

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Optical probe of spin-orbit fields in metallic magnetic structures**

MOHAMMAD MONTAZERI, PRAMEY UPADHYAYA, GUOQIANG YU, KIN L. WONG, MURONG LANG, YABIN FAN, PEDRAM KHALILI AMIRI, ROBERT N. SCHWARTZ, KANG L. WANG, Dep. of Electrical Engineering, University of California, Los Angeles — We report a novel self-consistent optical approach based on magneto-optical Kerr effect to directly and quantitatively probe the spin-orbit fields of magnetic devices with 1 $\mu$ m diffraction limited spatial resolution. The optical probe is exemplified by investigating the spin-orbit fields in a magnetic stack of Ta(5 nm)/CoFeB(1.1 nm)/MgO(2.0 nm)/TaOx with enhanced perpendicular anisotropy. Both field-like and damping-like contributions were measured independently and their coefficients are quantified at  $3.3 \times 10^{-6}$  and  $-2.0 \times 10^{-6} Oe/A.cm^{-2}$  respectively. A detailed comparison with standard transport technique is presented in which a very good agreement were found. Our results establish the relevance of the optical methods for studying spin-orbit torque related physics. We acknowledge the support from the National Science Foundation (DMR-1411085) and the FAME Center, one of the six centers of STARnet, a Semiconductor Research Corporation program sponsored by MARCO and DARPA.

Mohammad Montazeri  
Dep. of Electrical Engineering, University of California, Los Angeles

Date submitted: 13 Nov 2014

Electronic form version 1.4