Service de Physique de l'Etat Condensé (SPEC)
Département de Recherche sur l'Etat Condensé, les Atomes et les Molécules
Direction des Sciences de la Matière
Commissariat à l'Energie Atomique

Séminaire du SPEC

Vendredi 8 juin 2007, 11h00

SPEC, Pièce 12, Bâtiment 772
Centre d'Etudes de Saclay, Orme des Merisiers
91191 Gif-sur-Yvette

ATTENTION : jour et salle inhabituels

Séminaire exceptionnel en SALLE CAFE du SPEC

Surprises in quantum electromechanics

Aashish CLERK

(Université McGill, Montréal, Canada)

A nano-electromechanical system consists of a micron-scale mechanical resonator coupled to a mesoscopic electronic conductor. The dissipative quantum mechanics of these systems is particularly interesting. How do the tunneling excitations in the conductor heat and damp the oscillator ? To what extent do they act as an effective thermal bath ? I will review recent theoretical work which demonstrates how a generic out-of-equilibrium mesoscopic conductor can act as an effective thermal bath. I will also discuss the interesting case where this bath is formed by out-of-equilibrium, incoherently-tunneling Cooper pairs. This system is remarkable in that significant cooling of the oscillator is possible ; it can also exhibit a negative-damping instability reminiscent of a laser, characterized by strong feedback between the dynamics of the oscillator the tunneling of the Cooper pairs. Both these effects have recently been seen in experiment.

Invitant :
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