Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effects of the topological phase transition and band inversion on ultrafast dynamics in topological crystalline insulators[1] Y.M. DAI, J. BOWLAN, A.J. TAYLOR, D.A. YAROTSKI, R.P. PRASANKUMAR, Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, NM 87545, R.D. ZHONG, G.D. GU, T. VALLA, C.C. HOMES, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, Upton, NY 11973, T. YILMAZ, B. SINKOVIC, Department of Physics, University of Connecticut, Storrs, Connecticut 06269 — Topological crystalline insulators, characterized by a gapless metallic state on their high-symmetry surfaces that is protected by crystalline symmetry, are realized both theoretically and experimentally in the $Pb_{1-x}Sn_xTe$ and $Pb_{1-x}Sn_xSe$ compounds. In these materials, a topological phase transition and band inversion can be induced by doping, pressure or temperature. We use femtosecond optical pump-probe spectroscopy to study the evolution of the ultrafast dynamics as a function of both temperature and doping in the $Pb_{1-x}Sn_xTe$ system. The influence of these parameters on the topological phase transition and band inversion, as well as on quasiparticle dynamics, will be discussed.

[1]Supported by LANL LDRD and LANL-UCRP programs.

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Date submitted: 14 Nov 2014 Electronic form version 1.4