Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Pulsating Reconnection in the interaction of two magnetic flux ropes[1] WALTER GEKELMAN, TIM DEHAAS, University of California, Los Angeles, WILLIAM DAUGHTON, Los Alamos National Laboratory, BART VAN COMPERNOLLE, University of California, Los Angeles — Two flux ropes (dia = 7 cm, ds= 3 cm, L = 10m, I_{rope} = 300 A/rope) are generated by using a mask in front of a high emissivity cathode (n = $4X10^{12}$ cm^3, T_{e-rope} = 8.5 eV) in a background magnetoplasma (He, B_{oz} = 330 G, n=$1.0X10^{12}cm^3$, T_e = 4 eV) in the LAPD device at UCLA. The ropes are kink unstable (I >250 A) but not violently so. All three components of the magnetic field were measured with small (1 mm dia) 3-axis probes sensitive to $\frac{\partial \vec{B}}{\partial t}$ and the plasma potential measured with an emissive probe. These were measured at 42,075 locations in the volume containing the ropes and 7000 time steps ($\delta\tau = .33\ \mu$s). The total electric field $\vec{E} = -\nabla\phi - \frac{\partial \vec{A}}{\partial t}$ and parallel resistivity as well as the Quasi Seperatrix layer (QSL) were derived from the data. The flux ropes periodically collide as they kink. Each time this happens a strong QSL (Q<400) forms and the resistivity jumps to over a hundred times the classical value at locations within the QSL and also on the gradient of the rope current. The reconnection rate is directly evaluated by integrating the electric field along field lines as well as the energy deposition $\vec{J} \cdot \vec{E}$. The data indicate that there is more than one process causing the enhanced resistivity. The reconnection rate cannot be explained by conventional 2D theories.

[1]Work done at the BaPSF which is supported by NSF/DOE. project supported by DOE and a LANL research grant

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Date submitted: 22 Jul 2015 Electronic form version 1.4