



Contribution ID: 35

Type: Workshop 2025/2026

Analysis of perpendicular mean flows and fluctuations for various magnetic field configurations and heating methods

Wednesday 28 January 2026 14:45 (15 minutes)

Research on how to extract energy from nuclear fusion reactions has been active since the last century and comes hand in hand with our growing need for a clean and sustainable source of energy. At the high temperatures required, the system forms a plasma, which needs to be confined so that high densities and high temperatures are maintained. One way we can do so is through magnetic fields, with the tokamak and the stellarator being the devices with the best performance in magnetic confinement fusion.

Energy losses remain the biggest challenge in fusion research, with their main contribution coming from turbulent transport, the disordered flow of the plasma. Although a full understanding of turbulence dynamics in fusion plasmas is still missing, it's known that sheared profiles in the plasma velocity provide a way of suppressing turbulence, by stretching and breaking apart fluctuating structures (vortices) into smaller structures. Research work for the development of this thesis will be performed at the Wendelstein 7-X stellarator. Fusion plasmas subject to various magnetic field configurations and heating methods will be studied and the Doppler reflectometry diagnostic technique will be central to the work, since it provides a measurement on both the plasma's velocity and density fluctuation level at various probed regions in the device. With this in mind, research will further explore the interaction between turbulence and sheared plasma flows, which play a crucial role in the development of optimized fusion reactors.

Field of Research/Work

Plasma and Solar Physics, Accelerators and Beams

Author: LUZ, João (Universidade de Lisboa - Instituto Superior Técnico)