Main Objectives for OP2.1/2.2 – TF-III

…and scientific goals

1. Complete the core transport and stability physics basis in the extended operational space

- *Identify fundamental heat and particle transport mechanisms*
- *Continue the assessment of W7-X optimization*

2. Complete the edge and SOL physics basis in the magnetic configuration space of W7-X

- *Characterize parallel and perpendicular SOL transport regimes and validate transport models*
- *Characterize three-dimensional edge + SOL profiles and asymmetries*

3. Exploitation of low-field high-beta scenarios to demonstrate W7-X optimization

- *Characterize MHD equilibrium and stability at high beta and beta/magnetic field effects on turbulent and neoclassical transport.*
- *Characterize magnetic field modification due to high beta and assess implications for edge plasma.*

Main Objectives for OP2.1/2.2 – TF-III

Main objective

- **Complete the core transport and stability physics basis in the extended operational space**

Scientific goals

- *Identify fundamental heat and particle transport mechanisms*
- *Continue the assessment of W7-X optimization*

Deliverables

- Documentation of relevant plasma profiles for detailed transport analysis and modelling.
- Assessment of the effects of heating and fueling actuators (profile shaping, fast ions) and magnetic configuration on turbulent transport.
- Documentation of core impurity profiles and perturbative experiments for detailed impurity transport analysis and modelling.
- Confirmation of neoclassical optimization at increased ion temperatures.
- Confirmation of reduced equilibrium currents at higher betas and different magnetic configurations.
- Documentation of MHD stability and limits and fast-particle driven MHD modes within the magnetic configuration space.

Main Objectives for OP2.1/2.2 – TF-III

Main objective

- **Complete the edge and SOL physics basis in the magnetic configuration space of W7-X**

Scientific goals

- *Characterize parallel and perpendicular SOL transport regimes and validate transport models*
- *Characterize three-dimensional edge + SOL profiles and asymmetries*

Deliverables

- Providing the experimental data base for understanding transport mechanisms in the island divertor SOL and across the LCFS, including flows, drifts, turbulence
- Validation of edge transport codes
- Studies of SOL width and target heat flux scalings
- Characterization of asymmetries of plasma conditions and radiation, mapping of diagnostic results in 3D island divertor

Main Objectives for OP2.1/2.2 – TF-III

Main objective

- **Exploitation of low-field high-beta scenarios to demonstrate W7-X optimization**

Scientific goals

- *Characterize MHD equilibrium and stability at high beta and beta/magnetic field effects on turbulent and neoclassical transport.*
- *Characterize magnetic field modification due to high beta and assess implications for edge plasma.*

Deliverables

- Assessment of W7-X MHD optimization criteria at increased plasma beta and extended magnetic configuration space.
- Documentation of high-beta plasma profiles for detailed transport analysis and modelling, w/ emphasis on magnetic fluctuation measurements.
- Assessment of the effect of field stochastization on SOL transport and operational limits due to heat flux re-distribution at high beta