PhD position @ Unipd on "Development of LIBS for fusion-relevant plasma-material interaction studies in BiGyM" funded by the PNRR NEFERTARI project

The PNRR NEFERTARI project aims at the enhancement of technological and plasma diagnostic systems of the RFX-mod2 and the upgrade of facilities located at ISTP-CNR in Milan and Bari in support of its experimental program. In this framework, a PhD position is open for the development of a Laser-Induced Breakdown Spectroscopy (LIBS) to be installed on the linear plasma device BiGyM at ISTP Milan (www.istp.cnr.it/labs-milano) for in-situ real-time elemental analysis of plasma-facing materials.

Abstract: LIBS is a powerful and versatile diagnostics for material surface characterization being used in a wide range of applications. In the field of magnetic confinement nuclear fusion it is considered a very promising diagnostic tool for the study of Plasma-Wall Interaction (PWI) due to its capability of fast direct in-situ measurements in the extreme environment of the reactor. PWI is one of the most critical issues with respect to the performance, safety and economy of future magnetic confinement fusion reactors, like ITER and DEMO. This broad interdisciplinary field comprises all processes involved in the exchange of mass and energy between plasma and the surrounding wall materials. The main PWI issues are erosion, sputtered particles migration and fuel retention in Plasma-Facing Components (PFCs). Linear plasma devices, thanks to their simpler geometry, lower cost, higher flexibility and better control of the plasma conditions with respect to tokamaks, can be used as test beds to answer specific questions about Plasma-Material Interaction (PMI). The linear device GyM is one of the EUROfusion Consortium facilities for PWI studies. Highly reproducible uniform magnetised plasmas are currently obtained and steadily sustained by electron cyclotron resonance heating. BiGyM, its upgraded version, will improve plasma and PMI diagnostics performance to test materials under conditions relevant to tokamak divertor plasmas.

The successful candidate will mainly work at ISTP-Milan contributing to the design and installation of the LIBS system in BiGyM, also in collaboration with ISTP Bari. The candidate will then: (i) carry out the optimisation of the LIBS key parameters (e.g. laser pulse energy, beam spot, etc.), (ii) test the diagnostics on fusion-relevant materials exposed to BiGyM plasma, (iii) analyse and model the experimental data.

Deadline for submission of candidatures: November 28th at 13.00. Details and application form available on the webpage https://crf.unipd.it/phd/admission

Starting date: February 1st 2023

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