The Chinese University of Hong Kong
Faculty of Science / Department of Physics

C N Yang Lecture in Physics

Quantum Leap: From Tests of Quantum Foundations to New Quantum Technologies

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Date: January 21, 2019 (Monday)
Time: 4:00 - 5:30 p.m.
Place: LT5, Yasumoto International Academic Park, CUHK

Light refreshments will be served at LT4 lobby at YIA from 3:30 to 3:50p.m.

Abstract

Driven by the initial curiosity of "spooky action at a distance" referred by Einstein, in the last few decades, many ground-breaking technologies were developed for coherent manipulation of quantum systems. This consequently leads to the emerging quantum information sciences including quantum communication and quantum computation. While quantum communication can ensure secure information exchange, quantum computation can greatly enhance the computing power.

Over the past three decades, the promises of super-fast quantum computing and secure quantum cryptography have spurred a world-wide interest in quantum information, generating fascinating quantum technologies for coherent manipulation of individual quantum systems. However, the distance of fiber-based quantum communications is limited due to intrinsic fiber loss and decreasing of entanglement quality. Moreover, probabilistic single-photon source and entanglement source demand exponentially increased overheads for scalable quantum information processing. To overcome these problems, we are taking two paths in parallel: quantum repeaters and through satellite. Based on these techniques, we are developing quantum repeaters that combine entanglement swapping, entanglement purification, and quantum memory for the ultra-long distance quantum communication. The second line is satellite-based global quantum communication, taking advantage of the negligible photon loss and decoherence in the atmosphere. The quantum science satellite 'Micius' was launched in 2016, and accomplished High-rate QKD between satellite and ground, quantum entanglement distribution from satellite and quantum teleportation from ground to satellite, for the first time.

Biography

Jian-Wei Pan, born on March 11, 1970. He obtained his Ph.D. degree of Experimental Physics from the University of Vienna in 1999. In 2001, he was appointed as the full professor of physics by USTC. In 2011, he was elected as the academician of Chinese Academy of Sciences (CAS). The research of Jian-Wei Pan focuses on quantum optics, quantum information and quantum foundations. As one of pioneers in experimental quantum information science, he has accomplished a series of profound achievements. Due to his numerous progresses on quantum communication and multi-photon entanglement manipulation, quantum information science has become one of the most rapidly developing fields of physical science in China in recent years.

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