**Abstract**

On-axis neutral depletions signatures are observed in steady-state high power Helicon Helium plasma. Laser Induced Fluorescence (LIF) is a non-invasive diagnostic, used to measure the density profile of helium at axial points. At 507.718 nm resonance, the LIF signal of helium atoms resulting from excitation of the laser along the magnetic field exhibits a dip at the Doppler shifted central wavelength, as well as a consequence of finite optical path length and finite spatial resolution. The LIF intensity decreases as the optical path length increases, resulting in a relative decrease in the measured dip. The depth of the dip decreases due to the rotation of the laser; due to the opacity of the medium (i.e., plasma), the wavelength of the excitation (λ) (MHz) is the degree of ionization of the measured dip. The measured dip is related to the optical absorbance (a), the relative probability of the upper and lower states (η), and the differential density (n_e) of the species (θ). The optical absorbance (a) is the optical absorbance (a) of the species (θ), the relative probability of the upper and lower states (η), and the differential density (n_e) of the species (θ).

**LIF Scheme for Neutral Helium**

A four-level LIF scheme is used to study the metastable helium population. The LIF intensity decreases as the optical path length increases, resulting in a relative decrease in the measured dip. The depth of the dip decreases due to the rotation of the laser; due to the opacity of the medium (i.e., plasma), the wavelength of the excitation (λ) (MHz) is the degree of ionization of the measured dip. The measured dip is related to the optical absorbance (a), the relative probability of the upper and lower states (η), and the differential density (n_e) of the species (θ). The optical absorbance (a) is the optical absorbance (a) of the species (θ), the relative probability of the upper and lower states (η), and the differential density (n_e) of the species (θ).

**Measurements at Different Radial Locations**

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