



Tsinghua University
Department of Physics

Physics Colloquium

2012Spring

Up and down: The tale of a spin

Abstract

A spin is a tiny quantum magnet that can be in a superposition of up and down states. It can serve as an information unit called qubit in quantum information processing. By unavoidable coupling to environments, however, a spin will lose its quantum coherence by decoherence. In this talk, I will show how the spin decoherence can be understood in quantum mechanics and how the environments can be effectively decoupled by frequently flipping the spin up and down. When the decoherence is under such dynamical decoupling control, we observed anomalous effects of quantum fluctuations. The spin under control becomes a sensitive probe of weak quantum noises from the environments, which is useful not only in ultrasensitive magnetometry such as single-molecule nuclear magnetic resonance but also in research of fundamental physics such as quantum criticality.

Speaker

Professor Liu specializes in the research of quantum physics and condensed matters. He graduated from the Department of Physics, Nanjing University in 1995, and received his PhD from the Institute of Semiconductors, Chinese Academy of Sciences in 2000. He then joined Tsinghua University and the University of California, San Diego as a postdoctoral fellow. In 2005, he joined CUHK and is now an Associate Professor in the Department of Physics and Director of Centre for Quantum Coherence. He is currently the Vice President of the Physical Society of Hong Kong. Professor Liu has published more than 50 papers in various peer-reviewed international journals including Nature, Nature Nanotechnology, and Physical Review Letters and presented tens of invited talks in international conferences. He is a recipient of the Young Researcher Award 2010 of CUHK.



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Zheng Yu-Tong Lecture Hall, New Science Building

Prof. Ren-Bao Liu

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