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Plasma Length Dependence of Broadband Microwave Radiation from Laser Plasma in Air ANNA JANICEK, University of New Mexico, JENNIFER ELLE, ALEX ENGLESBE, ADRIAN LUCERO, ANDREAS SCHMITTSODY, Air Force Research Laboratory - Kirtland — A high power ultrashort laser pulse focused in air generates a plasma that radiates broadband electromagnetic waves. The transient current source responsible for radiation remains an open area of study. To better understand how the laser drives currents in plasma, we investigate the dependence of radiation at microwave frequencies on the plasma length. Radiation patterns of the microwaves are consistent with currents that flow longitudinally in the direction of laser propagation. We measured angular emission pattern of microwave frequency spectrum to determine microwave radiation source characteristics. At longer focal lengths and higher energies, the laser pulse intensity in the focal plane varies for a fixed beam diameter. After normalizing the pulse intensities, the emission patterns are compared to images of the visible plasma fluorescence. Relationships between frequency spectra and images indicate the dominant components of the radiation shift to lower frequencies with increased plasma lengths. Our research demonstrates the radiation mechanism is coupled with total variation in the current along the entire plasma length.

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