



Victor Gondret

PhD student in Quantum Physics

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Summary

I am a third-year PhD student working in the Quantum Atom Optics group at the Laboratoire Charles Fabry. My research focuses on a Metastable Helium Bose-Einstein condensate machine under the supervision of Chris Westbrook and Denis Boiron. Currently, I am working on two projects. The first one is my PhD project, which aims to probe phonon entanglement and then characterize decoherence and thermalization. Quasi-particles are generated using a parametric amplification process, analogous to the dynamical Casimir effect. The second project I am involved in focuses on setting up an efficient atomic interferometer and characterizing a bright source of momentum-entangled atomic pairs. We aim to violate Bell inequalities with momentum-entangled massive particles, which relates back to the original EPR paradox.

Education

- Master** **École Normale Supérieure**, Quantum Physics Sept. 2016 to June 2021
- Master's degree awarded with distinction
 - **Coursework:** Advanced quantum mechanics, statistical mechanics, atoms and photons, ultra cold atoms, numerical physics, introduction to topological order, quantum optics in condensed matter, advanced biological physics.
- Diplôme de l'École Normale Supérieure** Sept. 2017 to June 2019
- Major in Physics. Minor courses in mathematics, economy, musicology, ecology, english, student representative.
- Bachelor** **École Normale Supérieure**, General Physics Sept. 2014 to June 2017
- Third year of bachelor at ENS,
 - First and second year in preparatory school, Lycée Michelet, Vanves

Work experience

- Quantum Gases group**, PhD Student Laboratoire Charles Fabry,
Institut d'Optique,
Université Paris-Saclay
Since October 2021
- Experimental progress on the experiment: implementation of a new sequencer, rebuilt optical setup for the laser cooling, major changes in the detection scheme
 - Implementation of optimized laser pulses for an atomic interferometer,
 - Entanglement criteria, Parametric amplification, Acoustic analog to the dynamical Casimir effect, analog cosmology.
 - Teacher in bachelor and first year of master. Practical works on detector and noise, Electromagnetism, Introduction to Fourier transform, Informatics for scientist (Matlab & Python)
- Middle-school teacher**, in Physics and Chemistry Collège Victor Hugo,
Paris
Sept. 2019 to Sept. 2020
12 months
- Teacher with student aged from 12 to 15 years old. Experienced remote teaching during the 2 months covid lockdown.

Bose-Einstein Condensate group, intern

- Theoretical work on one-dimensional quantum gases,
- Study of the Bragg diffraction with Laguerre-Gauss mode lasers.

Laboratoire de Physique
des Lasers
Université Paris-Nord
2019 - 3 months

Consorzio RFX, Padova, Intern

- Hamiltonian dynamics, transition to chaos, neo-adiabatic theory, Alfvén waves

Padova, Italy
Feb. 2018 to June 2018
5 months

Publications

Sub-shot-noise interferometry with two-mode quantum states

Feb. 2024

Q. Marolleau, C. Leprince, **V. Gondret**, D. Boiron and C. I. Westbrook
[Phys. Rev. A 109, 023701](#)

Relevant heating of the quiet solar corona by Alfvén waves: a result of adiabaticity breakdown

Oct 2019

D. F. Escande, **V. Gondret**, and F. Sattin
[Sci Rep 9, 14274](#)

Talks

Non-separability of phonon pairs in a time modulated Bose-Einstein Condensate, *Analogue Gravitation and Cosmology*, Paris

Nov. 2023

Non separability of phonon pairs in a time-modulated BEC linked to inflationary scenarii, *PhD students seminar* Palaiseau

Jan. 2023

Creation and non-separability of phonon pairs in a modulated BEC, *French Optical Society Conference*, Nice

July 2022

Organization of Scientific Meetings

- 2024 - Organizer of the conference *Quantum PhDay* at Saclay,
- 2023 - Co-organizer of the Scientific day of the Charles Fabry Laboratory,
- 2023 - Member of the organizing committee for the French Physicist Tournament.

Funding

PhD scholarship: 3-years PhD scholarship awarded by the Île-de-France region and the Center *Quantum Saclay*

Ministry scholarship: 4-years ministry scholarship to finish the bachelor and the master at ENS as a civil servant.

Informatics

Languages: Proficient in Python, Familiar with C++, Matlab, Mathematica.


Software: Git, \LaTeX , MyST, HTML and CSS,

Hobbies

 Cello (orchestra) & Euphonium (brass band)

 Hiking

 Sewing

 Football & rugby