

Postdoc position in experimental quantum simulation with ultracold gases

Location: Laboratoire Charles Fabry, Institut d'Optique Graduate School, Palaiseau (France)

Starting Date: as soon as possible

Duration: 24 months

Description: The “Quantum Gases” group in Laboratoire Charles Fabry (LCF) is hiring a highly-motivated post-doctoral researcher to join the “[Helium Lattice](#)” team.

The primary research axis of the team is the study of (strongly) correlated lattice gases using ultracold metastable helium atoms. The experimental apparatus enables single-atom detection in momentum space [1], allowing the measurement of full counting statistics [2] and multi-point correlations [3,4]. The recent activity of the team involved detail studies of universal and non-Gaussian order-parameter fluctuations emerging near the superfluid-to-Mott transition in the Bose-Hubbard model [5].

The candidate will join the team effort to upgrade the experimental platform for the study of two-dimensional homogeneous gases. The upgraded apparatus is designed for the exploration of 2D critical phenomena, both for bulk and lattice gases, taking advantage of the specific single-atom detection technique of metastable helium [5]. The candidate will first supervise the completion of the experimental upgrade, including the new laser trapping system as well as the high-resolution optical addressing system. She/he will then supervise the data taking and analysis of critical phenomena and phase transitions in 2D homogeneous settings.

The candidate will be working on a daily basis in close collaboration with the team (typically 3 PhD students and 2 PIs). We are looking for candidates with a strong background in experimental AMO physics. A PhD degree in the field of experimental ultracold atoms and/or quantum simulation is required. Previous experience on degenerate lattice gases is valued. Teamwork and communication skills are appreciated.

We offer a two-year ANR-funded contract, in a dynamical team with excellent working conditions and established theory collaborations. The team is part of the larger “Quantum Gases” group at Institut d'Optique.

How to apply: The candidate should contact Thomas Chalopin (thomas.chalopin@institutoptique.fr) or David Clément (david.clement@institutoptique.fr). The application should contain a CV with a detailed description of past research experience, academic record and publication list, as well as a concise research statement.

Group webpage: <https://www.lcf.institutoptique.fr/en/groups/quantum-gases/experiments/lattice-gases>

References

- [1] H. Cayla et al., “Single-atom-resolved probing of lattice gases in momentum space,” *Phys. Rev. A* **97**, 061609 (2018)
- [2] G. Hercé et al., “Full counting statistics of interacting lattice gases after an expansion: The role of condensate depletion in many-body coherence,” *Phys. Rev. Res.* **5**, L012037 (2023).
- [3] A. Tenart et al., “Observation of pairs of atoms at opposite momenta in an equilibrium interacting Bose gas,” *Nat. Phys.* **17**, 1364 (2021)
- [4] J.-P. Bureik et al., “Suppression of Bogoliubov momentum pairing and emergence of non-Gaussian correlations in ultracold interacting Bose gases,” *Nat. Phys.* **21**, 57 (2025)
- [5] M. Allemand et al., *Observation of Universal Non-Gaussian Statistics of the Order Parameter across a Continuous Phase Transition*, arXiv:2508.21623