SORS: Turbulence understanding and prediction in confined magnetic plasmas

Speaker: Jeronimo Garcia, CEA - France

Abstract: Energy sources are becoming one of the most important issues in the world. Several key factors determine how energy and its sources are evolving, e.g. world population and growth of economy, social behaviour, contamination or technology. Fusion energy is a real solution for the future energy problems. The fuel sources for this energy are almost inexhaustible and available worldwide. It respects the environment, since there are no CO_2 emissions to the atmosphere, and, unlike the fission case, the low production of radioactive waste is perfectly assumable by the society.

Predicting the performance of future fusion devices, e.g. the international fusion R&D project called ITER currently build in France, is an essential step in order to properly asses the construction and the expectations of such devices. From this point of view, predicting plasmas microturbulence, which is one of the main physical issues limiting thermal energy confinement, is essential. Recently, interplay between basic theory, high computational performance and experimental results obtained from JET, the largest tokamak in the world that operates with conditions closest to ITER, has helped to understand the physics behind turbulence and its possible controllability and suppression. Predictions based on this understanding are used to design and prepare future experiments in other fusion devices.

Short Bio:I graduated in theoretical physics in University of Barcelona (UB) in 1998 and I obtained my Phd. in the Universitat Politecnica de Catalunya (UPC) with extraordinary prize. During that time, I carried out my research about plasma modelling and turbulence analysis in the National Institute for Fusion Science (NIFS) in Japan and the Princeton Plasma Physics Laboratory (PPPL) in USA. During my postdoc, in 2008, I moved to the “Commissariat à l'énergie atomique et aux énergies alternatives” (CEA) in France, in which I am currently working as an expert researcher. I combine this position with long stays at JET tokamak as scientific coordinator. My current research focuses in plasma theory and numerical modelling of present-day experiments.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación