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Demonstrating Ring Currents in a Planeterrella Device: Experiments and Modeling. ETHAN AYARI, Institute for Modeling Plasmas, Atmospheres and Cosmic Dust, INSTITUTE FOR MODELING PLASMAS, ATMOSPHERES AND COSMIC DUST TEAM — Plasmas confined in a dipole magnetic field give insight into the basic physics describing how planetary magnetospheres behave and evolve over time. A laboratory Planeterrella setup is used to visualize ring currents through light emission generated by impact excitation, ionization, and recombination processes. The Planeterrella device consists of a vacuum chamber with a 0.5 Tesla Neodymium bar magnet embedded within a biased aluminum sphere. The bar magnet combined with the potential difference between the biased sphere and the grounded chamber subject the charged particles to a vertically oriented magnetic dipole field and a radially inward electric field. Low pressures (˜400 mTorr) paired with applied voltages yield visible plasma ring currents. For the detailed analysis of these experiments, a Runge- Kutta-based Monte Carlo Collisional (MCC) algorithm was developed to follow the motion of electrons within the electromagnetic fields and track their collisions with neutral $_{--2}$ and $_{--2}$ particles. The MCC algorithm successfully reproduced the two visible rings.

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