

# Job Description

## 1. Job identification

**Title of job:** Post-doc  
**Type of contract :** yearly contract, renewable  
**Category (A,B or C) :** A  
**Contract/project period :** 1 to 2 years      **Expected date of employment :** October 2025  
**Proportion of work:** Full time position  
**Workplace :** ISIS, University of Strasbourg  
**Required level of education :** PhD  
**Experience required :** see skills below  
**Contact for information for the position:**  
**Dr. Cyriaque Genet, [genet@unistra.fr](mailto:genet@unistra.fr), +33368855196**  
**Date of publication :** April 28<sup>th</sup>, 2025  
**Closing date for the receipt of applications :** May 26<sup>th</sup>, 2025

## 2. Research project or operation

The role played by fluctuations at mesoscopic scales raises fascinating questions that form a major topic of current transdisciplinary research. In this context, the development of stochastic thermodynamics and optical trapping experiments offers a perfect framework for investigating these questions, both from experimental and theoretical perspectives [Cil17].

The fluctuations are usually of a thermal nature but recently, the interest has focused on fluctuations characterized by colored noise spectra. Among these, exponentially correlated spectra have emerged as an important class, providing optomechanical analogues of active matter that can be studied in detail and under the full control enabled by optical trapping setups [Mil21,Goe21].

The possibility to engineer fluctuating baths and exploit them to control the dynamics of a single trapped microsphere opens the door to exciting perspectives. Engineering noise spectra indeed provides a way to explore a new thermodynamics where systems, driven far from equilibrium using non-Gaussian baths for instance, develop features that lead to original questions [Dab19,Bal22]. Among these, the capacity to control non-equilibrium steady states (NESS) by harvesting the information content of the colored bath, or the possibility to develop new types of NESS-to-NESS shortcuts stand foremost [Gue22,Bal23]. Non-Gaussian baths will enrich the dynamical landscapes of “shortcut-to-adiabaticity” (STA) protocols currently at the heart of an intense research front.

The project aims at setting up the right framework for addressing efficiently these issues to their fullest extent. We propose to intertwine experimental and theoretical endeavors to explore this new far-from-equilibrium nanothermodynamics in the underdamped regime. We will exploit the unique level of control available on optical levitation platforms to carefully engineer the system's heat baths and environments.

[Bal22] M. Baldovin, D. Guéry-Odelin, and E. Trizac, Phys. Rev. E 106, 054122 (2022)  
[Bal23] M. Baldovin, D. Guéry-Odelin, and E. Trizac, arXiv:2212.06651  
[Cil17] S. Ciliberto Phys. Rev. X 7, 021051 (2017)  
[Dab19] L. Dabelow, S. Bo, and R. Eichhorn, Phys. Rev. X 9, 021009 (2019)  
[Goe21] R. Goerlich et al. Phys. Rev. E 103, 032132 (2021)  
[Gue22] D. Guéry-Odelin et al., Rep. Prog. Phys. 86, 035902 (2023)  
[Mil21] A. Militaru et al., Nature Commun. 12, 2446 (2021)

### 3. Activities

- **Description of the research activities :** experimental physics, optics, optical trapping, optical levitation, stochastic thermodynamics, statistical physics.
- **Related activities :** the project is designed within a collaboration between the group of Dr. C Genet "Light Matter Interactions of Complex Systems" at ISIS, University of Strasbourg and the group of Dr. Loïc Rondin at LuMIn, University Paris-Saclay. The experiments involved in this project are all located at ISIS, University of Strasbourg where the entire project will be developed.

### 4. Skills

- **Qualifications/knowledge :**  
The candidate should have preferably a strong background in experimental physics, with an experience in stochastic thermodynamics and optical trapping techniques, optomechanics, optical levitation.
- **Operational skills/expertise:**  
Experimental optics, laser optics, nano-optics, optical traps, etc.
- **Personal qualities :**  
Be curious and a team player, be motivated by scientific inquiry.

### 5. Environment and context of work

- **Presentation of the laboratory/institute:**  
See <https://isis.unistra.fr> and <https://nano.isis.unistra.fr/limacs>

- **Hierarchical relationship** : The post-doc will work directly under the supervision of Dr. Cyriaque Genet (ISIS)
- **Special conditions of practice (notice attached):**

**To apply, please send your CV with references and cover letter to**  
Dr. Cyriaque Genet, [genet@unistra.fr](mailto:genet@unistra.fr)