Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Ultrashort Pulsed Laser Filamentation Microwave Emission Physics[1] E. L. RUDEN, J. A. ELLE, A. C. ENGLESBE, T. M. GARRETT, A. P. LUCERO, A. SCHMITT-SODY, J. E. WYMER, Air Force Research Laboratory, Directed Energy Directorate — The electrodynamics of microwave emission from the plasma left behind by an ultrashort pulsed laser optical pulse after it has self-focused in air via the Kerr effect is explored theoretically and experimentally. The mechanism for and distribution of electrical current responsible for electromagnetic radiation in the microwave regime is not well-understood. Our goal here is to establish a consistent picture of the physical processes that need to be modeled by an integrated, complete, and predictive simulation under development. To this end, measurements of the filament's radius, electrical conductivity, and axial electric current time integral are made along its length at a broad range of atmospheric pressures. The resultant microwave radiation pattern at great distance is also measured. The results are explained in terms of a consistent set of simulations and/or calculations of electron ionization and acceleration by the optical field, subsequent evolution by a nonisotropic form of Generalized Ohm's Law, and radiated electromagnetic field.

[1]This material is based on work supported by Air Force Office of Scientific Research award FA9550-19RDCOR027

Edward Ruden
Air Force Research Lab - Kirtland

Date submitted: 08 Jul 2019 Electronic form version 1.4