Abstract Submitted
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Spin pumping with coherent elastic waves[1] M. WEILER, H. HUEBL, F.S. GOERG, F.D. CZESCHKA, R. GROSS, S.T.B. GOENNENWEIN, Walther-Meißner-Institut, Bayerische Akademie der Wissenschaften, 85748 Garching, Germany — The generation and detection of pure spin currents is an important topic for spintronic applications. Spin currents may be generated, e.g., via spin pumping. In this approach, a precessing magnetization relaxes via the emission of a spin current. Conventionally, electromagnetic waves, i.e. microwave photons, are used to drive the magnetization precession. We here show that a spin current can also be pumped by means of an acoustic wave, i.e. microwave phonons. In the experiments, coherent surface acoustic wave (SAW) phonons with a frequency of 1.55 GHz traverse a ferromagnetic thin film/normal metal (Co/Pt) bilayer. The SAW phonons drive the resonant magnetization precession via magnetoelastic coupling [1]. We use the inverse spin Hall voltage in the Pt film as a measure for the generated spin current and record its evolution as a function of time and external magnetic field magnitude and orientation. Our experiments show that a spin current is generated in the exclusive presence of a resonant elastic excitation. This establishes acoustic spin pumping as a resonant analogue to the spin Seebeck effect and opens intriguing perspectives for applications in, e.g., micromechanical resonators.

[1] M. Weiler *et al.*, Phys. Rev. Lett. **106**, 117601 (2011)

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