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An approximate Monte Carlo method for modeling radiation transport during DC plasma breakdown NICHOLAS A. ROBERDS, MATTHEW M. HOPKINS, ANDREW FIERRO, BENJAMIN T. YEE, Sandia Natl Labs — Line emission radiation in the UV range can play an important role in Townsend-type DC plasma breakdown [1]. A Monte Carlo method can be used to model the radiation transport numerically. Monte Carlo methods make few approximating assumptions and provide very accurate results for a wide range of cases [2]. Many systems of interest are optically thick for resonance radiation (photons emitted in transitions to the ground state). The very short photon mean-free-paths (MFPs) and short time intervals (τ) between emission and absorption place severe spatial and temporal resolution constraints on explicit Monte Carlo methods. We present an explicit Monte Carlo method with additional simplifying assumptions that relax the spatial and temporal resolution requirements. The model has been implemented in Aleph, which is a particle-in-cell direct simulation Monte Carlo (PIC-DSMC) code. [1] A. Fierro, C. Moore, B. Scheiner, B. Yee and M. Hopkins, J. Phys. D 50.6 (2017), 065202. [2] A. F. Molisch and B. P. Oehry, "Radiation Trapping in Atomic Vapours", p. 94, Oxford University Press, Oxford, 2006.

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