Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Proportionality of the interfacial Dzyaloshinskii-Moriya interaction and the Heisenberg exchange HANS NEMBACH, JUSTIN SHAW, National Institute of Standards and Technology, MATHIAS WEILER, Walther-Meissner Institut, EMILIE JU, TOM SILVA, National Institute of Standards and Technology — The Dzyaloshinkii-Moriya interaction (DMI) gives rise to chiral magnetic ordering and a shift of spin-wave frequencies, depending on their propagation direction. We employed Brillouin-Light-Scattering spectroscopy to measure this nonreciprocal frequency shift, which allowed us to directly determine the magnitude of the DMI in a series of $Ni_{80}Fe_{20}$(t)/Pt thin film bilayers where the thickness t ranged from 1 to 13 nm. It has also been predicted by theory that the DMI is proportional to the Heisenberg exchange for bulk magnetic oxides and metallic spin-glasses. We tested this prediction for our metallic system by independently determining the Heisenberg exchange via fitting the Bloch $T^{3/2}$-law to the temperature dependence of the magnetization obtained from SQUID magnetometry. We find that the $Ni_{80}Fe_{20}$ thickness dependence of the DMI and the Heisenberg exchange are identical, which is consistent with the notion that both effects share the same underlying physics. This result will lead us to a deeper understanding of the DMI and related spin-orbitronic effects.-/

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Date submitted: 06 Nov 2015 Electronic form version 1.4