Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Exploring the limits of spin transport efficiency for spin ejection in spin photodiodes[1] K.P. SIMON, Olin College of Engineering, Needham, MA, USA, A. BELKADI, A.F. ISAKOVIC, Khalifa University - KUSTAR, Abu Dhabi, UAE — We examine several factors that affect the efficiency of the transport of optically excited, spin-polarized carriers in ferromagnet-semiconductor heterostructures. The process of optical excitation leads to the creation of the population of spin carriers in a III-V semiconductor [1], which faces a number of obstacles on its way out of the semiconductor. This poster addresses a hierarchy of problems that need to be addressed in order to improve the efficiency of spin ejection, with the goal of bringing it up to the efficiency level of the opposite process, the spin injection. Our approach is based on modeling the existing spin ejection data, in order to understand several spin relaxation processes and the transport across the interface between a semiconductor and a ferromagnet or other metal. Our results are based in part on Schokley-Queisser [2] approach for photodiodes efficiency. Our investigation shows that there is a considerable space for improvement of spin ejection transport efficiency, which opens up possibility of designing novel spintronics devices.

[1] A. F. Isakovic, D. M. Carr, J. Strand, *et al.*, Phys. Rev. B **64** 161304.
[2] W. Schokley, H. J. Queisser, J. Appl. Phys. 32 (3), 510.

[1]K.P.S. acknowledges hospitality of KUSTAR in Spring 2011 and A. B. acknowledges support from Khalifa University.

K. P. Simon
Olin College of Engineering, Needham, MA, USA

Date submitted: 14 Dec 2011 Electronic form version 1.4