Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Properties of Magnetic Reconnection as a function of magnetic shear YI-HSIN LIU, WILLIAM DAUGHTON, Los Alamos National Laboratory, HOMA KARIMABADI, UCSD, HUI LI, PETER GARY, FAN GUO, Los Alamos National Laboratory — Observations of reconnection events at the Earth's magnetopause and in the solar wind show that reconnection occurs for a large range in magnetic shear extending to the very low shear limit. Here we report on our study of the effect of the magnetic shear on details of reconnection such as its structure and rate, using 2D and 3D kimetic simulations and analytical theory. Contrary to all previous theories, we find that the electron diffusion region bifurcates into two or more distinct layers in regimes with weak magnetic shear.[1] This new morphology is explained by oblique tearing modes which produce flux ropes while simultaneously driving enhanced current at multiple resonance surfaces. This physics persists into the nonlinear regime leading to multiple electron layers embedded within a larger Alfvénic inflow and outflow, a feature that could be observed by NASA's up-coming Magnetospheric Multiscale mission. We have extended the study to lower shear cases and found a new regime where the rate becomes much smaller and the properties of the reconnection changes significantly. We will discuss this new regime and offer a new analytical model that predicts key aspects of this regime.

[1]Yi-Hsin Liu et al. Phys. Rev. Lett. **110**, 265004, 2013

Yi-Hsin Liu
Los Alamos National Laboratory

Date submitted: 10 Jul 2013 Electronic form version 1.4