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High Time Resolution Analysis of Thermal Transport and Magnetic Stochasticity During a Sawtooth Event in MST[1] J.A. REUSCH, J.K. ANDERSON, F. EBRAHIMI, A.F. FALKOWSKI, D.J. DEN HARTOG, C.B. FOREST, R. O'CONNELL, H.D. STEPHENS, University of Wisconsin - Madison — New measurements with the multi-point, multi-pulse, Thomson scattering system on MST have enabled the analysis of the radial thermal diffusion (χ_e) profile within tens of microseconds of magnetic reconnection events known as sawteeth. Diffusion of thermal energy out of the plasma along stochastic magnetic field lines is believed to be the major mechanism of heat loss during these magnetic relaxation events. At the sawtooth crash the magnetic fluctuations are large and the magnetic field becomes fully stochastic throughout much of the plasma volume. By ensembling data from many similar shots, we have determined the evolution of the χ_e profile through the sawtooth crash with much higher time resolution than was previously possible. These new measurements cover the critical half millisecond around the sawtooth crash with 50μs wide bins. The evolution of the χ_e profile obtained from experiment is compared to Rechester-Rosenbluth predictions and results of MHD simulations done with the DEBS code.

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