Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

The effects of shape anisotropy and exchange coupling on spin precession frequencies in exchange coupled Co/Cu/Py trilayers[1] SAM KERAMATI, UDAY SINGH, SETH KURFMAN, CH. BINEK, S. ADENWALLA, Univ of Nebraska - Lincoln — Ultrafast high-power laser systems have successfully opened up the field of magnetization dynamics, studying subpicosecond laser-induced spin precession dynamics, demagnetization processes and magnetization reorientation. Here we investigate laser-induced magnetization dynamics in a series of photolithographically patterned microstructures of exchange coupled trilayers of Co/Cu/Py grown on Si substrates. The microstructures have different shape anisotropies as well as different exchange coupling parameters. The latter determines the magnetization state, varying from ferromagnetically to anti-ferromagnetically coupled. We explore how the different spin precession frequencies of the constituent exchange coupled magnetic layers with unequal relaxation times can trade-off with the differing shape anisotropies. The key physical point is that the precession frequency of ferromagnetic materials and their damping parameter vary with the effective field which depends on both the shape anisotropy, and exchange coupling, while their corresponding effects can be modulated through the action of the intense pump beam. Precession frequency maps of the behavior of the exchange coupling parameter of the samples with respect to their shape anisotropy and their laser-induced modulated precession frequencies will be generated through a pump-probe experiment to address the above-mentioned objective of our work.

[1]This work is supported by NSF Grant No. 1409622 and MRSEC DMR-0820521.

Uday Singh
Univ of Nebraska - Lincoln

Date submitted: 14 Nov 2014 Electronic form version 1.4