Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Measurement of the Atomic Orbital Composition of the Near-Fermi-Level Electronic States in the Lanthanum Monopnictides LaBi and LaSb[1] THOMAS NUMMY, JUSTIN WAUGH, STEPHEN PARHAM, HAOXIANG LI, XIAOQING ZHOU, University of Colorado Boulder, NICK PLUMB, Swiss Light Source, Paul Scherrer Institut, FAZEL TAFTI, Boston College, DANIEL DESSAU, University of Colorado Boulder — Angle resolved photoemission spectroscopy (ARPES) is used to measure the electronic structure of the Extreme Magnetoresistance (XMR) topological semimetal candidates LaBi and LaSb. Using a wide range of photon energies the true bulk states are cleanly disentangled from the various types of surface states, which may exist due to surface projections of bulk states as well as for topological reasons. The orbital content of the near-E_F states are extracted using varying photon polarizations. The measured bulk bands are somewhat lighter and are energy shifted compared to the results of Density Functional calculations, which is a minor effect in LaBi and a more serious effect in LaSb. This bulk band structure puts LaBi in the $v = 1$ class of Topological Insulators (or semimetals), consistent with the measured Dirac-like surface states. LaSb on the other hand is at the verge of a topological band inversion, with a less-clear case for any distinctly topological surface states. The low-dimensional cigar-shaped bulk Fermi surfaces for both compounds are separated out by orbital content, with a crossover from pnictide d orbitals to La p orbitals around the Fermi surface, which through strong spin-orbit coupling may be relevant for the Extreme Magnetoresistance.

[1]NSF GRFP

Thomas Nummy
University of Colorado Boulder

Date submitted: 09 Nov 2016 Electronic form version 1.4