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Surface photon flux dynamics during breakdown initiation BENJAMIN YEE, EDWARD BARNAT, NICHOLAS ROBERDS, MATTHEW HOPKINS, Sandia National Laboratories — The feedback of electrons from the cathode surface is critical for Townsend breakdown events. The source of these secondary electrons can vary due to changes in the electric field [1], and thus can be expected to change over the course of breakdown as space charge alters the electric field distribution. In a helium system, VUV emissions from resonance radiation are expected to contribute significantly to the breakdown process, but how this varies with time is unknown. In this work, we present preliminary measurements of the VUV flux dynamics in a helium discharge to the cathode surface. This is compared to 1D particle in cell simulations which use a kinetic approach [2] for describing the propagation of photons in the volume. These results are then discussed in the context of how secondary electron emission changes over time in a Townsend breakdown. [1] Z. Lj. Petrović and A. V. Phelps. Phys. Rev. E 80.1 (2009). [2] A. S. Fierro et al. J. Phys. D: Appl. Phys. 50.6 (2017). 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 Energy's National Nuclear Security Administration under contract DE-NA0003525.

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