

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Electric-field control of spin waves at room temperature in multiferroic BiFeO_3 MAXIMILIEN CAZAYOUS, PAULINE ROVILLAIN, YANN GALLAIS, ALAIN SACUTO, MARIE-AUDE MEASSON, Laboratoire Materiaux et Phenomenes Quantiques, Paris, France, ROGERIO DE SOUSA, Department of Physics and Astronomy, Victoria, Canada, DOROTHEE COLSON, ANNE FORGET, Service de Physique de l'Etat Condense, CEA Saclay, France, MANUEL BIBES, AGNES BARTHELEMY, Unite Mixte de Physique CNRS/Thales, France — A particularly exciting prospect in the field of spintronics is to use the wave like excitations of a magnetic material as a means to transmit and process information. This technology named magnonics relies on the control of spin waves. The key goal of magnonics is to read/write non-volatile spin information with minimal energy consumption. Multiferroic materials have at least two coupled magnetic and ferroelectric orders leading to electrical control of magnetic effects and vice-versa. Multiferroic materials are thus potentially interesting as a medium for spin-wave-based information processing. Here we show that the spin wave excitations in BiFeO_3 , a room temperature multiferroic can be controlled by an electric field at low power and in a non-volatile way. The present experiment clearly demonstrates spin waves can be tuned over 30% of their frequencies, several orders of magnitude larger than with previous methods. The switch and the control of the polarization is used to manage this tuning.

Maximilien Cazayous
Laboratoire Materiaux et Phenomenes Quantiques, Paris, France

Date submitted: 26 Oct 2010

Electronic form version 1.4