Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Hall Reconnection in Partially Ionized Plasmas in the Magnetic Reconnection Experiment ERIC LAWRENCE, HANTAO JI, MASAAKI YAMADA, JONGSOO YOO, Princeton Plasma Physics Laboratory — In many space and astrophysical plasmas, such as the solar chromosphere and protoplanetary disks, the degree of ionization can be quite low; often 1% or less. In addition, magnetic reconnection is thought to be a fundamental process in these plasmas. The presence of a large neutral atom population has at least two effects relevant to magnetic reconnection. First, electron-neutral collisions enhance resistive dissipation. Second, strong ion-neutral collisions increase effective ion inertia. This may increase the length scales on which fast Hall reconnection is predicted to occur. By using high gas fill pressures in the Magnetic Reconnection Experiment (MRX), we can study reconnection in partially or weakly ionized plasmas ($n_n/n_e = 1 - -200$). A newly constructed magnetic probe array allows us to make magnetic measurements of the reconnection region with high spatial resolution and large spatial extent. This will allow us to diagnose, for example, the structure of the Hall quadrupole field in these conditions. Langmuir and spectroscopic diagnostics will also provide insight into how neutrals affect the reconnection process. These results will also be discussed in the context of ongoing theoretical work.

Eric Lawrence
Princeton Plasma Physics Laboratory

Date submitted: 15 Jul 2011 Electronic form version 1.4