



ΣΕΜΙΝΑΡΙΟ ΚΕΝΤΡΟΥ ΚΒΑΝΤΙΚΗΣ ΠΟΛΥΠΛΟΚΟΤΗΤΑΣ & ΝΑΝΟΤΕΧΝΟΛΟΓΙΑΣ/  
CCQCN SEMINAR

**Wednesday, 20 November 2013**

**15:00-16:00**

**3<sup>rd</sup> Floor Seminar Room**

**Quantum metamaterials: Concept and applications**

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**Abstract**

Quantum metamaterials are optical media comprised of artificial quantum scatterers (e.g., qubits), in such a way that (1) these unit blocks maintain quantum coherence for times exceeding the characteristic travel time of an electromagnetic wave through the system, and (2) their quantum state can be directly controlled. For example, a periodic arrangement of qubits in a register of an adiabatic quantum computer can be considered as a quantum metamaterial.

The simplest case of a quantum metamaterial is a one-dimensional set of superconducting qubits in a transmission line. It was shown in experiment that a single qubit in such a line demonstrates all the expected of a pointlike quantum scatterer, with a much stronger coupling to the field than can be achieved with natural atoms in 3D space. Other implementations of quantum metamaterials (like quantum dots placed inside photonic crystals, which would operate in the optical range) are also being considered.

In my talk I will discuss some of the unusual properties of a quantum metamaterial, which stem from its being an \_extended\_ quantum object, and their possible applications.

