Fédération Sciences Plasmas Fusion

Année universitaire / Academic year 2020-2021

PROPOSITION DE STAGE M1-M2 / M1-M2 INTERNSHIP PROPOSAL

Institution & Laboratory: Aix-Marseille Université, PIIM lab., group Atomic Physics and Transport in Plasmas

Adresse du lieu de stage / Lab address : Campus St Jérôme, Av. Escadrille Normandie Niemen, Marseille

Responsable de stage / Supervisor : Mohammed KOUBITI

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Internship conditions (salary, travel, lodging, food,…) : **standard for M2, possible funding by ISFIN for M1**

Title: **Comparison of isotopic ratio determination technique used in magnetic fusion plasmas and their extrapolation**

Abstract: In the field of magnetic fusion research, one of the major issues is connected to tritium retention by the plasma facing materials (the wall and other components). For safety reasons, tritium inventory is mandatory in magnetic fusion devices operated using a mixture of deuterium and tritium. In that context, the determination of the hydrogen isotopic ratio T/(D+T) is of great importance. In preparation for future D-T discharges in JET and other devices, it is necessary to determine the isotopic ratio H/(H+D) for discharges operated with a mixture of hydrogen and deuterium. There are few methods to infer the hydrogen isotopic ratio like the residual gas analysis (RGA) [1] or the use of the Balmer-alpha line spectra [2]. Depending on the skills of the candidate, it is proposed here to use and improve an existing python program and/or develop a new computer program allowing to fit experimental spectral measurements of the Hα/Dα line from the JET tokamak. The shapes of the Hα/Dα line reflect several recycling mechanisms and are affected principally by Zeeman and Doppler effects. A special attention will be paid to comparisons with the results obtained from other methods like RGA whenever it is possible. The candidate is also encouraged to think about other new methods that can be used for the purpose of isotopic ratio determination in magnetic fusion devices.

References:

1. A. Drenik et al 2017 Phys. Scr T170 014021.
2. V.S Neverov et al 2019 Nucl Fusion 59 046011.

For M1: this internship can be continued as an M2 internship.

For M2: this internship can be followed by a PhD thesis through a funding from the doctoral school.