Seminar
Amplifying Quantum Information

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Time: 4:00pm, June 18, 2013(Tuesday)
时间： 2013年6月18日（周二）下午4:00
Venue: Conference Room 607, Science Building 5
地点： 理科五号楼607会议室

Abstract

Quantum Information is a new paradigm of information processing, where the systems used to store, transmit, and process data obey the laws of quantum mechanics.

One of the cornerstones of Quantum Information is the no-cloning theorem, stating that there exist no perfect "quantum copy machine". The no-cloning theorem is deeply connected with Heisenberg's uncertainty principle and with the impossibility of faster-than-light signalling, and allows for new cryptographic protocols with applications ranging from unforgeable credit cards to secure communication over an insecure transmission line.

In this talk I will present attempts to go beyond the no-cloning theorem, considering quantum processes that produce approximate copies with the best accuracy allowed by the laws of quantum mechanics. After introducing the fundamental features of approximate cloning processes, I will discuss how cloning can be treated as a special case of a more general task, the amplification of quantum signals. As a specific example, I will present a new result on the ultimate quantum limits to the amplification of coherent states of light, considering both deterministic and non-determinstic processes, and relating these limits to recent experimental breakthroughs on non-deterministic quantum optical amplification.

Related works:

G. Chiribella and G. M. D'Ariano, Quantum information becomes classical when distributed to many users, Phys. Rev. Lett. 97, 250503 (2006)

G. Chiribella and J. Xie, Optimal Design and Quantum Benchmarks for Coherent State Amplifiers, Phys. Rev. Lett. 110, 213602 (2013)

About the Speaker

Giulio Chiribella got his Ph.D in in Physics at the University of Pavia,under the supervision of Prof. G. M. D'Ariano.From 2006 to 2009, he had been a Postdoctoral fellow at QUIT Quantum Information Theory Group, University of Pavia.From 2009 to 2012, he had been an Affiliate Member of IQC Institute for Quantum Computing, Waterloo, Canada. Since June,2012, he has been an Associate Professor, Institute for Interdisciplinary Information Sciences,Tsinghua University.His research interests are Quantum Information Theory, Quantum Foundations, and Mathematical Physics.