Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

**Kinetic Theory and Simulation of Magnetic Reconnection in Force-Free Current Layers** YI-HSIN LIU, WILLIAM DAUGHTON, HUI LI, Los Alamos National Laboratory, HOMA KARIMABADI, UCSD — While many studies of reconnection have focused on the Harris sheet equilibrium, which is relevant to Earth's magnetosphere, there has been growing interest in force-free current sheets, which are thought to be more relevant in low-$\beta$ regimes such as the solar corona. One important first step is to understand the evolution of tearing modes, which give rise to magnetic flux ropes in large 3D systems. It has been shown that flux rope generation and subsequent interaction can lead to the development of turbulence[1] which may also affect the acceleration of energetic particles. Here, we describe the linear kinetic analysis of the tearing mode for the force-free configuration. We have verified the linear mode properties using 2D and 3D full particle simulations. In contrast to previous Harris sheet results,[2] the tearing instability in a force-free current layer is unstable over a wide range of oblique angles. This suggests that force-free current sheets may be even more susceptible to the generation of 3D turbulence in large systems. We will discuss the implications of this effect on the structure of the reconnection layers as well as associated particle acceleration. Heating efficiency in 2D and 3D will be compared.

[1]Daughton et al, Nature Physics **7**, 539, 2011
[2]Ibid.

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Date submitted: 12 Jul 2012 Electronic form version 1.4