BEC group lead by Hélène Perrin at Laboratoire de physique des lasers — USPN, Paris
https://bec.lpl.univ-paris13.fr/

# 2 post-doc positions opening — BEC group @LPL

The Bose-Einstein condensate group at LPL is an expert in the dynamics of quantum gases. We advertize two open post-doc positions to join our group in Paris North University (USPN), either on the Sodium or on the Rubidium project. For each of them, applications will be considered until the position is filled. To apply, send your CV, motivation and references to:

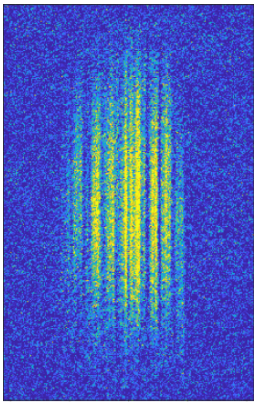
1. **Sodium project 'Dynamics of 1D Bose gases'**:
   helene.perrin@univ-paris13.fr or aurelien.perrin@univ-paris13.fr
2. **Rubidium project 'Vortex turbulence on a curved surface'**:
   helene.perrin@univ-paris13.fr or romain.dubessy@univ-paris13.fr

**Application requirements** Applicants should have a PhD in experimental physics. Experience in laser-matter interaction, cold atom physics (laser cooling), lasers and optics would be a major asset, as well as an interest in the physics of quantum gases. Applicants are expected to have excellent teamwork skills.

**General presentation of the institute:** Laboratoire de Physique des Lasers (LPL) is a joint institute of CNRS and Université Sorbonne Paris Nord/USPN located in the North of Paris. It gathers about 80 people on five research axes spanning metrology to biophysics. Electronic, mechanical and optical workshops support our activities. About 20 people currently work in the Quantum gases axis on one of the five experiments, including the Sodium and Rubidium projects.

## Project 1: Dynamics of 1D Bose gases

We advertize an 18-month post-doc position open to work on the sodium project, where we produce degenerate quantum gases on top of an atom chip. The extremely elongated trap geometry offered by the chip design allows to reach the unidimensional regime. The mid-term goal of the project aims at investigating out-of-equilibrium physics with these systems.
The main activities include the setting up a 1D box optical potential to realize a uniform 1D gas, the study of its out-of-equilibrium dynamics after a quench, and the investigation of 1D atom transport in a potential tailored by light fields with arbitrary profiles.



Expansion of a 1D Bose gas produced in the Sodium machine at LPL

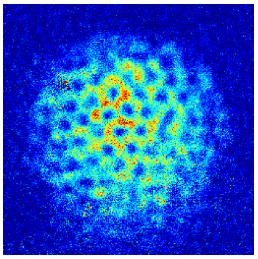
**Environment** The postdoc will join the Sodium team, currently comprising a CNRS researcher, a research engineer and two PhD students (1st and 4th year). The experiment is funded by two ongoing ANR projects (2022-2026), in collaboration with the theory groups of Patrizia Vignolo (Nice) and Anna Minguzzi (Grenoble), as well as the experimental group of Thorsten Schumm (TUW, Vienna).

**Position detail:** The contract duration is 18 months, starting early 2024, with a gross salary from 2930 € to 3370 € monthly depending on experience. Extensions can be envisioned through to applications to local, national and EU grants.

**Contact:** helene.perrin@univ-paris13.fr or aurelien.perrin@univ-paris13.fr
**To apply**: https://emploi.cnrs.fr/Offres/CDD/UMR7538-AURPER-002/Default.aspx?Lang=EN

# Project 2: Vortex turbulence on a curved surface

We operate an original BEC machine enabling the production of two-dimensional $^{87}$Rb superfluids trapped onto a curved shell-shaped surface using adiabatic potentials, resulting in a very smooth and highly tunable environment [1]. This enables the study of fast rotating superfluids in a new supersonic regime [2]. Recently we implemented a protocol to compensate the gravitational potential allowing the superfluid to expand onto the curved surface [3]. We are now in a position to combine these two know-how to study for the first time the physics of a superfluid rotating on a curved surface and address the analogy with atmospheric fluid dynamics.



Vortex lattice produced in the Rb BEC machine at LPL

**References**


[1] Merloti et al., New Journal of Physics **15**, 033007 (2013)
[2] Guo et al., Phys. Rev. Lett. **124**, 025301 (2020)
[3] Guo et al., New Journal of Physics **24**, 093040 (2022)


We advertize a two-year post-doctoral position starting in 2024 to investigate this new topic and drive the following experimental developments and research:

- new imaging systems to improve our current optical resolution. The post-doc will supervise the installation of a new laser system to image the superfluid on the blue (421 nm) 87Rb line and demonstrate in situ vortex imaging, a key asset for the study of vortex turbulence.
- strongly out-of-equilibrium dynamics of a two-dimensional superfluid on a curved surface: the post-doc will contribute to the study of the emergence of turbulent behavior in a rotating frame.

**Environment:** The postdoc will join the Rubidium team, currently comprising two associate professors and two PhD students (1st year and 3rd year). The experiment is funded by an ongoing ANR project (2023-2026), in close collaboration with the theory group of Sergey Nazarenko (Nice).

**Position detail:** The contract duration is 24 months, starting early 2024, with a gross salary from 2930 € to 3370 € monthly depending on experience. Extensions can be envisioned through to applications to local, national and EU grants.


**Contact:** helene.perrin@univ-paris13.fr or romain.dubessy@univ-paris13.fr

**To apply**: https://emploi.cnrs.fr/Offres/CDD/UMR7538-ROMDUB-001/Default.aspx?Lang=EN