P 18: Helmholtz Graduate School HEPP IV

Time: Thursday 14:00–15:15 Location: P-H12

P 18.1 Thu 14:00 P-H12

Microstructure and deformation behaviour of drawn W wires
— •Maximilian Fuhr[1,2], Nuttawan Ketkao[1,3], Till Höschen[1], Nico Hempel[2], Martin Balden[1], Wolfgang Pantleon[4], Jürgen Almanstötter[5], David Rafaja[3], Johann Riesch[1], and Rudolf Neu[1,2] — [1]Max-Planck-Insitut für Plasmaphysik, Garching, Deutschland — [2]Technische Universität München, Garching, Deutschland — [3]TU Bergakademie Freiberg, Freiberg, Deutschland — [4]Technical University of Denmark, Lyngby, Dänemark — [5]OSRAM GmbH, Schwabmünchen, Deutschland

Tungsten (W) shows a pronounced transition from ductile deformation behaviour at high temperatures to brittle behaviour at low temperatures (ductile-to-brittle transition). Standard, coarse-grained W exhibits transition temperatures T_{DBT} around $300^\circ\ C$, rendering it unsuitable for structural applications below T_{DBT}. The transition is shifted to lower temperatures by cold-working W in wire drawing, rolling or a severe plastic deformation process. Sufficiently cold-worked W materials deform plastically at room temperature and below. The reasons for the shift of T_{DBT} are connected to the deformation-induced microstructural changes. Thus, we performed the first systematic study focusing on the structure-property relations of a series of sequentially drawn potassium-doped W wires. The combination of careful microstructural investigations (electron backscatter diffraction (EBSD), X-ray diffraction (XRD)) and various mechanical tests performed at room and elevated temperatures allow for new insights into the deformation behaviour of drawn W wires.

P 18.2 Thu 14:25 P-H12

Edge Transport and Fuelling Studies via Gas Puff Modulation in ASDEX Upgrade
— •Christian U. Schuster[1,2], Elisabeth Wolfrum[1], Emiliano Fable[1], Rainer Fischer[1], Michael Griener[1], Balazs Tal[1], Clemente Angioni[1], Thomas Eich[1], Peter Manz[3], Ulrich Stroth[1,2], and the ASDEX Upgrade Team[1] — [1]Max-Planck-Institut für Plasmaphysik, Garching — [2]Physikdepartment E28, Technische Universität München, Garching — [3]Institut für Physik Universität Greifswald, Greifswald

In a tokamak the edge profiles of temperature and density are crucial for a multitude of aspects such as the L-H transition, the achievable pedestal top pressure, or the achieved fusion power itself. The processes that determine these profiles are transport on one hand and sources on the other. Especially for the density profile these processes are not sufficiently understood to predict profiles for future devices.

To characterize the edge transport in a quantitative way, we modulate the fuelling gas flow to perturb the plasma. We then use the transport code ASTRA as forward model and several diagnostics in an integrated data approach. This allows us to determine various quantities, depending on the available experimental data and the quality thereof. In particular we find particle transport coefficients, fuelling properties, and correlations of transport to other quantities. The transport coefficients are not constant in time: already slight perturbations of the plasma alter them, especially just inside the separatrix. We present results for various plasma scenarios ranging from L-modes to H-modes with and without large ELMs.

P 18.3 Thu 14:50 P-H12

Studies of propagating ICRF slow waves
— •Felix Paulus, Volodymyr Bobkov, Helmut Faugel, Helmut Fünfgelder, Oleksii Girka, Roman Ochoukov, Hartmut Zohm, and ASDEX Upgrade Team — Max-Planck-Institut für Plasmaphysik Garching

Heating a plasma with ion cyclotron range of frequencies (ICRF) waves is an established technique in tokamaks. While the design of ICRF antennas aims to launch one solution of the plasma's dispersion relation (fast wave), the other is an unwanted by-product (slow wave). The slow wave propagates in low-density plasmas only and is usually confined to a small region in the scrape-off layer (SOL) or in the limiter shadow in present-day tokamaks. ICRF systems for future devices as ITER or DEMO will need to cope with a propagating slow wave in front of the antenna since a relatively large clearance is foreseen. Studying the slow wave is important because it modifies the antenna near-field and poses a mechanism for transporting plasma-wall interactions.

An approach to study the ICRF slow wave propagation in the ASDEX Upgrade (AUG) tokamak SOL is demonstrated. RAPLICASOL simulation indicates that in SOL relevant plasmas the slow wave manifests in so-called resonance cones. Experiments on the test stand IShTAR are presented where resonance cones were launched from an RF antenna and detected by probing the oscillation of the plasma potential. Based on these results, experiments on AUG are prepared. Preliminary results from these experiments with the slow wave launched from plasma-facing components of the antenna periphery are shown and compared to simulations.