



量子材料科学中心

International Center for Quantum Materials

Seminar

Cooper Pair Splitter and Quantum Entanglement of Electrons

**Xiao Hu**

Principal Investigator

WPI Center for Materials Nanoarchitectonics (MANA),
NIMS, Japan

- **Time: 4:00pm, Mar. 15, 2011 (Tuesday)**
- **时间: 2011年3月15日 (周二)**
- **Venue: Room 607, Conference Room A, Science Building 5**
- **地点: 理科五号楼607会议室**

Abstract

The talk covers a theoretical study on nonlocal quantum entanglement of electrons. Josephson current of spin-entangled electrons through the two branches of a SQUID-like structure with two quantum dots exhibits a magnetic-flux response different from the conventional Josephson current. Due to their interference, the period of maximum Josephson current changes from $hc/2e$ to hc/e . This property can be used to detect Cooper-pair splitting events, and to provide a smoking gun evidence for the nonlocal quantum entanglement of split electrons. Moreover, we reveal that the nonlocal spin entanglement of two electrons trapped at the quantum dots can work as a quantum mechanical functionale for switching on and off this novel Josephson current. The background of our work and the future perspective will be presented.

Reference:

Z. Wang and X. Hu, PRL 106, 037002 (2011)

About the Speaker

Professor Xiao Hu obtained his Doctor Degree of Science from University of Tokyo. Now he works as Principal Investigator in World Premium International Center for Materials Nanoarchitectonics (MANA), NIMS. His research interests focus on the exotic magnetism and nano magnetism; novel superconductivity and vortex states and quantum entanglement of electron systems. Professor Xiao Hu received Award for the high achievement in scientific research from the Association for the Exchange of Japan-China Science and Technology in 1988 and Harada Prize (Japan) for significant contributions in basic and applied research of metals and related materials in 1995.