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Experimental and Computational Investigation of a Plasma Ion Accelerator with Multiple Magnetic Field Cusps[1] CHRISTOPHER YOUNG, MARK CAPPELLI, Stanford University Plasma Physics Laboratory — A cusped-field discharge produces efficient ionization by trapping electrons from an external cathode through magnetic mirroring between adjacent magnetic cusps. These discharges have applications in space propulsion, particularly at low power (under 200W). However, the underlying physics driving electron transport and ionization in these devices is still poorly understood. In the current study, the plasma potential of a 40–250 W cylindrical cusped-field discharge is characterized using a floating emissive probe. The potential exhibits a spatial structure that mimics visible light emission; elevated potential is observed in a surrounding conical region downstream of the discharge channel, concomitant with ion emission. The experimentally measured plasma potential is used in single-electron particle simulations to investigate transport processes associated with electron migration from the external cathode to the anode at the base of the discharge channel.

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