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Propagation Effects on THz Generation from Ionizing Two Color Laser Pulses LUKE JOHNSON, THOMAS ANTONSEN, JOHN PALASTRO, KI-YONG KIM, University of Maryland — Coherent mixing of an ultrashort laser pulse (800nm, 50fs) and its second harmonic in a nitrogen gas cell produces broadband THz radiation. Asymmetry in the time dependence around the peaks in the two color electric field results in a post ionization current that varies slowly in time driving the THz radiation. As a coherent process, the relative phase between the harmonics determines the rate of THz generation. Over several centimeters, the interplay between propagation effects such as gas and plasma dispersion, the nonlinear gas response ($P \propto \chi^{(3)}E^3$), and diffraction, can contribute to the relative phase. To examine the role of these effects on THz yields, we model laser pulse propagation using a 2D scalar unidirectional propagation equation for the electric field spectral components [2]. Additionally, we examine the broadening of the THz spectrum and its far field pattern. Finally, we will discuss the possibility of enhancing the THz yield with the presence of a third harmonic.

[1] K. Y. Kim, Phys. Plasmas 16, 056706 (2009).
[2] M. Kolesik and J. Moloney, Phys. Rev. E 70, 036604 (2004).

Luke Johnson
University of Maryland

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