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Accession number:20114214430936

Title:Single-cycle terahertz pulses with with >0.2 V/Å field amplitudes via coherent transition radiation

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Source title: Applied Physics Letters

Abbreviated source title: Appl Phys Lett

Volume:99

Issue:14

Issue date:October 3, 2011

Publication year:2011

Article number:141117

Language:English

ISSN:00036951

CODEN:APPLAB

Document type: Journal article (JA)

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

Abstract:We demonstrate terahertz pulses with field amplitudes exceeding 0.2 V/ generated by coherent transition radiation. Femtosecond, relativistic electron bunches generated at the Linac Coherent Light Source are passed through a beryllium foil, and the emitted radiation is characterized as a function of the bunch duration and charge. Broadband pulses centered at a frequency of 10 THz with energies of 140 J are measured. These far-below-bandgap pulses drive a nonlinear optical response in a silicon photodiode, with which we perform nonlinear autocorrelations that yield information regarding the terahertz temporal profile. Simulations of the spatiotemporal profile agree well with experimental results.

Number of references:31