Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Intense coherent THz radiation from two-color laser-gas interactions KI-YONG KIM, BALAKISHORE YELLAMPALLE, JAMES GLOWNIA, ANTOINETTE TAYLOR, GEORGE RODRIGUEZ, Los Alamos National Laboratory — Strong terahertz (THz) electromagnetic pulse generation is of current interest for applications in rapid THz imaging and nonlinear THz spectroscopy. While intense THz fields exceeding MV/cm can be obtained from large facility sources such as free electron lasers and synchrotron-based sources, there is a demand for high-power tabletop-scale THz sources. Recently, strong THz pulse generation was observed upon mixing the fundamental and its second harmonic laser fields in air. The underlying mechanism has been examined and understood in the context of a plasma current model, in which a directional transverse plasma current can be produced when the bound electrons of gas atoms are liberated via phase-sensitive tunneling ionization and accelerated in the asymmetric laser field, such as a mixed two-color field. This current surge can occur on the timescale of laser pulse duration (<50 fs), thus producing an electromagnetic pulse at THz frequencies in the far-field. We have investigated the THz generation mechanism using our 0.5 TW Ti:sapphire laser system. We have also observed intense THz radiation with peak field amplitude of 150 kV/cm with 2 THz bandwidth filtering, and energy of >4 microjoule per pulse with a spectral bandwidth in access of 70 THz.

Ki-Yong Kim
Los Alamos National Laboratory

Date submitted: 20 Jul 2007 Electronic form version 1.4