Abstract Submitted
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Damping of perpendicular standing spin waves via VNA-FMR in sputtered Py/Ta films THOMAS SILVA, MARTIN SCHOEN, HANS NEMBACH, JUSTIN SHAW, CARL BOONE, MATHIAS WEILER, NIST - Boulder, MIKHAIL KOSTYLEV, University of Western Australia — Bar'yakhtar first proposed that non-local damping processes $\propto \nabla^2 m$ are intrinsic in systems with exchange splitting. A recent theory from Tserkovnyak, *et al.*, substantiates Bar'yakhtar's claim with quantitative estimates based upon s-d exchange and diffusive spin transport models. We measured mode-dependent damping in 10-nm-thick nanomagnets. Data were in qualitative agreement with Bar'yakhtar/Tserkovnyak theory, though the magnitude of the effect was far greater than expected, suggestive that spin-orbit/interface effects are important (PRL 110, 117201). To test the theory further, we measured field-swept spectra of perpendicular standing spin waves up to wavenumber $k = 2 \times 10^6$ cm^{-1} ($\approx$ 30 GHz) in Permalloy/Ta films with Py thicknesses from 50 nm to 200 nm by use of vector-network-analyzer FMR. The spectra are fitted simultaneously with multiple complex susceptibilities to account for inter-mode interference. To account for eddy currents, results are compared to a 1-d electrodynamic model that solves the Maxwell and Landau-Lifshitz equations. The damping data shows no clear trend with k, indicating that nonlocal effects are too small to observe for bulk spin waves over the accessible range in k-space.

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