Abstract Submitted
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Velocity distribution function measurement of heavy species in weakly ionized plasma flows via coherent Rayleigh-Brillouin scattering ALEXANDROS GERAKIS, Department of Aerospace Engineering, Texas A&M University, MIKHAIL SHNEIDER, Mechanical & Aerospace Engineering Department, Princeton University, KENTARO HARA, Department of Aerospace Engineering, Texas A&M University — We suggest the applicability of single shot coherent Rayleigh-Brillouin scattering (CRBS) for the determination of the velocity distribution function (VDF) of heavy species in a weakly ionized plasma, from which macroscopic quantities can be extracted. CRBS, a four-wave mixing technique, relies on the interaction between a high energy optical lattice of precisely tailored chirped frequency and the VDF of the medium to which it is applied. The variation of the CRBS signal intensity at different optical lattice phase velocities enables the restoration of the VDF, directly mapping it in the CRBS lineshape. CRBS has already been demonstrated to be the coherent analogue of spontaneous Rayleigh-Brillouin scattering in measuring the temperature, pressure, bulk and shear viscosity, speed of sound and polarizability of a gas or gas mixture, in a single laser shot [1]. Nanoparticles produced in an arc discharge have also been measured *in situ* using CRBS [2]. We will discuss the recent progress of single shot CRBS as a gas flow measurement technique and its use in a weakly ionized plasma flow. 1. A Gerakis, MN Shneider and PF Barker 2013 Opt. Lett. 38(21), pp.4449-4452. 2. A Gerakis, YW Yeh, MN Shneider, JM Mitrani, BC Stratton and Y Raitses 2018 Phys. Rev. Appl. 9(1), p.014031.

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