



HS Plasma Physics: Actual Applied Research Topics in Nuclear Fusion

Description

Today's nuclear fusion experiments are used to identify the best possible candidate plasma scenarios which are compatible with next-step fusion devices such as ITER. In this sense, it is important to obtain plasmas with good energy confinement, and their compatibility with the first wall and divertor solutions has to be checked. In order to reliably determine plasma parameters experimentally, plasma diagnostics are used which permit the determination of a variety of important quantities with high precision.

This course addresses several key parameters for nuclear fusion experiments, and lays out their importance both for plasma performance and plasma-material interaction compatibility. Measurement methods used in order to obtain the above parameters will be presented conceptually, and examples from the real nuclear fusion world will be presented.

Learning Outcomes

Understanding some of the key physics topics of today's nuclear fusion science. Understanding on how to diagnose important quantities of a fusion plasma along with their interpretation.

Content

Each seminar will consist of a pair of two related presentations (not compulsory). One of them introduces the key physics topic or quantity, while the other covers a more applied view on how to diagnose, analyze and interpret the topic under consideration. In the first meeting, the topics will be presented and assigned and the criteria for evaluation will be explained.

Topics:

- Helium Ash and transport /Charge Exchange Recombination Spectroscopy (2 Person)
- Edge turbulence in fusion plasmas / Langmuir Probe Measurements (2 Persons)
- The 'pedestal' of fusion plasmas, ELM heat loads /Thomson Scattering (3 Persons)
- Radiation in fusion plasma, ITER power balance /Bolometry (1 Person)
- Divertor power exhaust in ITER / Infrared Thermography (2 Persons)
- Dynamics of filaments in the plasma edge, physical sputtering and Calorimetry (2 Persons)

Prerequisites:

none

Literature

Will be discussed on first meeting and provided to the seminar presenters.

Additional Information

The seminar is well suited to be combined with 'Plasma Physics: Applications' held by T. Happel.

Dates

Pre-Meeting on Thursday, 27.04.2023, 12.15 – 13:45. 'Blockveranstaltung' Mid/End June 23

Lecturer

Dr. Thomas Eich, Max-Planck-Institut für Plasmaphysik, Garching (thomas.eich@ipp.mpg.de)