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**Ion Heating in the PHAse Space MApping (PHASMA) Experiment**[1] EARL SCIME, West Virginia Univ, AND THE PHASMA TEAM — The PHAse Space MeAsurements (PHASMA) experiment, features laser induced fluorescence diagnostics for ion measurements, Thomson scattering for electron velocity distribution function measurements, and a microwave scattering system for turbulence measurements. PHASMA is designed to enable the direct measurement of ion and electron vdfs in space-relevant plasma phenomena including reconnection, shocks, and turbulence. To create the conditions necessary for different experimental regimes, PHASMA employs a 2 kW, steady-state helicon source capable of generating variable-density background hydrogen, helium, and argon plasmas with controllable plasma pressure (relative to the magnetic pressure), collisionality, and azimuthal flow shear. A key feature of the helicon plasma source is the capability to create 1eV ions over a wide range of plasma conditions. Early experiments in PHASMA resulted in helicon source ion temperatures less than 0.2 eV. The very low ion temperatures appear to be result from poor coupling of the slow wave to the plasma due to changes in antenna design during construction of PHASMA. We report ion temperature measurements as a function of modifications of the antenna structure designed to restore the high ion temperatures typically observed in helicon sources.

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