

424.

Accession number:12978278

Title:Relativistic Terahertz Pulse Generation by Non-linear Interaction of a High-power fs Laser with Underdense Plasmas

Authors:Kim, J.J. (1); Jang, D.G. (1); Hur, M.S. (2); Jang, H. (3); Suk, H. (1)

Author affiliation:(1) Dept. of Photonics & Appl. Phys., Gwangju Inst. of Sci. & Technol. (GIST), Gwangju, Korea, Republic of; (2) Sch. of Electr. & Comput. Eng., Ulsan Nat. Inst. of Sci. & Technol. (UNIST), Ulsan, Korea, Republic of; (3) APRI, Gwangju Inst. of Sci. & Technol. (GIST), Gwangju, Korea, Republic of

Source title:Journal of Physics D: Applied Physics

Abbreviated source title:J. Phys. D, Appl. Phys. (UK)

Volume:45

Issue:39

Publication date:3 Oct. 2012

Pages:395201 (5 pp.)

Language:English

ISSN:0022-3727

CODEN:JPAPBE

Document type:Journal article (JA)

Publisher:IOP Publishing Ltd.

Country of publication:UK

Material Identity Number:DL56-2012-038

Abstract:Generation of a terahertz radiation by the interaction of a highly intense laser ($I_L > 10^{18} \text{ W cm}^{-2}$) and an underdense plasma with relativistic effects has been investigated. The results of two-dimensional particle-in-cell simulations for the relativistic frequency shift of the emitted THz pulse are presented. It was found that the emitted THz frequency is shifted down with the scaling of $\gamma - \alpha$, where γ is the Lorentz factor of the driving laser pulse and α is roughly 0.2 and slightly depends on the laser spot size. Furthermore, the monotonic linear dependence of the THz field strength on the incident laser power was observed. Comparison of the non-relativistic and relativistic laser power regime is shown as well.

Number of references:12

Inspec controlled terms:plasma density - plasma light propagation - plasma nonlinear processes - plasma simulation - relativistic plasmas - terahertz waves

Uncontrolled terms:nonrelativistic laser power - incident laser power - THz field strength - monotonic linear dependence - laser spot size - driving laser pulse - Lorentz factor - $\gamma - \alpha$; scaling - emitted THz frequency - emitted THz pulse - relativistic frequency shift - two-dimensional particle-in-cell simulations - highly intense laser interaction - terahertz radiation - underdense plasmas - high-power fs laser - nonlinear interaction - relativistic terahertz pulse generation

Inspec classification codes:A5260 Relativistic plasma - A5265 Plasma simulation - A5225P Emission, absorption, and scattering of radiation in plasma - A5225L Plasma temperature and density - A5240D Electromagnetic wave propagation in plasma - A5235M Nonlinear plasma waves and nonlinear interactions

Treatment:Theoretical or Mathematical (THR)

Discipline:Physics (A)

DOI:10.1088/0022-3727/45/39/395201

Database:Inspec

Copyright 2012, The Institution of Engineering and Technology