

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

Mercredi 11 juillet 11h15

Orme des Merisiers SPEC Salle Itzykson, Bât.774

**Observation of Entanglement Between a Superconducting Qubit
and Itinerant Microwave Photons**

Andreas WALLRAFF

Department of Physics,

ETH Zurich (Switzerland)

Experiments with Rydberg atoms or superconducting circuits interacting with microwave photons confined in cavities have greatly enhanced our understanding of the interaction between matter and light at the level of single quanta. Due to the high level of control attainable about the coherent quantum dynamics of superconducting circuits coupled to individual microwave photons these systems also constitute a promising approach towards processing information quantum mechanically. In this presentation I will discuss experiments in which we characterize the entanglement generated on demand between a stationary qubit and microwave fields freely propagating down a transmission line containing zero, one and two photons. Using phase-preserving parametric amplification for detecting both quadrature amplitudes of the propagating field and the qubit state [1] we characterize all relevant qubit/photon correlations and reconstruct the density matrix of the joint qubit/photon state. The non-local nature of these states may prove to be useful for distributing entanglement in future quantum networks.

[1] C. Eichler, D. Bozyigit, and A. Wallraff, arXiv:1206.3405v1 (2012)

The seminar will be given in English. A coffee break will be served at 11h00.