SELF-SUSTAINED CURRENT OSCILLATIONS IN A MULTIQUANTUM WELL SPIN POLARIZED STRUCTURE WITH NORMAL CONTACTS

R. Escobedo[1], *M. Carretero*[2], *L. L. Bonilla*[2], *G. Platero*[3]

[1]*Dpto. Matemática Aplicada, Universidad de Cantabria, 39005 Santander – Spain*
[2]*Modeling, Simulation and Industrial Mathematics Group, Universidad Carlos III de Madrid, 28911 Leganés, Madrid – Spain, and Unidad asociada al Instituto de Ciencias de Materiales, CSIC, Spain*
[3]*Instituto de Ciencia de Materiales de Madrid, CSIC, 28049 Cantoblanco, Madrid – Spain*

escobedo@unican.es

We analyze nonlinear electron spin dynamics of a n-doped dc voltage biased semiconductor I-VI multi-quantum well structure (MQWS) having one or more of its wells doped with Mn.

Even if normal contacts have been attached to this nanostructure, spin polarized current can be obtained provided one well is doped with magnetic impurities.

We have studied the conditions for the system to exhibit static electric field domains and stationary current or moving domains and time-dependent oscillatory current.

There are self-sustained current oscillations (SSCO) for nanostructures with four or more QWs. Moreover, SSCO may appear or not depending on the spin splitting induced by both, the exchange interaction and the external magnetic field. We calculate the minimal doping density needed to have SSCO, which is crucial to design a device behaving as a spin polarized current oscillator.

References:

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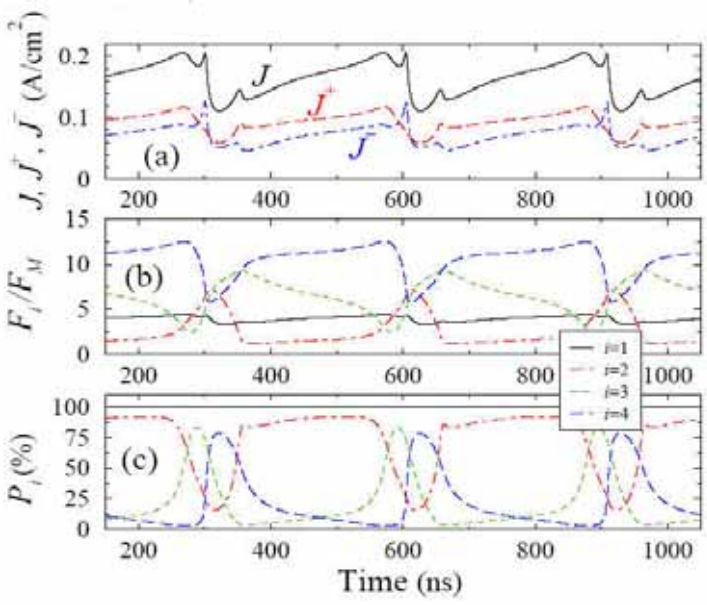

(a) Tunneling current (b) electric field and (c) polarization in a MQWS with 4 wells