Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Temperature-tunable Fano resonance induced by strong Weyl fermion-phonon coupling in TaAs[1] YAOMIN DAI, S. A. TRUGMAN, J.-X. ZHU, A. J. TAYLOR, D. A. YAROTSKI, R. P. PRASANKUMAR, Los Alamos Natl Lab, B. XU, L. X. ZHAO, K. WANG, R. YANG, W. ZHANG, J. Y. LIU, H. XIAO, G. F. CHEN, X. G. QIU, IOP CAS — Strong coupling between discrete phonon and continuous electron-hole pair excitations can give rise to a pronounced asymmetry in the phonon line shape, known as the Fano resonance. We present infrared spectroscopic studies on the recently discovered Weyl semimetal TaAs at different temperatures. Our experimental results reveal strong coupling between an infrared-active A_1 phonon and electronic transitions near the Weyl points (Weyl fermions), as evidenced by the conspicuous asymmetry in the phonon line shape. More interestingly, the phonon line shape can be continuously tuned by temperature, which we demonstrate to arise from the suppression of the electronic transitions near the Weyl points due to the decreasing occupation of electronic states below the Fermi level with increasing temperature, as well as Pauli blocking caused by thermally excited electrons above the Fermi level.

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

Yaomin Dai
Los Alamos Natl Lab

Date submitted: 09 Nov 2016 Electronic form version 1.4