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Time-Resolved Electron Density Measurements of Laser Produced Plasmas using X-Band Microwave Interferometry K. ELLEN KEISTER, JEFFREY L. PUTNEY, CLARK J. WAGNER, J. GARY EDEN, Laboratory for Optical Physics and Engineering, University of Illinois at Urbana-Champaign —
Laser produced plasma channels form a unique and significant laboratory tool for exploring the kinetics of plasma formation and decay. Using a sub-picosecond 100 GW ultraviolet laser system and a microwave interferometer operating at 9.2 GHz, time-resolved measurements are made of the electron density of the plasma. By vacuum sealing part of the interferometer, measurements are made at pressures between 10^{-2} and 10^{3} Torr, and in a variety of gases, including neon, argon, xenon, nitrogen, and oxygen. Rate constants and multiphoton ionization and excitation cross sections can be extracted from the electron density decay rates, using a simple gas kinetic model in neon. The calculated constants are consistent with existing results.

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