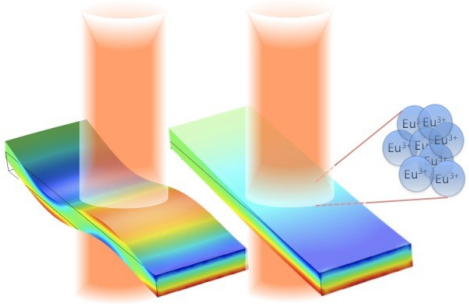
Post-Doc in Paris (LNE-SYRTE/Observatoire de Paris) on

Nano-mechanical hybrid quantum systems based on rare-earth doped crystals

Scope and aim:



The chief endeavor of this project is to investigate the behavior of macroscopic material objects - mechanical oscillators - in non-classical states. Our project wants to build upon the combination of several state-of-the-art techniques which have not so far been put together. Specifically, a first point is the use of rare-earth-doped crystalline materials, which allow ultra-narrow optical linewidth (<kHz) in atom-like systems [1]. A second point is the use of ultra-high precision spectroscopic techniques, typically developed and used in time-frequency metrology, which is one of the strong point of the LNE-SYRTE laboratory [2]. A third point is the use of dedicated nano-resonator realization and study technique, which are developed in collaboration with Institut Néel in Grenoble France. Last, the project will use strain-coupling technique between mechanical resonator and atom-like optical transitions [3]. Combining these expertises together will lead to probing and controlling mechanical nano-resonators at the quantum level [4].

Context:

The position is offered as part of a larger European Project on Quantum Information Technologies based on rare-earth doped crystals (NanoQTech FET-OPEN program). The successful applicant will be expected to carry out the research program using an already existing complex experimental apparatus (including ultra-stable lasers, closed-cycle cryostat, complex computer control system,...). He/she will be expected to take a substantial part in supervising a PhD student and several master students on the project, as well as interact with the technical staff at LNE-SYRTE on various experimental aspects. The working language is English.

The position is open from march 2017 until fulfilled. The initial duration is for 1 year, but an extension to a second year or more is possible.

The applicant:

Must hold a PhD in experimental physics. Knowledge in optical spectroscopy and/or laser physics techniques at high resolution is a plus.

CV motivation letter and references should be sent both to Dr. Yann Le Coq (yann.lecoq@obspm.fr) and Dr. Signe Seidelin (signe.seidelin@neel.cnrs.fr).

[1] O. Gobron,…, Y. Le Coq, « Towards a highly stable laser for the interrogation of SYRTE's Sr and Hg optical lattice clocks », CLEO 2016 proceeding (paper #SM2H.4) (2016)
[2] D. Nicolodi,…, Y. Le Coq, « Spectral purity transfer between optical wavelength at the 10^{-18} level », Nature Photonics 8, 219 (2014)
[3] I. Yeo et al., « Strain-mediated coupling in a quantum dot-mechanical oscillator hybrid system », Nature Nanotechnology 9, 106 (2014)
[4] K. Moelmer, Y. Le Coq, S. Seidelin, « Dispersive coupling between light and a rare-earth ion doped mechanical resonator », PRA 94, 053804 (2016)