

DRF: Thesis SL-DRF-19-0321

RESEARCH FIELD

Plasma physics and laser-matter interactions / Corpuscular physics and outer space

TITLE

Impact of kinetic effects on flows and transport barriers in fusion plasmas

ABSTRACT

Confinement in fusion plasmas is determined by transport processes mainly due to particle collisions and small scale turbulence. A significant increase of performances is made possible via the onset of transport barriers. A transport barrier is a localised layer in the plasma where turbulent transport is reduced thanks to strong shear flows. Hence the understanding of the underlying physics and the identification of control means are topics of utmost importance in the community of fusion plasma physicists. The thesis aims at studying the impact of kinetic effects on the intensity and shear rate of flows in a magnetised plasma, and thereby on the formation of transport barriers. A first part of the work is an analytical calculation of flows, which will be compared with numerical simulations of turbulent transport. The second part is rather experimental, and will consist in comparing theoretical results with measurements of flows using a Doppler backscattering diagnostic in Tore Supra, and the new WEST device (CEA-Cadarache).

LOCATION

Institut de recherche sur la fusion par confinement magnétique
Service Chauffage et Confinement du Plasma
Transport Turbulence et MagnétohydroDynamique
Place: Cadarache
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