Centre de Nanosciences et de Nanotechnologies

Séminaire

Lundi 04 septembre

11 heures
salle Richard Planel – C2N site Marcoussis

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" **Nano-optomechanics with hybrid carbon nanotube resonators**"

Résumé:
Optomechanical research have recently achieved important progress, notably with the first evidence of quantum behaviours on solid-state mechanical devices, including the demonstration of quantum backaction noise in interferometric systems and the preparation of mechanical resonators close to the quantum ground state. One of the major contribution to these milestones relies on the miniaturization of mechanical resonators at the nanoscale, enabling strongly decreased sensitivity towards classical decoherence mechanisms. The technological challenge raised is therefore to secure strong optomechanical interaction at that scale without compromising mechanical properties.
I will present a novel experimental approach, enabling unprecedentedly low level of thermal decoherence at room temperature. The concept relies on a carbon nanotube resonator at the tip of which an efficient nano-optical scatterer is synthesized. I will show that highly sensitive detection of such system is granted at very low power, and that dynamical backaction control of its vibrational state is available even without the assistance of cavity optical confinement. The mechanical frequency noise will also be analysed as a function of the vibrational state, opening the way towards quantitative understanding of mechanical decoherence in carbon nanotubes at room temperature. I will then conclude upon perspectives to incorporate the system into a cavity optomechanical design.