



PHD Project

Title:

Investigation of MHD modes in the plasma edge of ASDEX Upgrade and W7-X

Where:

This PhD position is based at the Max Planck Institute for Plasma Physics (IPP) in Garching, near Munich, Germany. The IPP, a research institute of the Max Planck Society, is the largest center for fusion research in Europe, employing approximately 1,100 people across its Garching and Greifswald sites. Scientists at IPP investigate the physical principles underlying fusion power plants, aiming to generate energy from the fusion of light atomic nuclei—similar to the process that powers the sun.

Project Description:

The ASDEX Upgrade facility, a medium-sized tokamak located in Garching, is used to study plasma physics relevant to future fusion devices, such as ITER. A tokamak's toroidal symmetry can be imperfect due to design variations or external influences like magnetic perturbations. The symmetry breaking can affect the magneto hydrodynamics at the plasma edge of the tokamak [M. Willensdorfer, Phys. Rev. Lett. 119, 085002]

This project focuses on studying magnetohydrodynamic (MHD) modes in the plasma edge under perturbed conditions using the advanced stability code CASTOR3D. Recent enhancements to CASTOR3D allow for the inclusion of key physical effects, such as resistivity, plasma rotation, and diamagnetic stabilization, in both axisymmetric and fully 3D geometries.

A central goal is to investigate the distinct localization of MHD modes in plasmas with distorted symmetry, where the local equilibrium perturbations influence mode dynamics. CASTOR3D's capability to analyze 3D equilibria enables the study of modes in non-axisymmetric tokamak plasma but also in devices like the stellarator W7-X. The main tasks will include data analysis, data modelling, experiment design, and diagnostic operation.

Your profile:

Master's degree in Physics with above-average grades. Interest in programming, data analysis, and hands-on experimental work.

Who to Contact:

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