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**2-D Interferometric Measurements of Electron Density in an Air Breakdown Plasma Using a 124.5 GHz, 1 MW Gyrotron** S.C. SCHAUB, J.S. HUMMELT, W.C. GUSS, M.A. SHAPIRO, R.J. TEMKIN, Massachusetts Inst of Tech-MIT — A 1 MW, 124.5 GHz gyrotron was used to produce a linearly polarized, quasioptical beam in 2.2 $\mu$s pulses. The beam was focused to a 2.6 mm spot size, producing a peak electric field of 70 kV/cm, after transmission losses. This electric field is great enough to produce a breakdown plasma in air at pressures ranging from a few Torr up to atmospheric pressure. The resulting breakdown plasma spontaneously forms a two-dimensional array of filaments, oriented parallel to the polarization of the beam, that propagate toward the microwave source. A needlepoint initiator was placed at the focal point of the beam, creating highly reproducible plasma arrays. An intensified CCD, with a minimum exposure of 2 ns, was combined with a two-wavelength laser interferometer, operating at 532 and 635 nm, to make spatially and temporally resolved electron density measurements of the plasma array.

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