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Far infrared spectroscopy of magnons and phonons in $TbFeO_3$ single crystal[1] T.N. STANISLAVCHUK, E.C. STANDARD, A.A. SIRENKO, Department of Physics, New Jersey Institute of Technology, Newark, NJ, USA, G.L. CARR, National Synchrotron Light Source, Brookhaven National Laboratory, Upton, NY, USA, A.A. MUKHIN, Prokhorov General Physics Institute, Moscow, Russia, M.V. MOSTOVOY, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands, N. LEE, S-W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, Piscataway, NJ, USA — Far-infrared spectra of $TbFeO_3$ single crystals have been studied in the temperature range between 1.6 K and 300 K using transmission in high magnetic field and rotating analyzer ellipsometry. The symmetry of the IR optical phonons and their oscillator strengths were determined. Polarization and frequencies of two AFM resonances at around 18 and 23 cm^{-1} were analyzed around the spin reorientation (SR) transition at ∼8K and magnetic fields up to 9 T. Intensity of the AFM resonances exhibit an unusual oscillator dependence on both temperature and magnetic field. The observed effects are analyzed taking into account main magnetic interactions in the system including exchange of the Fe^{3+} spins with Tb^{3+} paramagnetic moments as well as the geometry of the measurements.

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