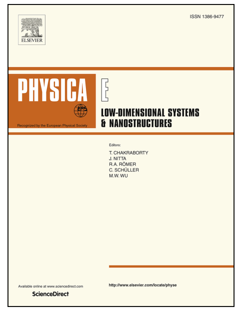
Accepted Manuscript



Pauli blockade microscopy of quantum dots

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PII: S1386-9477(18)30356-4

DOI: 10.1016/j.physe.2018.07.008

Reference: PHYSE 13211

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received Date: 9 March 2018

Revised Date: 29 June 2018

Accepted Date: 6 July 2018

Please cite this article as: E. Wach, B. Szafran, Pauli blockade microscopy of quantum dots, *Physica E: Low-dimensional Systems and Nanostructures* (2018), doi: 10.1016/j.physe.2018.07.008.

Pauli blockade microscopy of quantum dots

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Abstract

We propose a spin-sensitive scanning probe microscopy experiment on double quantum dots in Pauli blockade conditions. Electric spin resonance is induced by an AC voltage applied to the scanning gate which induces lifting of the Pauli blockade of the current. The stationary Hamiltonian eigenstates are used as a basis for description of the spin dynamics with the AC potential of the probe. For the two-electron system we evaluate the transition rates from triplet T_+ state to singlet S or triplet T_0 states, i.e. to conditions in which the Pauli blockade of the current is lifted. The rates of the spin-flip transitions are consistent with the transition matrix elements and strongly dependent on the tip position. Probing the spin densities and identification of the final transition state are discussed.

Keywords: scanning gate microscopy, quantum dots, electric dipole spin resonance

1. Introduction

The potential landscape within the electron gas buried shallow beneath the surface of semiconductor [1–9], quantum wires [10, 11], carbon nanotubes [12–14], graphene [15–17] can be modified in a controllable manner by potential of an external gate. This fact was used for development of a scanning gate microscopy technique [18], in which the current or conductance maps are taken as functions of the position of a charged tip of an atomic force

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