Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

The Effect of Detector Bias on Non-Local Measurements of Spin Transport E.S. GARLID, T. KONDO, University of Minnesota, R. MOHR, Swarthmore College, K.S.M. REDDY, Q. HU, P.A. CROWELL, C.J. PALMSTRØM, University of Minnesota — Previous studies of spin transport in Fe/GaAs heterostructures have observed a strong non-monotonic dependence of the spin polarization on the bias across the injector contact in a non-local measurement. We have studied the dependence of the non-local voltage signal in Fe/GaAs/Fe spin valves as a function of detector bias. Measurements were made on lateral devices fabricated from epitaxial Fe/n^+/n-GaAs heterostructures with channel dopings ranging from $2\times10^{16}-6\times10^{16}$ cm^{-3}. Measurements were performed by biasing the detector electrode with respect to a reference electrode and using lock-in techniques to measure the spin polarization generated from an AC biased injector electrode. The non-local voltage signal was found to have a very different dependence on detector bias than on injector bias. A sign change was observed at both forward and reverse detector bias, and the detector sensitivity was enhanced by up to a factor of five under large forward bias. This enhanced sensitivity may reflect the energy dependence of the Fe/GaAs interfacial density of states, although the connection between charge and spin transport in the semiconductor channel must also be considered. This work was supported by ONR and the NSF MRSEC, IGERT, and NNIN programs.

Paul Crowell
University of Minnesota

Date submitted: 30 Nov 2007 Electronic form version 1.4