



PHILIP WALTHER 'Photonic Quantum Systems: Recent Results and Perspectives in Quantum Simulation and Quantum Computing'

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December 19, 2011

Seminar, December 19, 2011, 15:00. Seminar Room

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The applications of photonic entanglement are manifold and reach from quantum communication (1) to quantum metrology(2) and optical quantum computing (3). The advantage of the photon's mobility makes optical quantum computing unprecedented in speed, including feed-forward operations with high fidelity (4). During the last few years the

degree of control over photonic multi-particle entanglement has improved substantially and allows for not only overcoming the random nature of spontaneous emission sources (5), but also for the quantum simulation of other quantum systems. In this talk I will focus on the recent photonic quantum simulation of four spin-1/2 particles interacting via any Heisenberg-type Hamiltonian (6). The ground state properties of such quantum magnets may be important for the understanding of high- T_c superconductors, thus raising significant interest in the so-called frustrated valence-bond states. In addition, recent experimental and theoretical progress, using the concepts of measurement-based quantum computation, indicates that photons are also best suited for quantum networks. I will also present the recent realization of a securely delegated quantum computation in a client-server environment, where quantum information is communicated and computed using the same physical system.

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Hosted by Prof. Frank Koppens