Prof Christopher BÄUERLE

NÉEL Institute - CNRS

Grenoble

Towards Quantum Nano Mechanics using Superconducting Diamond

Tuesday 21 December, 10:45 am

Sala Castagnoli, Istituto di Fisica, via P. Giuria 1

contact: Dr. Paolo Olivero (olivero@to.infn.it)

Dipartimento di Fisica Sperimentale

Università di Torino

Abstract

Nanomechanical systems offer a parameter space that is unprecedented. Because their resonance frequency can easily be tuned from kHz to GHz range, and because they have intrinsically low dissipation and small masses, NEMS are ideal systems to study quantum mechanics. One can also envision to couple this system to a variety of interesting solid state systems like superconducting Q-bits that exhibit themselves quantum mechanical coherence.

Towards this goal, superconducting diamond is a very promising material due to its exceptional mechanical as well as electrical properties. In particular, superconductivity in boron doped diamond is observed to survive up to a critical field $H_{c2} > 4$ T, whereas in conventional (type-I) superconductors like Al, the critical field is usually less than tenth of 1 T.

These materials provide hence a unique possibility for the creation of superconducting devices for operation at high fields. In this talk we will present the realization of promising quantum devices, such as diamond-based micro-SQUIDs that could allow measuring the quantum motion of a suspended beam.

The Author

Christopher Bäuerle obtained a Ph.D. in Physics in 1996 at the University Joseph Fourier, and was appointed post-doctoral positions at the Tsukuba University (Japan) and the University Joseph Fourier (France). He is currently “Directeur de Recherches” at the NÉEL Institute of Grenoble (CNRS).

His research interests include solid state physics at ultra low temperatures (quantum fluids and solids in reduced dimensionality, Fermi liquids, frustrated magnetism, spin liquids), surface physics (canning probe microscopy at low temperatures), and mesoscopic physics (phase coherence phenomena at low temperatures, persistent currents, Kondo effect in artificial nanostructures).