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Measuring and Modeling the Plasma Temperature and Density in WIRX MICHAEL MORKEN, DARREN CRAIG, Wheaton College (IL) — We develop a theoretical model and experimental techniques to provide a better picture of how the adjustable parameters such as the current, and electrode geometry affect the temperature and density of WIRX plasmas. Our model predicts the plasma temperature and density by balancing the Ohmic heating with convective losses. The Ohmic heating is measured directly as the product of the voltage drop between the electrodes and the plasma current. Temperature and density are measured independently using spectroscopic methods. Stark broadening of the H-Beta line is used to measure density. To measure the electron temperature of the plasma the line ratios of various hydrogen transitions were compared with the predictions of the Boltzmann thermal equilibrium model and the coronal equilibrium model. Preliminary experimental results are consistent with the plasma parameters predicted by our model. This work will be used to inform future modifications to the experiment with the intent of producing higher temperatures in WIRX plasma, making magnetic reconnection more probable. Work supported by US DOE.

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