

Abstract Submitted
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Optical properties of BiFeO₃ thin films and single crystal¹ R.C. RAI, X.S. XU, T.V. BRINZARI, J.L. MUSFELDT, University of Tennessee, D.J. SINGH, Oak Ridge National Laboratory, S. LEE, S-W. CHEONG, Rutgers University, Y.H. CHU, R. RAMESH, University of California, Berkeley, S. MCGILL, National High Magnetic Field Laboratory — BiFeO₃ has been studied using optical and magneto-optical spectroscopy and the results are compared with first-principle calculations. The optical gap in thin films (2.7 eV) is much larger than that in the single crystal (1.3 eV), the evidence that this system has a novel transition between strongly correlated and band insulator behavior. Both magnetic field and temperature suppress the excitation between the strongly hybridized valence levels and Fe d levels near 1.5 eV. The temperature and magnetic field effects appear to scale energetically suggesting spin-charge coupling. The high energy magneto-dielectric contrast shows a jump at 18 T corresponding to the transition from toroidal to homogeneous antiferromagnetic phase.

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