Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Ultrafast switching of a nanomagnet by a combined in-plane and out-of-plane polarized spin-current pulse OUKJAE LEE, V.S. PRIBIAG, P.M. BRAGANCA, P.G. GOWTHAM, E.M. RYAN, D.C. RALPH, R.A. BUHRMAN, Applied and Engineering Physics, Cornell University — For fast write operation of a spin-torque (ST) magnetic storage device, the exertion of a strong initial torque can switch the nanomagnet moment without the help of the thermal fluctuations. Use of an out-of-plane polarized reference layer can very quickly excite large free layer motion but reliable reversal requires precise ST pulse timing. The combination of strong in-plane and out-of-plane polarized spin currents can substantially relax this pulse-timing requirement. We have fabricated CPP spin-valve devices that incorporate both an out-of-plane polarizer, and an in-plane polarizer to quickly excite and reverse the moment of an in-plane polarized free layer. For pulse currents ranging between 100ps – 10ns, the reversal speeds are notably faster and much less thermally distributed than for a conventional spin-valve with the same pulse current amplitude. We will discuss the details of the short-pulse behavior of these device structures and the optimization of this approach for high-speed magnetic memory.

Oukjae Lee
Applied and Engineering Physics, Cornell University

Date submitted: 28 Nov 2008 Electronic form version 1.4