**Ref. PROMETEO-LNF-D1: Interaction between plasmas and alkaline metals**

The interaction of the plasma with the electrodes and surrounding elements in the thruster is eventually responsible of the working life of the engine and, to large extent, of the microscopic properties of the plasma and its propelling capacity. The conditions of the electron secondary emission by the exposed material affect the plasma potential, its energy consumption and stability, as well as the material sputtered from the wall by erosion and is integrated in gas phase (for instance Xe) can affect the composition of propellant species in a non-predictable way. The techniques developed for plasma-wall interaction in fusion plasmas are fully applicable to thrusters.

In the proposed work, we will explore the possibility of using alkaline coverings to protect the electrodes and the effect of alkaline ions that may enhance the gas ionization by charge exchange reactions (e. g. +K+Xe→ +Xe+K). The erosion of BN, presently used as cell material, by Xe+ will be also characterized and the possible ways for its mitigating will be explored. Electrostatic probes, spectroscopy, and laser and high vacuum techniques will be used to study the cold plasmas generated.

**Requirements**:

* Doctor in Physics, Chemist-Physics or Materials engineer.
* Experience in working with alkaline metals like Li, Na, K, Rb in liquid and solid phase.
* Computation skills
* Fluent English
* The knowledge of vacuum techniques, plasma diagnostics and properties of lasers and liquid metals will be appreciated.