Abstract Submitted
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Anisotropic ultrafast dynamics in $BiSbTe_2S$ topological insulator investigated by time-resolved photoemission spectroscopy F. BOSCHINI, M. ZONNO, E. DA SILVA NETO, S. ZHDANOVICH, M. SCHNEIDER, B. ZWARTSENBERG, G. LEVY, A. MILLS, D. JONES, A. DAMASCELLI, University of British Columbia, S. KUSHWAHA, R. J. CAVA, Department of Chemistry, Princeton University — Topological insulating phases in 3-dimensional bulk materials are characterized by the presence of a Dirac-like dispersive surface state – with a specific momentum-locked spin structure - localized within the bulk insulating band gap [1,2] Here we will present time-resolved photoemission (TR-ARPES) experimental results from a new topological insulator, $BiSbTe_2S$. $BiSbTe_2S$ exhibits superior chemical stability, as evidenced by the lack of any measurable energy shift of the Dirac point over time. The TR-ARPES signal (1.55-eV pump and 6.2-eV probe) reveals a direct optical population/depopulation of the Dirac states followed by slow recombination processes on a ps-timescale with a marked dependence of the relaxation time on crystallographic orientation. In addition, we also observe an ultrafast pump-induced modification of the equilibrium Dirac state energy dispersion. These effects can be ascribed to an anisotropic pump-induced modification of the phonon population, which in turn leads to an anisotropic electron-phonon assisted scattering of the hot electrons populating the unoccupied Dirac states. [1] Y. Xia et al. Nat. Phys. **5**, 398 (2009) [2] Z.-H. Zhu et al. Phys. Rev. Lett. **112**, 076802 (2014)

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