Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Spatially and Temporally Resolved Electron Density Measurements of Air Breakdown Plasma Utilizing a 1.4 MW, 110 GHz Gyrotron[1]
S.C. SCHAUB, J.S. HUMMELT, M.A. SHAPIRO, R.J. TEMKIN, Massachusetts Inst of Tech-MIT — We present the latest results of the MIT microwave-frequency air breakdown experiment. The experiment utilizes a 1.4 MW, 110 GHz gyrotron producing 3 microsecond pulses. The linearly polarized beam is focused to a 3.2 mm diameter spot size. The resulting breakdown plasma spontaneously forms a two-dimensional array of filaments, oriented along electric field lines, that propagate toward the source.[2] Two-wavelength laser interferometry is combined with a 2 nanosecond fast gating ICCD to make spatially and temporally resolved electron density measurements of the filament array. Electron density is measured as a function of incident microwave power in a range of pressures of atmospheric air from 25 to 700 Torr.

[1]This work was supported by an AFOSR Grant on the Basic Physics of Distributed Plasma Discharges.
[2]A. M. Cook, J. S. Hummelt, M. A. Shapiro, and R. J. Temkin, "Observation of plasma array dynamics in 110 GHz millimeter-wave air breakdown," Physics of Plasmas, Vol. 18, No. 10, 100704 (2011).

Samuel Schaub
Massachusetts Inst of Tech-MIT

Date submitted: 13 Sep 2013 Electronic form version 1.4