Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Experiments and simulations of flux rope dynamics in a plasma[1]
THOMAS INTRATOR, IVO FURNO, TSITSI MADZIWA-NUSSINOV, GIOVANNI LAPENTA, ADAM LIGHT, Los Alamos National Laboratory, SARA ABBATE, Torino Polytecnico, DMITRI RYUTOV, Lawrence Livermore National Laboratory — The behavior of flux ropes is a key issue in solar, space and astrophysics. For instance, magnetic fields and currents on the Sun are sheared and twisted as they store energy, experience an as yet unidentified instability, open into interplanetary space, eject the plasma trapped in them, and cause a flare. The Reconnection Scaling Experiment (RSX) provides a simple means to systematically characterize the linear and non-linear evolution of driven, dissipative, unstable plasma-current filaments. Topology evolves in three dimensions, supports multiple modes, and can bifurcate to quasi-helical equilibria. The ultimate saturation to a nonlinear force and energy balance is the link to a *spectrum of relaxation processes.* RSX has adjustable energy density $\beta \ll 1$ to $\beta \approx 1$, non-negligible equilibrium plasma flows, driven steady-state scenarios, and adjustable line tying at boundaries. We will show magnetic structure of a kinking, rotating single line tied column, magnetic reconnection between two flux ropes, and pictures of three braided flux ropes. We use computed simulation movies to bridge the gap between the solar physics scales and experimental data with computational modeling. In collaboration with Ivo Furno, Tsitsi Madziwa-Nussinovm Giovanni Lapenta, Adam Light, Los Alamos National Laboratory; Sara Abbate, Torino Polytecnico; and Dmitri Ryutov, Lawrence Livermore National Laboratory.

[1]supported by LANL LDRD-ER

Thomas Intrator

Date submitted: 02 Aug 2005 Electronic form version 1.4