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Title:Effects of laser-plasma interactions on terahertz radiation from solid targets irradiated by ultrashort intense laser pulses

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Abstract: Interactions of 100-fs laser pulses with solid targets at intensities of  $10^{18}$  W/cm<sup>2</sup> and resultant terahertz (THz) radiation are studied under different laser contrast ratio conditions. THz emission is measured in the specular reflection direction, which appears to decrease as the laser contrast ratio varies from  $10^{-8}$  to  $10^{-6}$ . Correspondingly, the frequency spectra of the reflected light are observed changing from second harmonic dominant, three-halves harmonic dominant, to vanishing of both harmonics. Two-dimensional particle-in-cell simulation also suggests that this observation is correlated with the plasma density scale length change. The results demonstrate that the THz emission is closely related to the laser-plasma interaction processes. The emission is strong when resonance absorption is a key feature of the interaction, and becomes much weaker when parametric instabilities dominate.

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