Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Spin transport on parallel coupled nanowires with Rashba spin-orbit interaction[1] MARIAMA REBELLO SOUSA DIAS, VICTOR LOPEZ-RICHARD, GILMAR MARQUES, Univ Fed de Sao Carlos, SERGIO ULLOA, Ohio University — The nature of various electron and spin transport mechanisms can be unveiled by exploring the properties of parallel coupled nanowires with Rashba spin-orbit interaction (SOI). Studies of a directional coupler proved the modulation of quantum transport through the proximity of waveguides. The overall control of charge and even spin flux in this system appears promising for spintronics, as well as in hybrid devices that include superconducting or magnetic materials nearby. In this work, we have studied the spin transport properties of parallel coupled nanowires, with an electric field applied in the mixing region, using a transfer matrix formalism. In this configuration, a Rashba SOI is generated, which breaks the spin degeneracy. Moreover, various configurations of gate voltages, applied on the wire structure, are considered. Under this configuration we are able to analyze the modulation of the spin transport through the combination of SOI and system dimensions. The combination of SOI and gate voltages allows a modulation of the polarization, when the measured spin is projected along the direction of the Rashba spin-orbit field. We will discuss how this polarization depends on structure features and explain how to use this effect to control the spin flux.

[1]Supported by CNPQ, FAPESP, MWN/CIAM-NSF, DAAD, and AvH.

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Date submitted: 15 Nov 2013 Electronic form version 1.4