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Broadband THz Radiation from Two-color Laser-produced Plasma YONGSING YOU, TAEK-IL OH, KIYONG KIM, University of Maryland College Park, INSTITUTE FOR RESEARCH IN ELECTRONICS AND APPLIED PHYSICS TEAM — We discuss the origin of broadband THz emission from two-color laser-produced plasmas. Previously, the emission of THz pulses was attributed to an ultrafast plasma current arising from tunneling ionization under an asymmetric two-color laser field. Here we find such mechanism produces ultra-broadband radiation, covering from tens of GHz to hundreds of THz, and investigate where such broadband radiation (THz supercontinuum) originates from. We first find that the onset of ultrafast photocurrent determines the radiation bandwidth, while its decay time sets the central frequency of radiation. We show that the nature of broadband radiation arises from the ultrashort timescale of photocurrent, substantially shorter than the laser pulse duration. We also consider other mechanisms such as self-phase modulation and spectral blue-shift generation by sudden plasma generation, which all broaden the fundamental and second harmonic laser spectra [1,2]. These also greatly broaden the THz radiation spectrum depending on the laser intensity and laser-plasma interaction length.

[1] I. Babushkin et al., PRL 105, 053903 (2010).
[2] Mark D. Thomson et al., Opt. Express 18, 23173-23182 (2010).

Yongsing You
University of Maryland College Park

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