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Ion Heating and Flows in a High Power Helicon Source[1] EARL SCIME, West Virginia University, RICCARDO AGNELLO, IVO FURNO, ALAN HOWLING, REMY JACQUIER, GENNADY PLYUSHCHEV, EPFL, Swiss Plasma Center (SPC), DEREK THOMPSON, West Virginia University — We report experimental measurements of ion temperatures and flows in a high power, linear, magnetized, helicon plasma device, the Resonant Antenna Ion Device (RAID). RAID is equipped with a high power helicon source. Parallel and perpendicular ion temperatures on the order of 0.6 eV are observed for an rf power of 4 kW, suggesting that higher power helicon sources should attain ion temperatures in excess of 1 eV. The unique RAID antenna design produces broad, uniform plasma density and perpendicular ion temperature radial profiles. Measurements of the azimuthal flow indicate rigid body rotation of the plasma column of a few kHz. When configured with an expanding magnetic field, modest parallel ion flows are observed in the expansion region. The ion flows and temperatures are derived from laser induced fluorescence measurements of the Doppler resolved velocity distribution functions of argon ions.

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