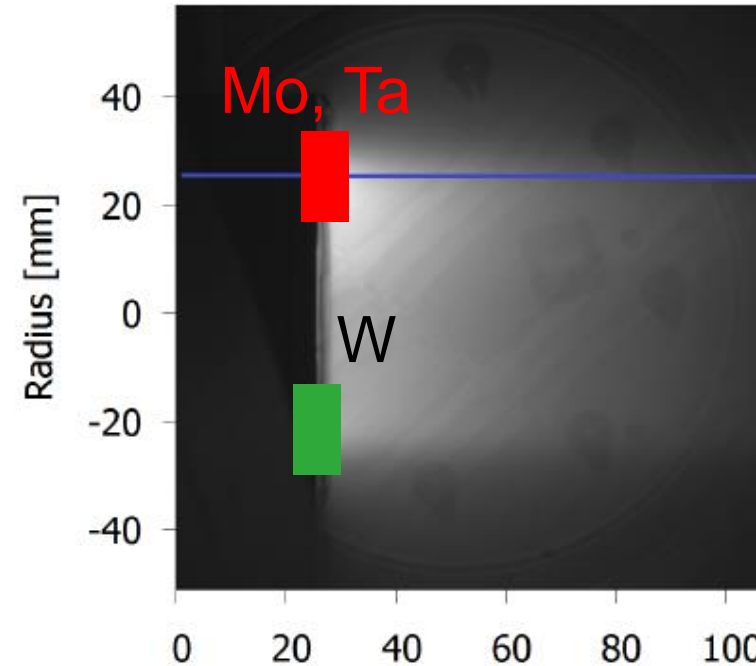
I. Sputtering of W target and redeposition at the plate

II. Sputtering of W target at the small target and redeposition on the W, Mo, Ta plates

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- Extend the measurements from VIS (350 -..) to near UV (200 -300 nm)

- Study of erosion of W targets with given roughness, etc.. using spectroscopy
  on small targets of W first
  (sputtering by Ne to increase the electron temperature to address the CRM models)

- Experiments to erosion and redepostion using big targets with small catchers.
  - Combination of both manipulators at PSI-2 (biased /not biased)
    to achieve the redeposition of W on W
  - In addition to standard techniques use of polarization for W (Brewster angle)

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