

## PROPOSITION DE THESE Ph.D. offer



Date limite de candidature / application until : 1<sup>er</sup> juin 2021 / June 1<sup>st</sup>, 2021

Responsable de la thèse / PhD supervisor:

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 Nom du Laboratoire / laboratory name: Laboratoire de Physique des Gaz et des Plasmas (LPGP)

 Code d'identification : UMR 8578
 Organisme / Institution : CNRS/U Paris Saclay

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 Lieu de la thèse / PhD place: idem
 Identification

**Titre de la thèse** / *PhD title* **Théorie et modélisation multi-fluide de l'interaction plasma-paroi pour des plasmas électronégatifs** magnétisés /

Theory and multi-fluid modelling of the plasma-wall interaction for electronegative and magnetized plasmas

Résumé / summary

The plasma-wall interaction, also known as sheath, is one of the oldest problems in plasma physics since the original contribution of I. Langmuir.

Among the most efficient methods to solve the sheath problem one can cite: kinetic models, based on the exact solution of the Boltzmann equation, the fluid approximation, based on the first few moments of the Boltzmann or Vlasov equation and finally the particle-in-cell method which simulates a plasma using macro-particles.

One of the advantages of the fluid models is the possibility to obtain results quickly and with an accuracy depending on how many moments for each species are considered. Many works have been made when an electropositive plasma made only of electron and one species of positive ions is considered. However, in the case of electronegative plasmas, the negative ions are always described by a Maxwellian distribution (1st order fluid approximation), which is very inaccurate.

The objectives of this PhD is to develop a 1D fluid model for an electronegative plasma describing all the species to the fourth order fluid approximation, first without and then with magnetic field. The inclusion of neutrals will be made in a second step. The results of the model will be compared to particle-in-cell simulations. An extension of the model to 2D is foreseen.

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**Début de la thèse** / *starting* of the *Ph.D. contract*: **01/10/2021** / October 1<sup>st</sup>, 2021 **Financement de thèse** / *financial support for the PhD*: **concours EDOM** / 'Doctoral School Matter and Waves', after application and oral defense of the application