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Resonant Wave Heating of Argon Ions in the Hot hELicon eXperiment (HELIX) STEPHANIE SEARS, JERRY CARR JR., JUSTIN ELFRITZ, MATTHEW GALANTE, RICHARD MAGEE, DUSTIN MCCARREN, ROBERT VANDERVORT, ERIC REYNOLDS, EARL SCIME, West Virginia University —
Alfvén wave damping is the dominant physical process invoked in leading theoretical models of ion heating in the solar corona. The construction of a new external antenna by the West Virginia University helicon source group to launch large-amplitude ($B_1 \sim 10\%$ of B_0) shear Alfvén waves in argon plasma provides a new experimental tool to investigate possible ion heating due to the damping of these waves. The ion temperatures are measured with time-resolved Laser Induced Fluorescence while magnetic sense coils are used to measure the phase velocity and amplitudes of the propagating waves. A new, small-scale magnetic sense coil provides sub ion gyroradius spatial resolution and new differential amplifiers block the ambient rf noise at high frequencies. Here we present both the antenna and the new b-dot probe designs, measurements of the plasma perturbations and spatially-localized field measurements, as well as comparisons of these experimental results with 3 dimensional PIC simulations of Alfvén wave propagation in plasmas with strong density gradients.

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