北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Quantum Computation Based on Spins in Solid State Systems

Jiangfeng Du

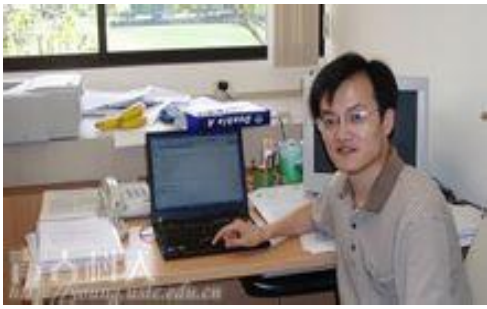
University of Science and Technology of China

Time: 4:00pm, Oct. 31, 2012 (Wednesday)

时间：2012年10月31日 （周三）下午4:00

Venue: Room 607, Conference Room A , Science Building 5

地点：理科五号楼607会议室



Abstract

In the past decade, there has been tremendous progress in the development of quantum computation, especially in solid-state quantum computing. The quantum information storage, the precise manipulation of quantum bits, the transmission of quantum information and quantum bit high efficiency measurement have been a great development, for example, in quantum dots, nuclear magnetic resonance, electron paramagnetic resonance, superconductivity qubits and so on. But most of the systems are still distance from practical quantum computation tasks. Thus it is necessary to research different quantum systems and combine them together to seek a possible way for scalable quantum computation proposal. Spin plays an important role among lots of proposals and is one of the best ways for practical quantum computation.

Herein, we mainly focus on the basic theory and experiment fields of quantum computations on spins in solid state. We concern on several respects such as decoherence regime, dynamical decoupling methods for suppressing the noise induced by the environment, the initialization of the quantum spin states, high fidelity quantum operations and readout, the entanglement of multiqubits and seek possible methods for scalable quantum computation.

About the speaker

Prof. Dr. Jiangfeng Du, Yangzi Professor at Hefei National Laboratory for Physical Sciences at Microscale and Dept. of Modern Physics of University of Science & Technology of China, the Principal Investigator of National Basic Research Program (973) of China. He is an expert in the area of magnetic resonance and quantum computation. He has done many outstanding experimental studies on quantum computing and related quantum fundamental issues using electron/nuclear spin resonance (ESR & NMR) and optically detected magnetic resonance (ODMR) technologies. So far he has published more than 100 scientific papers, including 1 paper published in *Nature* and 17 papers published in *Physical Review Letters*. One of his work, “Preserving spin coherence in solids by optimal dynamical decoupling” (Nature 461, 1265 (2009)), was selected as the “Top 10 Scientific and Technological Progresses of Chinese University” (2009) and the “Top 10 Scientific and Technological Progresses of China” (2009).