Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Temperature-dependent Helicity of In-gap states of SmB_6[1] SOOYOUNG JANG, Lawrence Berkeley Natl Lab, POSTECH, J.D. DENLINGER, Lawrence Berkeley Natl Lab, C.-H. MIN, F. REINERT, U. Würzburg, BOYOUN KANG, B.-K. CHO, GIST, D.J. KIM, Z. FISK, UC Irvine, KEUN SU KIM, POSTECH, J. W. ALLEN, U. of Michigan — Mixed-valent SmB_6 with a temperature (T) dependent bulk gap is the first candidate example of a new class of strongly correlated topological insulators with f-d band inversion. Previous angle-resolved photoemission (ARPES) on cleaved <100> surfaces of SmB_6 have quantified the T-evolution of (i) the Sm $4f$ state coherence, (ii) the X-point f-conduction band energy and many-body gap destabilization, and (iii) the intimately connected fate of in-gap states. In this work we additionally characterize the T-evolution of the in-gap state orbital angular momentum helicity using circular dichroism. We show that the onset of dichroism, above 100K, coincides with the dimensional crossover from high T 3D non-helical bulk d-band states crossing E_F to low T 2D in-gap surface states where the dichroic asymmetry reaches 100%. With the assumption of topological surface state anti-parallel spin-momentum locking, this result can be viewed as supporting previous spin-resolved ARPES measurements of in-gap state helical spin structure.

[1]Supported by U.S. DOE at the Advanced Light Source (DE-AC02-05CH11231).

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Date submitted: 06 Nov 2015 Electronic form version 1.4