Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Laboratory Study of Magnetic Reconnection with Variable Collisionality and its Application to Space Astro-physics[1] M. YAMADA, D. UZDENSKY, R. KULSRUD, H. JI, S. DORFMAN, E. OZ, J. YOO, Center for Magnetic Self-Organization, PPPL, Princeton U — The fundamental physics of magnetic reconnection derived from the recent MRX experiment [1] is presented focusing on the different dynamics of electrons and ions during reconnection. Both local and global physics issues for reconnection and magnetic field dissipation are discussed. In the MRX scaling [1], the reconnection rate increases rapidly when the ion skin depth becomes larger than the Sweet-Parker width; the rate depends linearly on λ_{mfp}/L, a ratio of the electron mean free path to the scale length. This scaling can guide comparisons between laboratory results and astrophysical plasmas [2]. The recent experimental study of the global dynamics of line-tied solar flux ropes in a half-toroid plasma arc is also presented.

[1] M. Yamada et al, Phys. Plasmas, 13, 052119 (2006)
[2] D. A. Uzdensky, Phys. Rev. Lett., v.99, 261101 (2007).

[1]Supported by DoE, NSF, and NASA.

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Date submitted: 21 Jul 2009 Electronic form version 1.4