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**Cavity Ring Down Spectroscopy measurements of Ar-II velocity distribution functions** SAIKAT CHAKRABORTY THAKUR, JERRY CARR JR., EARL SCIME, West Virginia University — The WVU helicon source group routinely uses laser induced fluorescence (LIF) to measure the ion velocity distribution function (ivdf) of argon plasmas. We are constructing a continuous wave Cavity Ring Down Spectroscopy (cw-CRDS) system that will provide an alternate approach to measuring the ivdf. CRDS is a proven, ultra-sensitive, laser absorption technique that will provide sufficient resolution to measure the Doppler broadened absorption line of Argon and other plasma species. We will use a CW tunable diode laser at 668.43 nm, pumping the Ar-II metastable  $3d^4F_{7/2}$  level to the  $4p^4D_{5/2}$  level, to gather data from our steady state, high density, helicon plasma source CHEWIE (the Compact HELicon Waves and Instabilities Experiment). The cw-CRDS data will then be compared to LIF measurements. Once optimized for the Ar-II transition, we will use a similar experimental configuration to complete the difficult measurement of the ivdf for He-II transition at 1012.36 nm. This report will present completed design schematics for the CRDS system as well as initial data gathered through the early stages of operation.

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