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Superconducting circuits for Quantum Information Processing

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摘要: Superconducting quantum circuits, particularly circuit Quantum Electrodynamics (circuit QED), have become a promising platform for quantum information processing (QIP) because of their long coherence times, fast quantum manipulation, and ease of scale up. In this talk, I will first review the recent progress based on this system towards QIP, in particular quantum error correction. Then I will focus on our two recent experiments with this system at Tsinghua University, although not particular for the purpose of QIP. In the first experiment, we demonstrate a unique two-fold quantum delayed-choice experiment, enabled by a which-path detector with further unprecedented controllability to test of wave-particle complementarity. In the second experiment, we demonstrate a new method to generate arbitrary Fock-state superpositions. As examples, we generate high-fidelity phase eigenstates under various Hilbert-space dimensions and squeezed states, which are useful for quantumwalk and high-precision measurements, respectively.

报告人简介: Dr. Luyan Sun got his bachelor degree at the Department of Physics, Zhejiang University, in 2001. He then did his PhD study at University of Maryland, College Park, mainly on silicon-based quantum computation. After getting his PhD in physics in 2008, he moved to Yale University and started to work on quantum computation based on superconducting systems as a post-doctor. Since the end of 2013, Dr. Sun has been working at Tsinghua University with a new lab on superconducting qubits and circuit QED systems. His publications, including several in Nature and PRL, have been cited for more than 1,000 times. Dr. Sun was selected to the "1000 Youth Talent Plan of China" and "221 Basic Research Plan for Young Faculties at Tsinghua University" in 2014.

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