FERRIER-BARBUT Igor
Chargé de recherche CNRS
Laboratoire Charles Fabry
Institut d'optique
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Birth: December 30th, 1987
Nationality: French, Canadian
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Google Scholar

RESEARCH INTERESTS:

Quantum physics, atomic, molecular and optical physics

Quantum many-body physics

Atom-light interactions and quantum optics

Long-range interacting systems

RESEARCH EXPERIENCE:

2018-present **Chargé de recherche CNRS**
Laboratoire Charles Fabry, Institut d'optique
Palaiseau, France
Quantum optics - atoms team

2014-2018 **Post-doctoral researcher, group leader, Marie Sklodowska-Curie fellow**
5. Physikaliches Institut, Stuttgart University, group of Pr. Dr. Tilman Pfau,
Stuttgart, Germany
Dipolar quantum gases team

2011-2014 **Graduate student researcher**
Laboratoire Kastler-Brossel, ENS Paris, France
Ultracold fermions team
Advisors: Christophe Salomon and Frédéric Chevy

TEACHING EXPERIENCE:

Advising

2018-present **Advising:** 3 graduate students, 1 postdoc, 2 Master students in collaboration with Antoine Browaeys

2014-2018 **Co-advising:** 6 graduate students, 4 master students and several bachelor students as group leader in Tilman Pfau's research group

Teaching

2018-present **Institut d'Optique (IOGS):**
Lectures: Ultracold gases and quantum simulators (part of 'M2 LOM')
Exercise sections: Mathematics and signal analysis

2014-2018 **Stuttgart University physics department:**
Weekly exercise sections: Atomic physics, linear optics and non-linear optics
Lectures: Atomic physics and quantum gases of bosons and fermions

2011-2014 **ENS Paris physics department:**

Experimental projects: atomic physics, quantum optics

Weekly exercise sections: Special relativity and E&M

Examiner for ENS entrance exam: experimental examination (design of the setups, student assessment)

EDUCATION:

2011-2014 **Graduate Studies** *Ecole Normale Supérieure, physics dept., Paris, France*
Title: Mixtures of Bose and Fermi superfluids
Obtained with "Félicitations du jury à l'unanimité"

2010-2011 **Second year of Masters of Science in Physics** at *Université Pierre et Marie Curie and Ecole Normale Supérieure, Paris, France*
Quantum Physics program

2009-2010 **First year of Masters of Science in Physics** at the *University of California at Berkeley, Berkeley, CA*
As part of the *Education Abroad Program*, exchange with *UGA*

2005-2009 **Bachelor of science in Physics / Licence de Physique**. *Université Grenoble Alpes (UGA), Grenoble, France*

AWARDS AND HONOURS:

Grand Prix Jacques Herbrand, French academy of sciences, 2022

ERC Starting Grant, European Commission, CORSAIR, 1.5M€, 2022 - 2026

Young researcher grant / Financement JCJC, french national research agency (ANR), DEAR, 450k€, 2021 - 2024

Marie Sklodowska-Curie individual fellowship, MSCA Actions, European Union, DipInQuantum, 2016 - 2018

Young Researcher Prize, "Prix Jeunes chercheurs" IFRAF/GDR atomes froids, french cold atoms research network, 2015

Doctoral School PhD grant, Government grant, delivered by the Île de France Physics doctoral school (EDPIF), 2011 - 2014

REFEREE SERVICE:

Referee for scientific articles: *Science, Nature, Nature Physics, Physical Review Letters, Physical Review X, Physical Review A, New Journal of Physics, Optics Express, Europhysics Letters, Applied Physics B, Physics Letters A.*

Referee for scientific proposals: *Various national science agencies.*

OUTREACH ACTIVITIES:

2019, 2022	Organization of the science fair "Fête de la Science" for the Institut d'Optique
2015-2016	Preparation of hands-on experiments for the outreach activities of the PI5 in Stuttgart through "Spiel der Kräfte"
2011-2014	Organization and supervision of scientific weeks for high-school students in the Paris area offered by the association "Science Ouverte"

SCIENTIFIC PUBLICATIONS:

ResearcherID: J-8759-2016
ORCID: 0000-0002-4707-0474
Google Scholar

Perspective pieces:

- **Ultradilute quantum droplets,** Physics Today feature article
I. Ferrier-Barbut
***Physics Today* 72**, 4, 46 (2019)
- **Quantum liquids get thin,** perspective article about: ***Science* 359,** 301 (2018)
I. Ferrier-Barbut and T. Pfau
***Science* 359**, 274 (2018)
- **Smashing magnets,** perspective article about: ***New J. Phys.* 18**, 113004 (2016)
I. Ferrier-Barbut
***New J. Phys.* 18,** 111004 (2016)

Peer-reviewed:

