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Spectroscopic Investigations of Power Flow Plasmas on the Z-Machine at Sandia National Laboratories[1] MARK JOHNSTON, SONAL PATEL, GEORGE LAITY, MICHAEL CUNEO, Sandia National Laboratories, R. DORON, E. STAMBULCHIK, V. BERNSHTAM, Y. MARON, Weizmann Institute of Science — Investigations are underway to study plasmas formed in the power flow region of the Z-Machine at Sandia National Laboratories. High current densities (MA/cmˆ2) during a 100nsec pulse, rapidly heat electrode surfaces, desorbing contaminants and entrained gases. These species form a dense (10ˆ19 cmˆ-3) surface plasma layer composed of neutrals and low charge state ions. Ions that get outside of this layer are subject to MV/cm electric fields, can cross the A- K vacuum gap, and carry current away from the load. Steaked visible spectroscopy using multifiber arrays allow for time and space resolved measurements of the plasma boundary region. The addition of surface dopants such as magnesium and lithium provide a means of measuring localized electric and magnetic fields near the boundary based on Zeeman and Stark affected lineshapes [1]. Data is analyzed using detailed, time-dependent, collisional-radiative and radiation transport modeling. [1] S. Biswas, M.D. Johnston, *et. al.*, "Shielding of the Azimuthal Magnetic Field by the Anode Plasma in a Relativistic Self-Magnetic-Pinch Diode," Phys. of Plasmas, 25, 113102 (2018).

[1]Sandia National Laboratories is a multimission laboratory managed and operated by National Technology Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energys National Nuclear Security Administration under contract DE-NA0003525.

Mark Johnston
Sandia National Laboratories

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