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Reconnecting Flux Ropes[1] WALTER GEKELMAN, BART VAN COMPERNOLLE, Department of Physics, University of California, Los Angeles — Magnetic flux ropes are due to helical currents and form a dense carpet of arches on the surface of the sun. Occasionally one tears loose as a coronal mass ejection and its rope structure is detected by satellites close to the earth. Current sheets can tear into filaments and these are nothing other than flux ropes. Ropes are not static, they exert mutual $\vec{J} \times \vec{B}$ forces causing them to twist about each other and merge. Kink instabilities cause them to violently smash into each other and reconnect at the point of contact. We report on experiments done in the large plasma device (LAPD) at UCLA ($L = 17m, dia = 60cm, 0.3 \leq B_{0z} \leq 2.5kG, n \simeq 2 \times 10^{12} cm^{-3}$)on three dimensional flux ropes. Two, three or more magnetic flux ropes are generated from initially adjacent pulsed current channels in a background magnetized plasma. The currents and magnetic fields form exotic shapes with no ignorable direction and no magnetic nulls. Volumetric space-time data show multiple reconnection sites with time-dependent locations. The concept of a quasi-separatrix layer (QSL), a tool to understand 3D reconnection without null points. In our experiment the QSL is a narrow ribbon-like region(s) that twists between field lines. Within the QSL(s) field lines that start close to one another rapidly diverge as they pass through one or more reconnection regions. When the field lines are tracked they are observed to slip along the QSL when reconnection occurs. The Heating and other co-existing waves will be presented.

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