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Optical spectroscopy of the half-Heusler semi-metal DIPANJAN CHAUDHURI, Department of Physics and Astronomy, Johns Hopkins University, ANA AKRAP, Department of Quantum Matter, University of Geneva, SATYA K. KUSHWAHA, ROBERT J. CAVA, Department of Chemistry, Princeton University, DIRK VAN DER MAREL, University of Geneva, N. PETER ARMITAGE, Department of Physics and Astronomy, Johns Hopkins University — The half-Heusler compound GdPtBi is a fascinating system that has an interesting interplay between antiferromagnetism and strong spin-orbit coupling. The proposed electronic structure of the compound is that of a zero gap semiconductor with degenerate quadratic bands touching at Γ point which in presence of externally applied magnetic field splits, giving rise to a pair of Weyl nodes. Evidence in favour of such interesting crossover has been presented through the observation of a chiral anomaly in transport experiments. Additionally, a large anomalous Hall effect has also been observed in this compound through neutron scattering experiments. In this work, we have studied high quality GdPtBi single crystals through FTIR spectroscopy. With quadratic band touching at zero field, the compound also provides an opportunity to explore non-Fermi liquid physics as a result of large joint density of states near the Fermi level. Moreover, in magnetic field our optical study offers the advantage of a non-contact transport measurement which can help distinguish the true chiral anomalous effect from possible current jetting effects. Additionally, the magnetic field data can provide useful insight on the crossover into the Weyl semi-metallic phase.

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