Abstract Submitted
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Fully kinetic particle simulations of high pressure streamer propagation[1] DAVID ROSE, DALE WELCH, CARSTEN THOMA, ROBERT CLARK, Voss Scientific — Streamer and leader formation in high pressure devices is a dynamic process involving a hierarchy of physical phenomena. These include elastic and inelastic particle collisions in the gas, radiation generation, transport and absorption, and electrode interactions. We have performed 2D and 3D fully EM implicit particle-in-cell simulation model of gas breakdown leading to streamer formation under DC and RF fields. The model uses a Monte Carlo treatment for all particle interactions and includes discrete photon generation, transport, and absorption for ultra-violet and soft x-ray radiation. Central to the realization of this fully kinetic particle treatment is an algorithm [D. R. Welch, *et al.*, J. Comp. Phys. **227**, 143 (2007)] that manages the total particle count by species while preserving the local momentum distribution functions and conserving charge. These models are being applied to the analysis of high-pressure gas switches [D. V. Rose, *et al.*, Phys. Plasmas **18**, 093501 (2011)] and gas-filled RF accelerator cavities [D. V. Rose, *et al.* Proc. IPAC12, to appear].

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