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Upgrades to the MARIA Helicon Experiment at UW-Madison[1]
JONATHAN GREEN, NOAH HERSHKOWITZ, OLIVER SCHMITZ, Univ of Wisconsin, Madison, GREG SEVERN, University of San Diego, VICTORIA WINTERS, Univ of Wisconsin, Madison — The MARIA helicon plasma device at UW Madison is setup to investigate the neutral particle fueling of helicon discharges. Following initial results from the 668.614nm diode laser LIF system, the active spectroscopy diagnostic suite was expanded by establishing a 1.4J pulsed Nd:YAG pumped dye laser. To verify the new laser system, a comparison of measured ion velocities near a target plate was made between the diode based and dye based LIF systems. Additionally, theory and further verification of a new technique for measuring ion velocities leveraging Zeeman splitting is presented. During a campaign with $\leq$ 750W RF power, densities in the range of 1x10^{18} m^{-3} and 2 eV electron temperature were achieved with 4.1 mTorr of argon and a magnetic field of 750G. To achieve higher densities and explore the physics of neutral depletion, the available RF power was increased from 750W to 2kW, with further expansion to 4kW on a single antenna planned. For both power levels a clear helicon mode can be reliably established and its extension increases with increasing RF power. Basic plasma characterization at the higher RF power, such as electron density vs magnetic field scans, will be presented.

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