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Coherent long-range transfer of angular momentum between magnon Kittel modes by phonons

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Abstract

© 2020 American Physical Society. We report ferromagnetic resonance in the normal configuration of an electrically insulating magnetic bilayer consisting of two yttrium iron garnet (YIG) films epitaxially grown on both sides of a 0.5-mm-thick nonmagnetic gadolinium gallium garnet (GGG) slab. An interference pattern is observed and it is explained as the strong coupling of the magnetization dynamics of the two YIG layers either in phase or out of phase by the standing transverse sound waves, which are excited through a magnetoelastic interaction. This coherent mediation of angular momentum by circularly polarized phonons through a nonmagnetic material over macroscopic distances can be useful for future information technologies.

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