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

Main Objective	Scientific Goal	Measures of Success / Deliverables
▪ Exploration of reduced turbulence / high performance scenarios w.r.t. stationary plasma conditions, kinetic-, density-, and impurity-profile control	▪ Demonstrate steady-state viability of increased performance scenarios after pellet / impurity injections as well as low ECRH/NBI heated plasmas ▪ Qualify actuators for the control of profiles and impurities	▪ High plasma performance in the order of seconds, including ○ T_i above clamping limit (1.5 keV) ○ τ_E equal or better to ISS04 scaling ▪ Avoidance of impurity accumulation ▪ Assessment of density profile control
▪ Exploration of heating scenarios using upgraded plasma heating capabilities (ECRH, NBI, ICRH)	▪ Extension of NBI operation space and preparation of fast ion diagnostics ▪ Observation and prediction of fast ion losses for the validation of simulations tools	▪ Demonstrate effective ion heating ▪ Exhaustive operational map of the W7-X configuration space incl. operation limits ▪ Validation of fast ion loss simulation tools ▪ Demonstration of safe operation of heating systems
▪ Develop high beta plasma scenario by means of low field operation	▪ Development of a plasma startup scenario @ B=1.7 T employing X3 / ICRH / NBI heating ▪ Fast ion confinement at high plasma-beta	▪ Reliable plasma startup scenario at low magnetic field ▪ Assessment of capabilities for the demonstration of improved fast ion confinement of W7-X at high beta ▪ Develop capability to extrapolate B-field dependency to high-field reactor operation