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Emission and Current Density Distribution in an Extended Magnetic Arcade[1] D. CRAIG, C. ADAMS, S. MCKAY, M. MCMILLAN, M. RAK, Wheaton College — We report on observations and analysis of emission and current density distribution in the Wheaton Impulsive Reconnection Experiment (WIRX). The arcade-shaped plasma is formed between two parallel electrodes and is constrained by a magnetic coil surrounding the electrodes. This setup is geometrically similar to two-ribbon flares and magnetic arcades in the solar corona. ICCD images and a 1D, 20-channel custom photodiode camera are used to record emission from the plasma in space and time. A set of 76 probes samples the magnetic field throughout the plasma volume. Using the relative emission as a proxy for current density, we construct a model for the magnetic field and compare with the probe data. We find good agreement, indicating that the emission intensity is roughly proportional to current density in this gaseous arc discharge. The percentage of the electrode length filled by plasma current and the extent of the current-carrying region in the plasma is examined as a function of total plasma current and vacuum magnetic field strength. Higher plasma current and lower vacuum magnetic field leads to taller arcades and more diffuse current distributions, consistent with expectations from MHD force balance.

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