Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

π **Berry phase and Zeeman splitting of Weyl semimetal TaP**[1] JIN HU, JINYU LIU, Tulane Universirty, DAVID GRAF, National High Magnetic Field Laboratory, SEYED RADMANESH, DANIEL ADAMS, University of New Orleans, ALYSSA CHUANG, YU WANG, Tulane Universirty, IRINEL CHIORESCU, Florida State University, JIANG WEI, Tulane Universirty, LEONARD SPINU, University of New Orleans, ZHIQIANG MAO, Tulane Universirty — The recent breakthrough in the discovery of Weyl fermions in monopnictide semimetals provides opportunities to explore the exotic properties of relativistic fermions in condensed matter. The chiral anomaly-induced negative magnetoresistance and π Berry phase are two fundamental transport properties associated with the topological characteristics of Weyl semimetals. Since monopnictide semimetals are multiple-band systems, resolving clear π Berry phase for each Fermi pocket remains a challenge. We report the determination of Berry phases of multiple Fermi pockets of Weyl semimetal TaP through high field quantum transport measurements. We show our TaP single crystal has the signatures of a Weyl state, including light effective quasiparticle masses, ultrahigh carrier mobility, as well as negative longitudinal magnetoresistance. Furthermore, we have generalized the Lifshitz-Kosevich (LK) formula for multiple-band Shubnikov-de Haas (SdH) oscillations and extracted the Berry phases of π for multiple Fermi pockets in TaP through the direct fits of the modified LK formula to the SdH oscillations. In high fields, we also probed signatures of Zeeman splitting, from which the Landé g-factor is extracted.

[1]Supported by the DOE (DE-SC0012432) and the NSF (EPS- 1003897)

Jin Hu
Tulane Universirty

Date submitted: 06 Nov 2015 Electronic form version 1.4