

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Electric-field modulation of the phase shift for spin waves¹

TIANYU LIU, Department of Physics and Astronomy, University of Iowa, XUFENG ZHANG, HONG TANG, Department of Electrical Engineering, Yale University, MICHAEL E. FLATTÉ, Optical Science and Technology Center and Department of Physics and Astronomy, University of Iowa — An electric field has been predicted to manipulate the phase of spin waves in yttrium iron garnet (YIG) through the spin-orbit interaction, which couples the electric field with the gradient of the magnetization [1,2]. We have observed an electric-field-dependent phase shift in the propagation of surface spin waves in a YIG waveguide. In addition to the spin-orbit effect there is a stronger effect on the phase shift due to the change of the magnetization of the YIG due to the applied electric field (a magnetoelectric effect). The contributions of the two effects can be distinguished by varying the direction of the electric field relative to the YIG magnetization.

[1] T. Liu and G. Vignale, Phys. Rev. Lett. 106, 247203 (2011).

[2] T. Liu and G. Vignale, Journal of Applied Physics 111, 083907-083907-6 (2012).

¹Work supported by DARPA MESO.

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Date submitted: 15 Nov 2013

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