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<u>Multi-band topological Semimetals</u>

Abstract: Topological magnetic semimetals, like Co3Sn2S2 and Co2MnGa, display exotic transport properties, such as large intrinsic anomalous (AHE) due to uncompensated Berry curvature. The highly symmetric XPt3 compounds display anti-crossing gapped nodal lines, a driving mechanism in the intrinsic Berry curvature Hall effects. Uniquely, these compounds contain two sets of gapped nodal lines that harmoniously dominate the Berry curvature in this complex multi-band system. We calculate a maximum AHE of 1965 S/cm in the CrPt3 by a state-of-the-art first principle electronic structure. We have grown high-quality thin films by magnetron sputtering and measured a robust AHE of 1750 S/cm for different sputtering growth conditions. Additionally, the cubic films display a hard magnetic axis along [111] direction. The facile and scalable fabrication of these materials makes them ideal candidates for integration into topological devices [1].

BIO: Jacob Gayles started his research as an undergraduate, that focused on electrical transport in DNA molecules and computational studies of semiconductors. He received his Ph.D. in Physics from Texas A&M University in 2016. During his doctoral studies, he moved to the Johannes Gutenberg University of Mainz to research computational and theoretical condensed matter physics, for both chiral magnetic systems and spin-orbit torques. During his Post-Doctoral fellowship, he studied topological magnetic systems at the Max Planck Institute for Chemical Physics of Solids in Dresden, Germany. While at the Max Planck Institute, he led the on Skyrmionics working group. Currently, he is an Assistant Professor of Physics and the leader of the Quantum Chiraltronics Group at the University of South Florida in Tampa, Florida.