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Accession number:20113214218734

Title:Towards gigawatt terahertz emission by few-cycle laser pulses

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Source title:Physics of Plasmas

Abbreviated source title:Phys. Plasmas

Volume:18

Issue:7

Issue date:July 2011

Publication year:2011

Article number:073108

Language:English

ISSN:1070664X

CODEN:PHPAEN

Document type:Journal article (JA)

Publisher:American Institute of Physics, 2 Huntington Quadrangle, Suite N101, Melville, NY 11747-4502, United States

Abstract: It is shown by analysis and simulations that an extremely powerful terahertz (THz) radiation can be produced by a few-cycle laser pulse in a tenuous plasma. The THz amplitude scales linearly with the laser amplitude as well as with the sine of the laser carrier-envelope phase, and in particular, it increases exponentially with the decrease of the laser duration. For example, the THz amplitude increases by near 2 orders of magnitude as the laser duration decreases from one and a half cycles to one cycle; a single-cycle laser of 200 TW can drive the THz radiation of 1 GW with the energy conversion efficiency higher than 10⁻⁴.

Number of references:29