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3D current, temperature and density profiles of three interacting flux ropes[1] BART VAN COMPERNOLLE, WALTER GEKELMAN, STEPHEN VINCENA, University of California, Los Angeles — Three magnetic flux ropes are created in a background magnetoplasma (L = 16 m, $n_{background}$ = 2 10^{12} cm^{-3}, n_{rope} = 10^{13} cm^{-3}, Helium, B_{0z} = 330 G, plasma diameter = 60 cm). The ropes are made using a 8 cm diameter 'masked' Lanthanum Hexaboride (LaB_6) cathode and remote anode, 11 m away. The mask consists of a carbon plate with three one inch diameter holes cut out, center to center spacing is 1.5 inch. Each rope carries 40 amps of current and produces magnetic fields on the order of 4% of B_{0z}. The 3D current structure is calculated from volumetric magnetic field data. The current channels are fixed to the cathode at one end, but are seen to twist about each other and merge away from the cathode. Return currents are observed and may be linked to reconnection events. Cross correlation analysis of ion saturation current measurements revealed large drift modes (m=1,2,3,4,...) surrounding the current channels. Swept Langmuir probe measurements, acquired at 2600 locations in a transverse plane show the spatial profile and temporal evolution of the density and temperature associated with the flux ropes.

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