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Mass dependence of impurity ion temperature in a reconnecting laboratory plasma CHRISTOPHER COTHRAN, Haverford College, MICHAEL BROWN, Swarthmore College — Magnetic reconnection is ubiquitous in magnetized plasmas, occurring in the solar corona, the magnetosphere, as well as in laboratory plasmas. In the corona, ion temperatures are correlated with ion mass (Cranmer, SSR 2002), therefore suggesting that the heating mechanism in the corona, most likely reconnection, is more efficient for more massive ion species. This observation motivated a recent laboratory study at the Swarthmore Spheromak Experiment (SSX). Magnetic reconnection occurs as left– and right– handed spheromaks merge axially within a cylindrical flux-conserving boundary (counter-helicity merging). Doppler broadened and shifted emission lines from impurity ions (He, C, N, O in majority H plasma) are monitored with a fast, high resolution echelle spectrograph (Cothran, RSI 2006) capable of tracking the lineshape at the MHD timescale of the experiment. The well resolved spectral lines intermittently show a double-peaked shape indicative of reconnection outflow at a substantial fraction of the Alfvén speed. Contrary to the results in the corona, however, the He ions appear to be somewhat hotter than the heavier impurity species observed.

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