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Mass dependent ion heating in the SSX reconnection device[1] M. BROWN, T. GRAY, J. SANTNER, M. KOREIN, D. WEINHOLD, Swarthmore College — Ion heating due to magnetic reconnection is measured in the SSX plasma merging device for a variety of ion masses and charge states with a high resolution ion Doppler spectrometer. The SSX IDS instrument measures the width and Doppler shift of the nascent C_{III} impurity 229.7 nm line, a doped He_{II} impurity 468.6 nm line, or a doped Ar_{II} impurity line to determine the temperature and line-averaged flow velocity. The velocity resolution of the instrument is $\leq 5\ km/s$. There is enough signal to resolve the full line within an MHD dynamical time (about 1 μs in SSX). Peak ion temperatures of 80 eV have been recorded during reconnection events as well as flows up to 40 km/s. Spheromak merging in a new slightly prolate flux conserver ($R = 0.2\ m, L = 0.4\ m$) often results in excitation of several unstable MHD modes. After reconnection and instability, we measure a period of reconnection driven ion heating with peak temperatures for carbon $T_C \cong 50\ eV$ and for helium $T_{He} \cong 70\ eV$ (averaged over many shots). During the decay phase, we observe rapid ion cooling likely due to energetic ion loss. Results from a new ion energy analyzer and Mach probe will be presented.

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