Partially magnetized E×B plasmas is an omnifarious family of plasmas exploited in a variety of technologies, with the most prominent application being space propulsion. A salient feature of these plasmas is the presence of an externally applied magnetic field used for electron confinement. Electron confinement is crucial for plasma sustainment, however E×B plasmas are widely known to exhibit anomalous levels of cross-field electron transport, which fail to be explained by classical electron transport theory. Although anomalous electron transport has been observed for over half a century, there is still no satisfactionary explanation of the levels of electron conductivity observed in experiments.

# 1 Aim of the project

Azimuthal plasma oscillations are inherently present in most ExB plasmas and are known to influence anomalous transport. The aim of the project **Anomalous electron transport in partially magnetized E×B plasmas induced by azimuthal oscillations** is to investigate the nature of azimuthal plasma oscillations and their influence on anomalous electron transport. The studies will be realized on a Hall thruster plasma discharge, which is a notable example of partially magnetized E×B plasma. Hall thrusters are space propulsion devices used to change orbit of satellites and propel space probes.

# 2 Description of research activities

This study encompasses both theoretical and experimental studies of a Hall thruster plasma discharge. To capture the whole physics of the partially magnetized plasma, two separate numerical simulations will be developed based on two distinct formalisms: fluid and kinetic. This will allow to study both low frequency and high frequency oscillations. The findings of the simulations will be validated against a high speed camera experiment held at the Laboratory of Plasma Nudge for Satellites at Institute of Plasma Physics and Laser Microfusion.

# 3 Project results

The thorough investigation of azimuthal plasma oscillations proposed in the **Anomalous electron transport in partially magnetized E×B plasmas induced by azimuthal oscillations** project will contribute to the understanding of the physical mechanism fueling both the low frequency and high frequency oscillations as well as their contributions to anomalous electron transport. Thanks to implementing both fluid and kinetic formalisms, a possible link between the high frequency and low frequency oscillations will be established.