**CEA/CADARACHE**
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## postdoc position

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# Title : SELF-CONSISTENT MODELLING OF ICRF WAVES AND FAST ION DISTRIBUTIONS

In order to reach the ignition in magnetic fusion plasmas, it is necessary to increase their temperature by means of auxiliary heating systems. Neutral Beam Injection (NBI) and the injection of waves in the Ion Cyclotron Range of Frequencies (ICRF) serve this purpose. The neutrals from the NBI are ionized in the plasma and transfer their energy to thermal particles, whereas ICRF waves channel radiofrequency power either by direct wave damping and/or collisional redistribution depending on the chosen scenario. There also exists a direct resonant interaction between ICRF waves and super-thermal ions from the NBI system and/or from the D-T fusion reactions themselves. It is necessary to quantify this interaction and follow the fast particles evolution in the electromagnetic field in order to estimate the amount of energy eventually reaching the thermal species. This interaction must be simulated in a self-consistent fashion to retain the mutual effect of the super-thermal particles distribution and the wave electromagnetic field. At IRFM, we currently dispose of a Monte Carlo code which allows describing fast ions (SPOT) on the one hand, and a wave code to simulate ICRF waves on the other hand (EVE). The proposed work is therefore the coupling of these two tools as a first step. This must be done rigorously to accurately describe the physics phenomena at play, and also with a special attention to numerical performance since these two parallel codes are computationally demanding. A second step consists in exploiting the obtained numerical tool to simulate NBI+ICRF experiments currently performed in JET, and to help in the design of scenarios for ITER.

**Skills :**

Ideally with a physics background, the candidate must be skilled in numerical simulation and code development. An experience in magnetic fusion is an advantage. Fluent English (spoken and written) is a prerequisite.