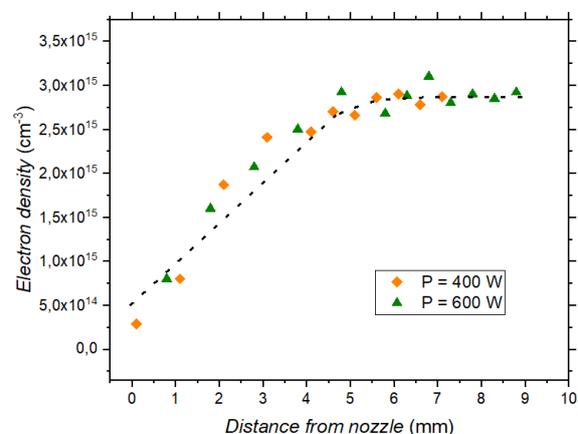


# Experimental evidence of *TIAGO* torch dart at atmospheric pressure to be a Surface Wave Discharge.

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Surface Wave Discharges (SWD) are characterized by an increase of its length with the power supplied, the existence of a radiative zone and a sharp and linear decrease of electron density along the discharge whose slope does not vary with applied power [1]. *TIAGO* (*Torche à Injection Axiale sur Guide d'Ondes*) torch [2] creates a plasma that shows two different luminous regions: a bright plasma column (dart) and a tenuous shell (plume). It has been suggested [1] that this dart is a SWD, with the surrounding air acting as a virtual dielectric cylinder for the propagation of the electromagnetic surface wave [1,2]. However, this has still not been experimentally proven. In this work, the dart and the plume generated by the *TIAGO* device have been studied by optical emission spectroscopy. The discharge is demonstrated to be a SWD by the analysis of the axial distribution of electron density (Figure 1). Secondly, a radiative zone has been identified, which is further evidence that the dart from *TIAGO* plasma is a SWD. In addition, it has been found the plume to behave as a postdischarge, similar to that formed at the end of discharges containing nitrogen [3].



**Figure 1:** Axial distribution of the electron density in the *TIAGO* torch exhibiting a typical SWD behavior. The origin of the coordinates system has been placed at the end of the dart, taking positive sense towards the nozzle.

## References:

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