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Collecting Evidence from Experiments and Simulations for Credible Predictions of Gas Breakdown by High Energy Photons

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A high degree of confidence in simulations requires good geometric fidelity, sound physics models, code verification/code software quality assurance, solution verification, validation, and uncertainty analysis 2. Each of these elements are well defined processes that may consume vast resources and should be applied with the end application in mind. This talk discusses a balanced approach to produce credible prediction for low pressure (near vacuum to 500mTorr) N2,O2 and Ar discharges that are driven by high energy radiation sources. The EMPIRE code, a new electromagnetic plasma simulation capability under development at Sandia that includes kinetic (Particle-in-Cell)plasma representation with Direct Simulation Monte Carlo (DSMC) collisions was used in this endeavor. The system studied includes photoelectrons, thermionic electrons and thermally enhanced neutral desorption from an irradiated surface along with volumetric collisional effects with a background neutral gas.