Joint Seminar – CQSE, CTP, & CASTS

Special Seminar
Oct. 31, 2019 (Thursday)

TIME Oct. 31, 2019, 2:00~3:00pm
TITLE Silicon-based quantum-dot quantum computing
SPEAKER Prof. Seigo Tarucha
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PLACE Rm312, CCMS & New Physics Building, NTU

Abstract
To date various techniques of implementing spin-based quantum computing have been developed, including single and two-qubit gates, initialization and readout. But improving the operation fidelity as well as increasing the qubit number is still a challenge in realizing fault-tolerant quantum computing. In this context electron spins confined to Si quantum dots have advantages because of the long decoherence time (> msec), small physical area per qubit (< 0.1 µm²), possible high temperature operation (> K), and compatibility with LSI technology. In this talk I will first discuss the spin dephasing mechanism for Si quantum dots and how to suppress it to raise the gate fidelity well exceeding the threshold of fault tolerant computation, and in addition specific techniques for improving the readout fidelity. I will then review the current research and development to scale up the qubit system, including integration technologies of the quantum processor and cryo-electronics to improve the performance of the large-scale quantum circuit.