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Particle Heating and Energization During Magnetic Reconnection Events in MST Plasmas[1] AMI M. DUBOIS, A.F. ALMAGRI, J.K. ANDERSON, D.J. DEN HARTOG, C. FOREST, M. NORNBERG, J.S. SARFF, University of Wisconsin - Madison — Magnetic reconnection plays an important role in particle transport, energization, and acceleration in space, astrophysical, and laboratory plasmas. In MST reversed field pinch plasmas, discrete magnetic reconnection events release large amounts of energy from the equilibrium magnetic field, resulting in non-collisional ion heating. However, Thomson Scattering measures a decrease in the thermal electron temperature. Recent fast x-ray measurements show an enhancement in the high energy x-ray flux during reconnection, where the coupling between edge and core tearing modes is essential for enhanced flux. A non-Maxwellian energetic electron tail is generated during reconnection, where the power law spectral index (γ) decreases from 4.3 to 1.8 and is dependent on density, plasma current, and the reversal parameter. After the reconnection event, γ increases rapidly to 5.8, consistent with the loss of energetic electrons due to stochastic thermal transport. During the reconnection event, the change in γ is correlated with the change in magnetic energy stored in the equilibrium field, indicating that the released magnetic energy may be an energy source for electron energization. Recent experimental and computational results of energetic electron tail formation during magnetic reconnection events will be presented.

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