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Picosecond electron deflectometry of laser-induced plasmas MARTIN CENTURION, Max Planck Institute of Quantum Optics, PETER RECKENTHAELER, ALEXANDER APOLONSKIY, FERENC KRAUSZ, ERNST FILL —
We demonstrate a method for real-time imaging of the field distribution in laser-induced plasmas with picosecond temporal resolution. The plasma is generated by a 50 fs laser pulse focused in nitrogen gas jet, and is then probed by a picosecond electron pulse synchronized with the laser. Pump-probe images of the electron beam at different delay times are recorded on a CCD camera. The electric and magnetic fields are reconstructed by comparing the recorded patterns with numerical simulations. We have observed a cloud of hot electrons expanding away from a central core of positively charged ions, and the appearance of strong magnetic fields near the boundaries of the gas jet. In the case of a plasma generated in low density nitrogen (10^{13} cm^{-3}), we observed that even low energy electrons can escape from the plasma volume.

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