

Abstract Submitted
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Spectral Analysis of Forward Scattered Radiation in a Laser Wakefield Acceleration Experiment¹ MICHAEL HELLE, Georgetown University, DMITRI KAGANOVICH, Icarus Research Inc., DANIEL GORDON, U.S. Naval Research Laboratory, BAHMAN HAFIZI, Icarus Research Inc., ANTONIO TING, U.S. Naval Research Laboratory — We have characterized the forward scattered radiation generated from a LWFA experiment at the U.S. Naval Research Laboratory. High-order, large amplitude, anti-Stokes radiation was produced from the interaction of an intense laser pulse propagating through an $\sim 1\%$ critical density plasma. Evidence of relativistic cross-phase modulation and previously unreported conical emission of Stokes radiation has also been observed. The Stokes radiation can be the consequence of a third order nonlinear mixing of two fundamental photons with an anti-Stokes photon. This nonlinear electromagnetic four wave mixing process is usually not permissible owing to phase matching considerations. However, the matching condition can become satisfied when modification of the plasma dispersion relation due to plasma channel guiding is considered. Discussion of these novel experimental results in relation to the underlying nonlinear effects will be presented.

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