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Title:Relativistic terahertz pulse generation by non-linear interaction of a high-power fs laser with underdense plasmas

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Abstract:Generation of a terahertz radiation by the interaction of a highly intense laser ($I_{\text{int}} > 10^{18} \text{ W cm}^{-2}$) 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. © 2012 IOP Publishing Ltd.

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