ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 18 October 2012

17:00 -18:00

3rd Floor Seminar Room

"Engineering of Quantum Networks in the Quest for the Quantum Computer"

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FORTH - IESL

Abstract

Quantum information processing (QIP), an essential tool toward quantum computing, is a rather new and rapidly developing field of research at the intersection of physics, mathematics, and computer science. It explores fundamental principles of quantum physics, to achieve various information processing tasks pertaining to computing and networking. So far, large-scale QIP and networking remains a formidable challenge and undoubtedly, the reliable communication of quantum states is a necessary precondition to this end. I will review recent results on the transfer of quantum states in realistic quantum networks of moderate complexities. The envisioned networks are represented by discrete lattices of interacting nodes, each node corresponding to a quantum system with well-defined properties, such as quantum dot, cavity, waveguide, atom, ion, etc. I will demonstrate how one can engineer Hamiltonians that ensure high-fidelity transfer of quantum states and distribution of entanglement in such lattices. Finally, I will present the first experimental realization of such a Hamiltonian in the context of photonic lattices engineered in fused silica.