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Interactions Between Magnetic Flux Ropes in a Laboratory Plasma[1] ERIC LAWRENCE, WALTER GEKELMAN, STEPHEN VINCENA, UCLA — The behavior and interaction of magnetic flux ropes have long been topics of interest to solar and space plasma physicists, but few laboratory experiments have been performed as it is necessary to have a relatively collisionless plasma and currents with significant self-generated fields. Movable lanthanum hexaboride (LaB_6) cathodes have been developed to study the 3D dynamics of flux ropes in the Large Plasma Device (LaPD). Each 2.5 cm LaB_6 cathode can produce current densities of 5-20 A/cm^2 and $\Delta B/B \sim 10\%$. The background plasma ($n \sim 2 \times 10^{12}$ cm^{-3}, $d \sim 60$ cm, $L \sim 18$ m, and $\tau_{\rm rep} = 1$ s) is produced with a DC discharge using a pulsed barium oxide-coated cathode. The two current channels are created by biasing the LaB_6 cathodes with respect to a grid anode at the opposite end of the chamber. They are emitted parallel to each other and the background B field. $\boldsymbol{J} \times \boldsymbol{B}$ forces cause the currents to move across the field and interact. The role of reconnection in these interactions will be investigated through detailed volume measurements of the magnetic field and current density. Data from Langmuir probes and microwave horn antennas will also be presented.

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