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Statistical analysis of variations in ion heating at individual reconnection events in the MST RFP D. CRAIG, M.S. CARTOLANO, Wheaton College, D.J. DEN HARTOG, M.D. NORNBERG, S.T.A. KUMAR, University of Wisconsin - Madison and the Center for Magnetic Self-Organization — Ion heating in the reversed field pinch (RFP) far exceeds collisional energy transfer from electrons and the mechanism for this heating remains unknown. The connection between ion heating and other physical processes in the plasma is evaluated by studying variations in the amount of ion heating at individual reconnection events in the Madison Symmetric Torus (MST). Ion temperature is measured spectroscopically by Doppler broadening of C V and C VI emission lines. Correlation of the change in ion temperature with the change in magnetic energy confirms that the magnetic energy is the source for the heating. Correlation of the change in ion temperature with individual tearing mode amplitudes indicates that the edge-resonant modes are better predictors for the amount of global ion heating then the core-resonant modes. There is also a strong correlation between ion heating and dynamo activity. Simultaneous measurements of the ion temperature at different toroidal locations reveal a toroidal asymmetry to the ion heating in MST. These results present challenges for existing heating theories and suggest a stronger connection between edge-resonant tearing modes, dynamo activity, and ion heating than has been previously thought. This work was supported by the U.S.D.O.E. and the N.S.F.

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