

Postdoc: Ultra low noise laser and optical levitation.

Duration 12 months period (with possibility of 12 additional months)

Job status Post doc full time

Location : Talence (France)

Start date : February-April 2022

Salary : around 2800€ gross per month

Description

Context: Levitated nanomechanical oscillator are a very interesting class of optomechanical systems. With its extreme isolation from environment and the highest recorded mechanical quality factor, levitated particles are also ultra-sensitive force and torque sensors. To go further in this field, it is desirable to reach the quantum ground state for all vibrational degrees of freedom of a nanoparticle by using only optical techniques.

The trapping of such nanoparticles requires a watt level ultra-low intensity noise laser around 1550nm. With target relative functions below $10^{-16}/\text{Hz}$ ($<-160\text{dBc}/\text{Hz}$ RIN) from 100Hz to 1MHz Fourier frequencies and beyond.

The LP2N (Institut d'Optique Graduate School, CNRS and Université de Bordeaux) and the LOMA (CNRS and Université de Bordeaux) are seeking a post-doctoral research associate for the development of a medium power (2W) ultra low-noise laser source around 1550 nm for optomechanical experiment with optically levitated silicon nanoparticles.

The Postdoctoral Research Associate will first work at LP2N for the ultra-low noise laser realization and fine control. Then in a second part he/she will be involved in advanced optical manipulation of nanoparticles at LOMA. The advantage of our method for cooling the motion of the particle's center of mass is largely related to its ability to measure ultra-weak forces and torques in real time and thus to allow testing the existence of forces beyond the standard model, measuring Casimir forces and torques near surfaces or even testing the possible non-neutrality of matter, to name a few examples. Importantly, the levitated experimental platform is operational. Thus, the candidate will have the opportunity to directly test the trapping, cooling and force/torque measurement with the developed laser source. He or she will be expected to participate in the experimental work in close collaboration with R&D scientists from the nearby company AzurLight System.

[LP2N](#) is a laboratory hosted in the facilities of the Institut d'Optique d'Aquitaine focusing on several research fields ranging from nano&bio photonics, metamaterials to stable laser developments as well as advanced atom interferometry. [LOMA](#) is a multidisciplinary laboratory involving biophysics, soft matter, condensed quantum matter, optomechanics, laser physics, etc. They are both located in Talence (on the campus of Bordeaux University), we enjoy proximity to several world-class research laboratories, laser companies and cultural opportunities.

Profile of applicant

The candidate should have a Ph.D in applied physics, optics or a related discipline. A fluent knowledge of English and/or French is a pre-requisite. The successful candidate will be highly motivated, creative, with demonstrated abilities to work in a collaborative environment. Experimental training in optoelectronics, fiber optics, laser and optics is highly recommended.

Supervisors/Contact

Interested candidates are invited to apply, by email with a CV, reference and a cover letter to Giorgio Santarelli, Yann Louyer and Adele Hilico.

Giorgio.Santarelli@institutoptique.fr, yann.louyer@u-bordeaux.fr and adele.hilico@institutoptique.fr