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].

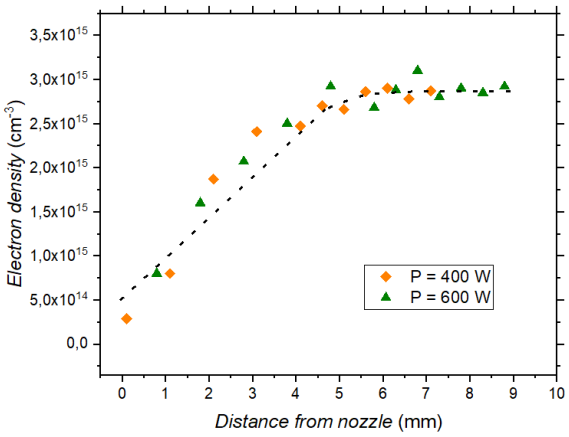

Figure 1: Axial distribution of the electron density in the TIAGO torch exhibiting a typical SWD behavior. The origin of the coordinates system has been placed at the end of the dart, taking positive sense towards the nozzle.

References:

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