Institut Sciences de la Fusion et de l'Instrumentation en Environnements Nucléaires
Aix*Marseille Université

PHD POSITION

Impact of turbulent transport on W accumulation and fusion performance in the central part of ITER plasmas

- **RESEARCH FIELD(S):** magnetic fusion, plasma physics, turbulence
- **JOB LOCATION:** AMU-PIIM (60%), CEA-IRFM (20%), ITER-IO (20%)
- **CONTRACT AND SALARY:** Aix-Marseille University's 3 years PhD contract
- **ABSTRACT:** Fusion energy promises high-energy-density baseload electricity and heat production with essentially limitless fuel reserves, inherent nuclear safety, and negligible impact on the environment. With the construction of ITER, we are entering a new phase where fusion experiments aim for net power gain. This challenging goal requires to avoid excessive radiative losses associated with high Z impurity accumulation in the confined plasma and to maximize the density and temperature of the main ions for increased fusion performance. A very recent numerical study revealed that pressure-driven instabilities known as Kinetic Ballooning Modes (KBM) are destabilized in the central region of high-performance JET plasmas and drive a subsequent level of heat and particle transport [N. Kumar *et al.*, Nucl. Fusion **61**, 036005 (2021)]. Preliminary gyrokinetic stability calculations indicate that the central part of ITER conventional H-mode scenarios is also prone to KBM destabilization. The goal of this PhD is to study the implications of core turbulent transport, including transport driven by KBM turbulence, on core W accumulation in ITER, and mechanisms for its control. The problem will be addressed with state-of-the-art non-linear gyrokinetic simulations complemented with tokamak simulations relying on reduced transport models. The thesis will be jointly supervised by A. Loarte from ITER Organisation, C. Bourdelle from CEA Cadarache and Y. Camenen from Aix-Marseille University.
- **QUALIFICATIONS/SKILLS/EDUCATION & RESERACH REQUIREMENTS/DUTIES:** MASTER degree in plasma physics
- **APPLICATION DEADLINE**: 30th of June 2022
- **REQUESTED DOCUMENTS OF APPLICATION:**
  - Bachelor and Master grades
  - Cover letter & Curriculum Vitae
  - One or two recommendation letters
  - If available, the internship report at the end of the Master degree will be appreciated.
- **CONTACT TO APPLY (EMAIL OR WEBSITE**):
  - Please send any information request at the two following addresses: isfin-direction@univ-amu.fr; yann.camenen@univ-amu.fr