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Charge-to-mass-ratio-dependent ion heating during magnetic reconnection in the MST RFP[1] S.T.A. KUMAR, D.J. DEN HARTOG, M.D. NORNBERG, A.F. ALMAGRI, J.S. SARFF, CMSO, University of Wisconsin-Madison, D. CRAIG, Wheaton College, IL — Global magnetic reconnection events in the MST reversed field pinch (RFP) result in significant ion heating and acceleration. It is well understood that the ultimate energy source is the equilibrium magnetic energy, but the exact mechanism of the conversion of magnetic energy to particle kinetic energy is a topic of continuing research. In a recent experiment, we measured the temperature evolution of various charge states of dominant impurity ions in MST (Al, C, N and O), using passive spectroscopy. Measurements are made in standard RFP discharges with plasma current, I_p ∼400 kA and central line averaged electron density, $n_e \sim 1.0 \times 10^{19}$ m^{-3}. Temperatures of these impurity ions are measured at the edge of the plasma, predominantly in the direction parallel to the equilibrium magnetic field. It is found that the increase in ion temperature during magnetic reconnection events is proportional to the charge-to-mass ratio of the ion species. Consistency with existing theoretical models for ion heating is investigated.

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