Optical spin injection in GaAs nanowires\(^1\) 

PAULO EDUARDO FARIA JUNIOR, Universidade de São Paulo, Brazil, GUILHERME MATOS SIPAHI, SUNY Buffalo / Universidade de São 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 \(\Gamma\)-point, we recover previously known results\(^7\). 


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