Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Self-Organization of Reconnecting Plasmas to a Marginally Collisionless State[1] ELLEN ZWEIBEL, U. Wisconsin-Madison, SHINSUKE IMADA, Institute of Space & Aeronautical Science, Japan Aerospace Exploration Agency — It was suggested by Uzdensky (2007) and Cassak et al. (2008) that stellar coronal loops heated by magnetic reconnection naturally maintain themselves in a marginally collisionless state. The mechanism is based on the observation, reported in many calculations and experiments, that collisionless reconnection is faster than collisional reconnection. The mechanism operates as follows: increasing the heating rate increases the conductive heat flux to the dense lower atmosphere, driving an evaporative flow. The resulting increase in coronal density increases the collisionality, reducinging the heating rate. Likewise, reducing the heating rate decreases the collisionality. We are testing this scenario using a time dependent, 1D model for a coronal loop in thermal contact with a colder, denser plasma. We include a collisionality dependent heating rate. heat transport by thermal conduction, radiative cooling, and enthalpy flux. We will discuss the conditions under which the plasma self organizes, and the stability of the resulting state. References: Cassak, P.A., Mullan, D.J, & Shay, M.A. ApJ 676, L69 (2008) Uzdensky, D. ApJ 671, 2139 (2007)

[1]NSF PHY0821899 to the Center for Magnetic Self-Organization & JSPS.

Ellen Zweibel
U. Wisconsin-Madison

Date submitted: 19 Jul 2011 Electronic form version 1.4