Introduction

Topic 1: Plasma Chamber and Tritium Behaviour, introduction

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- Purpose of Session
- Topics to be discussed
- Operational-physics issues and links to tritium fuel cycle
- Agenda

Purpose of Session

- Describe physics basis for processes impacting plasma fuelling and the fuel cycle in fusion reactors:
  - Requirements/constraints related to scenario integration in fusion reactors
  - Physics of main ion (DT) and impurity transport, DT mix control and burn control
  - In-vessel T retention and schemes for removal
- Identify areas where further R&D is required to:
  - Better quantify requirements for fuel cycle
  - Alternative operational scenarios to meet fuel cycle needs
  - *Alternative fuel cycle technical optimization/solutions to meet operational scenarios*

Topics to be discussed

- Physics of plasma particle transport and plasma fuelling
- Inter-relations between plasma fuelling requirements and scenario integration issues (power/particle exhaust, ELM control, etc.)
- Physics of main fuel (DT) and impurity transport
- Needs for separate control of D and T in core plasma of fusion reactors
- Processes that cause in-vessel T retention and schemes for removal

Operational-physics issues and links to fuel cycle

- Required fuel rates and schemes (gas, pellets)
- Impurity species required for power exhaust (in-vessel T trapping, requirements for fuel re-processing, etc.)
- Need for separate control of D versus T fuelling for core and edge plasma fuelling
- T retention and in situ removal techniques (compounds released, periodicity, etc.)
- …..

Agenda

- Plasma chamber particle balance and physics of fuel behaviors - A. Loarte
- Isotopic Fuel Tailoring as Actuator for Burn Control in Tokamak Reactors – E. Schuster
- Integrated power and particle exhaust scenarios – A. Kallenbach
- Plasma core transport of D and T and implications for the fuel cycle – J. Garcia
- A survey of the behavior of impurities in tokamak plasmas – R. Dux
- Plasma-material interaction in the main chamber of fusion reactors: the role of high-Z and low-Z wall materials on erosion, dust, fuel retention, and fuel recovery methods – S. Brezinsek
- Plasma chamber PMI – Linear plasma facilities (implantation, retention, erosion, first wall) – G. Tynan
- Plasma chamber PMI – Linear plasma facilities (TPE, implantation and irradiated materials) – M. Shimada
- Discussion