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Electric and Magnetic Field Measurements in High Energy Electron Beam Diode Plasmas using Optical Spectroscopy[1] MARK JOHNSTON, SONAL PATEL, MARK KIEFER, Sandia National Laboratories, S. BISWAS, R. DORON, E. STAMBULCHIK, V. BERNSHTAM, YITZHAK MARON, Weizmann Institute of Science — The RITS accelerator (5-11MV, 100-200kA) at Sandia National Laboratories is being used to evaluate the Self-Magnetic Pinch (SMP) diode as a potential flash x-ray radiography source. This diode consists of a small, hollowed metal cathode and a planar, high atomic mass anode, with a small vacuum gap of approximately one centimeter. The electron beam is focused, due to its self-field, to a few millimeters at the target, generating bremsstrahlung x-rays. During this process, plasmas form on the electrode surfaces and propagate into the vacuum gap, with a velocity of a 1-10 cm's/microseconds. These plasmas are measured spectroscopically using a Czerny-Turner spectrometer with a gated, ICCD detector, and input optical fiber array. Local magnetic and electric fields of several Tesla and several MV/cm were measured through Zeeman splitting and Stark shifting of spectral lines. Specific transitions susceptible to quantum magnetic and electric field effects were utilized through the application of dopants. Data was analyzed using detailed, time-dependent, collisional-radiative (CR) and radiation transport modeling. Recent results will be presented. [1]Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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