Title : **Turbulence in Fusion Plasma; Wave propagation in turbulent plasma in presence of sheared flow**

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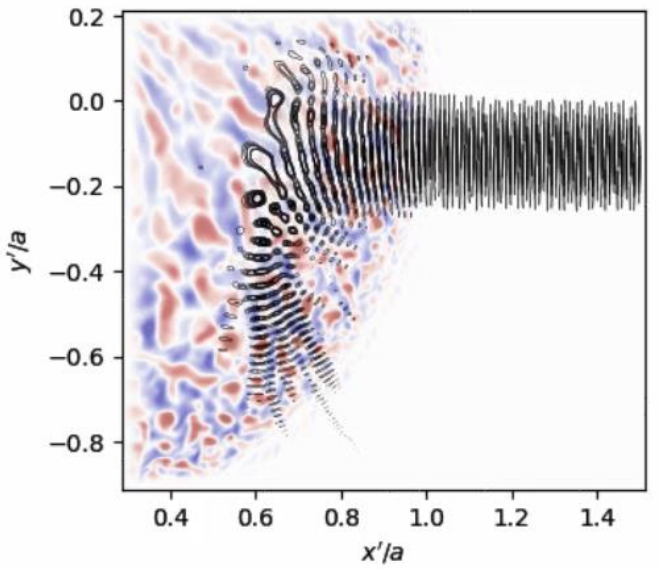
Research Area : Plasma Physics, Magnetic confined fusion

Methods: Fusion plasma physics; combine numerical modelling and experiments

PhD track subject :

The Fusion Plasma Group at LPP studies turbulent transport in magnetic fusion plasmas. Turbulence mixing impinges on magnetic confinement, making future machines (ITER) or reactors necessarily big for keeping the hot core isolated and self-heated. Modelling and first principle simulation codes need to be validated against experiments to gain predictive capabilities. This is at the heart of our approach. To probe turbulence we use light scattering (microwaves, Doppler back-scattering), with instruments installed on European tokamaks (France, Germany, Swiss). Designed to measure simultaneously turbulence intensity and flows make them particularly interesting to study turbulence flow interaction. Indeed, strongly sheared flows reduce the turbulent transport leading to improved performances. Comparison between experiments in the WEST tokamak and simulations require also codes helping the interpretation, for instance, coupling wave propagation to plasma turbulence codes (illustration below)



Wave propagation in turbulent plasma in presence of sheared flow
Example of the coupling of the fullwave code with GYSELA simulation (from S. Rienäcker)

References :

[Burrel, Physics of Plasmas **27**, 060501 (2020)]
https://aip.scitation.org/doi/10.1063/1.5142734

[Hennequin, Nuclear Fusion **46** (2006) S771–S779]
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