

Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

High order harmonic generation in a strongly-driven periodic solid¹ SHAMBHU GHIMIRE, PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, CA, 94025, ANTHONY DICHIARA, EMILY SISTRUNK, LOUIS DIMAURO, PIERRE AGOSTINI, Physics Department, Ohio State University, Columbus, OH, 43210, DAVID REIS, PULSE Institute and Departments of Photon Science and Applied Physics SLAC/ Stanford University, Menlo Park, CA, 94025 — We present results of high order harmonic generation from the wide band gap (3.2eV) semiconductor ZnO driven by mid-infrared (0.34 eV) laser pulses in the strongly non-perturbative limit where the field approaches a band-gap per lattice constant. We measure harmonics up to 17th order—*extending well above the band edge*. The spectrum comprises odd harmonics when the electric field is polarized along a centrosymmetric orientation and both odd and even harmonic when polarized along a non-centrosymmetric orientation. We present a simple semi-classical model for emission based on the nonlinear driven oscillation of laser-induced carriers in a periodic lattice potential and discuss its limitations. In addition, we study the laser-dressed band structure using dynamical absorption of a time delayed frequency doubled Ti: Sapphire (3.0 eV) probe.

¹This work is supported by US Department of Energy.

Shambhu Ghimire
PULSE Institute, SLAC National Accelerator Laboratory,
Menlo Park, CA, 94025

Date submitted: 27 Jan 2010

Electronic form version 1.4