

Research Studentships (Master or Integrated Master students)

Applications are open for 1 (one) Research Studentship(s), within the framework of project *Plasma Surface Interaction (Data and Tools) COupled Modelling* (PSI.COM) of IPFN – PEP: 1801P.01261.1.01.01, reference 2022.04128.PTDC, financed by national funds through FCT/MCTES (PIDDAC), under the following conditions:

Scientific Area: Physics - Plasma Physics and Nuclear Fusion

Admission Requirements: *To be enrolled at an integrated master or a master.*

Workplan: The work addresses the modelling of N₂-H₂ plasmas with a description of the electron and the heavy-species kinetics in the plasma volume, the transport of species towards the wall and a description of the surface kinetics, accounting for the heterogeneous catalytic formation of ammonia at the wall.

Self-consistent simulations will use the LisOn Kinetics (LoKI) tool suite, coupling a Boltzmann solver (LoKI-B) and a Chemistry solver (LoKI-C), to obtain the electron energy distribution function and the densities of the most relevant heavy species with the plasma. LoKI will be further developed and consolidated, aiming the final release of a full time-dependent algorithm, a set of Machine Learning LoKI-tools for sensitivity analysis, and a LoKI-B web-version. Results will be validated against experimental characterization and diagnostics of N₂-H₂ discharges (probe, optical/laser spectrometry, mass spectrometry measurements) performed at the Laboratoire de Physique des Plasmas (LPP), Paris, France.

Tentative goals are as follows:

- Update of the current N₂-H₂ Lisbon model (volume and surface), to improve its predictions
- Development and consolidation of the LoKI tool suite, aiming at full time-dependent description, and including Machine Learning tools for reduction of chemistry schemes
- Participation in the experimental characterization and diagnostics of the plasma, for model validation

This work plan and objectives can contribute to a Master's dissertation on the same subject.

Legislation and Regulations: Statute of Scientific Research Fellow, approved by Law nr. 40/2004, of August 18, as worded by Decree-Law nr. 123/2019, of August 28; FCT Regulation for Research Studentships and Fellowships, available on <https://www.fct.pt/apoios/bolsas/docs/RegulamentoBolsasFCT2019.pdf> and <https://dre.pt/application/file/a/127230968>.

Workplace: The work will be developed at Instituto de Plasmas e Fusão Nuclear of Instituto Superior Técnico (Lisbon, Portugal), under the scientific supervision of professor Luís Lemos Alves.

Duration: The research fellowship(s) will have the duration of 6 months. It's expected to begin in October 2024, and may be eventually renewed up to the maximum of 12 months, including the duration of the initial contract.

Monthly maintenance allowance: According to the values for Research Fellowships awarded by FCT in Portugal (https://www.fct.pt/wp-content/uploads/2024/02/Tabela-de-Valores-SMM_atualizacao-2024.pdf), the amount of the monthly maintenance allowance is €990,98, being the payment method an option of the Fellow by Wire Transfer/Check.

Selection methods: The selection will consider the following items (each item scored from 1-5): Curriculum evaluation (40%); Motivation letter (20%); Individual interview in person (40%). The following preferential factor is considered: programming skills and knowledge of programming languages.

Composition of the selection Jury: Prof Luís Lemos Alves (president of the jury, IST), Dr Olivier Guaitella (École Polytechnique, (Paris), Dr. Nuno Pinhão (IST)



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Announcement/ notification of the results: The final evaluation results will be communicated to all applicants by email.

Application deadline and formalization: The call is open from July 31 until September 30, 2024.

It is mandatory to formalize applications with the submission of the following documents: i) B1 Form – Fellowship application (<https://ist-id.pt/concursos/bolsas/>); ii) *Curriculum Vitae*; iii) academic degree certificate, where applicable; iv) proof of enrollment at an academic degree course (Master, Integrated Master); v) motivation letter;

Applications must be submitted to the email: carmo@ipfn.tecnico.ulisboa.pt

At the subject please mentioned "**BI PSI.COM**"



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