# Guillaume Thémèze | PhD in Quantum Physics

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## Education

**2022–2025** **PhD in Quantum Physics** – Doctoral Researcher
*Institut d'Optique Graduate School (IOGS) / Charles Fabry Laboratory (LCF)*
Thesis on the out-of-equilibrium dynamics of one-dimensional bosonic gases.

**2021–2022** **Master 2 Quantum, Light, Matter, Nanoscience (QLMN)** – Research-Oriented MSc
*(IOGS) / Université Paris-Saclay*
Specialization in quantum physics, optics, nanoscience, and condensed matter.

**2020–2021** **Master 2 Métiers de l'enseignement, de l'éducation et de la formation (MEEF) Physics-Chemistry** – Teacher Training and Agrégation Preparation
*École Normale Supérieure (ENS) Ulm & Université Paris-Saclay*
Specialized program in pedagogy and preparation for the French national competitive exam (agrégation de physique-chimie). This year also validated the Magistère's MSc requirement (M2 in Fundamental Physics).

**2018–2021** **Magistère in Fundamental Physics (L3–M2)** – Selective Excellence Program
*Université Paris-Sud*
Intensive training in theoretical and experimental physics, research internships, and complementary courses (languages, computing, management).

**2015–2018** **Preparatory Classes (MPSI/MP)** – Intensive training in Math and Physics
*Lycée Leconte de Lisle (Réunion) & Lycée La Martinière (Lyon)*

## Research Experience

**2022–2025** **PhD Research** – Doctoral Researcher
*(IOGS)/ (LCF)*
Out-of-equilibrium quantum gases: combined theoretical, numerical and experimental work. Development of models, simulations, and local density measurements.See [1, 2, 3] for details.

**2022** **Master 2 Internship** – Research Intern
*(IOGS)/ (LCF)*
Dynamics of a one-dimensional bosonic gas. Theoretical modeling, simulations, and experimental measurements.

**2020** **Master 1 Internship** – Research Intern
*Université Paris-Saclay*
Bibliographic and numerical project: maximal expansion of Schwarzschild and Kerr black holes. Theoretical and numerical analysis during COVID lockdown.

**2019** **Bachelor Internship** – Research Intern
*l'École Polytechnique (l'X) / Plasma Physics Laboratory (LPP)*
Study of electric discharges in plasma. Theoretical and numerical modeling.

## Teaching Experience

**2023–2025** **Teaching Assistant** – TD/TP Instructor
*(IOGS) (SupOptique, Institut Polytechnique de Paris (IP Paris)) & Polytech Paris-Saclay*

- Tutorials in **Quantum Mechanics** and **Signal Processing** (BSc, L3 level) at SupOptique.
- Practical classes in **Laser Physics** (MSc, M1 & M2 levels) at Polytech Paris-Saclay.
- Over **150 hours** of teaching experience.

## Extra Training

- Software development best practices: project structuring, version control (Git), documentation, collaborative workflow (Django, Flutter, Web).
- Artificial Intelligence: Deep Learning, Machine Learning, algorithm optimization.
- Scientific communication and public speaking (thesis defense preparation).
- Time and priority management for research and projects.

## Skills

**Physics & Research:**

- **Mathematics:** Pure mathematics (analysis, algebra, geometry, mathematical elegance); applied mathematics for physics (modeling, optimization, statistics).
- **Theoretical Physics:** quantum mechanics and quantum gases; quantum field theory; statistical field theory; statistical physics; general relativity; personal interest in string theory, M-theory, supersymmetry, and quantum gravity.
- **Experimental Physics:** laser physics, optics, and measurements on 1D bosonic gases.
- **Teaching:** mathematics and physics tutorials, practicals, and lectures.

**Programming:** Python, Julia, C++, LaTeX/TikZ, High-Performance Computing (HPC), numerical simulations, optimization.

**AI & Data:** Machine Learning and Deep Learning, algorithm optimization, data analysis.

**Software Development:** Django (Python), Flutter (mobile apps), Web (HTML, CSS, JavaScript).

**Languages:** French (native), English (fluent, scientific writing).

**Personal interests:** Portrait drawing, Photography, Drone videography, Hiking, Paragliding, DIY computing (Raspberry Pi, NAS).

## Publications

## Journal Articles

[1] L. Dubois et al. "Probing the Local Rapidity Distribution of a One-Dimensional Bose Gas". In: *Physical Review Letters* 133.11 (Sept. 2024). ISSN: 1079-7114. DOI: 10.1103/physrevlett.133.113402. URL: http://dx.doi.org/10.1103/PhysRevLett.133.113402.

## Preprints

[2] Léa Dubois et al. *Experimental Investigation of a Bipartite Quench in a 1D Bose gas*. 2025. arXiv: 2505.05839 [cond-mat.quant-gas]. URL: https://arxiv.org/abs/2505.05839.

## Talks and Seminars

[3] Guillaume Thémèze. "Seminar: Study of the Out-of-Equilibrium Dynamics of One-Dimensional Bose Gases". In: Talk at Institut d'Optique Graduate School, Palaiseau, 11 April 2024, 13:15, Auditorium. Quantum Gases Group, Charles Fabry Laboratory. Apr. 2024.