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The Effect of Cathode Sheath Position on a Self-Magnetic-Pinch Diode DAVID HOUSLEY, Idaho State University, RICK SPIELMAN, Idaho Accelerator Center — Pulsed electron accelerators like TriMeV emit electrons from a cathode into a vacuum gap and accelerate them toward an anode by a high voltage potential (3-MV peak, 20-ns duration) applied across the gap. Often the electron beam is applied to a Bremsstrahlung converter to produce a radiographic source whose radial extent is termed the "spot" and the "diode" is the portion which bridges the cathode and anode quintessentially being the path electrons traverse and only in one direction. Initially, emitted electrons follow the electric field lines but within a few nanoseconds an equilibrium is established between opposing radial forces that shape the temporal extent of the electron beam throughout the anode-cathode gap. Elements influencing this equilibrium are the geometry and strength of the electric field, coulomb forces between the particles, and Lorentz forces due to currents in the gap. It is thought that all of these elements can be perturbed by changes in the design of the diode which includes the hardware terminating the cathode and accessories mounted on the anode. Recent experiments investigating the effect of a cathode sheath and its position, applied to a self-magnetic-pinch diode, on the resulting spot size and radiographic dose will be presented.

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