THEORETICAL PHYSICS SEMINAR

Title: Quantum Information Processing: Implementation Schemes and Quantum Memory

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Date/Time/Venue: 1st January (Friday)/4:00 PM/ Room No. 469

ABSTRACT

The central aim of the quantum information processing (QIP) is to extend information processing (including computation and communication) in regimes where quantum effects are significant. QIP uses the states of a multilevel quantum system as the basic unit of information. To be useful, a quantum system needs to be both isolated from its environment and easy to control, thus placing a stringent requirement on its physical realization. Photons interact weakly with their environment and are in this respect suitable candidates for QIP.

In this talk, I will present photonic implementation schemes for a number of QIP tasks. While some of the QIP tasks such as quantum walks, can be implemented using intense laser pulses (classical light), other protocols such as quantum teleportation, require reliable on demand single photon sources. Quantum memories, i.e., systems capable of storing a single photon, can be used to develop a single-photon source. Hence, constructing efficient and robust quantum memories would pave the way for performing QIP tasks efficiently. Here I will show that quantum memory consists of atomic frequency combs, beside storing a single photon efficiently, can be used for creating genuine multipartite entangled states in macroscopic systems. Finally, I will present an experimentally accessible method to witness this entanglement.

All are welcome to attend