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**Long-wavelength magnetic excitations in multiferroic $BiFeO_3$** D. TALBAYEV, J. G. GIGAX, A. J. TAYLOR, Los Alamos National Laboratory, SEONGSU LEE, S.-W. CHEONG, Rutgers University — Magnetic and lattice vibrations play a central role in the properties of multiferroics. This low-energy electrodynamics can help unravel the fundamental interactions between magnetic and lattice degrees of freedom. $BiFeO_3$ is a multiferroic material with robust room temperature ferroelectricity and antiferromagnetism and promising technological potential. The interaction between the ferroelectric and antiferromagnetic order parameters leads to the modification of the isotropic Heisenberg-antiferromagnet ground state that becomes an incommensurate cycloid with a very long period. The cycloidal magnetic structure results in a complex spectrum of zero-wavevector magnetic excitations; these magnetic modes were detected using Raman scattering. Here, we report a far-infrared spectroscopic study of a $BiFeO_3$ single crystal. We detected magnetic resonances at energies close to those reported in the Raman spectroscopy studies. The magnetic character of these excitations is supported by their characteristic temperature dependence. We will discuss our results in the context of possible electric-dipole activity of the observed resonances.

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