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An optical investigation of the Magnetic Weyl semi-metal candidate $YbMnBi_2$ DIPANJAN CHAUDHURI, BING CHENG, Department of Physics and Astronomy, Johns Hopkins University, QUINN D. GIBSON, ROBERT J. CAVA, Department of Chemistry, Princeton University, N. PETER ARMITAGE, Department of Physics and Astronomy, Johns Hopkins University — The discovery of Dirac and Weyl fermions in condensed matter systems has sparked tremendous interest in both condensed matter and high energy physics communities alike. While the existence of Dirac electrons in graphene and topological insulator materials is now well established, only a handful of experiments provide direct evidence of Weyl fermions in non-centrosymmetric systems. Moreover, the theoretically predicted Weyl fermions in magnetic materials with strong spin-orbit coupling have continued to be elusive. A potent candidate for a Weyl semimetal with broken time reversal symmetry (TRS) and antiferromagnetic ordering is the newly discovered $YbMnBi_2$ compound. Although the complete magnetic structure of this material is still unknown, preliminary ARPES measurements are consistent with TRS breaking and a Weyl fermionic band dispersion. In this work, we investigate $YbMnBi_2$ single crystal with FTIR spectroscopy and study its low energy electrodynamic response. The energy scale of IR light is ideally suited to probe for the linear band dispersion of these materials close to the Weyl points. Temperature dependent optical conductivity calculations reveal crucial information on the fundamental scattering processes in these materials.

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