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Microwave Assisted Helicon Plasmas EARL SCIME, UMAIR SIDDIQUI, JOHN MCKEE, ZACH SHORT, JULIANNE MCILVAIN, West Virginia University — Up to 1.2 kW of pulsed 2.45 GHz microwaves are injected into argon and helium helicon plasmas at 6 to 20 mTorr neutral pressure, at 500 W of continuous rf power, and up to 1 kG magnetic field strengths. The objective is to heat the tail of the electron energy distribution function (EEDF) and populate ion metastable states for investigation with laser-induced-fluorescence. Langmuir probes are used to measure the EEDF and optical emission spectroscopy is used to monitor ion emission from excited states populated by the additional microwave power. The injection of microwave power in argon helicon plasmas is shown to heat the high energy tail of the EEDF without increasing the plasma density. Argon ion emission is shown to increase by a factor of 4. Injection of microwaves into a helium helicon plasma is shown to cool the bulk of the EEDF and increase the plasma density. Previously absent helium ion emission lines are observed with the injection of microwaves.

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