Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Measurement & Imaging for the Reconnection Scaling Experiment H. SWAN, J. SEARS, Y. FENG, T. INTRATOR, LANL — The Reconnection Scaling Experiment (RSX) is a fundamental investigation of the detailed behavior and interactions of plasma flux ropes, both within the framework of MHD and on electron inertial length scales (mm). Effectively determining the dynamics of flux ropes requires precisely located, 3D measurements of a wide array of parameters: density and temperature (pressure), ion velocity, current density (electron fluid flow), and magnetic fields. To achieve this, RSX employs a large suite of diagnostic probes, which are inserted directly into the plasma in various locations and orientations, as well as external cameras and other optical tools. We describe several useful experimental diagnostic developments. These include a homebrew recipe for fabricating Mach probes, with directionality that is easy to implement at construction time, and a straightforward but powerful 3D imaging technique that allows precision location of probes within the experiment, using no more sophisticated hardware than standard webcams. We discuss the challenges of reconstructing plasma dynamics from the myriad data channels involved, and how the new diagnostics help solve these challenges.

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Date submitted: 08 Jul 2013 Electronic form version 1.4