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Continuous Wave Cavity Ring-Down Spectroscopy and Laser Induced Fluorescence Measurements of Argon Ion Velocity Distribution Functions in a Helicon Plasma DUSTIN MCCARREN, ROBERT VANDERVORT, MARK SODERHOLM, EARL SCIME, West Virginia University — LIF is an established and powerful technique, but suffers from the requirement that the initial state of the LIF sequence have a substantial density. This usually limits LIF to ions and atoms with large metastable state densities for the given plasma conditions. Cavity ring down spectroscopy (CRDS) is a proven, ultra-sensitive, cavity enhanced absorption spectroscopy technique and when combined with a continuous wavelength (CW) diode laser that has a sufficiently narrow line width, the Doppler broadened absorption line, i.e., the target specie velocity distribution function (VDFs), is measured. CW-CRDS is designed for measurements of ion and atom states inaccessible to conventional techniques such as LIF. However, being a line integrated technique, CW-CRDS lacks the spatial resolution of LIF. We present a comparison of CW-CRDS and spatially resolved LIF measurements of the VDFs in an argon plasma using the 668.614 nm (in vacuum) line of Ar II.

Dustin McCarren
West Virginia University

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