Main Objectives of TF II in OP2.1 and OP2.2

Main Objective	Scientific Goal	Measures of Success / Deliverables
▪ Integrated scenarios for long-pulse operation with PFC heat load control, efficient particle exhaust, and impurity screening	▪ Control of divertor/baffle loads and actuation of heat load distribution ▪ Studies on particle exhaust and optimization of plasma fueling schemes	▪ Demonstration of safe divertor scenarios to avoid overloaded plasma-facing components ▪ Determination of trim and/or control coil currents required to correct error fields ▪ Demonstration of effective pumping, high divertor compression, and qualification of fueling actuators ▪ Demonstration of long-pulse operation (1 GJ energy turnaround)
▪ Development of long, stationary divertor detachment scenarios with and without impurity seeding	▪ Creating conditions for detachment by tailoring edge plasma conditions and impurity seeding ▪ Compatibility of stationary detachment with high-performance scenarios ▪ Development of detachment scenarios with efficient exhaust	▪ Demonstration of scenarios with long, stationary divertor detachment; in particular, for the high-mirror, high-iota and standard configurations ▪ Characterize the conditions under which detachment is possible ▪ Achieve rapid transition to detachment

▪ Exploration of scenarios compatible with carbon-free operation and tungsten PFCs	▪ Migration (erosion, deposition) of tungsten-based materials and assessment of operation limits ▪ Edge scenario development for metallic plasma-facing components	▪ Definition of the operation limits associated with plasma-facing components containing tungsten materials ▪ Characterize the scrape-off layer retention for tungsten impurities (eroded from baffle and heat shield) ▪ Determination of erosion effects due to seeding impurities ▪ Characterize enrichment/accumulation for low-Z and high-Z impurities
▪ Development of wall conditioning procedures	▪ Optimization of glow discharge cleaning, boronization, and qualification of dedicated wall conditioning discharges with ECRH/ICRH	▪ Condition walls to enable plasmas with high density gradients necessary for high performance
▪ Reference discharge	▪ Validation of edge models ▪ Tracking of plasma/wall conditions ▪ Analysis of configuration dependences (incl. reversed field operation)	▪ Regular performance of a standardized discharge with defined diagnostic coverage throughout campaign