Abstract Submitted
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Microwave Emission Spectroscopy of Short Pulse Laser-Produced Plasma in Air[1] ALEXANDER ENGLESBE, University of Michigan, Air Force Research Laboratory, JENNIFER ELLE, REMINGTON REID, ADRIAN LUCERO, HUGH POHLE, SERGE KALMYKOV, MATTHEW DOMONKOS, ANDREAS SCHMITT-SODY, Air Force Research Laboratory, KARL KRUSHELNICK, University of Michigan — Measuring the radiated power spectral density of microwaves from plasmas has long been used to infer details about plasma behavior. We apply this technique to plasma generated via ultra-short pulse laser ionization. The impulsive interaction of the laser with the plasma drives current, which couples to radiated fields and is a source of broadband terahertz and microwave radiation. We measure the radiated spectrum and angular distribution in the far field over a frequency range of 1-40 GHz. The spectrum of the microwaves is sampled using calibrated, tunable heterodyne receivers. We show that neutral gas pressure significantly alters the amplitude of microwave emissions from the plasma. The spectrum as a function of background neutral density is used to infer information about the free electron density of the plasma. Experimental results are compared to a moving dipole model, with good agreement over a limited parameter range.

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