北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Quantum Computing Based On Single Electron Semiconductor Devices -- Charge, Spin, and Hybrid Qubits

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Time: 4:00pm, Nov. 20, 2017 (Monday)

时间：2017年11月20日 （周一）下午4:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

Quantum computing attracts much interest as Moore's Law seems to reach a limit in semiconductor industry. We report our progress in developing semiconductor qubits based on individual electron charges, spins, or hybrid states of charges and spins. Charge qubits can be coherently manipulated with picosecond voltage pulses. We developed single, double, and triple charge qubits in GaAs/AlGaAs heterostructures in the last few years. Spin qubits in Si devices possess much longer coherence time. We report our efforts in making spin qubits in stack-gated Si MOS-FET devices. Recently, we made progress in realizing a type of hybrid qubits, which compromise the fast operational speed of charge qubits and the long coherence time of spin qubits.

About the speaker

Dr. Xiao Ming now is a professor in the Key Laboratory of Quantum Information, University of Science and Technology of China. Dr. Xiao received his Ph. D. degree in experimental condensed matter physics from University of California at Los Angeles (UCLA) in 2004. His research focuses on the manipulation of a single electron spin or charge in nanometer-scale semiconductor devices to implement quantum computing. In silicon MOS FETs and quantum dots, he realized the detection and manipulation of a single electron spin. In GaAs/AlGaAs quantum dots, he performed quantum operations of a single charge qubit, two and three strongly coupled charge qubits, and a tunable spin-charge hybrid qubit. He has published about 40 peer-viewed papers in Nature, Physical Review Letters, Nature Communications, and so on.