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**Magnetic and magnetoelectric excitations of BiFeO3** NOBUO FURUKAWA, Dept Physics, Aoyama Gakuin University , MASAAKI MATSUDA, Quantum Condensed Matter Division, Oak Ridge National Laboratory, JASON T. HARALDSEN, Theoretical Division and Center for Integrated Nanotechnologies, Los Alamos National Laboratory, SHIN MIYAHARA, Asia Pacific Center for Theoretical Physics, Pohang University of Science and Technology, RANDY S. FISHMAN, Materials Science and Technology Division, Oak Ridge National Laboratory
— We have determined a model which describes the magnetic and magnetoelectric excitations of multiferroic $BiFeO_3$. Using the full magnetic dispersion relations which are obtained by neutron inelastic scattering measurements [1], parameters for the Heisenberg model with 1st and 2nd neighbor exchange couplings as well as Dzyaloshinskii-Moriya interaction and the single ion anisotropy are estimated. The model also shows excellent agreements with the observed peaks in THz [2] and Raman [3] spectroscopies, which leads to successful assignments of the excitation modes to these peaks. We also discuss that the mode observed at 21.5 $cm^{-1}$ is an electromagnon excitation which should be both magnetic and electric active. This can be verified by the non-reciprocal directional dichroism measurements. *REFERENCES:* [1] Matsuda et al., PRL **109**, 067205 (2012). [2] Talbayev et al., PRB 83, 094403 (2011). [3] Rovillain et al., PRB 79, 180411 (2009).

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