Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Topologically tunable ultrafast Fano interference dynamics SANGWAN SIM, School of Electrical and Electronic Engineering, Yonsei University, Korea, NIKESH KOIRALA, MATTHEW BRAHLEK, Department of Physics and Astronomy, Rutgers the State University of New Jersey, USA, JUN PARK, SOONYOUNG CHA, School of Electrical and Electronic Engineering, Yonsei University, Korea, SEONGSHIK OH, Department of Physics and Astronomy, Rutgers the State University of New Jersey, USA, HYUNYONG CHOI, School of Electrical and Electronic Engineering, Yonsei University, Korea — Asymmetric Fano resonance arises from interference between continuum and discrete state. The asymmetric profile has attracted strong interests in understanding light-induced optoelectronic responses and corresponding applications. In conventional solids, however, the tunability of Fano resonance is generally limited by material's intrinsic property. Topological insulator is unique class of matters embodying both conducting Dirac surface and insulating bulk. If it is possible to manipulate the two coexisting states, then it should form an ideal laboratory for realizing a topologically tunable Fano system. In this work, with recently discovered topological phase transition in $(Bi_{1-x}In_x)_2Se_3$, we report novel Fano interference phenomena. By engineering the spatial overlap between surface Dirac electrons and bulk phonon, we continuously tune, abruptly switch, and dynamically modulate the Fano profile. Ultrafast optical-pump terahertz-probe spectroscopy reveals that the controlled spatial overlap is responsible for the picosecond tunability of the asymmetric Fano profile, suggesting potentials toward optically controllable topological Fano systems.

Sangwan Sim
Yonsei Univ

Date submitted: 14 Nov 2014 Electronic form version 1.4