Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Optical spin injection in GaAs nanowires[1] PAULO EDUARDO FARIA JUNIOR, Universidade de Sao Paulo, Brazil, GUILHERME MATOS SIPAHI, SUNY Buffalo / Universidade de Sao Paulo, Brazil, IGOR ZUTIC, SUNY Buffalo — Controlling quantum confinement in semiconductor nanowires (NWs) allow desirable spin-dependent properties and enable novel devices, such as spin-interconnects[1], spin-lasers[2,3] or spin-enhanced phonon lasers[4]. Typically, the key element in such applications is the presence of non-equilibrium spin population. Focusing on GaAs NWs of different cross-sectional areas, we analyze their carrier spin polarization based on k.p band structure calculations[5,6]. We show that shining circularly polarized light propagating along the NW axis provides a robust spin injection, reaching $\sim 100\%$ and switchable by changing the incident photon energy. For optical spin injection in bulk GaAs near the Γ-point, we recover previously known results[7]. [1] H. Dery, et al., Appl. Phys. Lett. 99, 082502 (2011). [2] J. Lee, et al., Phys. Rev. B 85, 045314 (2012). [3] J. Sinova and I. Zutic, Nature Mater. 11, 368 (2012). [4] A. Khaetskii, et al., Phys. Rev. Lett. 111, 186601 (2013). [5] G. M. Sipahi, et al., Phys. Rev. B 57, 9168 (1998). [6] P. Li and H. Dery, Phys. Rev. Lett. 107, 107203 (2011). [7] F. Nastos, et al., Phys. Rev. B 76, 205113 (2007).

[1]FAPESP (No. 2011/19333-4 and No. 2012/05618-0), CNPq (No. 246549/2012-2), NSF-ECCS, DOE-BES and US ONR.

Paulo Eduardo Faria Junior
Universidade de Sao Paulo, Brazil

Date submitted: 14 Nov 2013 Electronic form version 1.4