Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Non-local thermal spin injection: Mapping the magnon spin diffusion length in Yttrium Iron Garnet (YIG)[1] BRANDON L. GILES, Department of Materials Science and Engineering, The Ohio State University, ZIHAO YANG, Department of Electrical and Computer Engineering, The Ohio State University, JOHN JAMISON, ROBERTO C. MYERS, Department of Materials Science and Engineering, The Ohio State University — The non-local spin detection geometry was developed to sample a pure electron spin current in the absence of an electric field, thereby removing parasitic transport effects [1]. Here we demonstrate the non-local detection of magnon spins that are thermally injected via the spin Seebeck effect in single crystal YIG. A laser is used to thermally generate a spin current under an electrically isolated Pt absorbing pad. The spin current is detected on a remote Pt strip via the inverse spin Hall effect ($V_{ISHE}^{non-local}$). Spatial maps of the spin current are acquired by measuring $V_{ISHE}^{non-local}$ while scanning the laser to different absorbing pads. Temperature modeling shows the laser-induced temperature gradient contained within 50μm of the Pt absorbing pad [2]. Thus, the spin detector is isolated from thermal effects unrelated to the spin current. Although the thermal magnon diffusion length at 21K is $\sim$ 1 μm [3], $V_{ISHE}^{non-local}$ is detected at displacements of more than 150um with an exponential decay constant of 40 μm at 25K.

[1] Jedema, *et al.* Nature 416, 713 (2002).
[2] Z. Yang et al. 2015 APS March meeting abstract.
[3] Boona *et al.* Phys. Rev. B 90, 064421 (2014).

[1]This work was supported by ARO-MURI W911NF-14-1-0016.

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Date submitted: 14 Nov 2014 Electronic form version 1.4