SPECIAL COLLOQUIUM

Department of Physics, Tsinghua University

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Title ***Quantum Communication, Quantum Computation and Quantum Simulation with Photons***

Speaker **Prof. Anton Zeilinger**

Faculty of Physics, University of Vienna and Austrian Academy of Sciences

Venue 清华大学理科楼郑裕彤讲堂

&Date **2011年12月7日16:00**

Abstract: Entangled photons are a major resource in many quantum information protocols. In quantum cryptography, entangled systems provide the significant advantage of device-independent security. In quantum information processing, measurement-based protocols provide deterministic universal photonic quantum computation. Recent experimen-tal realizations include quantum simulation of a frustrated Heisenberg spin chain and imple-mentation of the fundamental elements for blind quantum computation. There a central quantum computer is able to perform computation such that its operator has no possibility whatsoever to obtain any information performed by an outside user. An interesting future direction of research is long-distance quantum communication with satellites implementing quantum cryptography between any two locations on Earth or connecting users to very distant quantum computation nodes. Another direction is quantum superposition and quantum entanglement in higher dimensional Hilbert spaces. This can be implemented with multi-path micro-optics or with novel quantum states with unconventional wave fronts, like optical angular momentum states where an individual photon can carry any number of units of angular momentum.

Introduction to the Speaker

Anton Zeilinger, 2004-present Scientific Director, IQOQI
Institute of Quantum Optics and Quantum Information,
Austrian Academy of Sciences, Vienna
1999-present Full Professor of Experimental Physics, University of Vienna
1990-1999 Full Professor of Experimental Physics, University of Innsbruck
1988-1989 Full Professor of Physics (Lehrstuhlvertretung), Technical University of Munich
1983-1990 Associate Professor, Technical University of Vienna
1981-1983 Associate Professor of Physics, M.I.T. (Visiting)
1979-1983 Assistant Professor, Atominstitut Vienna
1977-1978 Research Associate (Fulbright Fellow) at M.I.T. in the Neutron Diffraction Laboratory under Prof. C.G. Shull (Nobel Laureate 1994), USA
1972-1979 Research Assistant, Atominstitut Vienna
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