Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

The MARIA Helicon Plasma Experiment at UW Madison: Upgrade, Initial Scientific Goals Mission and First Results[1] VICTORIA WINTERS, JONATHAN GREEN, NOAH HERSHKOWITZ, OLIVER SCHMITZ, University of Wisconsin Madison, GREG SEVERN, University of San Diego — The versatile helicon plasma device, MARIA (Magnetized AnisotRopic Ion-distribution Apparatus), was upgraded with stronger magnetic field B $\leq$ 1200G. The main focus is to understand the neutral particle dynamics and ionization mechanism with helicon waves to establish a high-density plasma (10ˆ20/mˆ3) at substantial electron (Te$\approx$5-15eV) and ion (Ti$\approx$1-3eV) temperature. To achieve this, installation of higher RF Power $\leq$ 15kW is planned as well as design of an ion cyclotron-heating antenna. To quantify the plasma characteristics, diagnostics including a Triple Langmuir Probe, Emissive Probe, and Laser Induced Fluorescence were established. We show first results from characterization of the device. The coupling of the helicon mode in the electron temperature and density parameter space in Argon was mapped out with regard to neutral pressure, B-field and RF power. In addition, validity of the Bohm Criterion and of the Chodura model starting in the weakly collisional regime is tested. A key goal in all efforts is to develop methods of quantitative spectroscopy based on cutting-edge models and active laser spectroscopy.

[1]This work was funded by Startup funds of the Department of Engineering Physics at UW Madison, the NSF CAREER award PHY-1455210 and NSF grant PHY-1206421.

Victoria Winters
University of Wisconsin Madison

Date submitted: 23 Jul 2015 Electronic form version 1.4