CEA - Saclay 91191 Gif-sur-yvette Cedex
Service de Physique de l'Etat Condensé
SÉMINAIRE

******

Vendredi 1er octobre 11h15

Orme des Merisiers SPEC Salle Itzykson, Bât.774

Deterministic Creation of NOON States in Two Superconducting Resonators

John MARTINIS

University of California, Santa Barbara (Etats-Unis)

The quantum entanglement of two or more degrees of freedom is a key requirement for quantum computation, and has been demonstrated in a variety of spin-like physical systems, ranging from atoms to electronic circuits. These systems share the common trait of very strong nonlinearity, and are used because the nonlinearity allows straightforward quantum control by classical means. Quantum control of linear systems, such as harmonic oscillators, is by contrast significantly more difficult, and has only been achieved using nonlinear intermediaries: Beam-splitters, nonlinear crystals and photon detectors to control traveling optical photons, and atoms, ions and more recently superconducting qubits to control microwave photons and phonons in cavities and resonators.

I will discuss a recent experiment where we used a quantum circuit to deterministically generate entangled photon states in two microwave resonators. We use as a benchmark the generation of NOON states, with N photons in one resonator and 0 in the other, superposed with the state with the occupation numbers reversed. The resonator states are analyzed using bipartite Wigner tomography required to distinguish entanglement from an ensemble of mixed states.

A coffee break will be served at 11h00.

Contact : patrice.bertet@cea.fr/elisabeth.bouchaud@cea.fr - Tel : +33 1 69 08 55 29 / 41 03
http://iramis.cea.fr/spec/