Abstract Submitted
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Nonlinear Pressure Anisotropy Yielding Multiple Reconnection Regimes[1] A. LE, J. EGEDAL, MIT, W. DAUGHTON, LANL, H. KARIMABADI, UCSD — Fully kinetic PIC simulations exhibit several regimes for the saturated state of a reconnecting current sheet. The electron dynamics vary with the characteristics of thermal electron orbits, which depend nonlinearly on the implemented mass ratio, strength of the guide magnetic field, and electron beta. The inflow electron pressure becomes anisotropic due to electron trapping effects with a strong dependence on density variations, and the highest anisotropy is predicted to develop in low beta plasmas [1]. For the weakest guide fields, effective pitch angle scattering causes the outflow electron pressure to become nearly isotropic. Above a certain threshold guide field, the electron orbits remain magnetized in the exhaust and the pressure anisotropy extends into the outflow. In simulations at the physical proton-to-electron mass ratio, the electron pressure anisotropy may then drive magnetized current layers [2] longer than 15 ion inertial lengths similar to layers inferred from spacecraft observations in the magnetosphere [3].

[1] Le et al., GRL 37, L03106 (2010).
[2] Ohia et al., PRL (2012).
[3] Phan et al, PRL 99, 255002 (2007)

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J. Egedal
MIT

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