Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

The role of magnetic fluctuations in ion heating on MST SANJAY GANGADHARA, DARREN CRAIG, DAVID ENNIS, DANIEL DEN HARTOG, GENNADY FIKSEL, STEWART PRAGER, University of Wisconsin-Madison, Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas — Observations of ion heating during magnetic reconnection have been made in a number of laboratory and astrophysical plasmas. On the MST reversed field pinch, ion heating occurs during a sawtooth crash over a fast time scale ($\sim$ 100 μs) relative to the ion-ion collision time. The mechanism by which energy is deposited in the ions is unknown, but the amount of energy is similar to the drop in stored magnetic energy during the event. The role of magnetic fluctuations is investigated by correlating tearing fluctuation (mode) activity with localized measurements of the impurity ion temperature (T_i) obtained with fast time resolution using charge exchange recombination spectroscopy. Results indicate that in standard MST plasmas, where the dominant core tearing modes during reconnection are m=1 and the dominant edge modes are m=0, the ion heat source is broad. However, for similar plasmas in which the m=0 mode resonance is kept outside the plasma volume, no ion heating is seen. In addition, measurements suggest that the magnitude and structure of the heating is correlated with fluctuation behavior. Enhanced ion temperatures have also been observed in improved confinement plasmas when the hard x-ray flux is extraordinarily large. Correlations between T_i and magnetic mode activity for these plasmas will also be presented. Work supported by U.S.D.O.E and N.S.F.

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Date submitted: 25 Jul 2005 Electronic form version 1.4