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**Two-scale structure of the electron dissipation region during collisionless magnetic reconnection: PIC simulations and Cluster satellite observations** MICHAEL SHAY, JAMES DRAKE, MARC SWISDAK, TAI PHAN, JONATHAN EASTWOOD, University of Delaware — Particle in cell (PIC) simulations[1] and Cluster satellite observations of collisionless magnetic reconnection are presented that demonstrate that the electron dissipation region develops a distinct two-scale structure along the outflow direction. Consistent with past hybrid and two-fluid simulations, the rate of reconnection remains fast in very large systems, independent of the mass of the electrons. A surprise is the existence of an outer electron dissipation region downstream of the inner one, which extends up to 40 ion inertial lengths downstream of the X-line in the largest simulations. This outer region consists of a super-Alfvenic jet of electrons which are decoupled from the magnetic field. The existence of this outer dissipation region is confirmed by Cluster satellite observations during a current sheet crossing in the flanks of the dayside magnetopause about 30 ion inertial lengths downstream of an x-line.
[1] Shay, M. A., J. F. Drake, and M. Swisdak, "Two-scale structure of the electron dissipation region during collisionless magnetic reconnection," Submitted to Physical Review Letters, arXiv:0704.0818v1 [physics.plasm-ph]

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