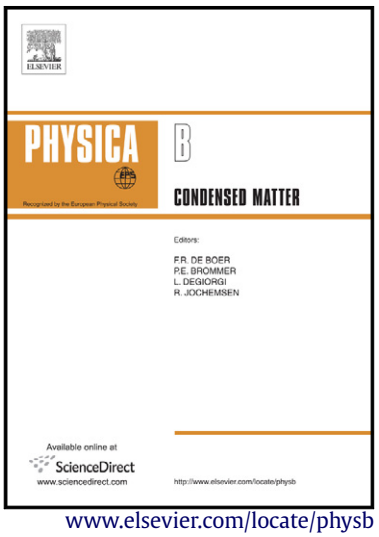


www.elsevier.com/locate/physb

# The effect of thermal bias on the spin-state manipulation in a quantum dot

Jia Liu, Jie Cheng, Song Wang

PII: S0921-4526(14)00456-6
DOI: http://dx.doi.org/10.1016/j.physb.2014.05.058
Reference: PHYSB308450

To appear in: *Physica B*

Received date: 15 February 2014
Revised date: 27 May 2014
Accepted date: 30 May 2014

Cite this article as: Jia Liu, Jie Cheng, Song Wang, The effect of thermal bias on the spin-state manipulation in a quantum dot, *Physica B,* http://dx.doi.org/10.1016/j.physb.2014.05.058

# The effect of thermal bias on the spin-state manipulation in a quantum dot

Jia Liu[1,2*†], Jie Cheng[1] and Song Wang[1]

*1.School of Mathematics, Physics and Biological Engineering, Inner Mongolia University of Science and Technology, Baotou 014010, China; 2.Key laboratory of Integrated Exploitation of Bayan Obo Multi-Metal Resources IMUST, Baotou 014010, China*

## Abstract

The control of the single electronic state in a quantum dot (QD) by magnetic field in the presence of thermal bias was investigated with master equation method. Results show that the qubits for information processing can be realized by tuning the magnitude and direction of the magnetic field. In addition, the temperature difference between the source (S) and drain (D) leads, thermal-spin effect, which is inevitable in practical devices, can also be counteracted with magnetic field. Our results have important implications for quantum information processing.

Keywords: Quantum dot; Thermal bias; Spin-state manipulation.

PACS numbers:



* Email: jialiu@imust.cn

† Phone: 86-0472-5954358; Fax:86-0472-5954358