WPTE task force meeting 20-10-2025

RT14/RT16 - programme priorities in 2027

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with contributions from Nobuyuki Aiba and all members of the topical groups

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Introduction

- Priority for 2027 is the successful completion of JT-60SA OP2 campaign and preparation and of OP3.
- Period of experiment preparation leading to around about to February 2027.

Overview of selected experiments for transport and confinement

- Three main experiments selected (sharing machine time with PEP).
- M14 Characterization of L-mode transport and confinement (EC: Yoshiaki Ohtani, CoEC: Tuomas Tala)
- M16 Characterization of H-mode transport and confinement EC: Clemente Angioni, CoEC: Yoshiaki Ohtani)
- M18 Tungsten transport studies in support of the JT-60SA W-PFC phase (EC: Tomoko Kawate, CoEC: Pierre Manas)
- Topical Group meetings will be organized starting from the end of the call for participation to prepare in detail the experiments.

M14 - Characterization of L-mode transport and confinement

- EC: Ohtani - Co-EC: Tala
- Deliverables
  - D1: Characterize L-mode transport and confinement dependences during the campaign.
  - D2: Document isotope effect in L-mode plasmas (H, H-D and D plasmas).
  - D3: L-mode transport studies with perturbative experiments (ECRF and gas modulation) (if actuators demonstrated).
  - D4: Modelling validation and comparison with OP1 data and existing scalings (I_p, shape, P_e/P_i).
- Extended goals
  - E1: Intrinsic rotation scaling in L-mode plasmas with dominant electron heating.
  - E2: Characterize L-mode transport and modelling validation during the current ramp-up phase.
  - E3: Characterize low-Z and mid-Z impurities in L-mode plasmas and compare with modelling predictions.

M16 - Characterization of H-mode transport and confinement

- EC: Angioni – Co-EC: Ohtani
- Deliverables
  - D1: Characterize H-mode confinement and transport in D plasmas.
  - D2: H-mode transport studies with perturbative experiments (ECRF and gas modulation).
  - D3: Characterize H-mode confinement as a function of the ion/electron heating ratio.
  - D4: Modelling validation and comparison with existing scalings.
- Extended goals
  - E1: Characterize isotope effect in H-mode plasmas (if H-mode achieved also in H-D and H plasmas).
  - E2: Characterize low-Z and mid-Z impurities in H-mode plasmas and compare with modelling predictions.

M18 - Tungsten transport studies in support of the JT-60SA W-PFC phase

- EC: Kawate – Co-EC Manas
- Deliverables
  - D1: Characterize tungsten transport in dedicated L-mode and H-mode plasmas with W-TESPEL injections.
  - D2: Document the impact of ECRH radial deposition on W transport.
  - D3: Modelling validation against neoclassical and turbulent W transport models.
- Extended goals
  - E1: Document the impact of plasma current on W transport.
  - E2: Document the impact of ELMs and sawteeth on W .
  - E3: Analyse differences in W transport in baseline and advanced scenarios (if performed in OP2).

Required expertise

- Planning shot lists to explore widest possible parameter space to determine transport and confinement dependencies.
- Diagnostic expertise to ensure the quality and completeness of data collected.
- Modelling expertise (from integrated modelling to gyrokinetic) to interpret the experimental results.

Overview of selected experiments for pedestal

- Two main experiments selected (sharing machine time with T&C).
- M15 L-H power threshold characterization (EC: Nobuyuki Aiba, CoEC Lorenzo Aucone)
- M17 Pedestal and ELM characterization (EC: Lorenzo Frassinetti, CoEC Moe Akimitsu)

M15 - L-H power threshold characterization

- EC: Nobuyuki Aiba - Co-EC: Lorenzo Aucone
- Deliverables
  - D1: Document and characterise P_{L-H} in D plasmas during the campaign
  - D2: Compare with existing scaling and improving P_{L-H} predictions for OP3 and OP4
  - D3: Characterise P_{L-H} difference between dominant electron and dominant ion heating (N-NBI/ECRH and P-NBI)
- Extended goals
  - E1: Characterise isotope dependence of P_{L-H}, if H-mode achieved in H-D plasmas
  - E2: Analyse the density dependence of P_{L-H} and validate nemin observations with existing scalings
  - E3: Document the impact of the divertor configuration and the momentum impact on P_{L-H}.

M17 - Pedestal and ELM characterization

- EC: Lorenzo Frassinetti - CoEC: Moe Akimitsu
- Deliverables
  - D1: Characterise pedestal structure and ELMs during the campaign
  - D2: Compare modelling and improve predictive pedestal models for JT-60SA (for OP3 and OP4)
  - D3 Characterise losses induced by type-I ELMs and comparison with existing scalings
- Extended goals
  - E1 Study the effect of highly shaped plasmas on the pedestal and ELM characteristics
  - E2: Study the relationship betweeen the SOL/divertor heat load and the ELM type
  - E3: Map access conditions for large type-I ELMs and small/no-ELM regimes
  - E4: Characterise the impact of mid-Z impurities on the pedestal and ELM characteristics

Required expertise

- Similar to T&C experiments.

Final consideration

- Unconventional approach to exploitation of experimental time.
- Careful planning and pulse optimization highest priority at the start to maximize scientific outputs.
- Close collaboration with other topical groups (especially ORD) to gather data parasitically.