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Spin Seebeck measurements of current-induced switching in YIG[1]
JASON BARTELL, COLIN JERMAIN, SRIHARSHA ARADHYA, Cornell University, HAILONG WANG, The Ohio State University, ROBERT BUHRMAN, Cornell University, FENGYUAN YANG, The Ohio State University, DANIEL RALPH, GREGORY FUCHS, Cornell University — Quantifying spin torques generated at the interface between a normal metal (NM) and a ferromagnetic insulator (FI) is an important step in understanding the spin hall effect without charge transport. Measuring magnetization in NM/FI devices is challenging, however, because both magnetoresistive and magneto-optical signals are tiny in thin-film bilayers. We show that a promising alternative measurement approach is the use of picosecond thermal gradients to study spin torques in Pt/Yttrium Iron Garnet (YIG) bilayers. Recently, we demonstrated the application of heat to stroboscopically transduce a local magnetic moment into an electrical signal via the time resolved anomalous Nernst effect (TRANE) in ferromagnetic metals [1]. Using a similar geometry the spin Seebeck effect of YIG combined with the inverse spin Hall effect of Pt enables measurement of local magnetization [2]. Here we describe our study using this technique to study current-induced switching in Pt/YIG with sub-10 nm thick YIG films. [1] Bartell et al., Nat. Commun. 6, 8460 (2015). [2] Weiler et al., Phys. Rev. Lett. 108, 106602 (2012).

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