Technical Meeting on Plasma Physics and Technology Aspects of the Tritium Fuel Cycle for Fusion Energy

Tuesday, 11 October 2022 - Thursday, 13 October 2022

IAEA Headquarters

Topics

The programme will mainly consist of sessions dedicated to invited oral talks and poster presentations and discussions.

A Programme Committee made up of a representative international membership will be responsible for selecting the invited oral and poster presentations and arranging the technical and discussion sessions, as well as for the overall scientific content of the event.

The topical area of focus in this technical meeting series is the complex interface of plasma physics and the DT fuel cycle, a scope largely neglected by other major international meetings but having potentially large impacts on the operations and feasibility of fusion as an energy source.

Below is a representation of topical scope that will be addressed, and subsequent meetings may pursue other topics identified in deliberations or more deeply into any one of those.

Interface btw Plasma Physics & Fuel Cycle Technology

Plasma physics:
• Burn fraction
• Fuel delivery requirements
• Gas delivery in addition to DT (H, Ne, other)
• Plasma resilience to impurity build-up
• Plasma particle transport

Fuel cycle technology:
• Fuelling
• Isotope separation
• Loop configuration (direct recycle)
• Vacuum pumping
• Fuel cleanup (purification)

Interface btw Plasma Burn Control & Fuel/Exhaust Actuator

Plasma burn control:
• Plasma fueling rate and isotopic mix control
• Power dissipation
• ELM control

Fuel/exhaust actuator:
• Fueling and impurities feed control
• Isotope separation and/or direct recycle
• Pellet and gas injection

Interface btw First Wall & Fuel Cycle Technology

First wall:
• Be, W, Mo, steel
• Low-Z first wall coatings
• Liquid metals
• Dust
• Redeposited layers
• Tritium retention

Fuel cycle technology:
• Fuel cleanup (impurity processing)
• Be and activated product cleanup technology (off normal)
• In-vessel Tritium recovery (conditioning and remote handling)
• Tritium recovery from coolant
• Inventory measurement

Interface btw Disruptions & Disruption Mitigation

Disruptions
• Fuel and impurity released due to disruptions
• Optimization of disruption mitigation for fuel cycle compatibility

Disruption mitigation
• Disruption mitigation technology
• Fuel cleanup (purification and impurity processing)
• Isotope separation
• Vacuum pumping