

Abstract Submitted
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Generation of pulsed THz signal by laser wake driven in a stratified leaky plasma channel¹ SERGE KALMYKOV, Leidos - Albuquerque, ALEXANDER ENGLISBE, JENNIFER ELLE, ANDREAS SCHMITT-SODY, High Power Electromagnetics Division, Air Force Research Laboratory — The laser wake, driven by a terawatt pulse in a radially uniform, longitudinally stratified plasma, is known to emit the broadband THz radiation in the forward hemisphere [L. M. Gorbunov and A. A. Frolov, JETP 83, 967 (1996).] We consider a more complex situation, when the plasma is pre-shaped as a leaky channel (still longitudinally stratified). The plasma density thus has a parabolic dip near axis, while rapidly falling off at the periphery. The wake-emitted THz radiation thus escapes into vacuum, which changes the radiation condition and emission pattern. An additional component to the THz rotational current is generated via coupling longitudinal electron velocity associated with the wake to the radial density gradient in the channel. Were the plasma longitudinally uniform, this pulsed current would be sub-luminal, and the THz signal radially evanescent. Longitudinal modulation of the background plasma density makes plasma wake locally superluminal, permitting generation of the outgoing THz radiation. Competition between the two mechanisms of producing THz radiation and emerging plasma diagnostic opportunities are explored.

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