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Modifications produced on a large magnetized plasma column by a floating end-plate that is partially emissive: experiment and theory[1]
MATTHEW POULOS, BART VAN COMPERNOLLE, GEORGE MORALES, University of California, Los Angeles — This poster reports on an experiment performed in the Large Plasma Device (LAPD) at the University of California, Los Angeles (UCLA) in which an electrically floating structure is placed near the end of a 20-meter magnetized plasma column. The structure consists of a flat carbon plate that acts as a mask for a smaller, ring-shaped LaB6 emissive surface whose temperature can be externally controlled. This configuration has been previously used to study electron heat transport and pressure-driven avalanches by biasing the LaB6 ring-cathode with respect to a distant anode in a cold afterglow plasma. In contrast, the present study is performed during the active portion of the steady-state discharge in which the nominal plasma parameters are determined by injection of an electron beam from a BaO cathode at the opposite end. Even without an applied bias on the LaB6 cathode, the self-consistent potential and current profiles are modified near the end plate as the LaB6 temperature is increased, resulting in density increases on the field lines in contact with the emissive surface. In the absence of enhanced ionization, at the largest cathode temperatures the ambient density can be doubled. A theoretical model is presented that provides a quantitative explanation for the observations.

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