

Abstract Submitted
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Measurement of Electrical Currents in the Solar Corona STEVEN SPANGLER, University of Iowa — Some theories for heating of the solar corona invoke Joule heating by electrical currents. Observations of spatially-extended radio sources through the corona show times when there is a difference in the Faraday rotation between two lines of sight separated by about 33,000 km in the corona. Ampere's Law is used to relate these observations to the presence of electrical current flowing between the two lines of sight. I infer a current of 2.5×10^9 Amperes in the case of the strongest signal, and a current of 2.3×10^8 Amperes in another, marginally significant detection. A model of coronal current sheets is used to interpret the current measurements, and estimate the volumetric heating rate due to Joule dissipation. The model uses the Spitzer resistivity. The model heating rate is approximately 6 orders of magnitude less than independent, observational estimates in the relevant part of the corona. Either the currents detected play a negligible role in coronal heating, or the effective resistivity in the corona is 6 orders of magnitude larger than the Spitzer value.

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