Electromagnon excitation in the triangular lattice antiferromagnet $CuFeO_2$

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In multiferroic materials, peculiar magnetoelectric effects are expected. One of the most distinctive examples of such effects is the electromagnon excitation, for which magnon is driven by an oscillating electric field. In this study, from high-field/multi-frequency ESR measurements we investigate the detailed frequency and field dependences of the electromagnon in the triangular lattice antiferromagnet $CuFeO_2$, which was recently found by teraheltz time-domain spectroscopy[1]. Polarization dependence for two kinds of the magnon modes in this material is measured. As a result, the higher frequency mode is shown to be driven by an oscillating electric field as Seki *et al.* reported. The frequency dependence of the observed magnon modes are analyzed based on a spin wave theory and compared with the excitation spectra measured by neutron scattering experiments. We now plan to measure the polarization dependence of the magnon modes in a field-induced 1/5 plateau phase, which appears above 13 T.

[1]S. Seki, N. Kida, S. Kumakura, R. Shimano, and Y. Tokura, Phys. Rev. Lett. **105**, 097207 (2010).