Post-doctoral position for the development of a new spectro-tomography diagnostics for edge tokamak plasmas and for laboratory plasmas study

duration : 24 months
Location: PIIM laboratory (Aix-Marseille university) / IRFM (Cadarache)
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Plasma transport is a key issue for ITER, the international tokamak being built in Cadarache. Presently France is developing the WEST project to test the plasma behavior in a full-metal tokamak during long pulse operation, which will be ITER relevant. In this frame, the WEST diagnostics will be essential to make comparisons with the theoretical predictions of the numerical transport codes. The DEMON (Diagnostic studIEs for plasMa transpOrt in fusioN) project aims to develop innovative diagnostics through the combined expertise of the PIIM laboratory (Physique des Interactions Ioniques et Moleculaires), the Center of Particles Physics in Marseille (CPPM) and the Institute for Research on Magnetic Fusion (IRFM) in Cadarache.

In this frame, a new diagnostics which couples the advantages of spectroscopy and tomography will be developed at the PIIM laboratory. By overcoming the problem of averaging radiation along the spectroscopic lines of sights, this powerful tool will allow to obtain the time evolution of spectra for a 2D section of the plasma. It will enable to non-intrusively measure density/temperature of different plasma species and, beyond this, to access to all the physical parameters obtained by emission spectroscopy. The PIIM laboratory has several experimental devices dedicated to fundamental physical studies of plasmas, among which the MISTRAL machine [1, 2, 3] (Head: A. Escarguel) ideally suited to plasma diagnostics development. Indeed, the magnetized plasma column of MISTRAL produces reproducible and stable plasmas over long periods, for a wide range of controlled plasma parameters.

We are looking for a candidate for a 24 months post-doctoral position to develop this diagnostics in the PIIM laboratory, in collaboration with IRFM. At first, the retained person will be responsible for setting up the experimental apparatus and adapt a tomographic inversion code to analyze the data. In a second step, he will explore the physical parameters that can be measured with the new diagnostics for edge plasmas of tokamaks and more generally for laboratory plasmas: density/electronic temperature, density of metastable levels, Doppler temperatures ... In this context, he will collaborate with experimentalists from PIIM laboratory, as well as with researchers from IRFM to study the implementation of the diagnostics on a tokamak. He is also expected to participate to the first experimental campaign on the WEST tokamak, in 2016.

Skills: experimentalist, spectroscopy, tomography, optical diagnostics, plasma physics, atomic physics, good knowledge of English required, analytical mind and good aptitude for writing reports and publications.

References