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Acceleration of ions and electrons during magnetic reconnection in a multi-island environment KEVIN SCHOEFFLER, JAMES DRAKE, MARC SWISDAK, University of Maryland — Hard x-ray and gamma ray emission in flares, and energetic particles found by Wind in the magnetosphere imply an association between Magnetic reconnection and energetic ions and electrons. One explanation for the acceleration of these particles is by 1st order Fermi acceleration of particles bouncing in contracting magnetic islands. Using a particle-in-cell code, we investigate the effects of β on the acceleration by simulating island growth in multiple interacting Harris current sheets. Many islands are generated, and particles are heated in this context. There is a striking difference between the heating of electrons vs. the heating of ions. There is a strong dependence on β for electron heating, while the ion heating seems independent of β. Anisotropies are formed both with $T_{\|} > T_{\perp}$ and with $T_{\|} < T_{\perp}$. When the anisotropy reaches the marginal firehose condition or the marginal mirror mode condition, the anisotropy is constrained. The firehose instability and the dependence of the criteria for marginal firehose instability on β, may play an important role in the acceleration of ions and electrons. This study may shed light on particle acceleration mechanisms at sectored magnetic fields in the heliosheath, as well as other systems such as in the solar wind and the solar corona.

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