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The interplay of Dzyaloshinskii-Moriya interaction and single-ion anisotropy in multiferroic $BiFeO_3$ JAEHONG JEONG, IBS-CCES, SNU, P. BOURGES, S. PETIT, LLB, CEA-CNRS, CEA-Saclay, S. FURUKAWA, Dept. of Physics, Grad. School of Science, The University of Tokyo, M.D. LE, IBS-CCES, SNU, S.-A. KIM, S. LEE, Neutron Science Division, KAERI, S.-W. CHEONG, Rutgers Center for Emergent Materials, Rutgers University, JE-GEUN PARK, IBS-CCES, SNU — Multiferroic compounds are promising materials for new spintronic devices utilising the coupling between magnetism and ferroelectricity. Among them, $BiFeO_3$ is the only example that has both magnetic and ferroelectric transitions above room temperature. It also has the cycloid spin structure with an extremely long period. In order to understand the microscopic magnetic interactions, several inelastic neutron scattering (INS) experiments were carried out using co-aligned single crystals. We could, for the first time, measure the magnon dispersion over the full Brillouin zone and determine the interaction parameters in a Hamiltonian with two Heisenberg interactions between the nearest and the next nearest neighbors. For the further study on the detailed magnetic excitations at low energy, we performed two INS experiments using the triple-axis spectrometer 4F2 at LLB. We also calculated the magnon dispersion using the Hamiltonian that includes Dzyaloshinskii-Moriya (DM) interaction and single-ion anisotropy (SIA), which are associated with the distortion of Fe^{3+} ion in the FeO_6 octahedra, allowing us to understand the unusual low-energy excitations in $BiFeO_3$ by examining the interplay of the DM interaction and SIA.

Jaehong Jeong
Seoul National University

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