

## Levitation Nano-optomechanics

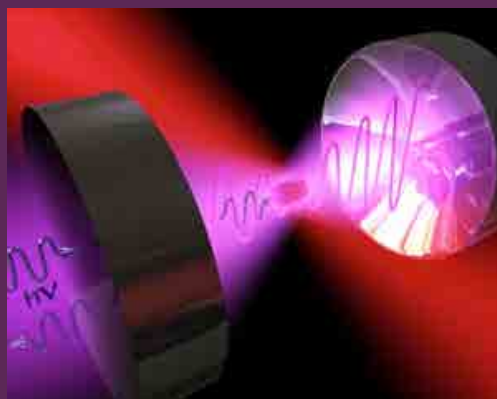
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### Abstract

Optomechanics holds great promises to push the limits of experimental physics, opening new opportunities in ultra-weak force sensing, thermodynamics and giving us further insight on the transition between the quantum and classical worlds. This talk will introduce the use of a levitated



nanoparticle in vacuum as a nano-optomechanical system with unprecedented performance. We first describe its unique linear and nonlinear mechanical properties including its high sensing capability and bistable dynamics. Subsequently, we present our efforts in cooling the nanoparticle

motion towards mechanical ground state at room temperature. In particular, reporting on an experiment that combines active parametric feedback cooling with passive resolved side-band cooling in a macroscopic high finesse optical cavity. Finally, we discuss how the concept of levitation optomechanics can be extended to optical nanocavities by exploiting their subwavelength mode confinement.

*All staff and students welcome. Refreshments will be served.*



### Prof Romain Quidant

received a PhD in Physics (2002) from the University of Dijon and subsequently joined the Institute of Photonic Science (ICFO), Barcelona. In 2006 he was appointed Junior Prof. and group leader of the Plasmon NanoOptics group, and in 2009 became Tenure Professor both at ICFO and ICREA.

His research interests lie at the interface between photonics and nanotechnology. His group's activities cover both fundamental and applied research on the interaction of light with nanostructures, particularly with metallic nanoparticles supporting plasmonic resonances. Basic research is mainly directed towards enhanced light/matter interactions for quantum optics and optomechanics. Applied research focuses on new strategies to control light and heat at the nanometer scale for biomedical applications, including early detection and photothermal therapy of cancer.

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Tuesday 13 February 2017, 15:00, ORC Boardroom (B46 4050)