Wendelstein 7-X
Operation campaigns OP 2.4 & OP 2.5

MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

Task Force II: Edge Scenario Development

Main objective	Deliverable
Controlled divertor operation	▪ Steady-state scenarios that integrate high core performance (T_i > 2.5 keV) with divertor detachment (f_{rad} > 80%) and improved particle exhaust (p_n > 1E-3 mbar in low-iota sub-divertor and/or p_n > 3E-3 mbar in high-iota sub-divertor) ▪ Demonstration of long-pulse detached operation (≥6 GJ energy turnaround) ▪ Explore divertor performance and resilience of strike line location with respect to equilibrium evolution in configurations with chaotic edge topologies ▪ Characterize divertor transport in underexplored regions of plasma parameter and magnetic configuration space, including low collisionality, limiter configurations, and small plasmas
Empirical scaling of edge performance towards a next-generation device	▪ Characterize how SOL profiles (heatflux, T_e, n_e, etc.) scale with power, density, and field strength ▪ Maximize sub-divertor neutral pressure and characterize its scaling with power, density, and magnetic configuration ▪ Characterize scaling of radiation distribution, stability, and impurity enrichment
Material erosion, transport, and migration in 3D	▪ Validation of PWI modelling via characterization of carbon/tungsten PFC erosion and retention/transport in SOL ▪ Test novel materials and characterize far-SOL charge-exchange neutrals using sample exposure ▪ Advance wall conditioning techniques, including steady-state powder dropper, ion cyclotron wall conditioning, and boronization