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Parallel and perpendicular ion heating in the MST RFP[1]
RICHARD MAGEE, DANIEL DEN HARTOG, GENNADY FIKSEL, SANTHOSH KUMAR, University of Wisconsin - Madison, DARREN CRAIG, Wheaton College, CMSO COLLABORATION — The anomalous energization of plasma ions during magnetic reconnection has long been observed in numerous laboratory and astrophysical plasmas. In the MST reversed-field pinch, the reconnection impulsively heats the ions, more than doubling their temperature in $\sim$100 μsec. A critical outstanding question has been whether or not this heating is isotropic with respect to the magnetic field, which we attempt to address here with charge exchange recombination spectroscopy measurements. A new toroidal view allows localized measurements of the impurity ion (C^{+6}) temperature both perpendicular and parallel to the mean magnetic field. We observe that in the core of low-density discharges, the parallel temperature rise is comparable to the perpendicular rise, and a large increase in neutron flux occurs at the time of reconnection. In high-density discharges, the perpendicular temperature increase is the same as in low, but there is almost no heating seen in the parallel direction, and no increase in neutron flux is observed. Possible mechanisms will be discussed.

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