1. From superradiance to subradiance: exploring the many-body Dicke ladder
A. Glicenstein, G. Ferioli, A. Browaeys and I. Ferrier-Barbut.
***Optics Letters* 47**, 1542 (2022)
2. Laser driven superradiant ensembles of two-level atoms near Dicke's regime
G. Ferioli, A. Glicenstein, F. Robicheaux, R. T. Sutherland, A. Browaeys and I. Ferrier-Barbut.
***Phys. Rev. Lett* 127**, 243602 (2021)
3. Storage and release of subradiant excitations in dense atomic clouds
G. Ferioli, A. Glicenstein, L. Henriet, I. Ferrier-Barbut and A. Browaeys.
***Phys. Rev. X* 11**, 021031 (2021)
Subject of a **Physics Viewpoint** by A. Asenjo Garcia.
4. Preparation of one-dimensional chains and dense cold atomic clouds with a high numerical aperture four-lens system
A. Glicenstein, G. Ferioli, L. Brossard, Y. R. P. Sortais, D. Barredo, F. Nogrette, I. Ferrier-Barbut and A. Browaeys.
***Phys. Rev. A.* 103**, 043301 (2021)
5. Many-body signatures of collective decay in atomic chains
S. J. Masson, I. Ferrier-Barbut, L. Orozco, A. Browaeys and A. Asenjo-Garcia
***Phys. Rev. Lett.* 125**, 263601 (2020)
6. Collective shift in resonant light scattering by a one-dimensional atomic chain
A. Glicenstein, G. Ferioli, N. Sibalic, L. Brossard, I. Ferrier-Barbut and A. Browaeys.
***Phys. Rev. Lett.* 124**, 253602 (2020)
7. Dilute dipolar quantum droplets beyond the extended Gross-Pitaevskii equation
F. Böttcher, M. Wenzel, J.-N. Schmidt, M. Guo, T. Langen, I. Ferrier-Barbut, T. Pfau, R. Bombin,J. Sanchéz-Baena, J. Boronat and F. Mazzanti.
***Phys. Rev. Res.* 1**, 033088 (2019)
8. A fermionic impurity in a dipolar quantum droplet
M. Wenzel, T. Pfau and I. Ferrier-Barbut
***Physica Scripta* 113,** 104004 (2018)
9. Anisotropic superfluid behavior of a dipolar Bose-Einstein condensate
M. Wenzel, F. Böttcher, J. N. Schmidt, M. Eisenmann, T. Langen, T. Pfau and I. Ferrier-Barbut
***Phys. Rev. Lett.* 121**, 030401 (2018)

10. Scissors mode of a dipolar quantum droplet of dysprosium atoms
    I. Ferrier-Barbut, M. Wenzel, F. Böttcher, T. Langen, M. Isoard, S. Stringari and T. Pfau
    Phys. Rev. Lett. **120**, 160402 (2018)
11. Onset of a modulational instability in trapped dipolar Bose-Einstein condensates
    I. Ferrier-Barbut, M. Wenzel, M. Schmitt, F. Böttcher, T. Pfau
    Phys. Rev. A **97**, 011604(R) (2018)
12. Striped states in a many-body system of tilted dipoles
    M. Wenzel, F. Böttcher, T. Langen, I. Ferrier-Barbut and T. Pfau
    Phys. Rev. A **96**, 053630 (2017)
13. Self-bound droplets of a dilute magnetic quantum liquid
    M. Schmitt, M. Wenzel, F. Böttcher, I. Ferrier-Barbut and T. Pfau
    Nature **539**, 259 (2016)
    subject of a **News & Views** article by B. Laburthe-Tolra
14. Liquid quantum droplets of ultracold magnetic atoms
    I. Ferrier-Barbut, M. Schmitt, M. Wenzel, H. Kadau and T. Pfau,
    J. Phys. B. **49**, 214004 (2016)
15. Observation of quantum droplets in a strongly dipolar Bose gas
    I. Ferrier-Barbut, H. Kadau, M. Schmitt, M. Wenzel, and T. Pfau,
    Phys. Rev. Lett. **116**, 215301 (2016)
    Subject of a **Physics Viewpoint** by L. D. Carr & B. L. Lev
16. Observing the Rosensweig instability of a quantum ferrofluid
    H. Kadau, M. Schmitt, M. Wenzel, C. Wink, T. Maier, I. Ferrier-Barbut and T. Pfau
    Nature **530**, 194 (2016)
17. Universal loss dynamics in a unitary Bose gas
    U. Eismann, L. Khaykovich, S. Laurent, I. Ferrier-Barbut, B. S. Rem, A. T. Grier, M. Delehaye, F. Chevy, C. Salomon, L.-C. Ha and C. Chin
    Phys. Rev. X **6**, 021025 (2016)
18. Critical velocity and dissipation of an ultracold Bose-Fermi counterflow
    M. Delehaye, S. Laurent, I. Ferrier-Barbut, S. Jin, F. Chevy, and C. Salomon
    Phys. Rev. Lett. **115**, 265303 (2015)
19. Broad universal Feshbach resonances in the chaotic spectrum of dysprosium atoms
    T. Maier, I. Ferrier-Barbut, H. Kadau, M. Schmitt, M. Wenzel, C. Wink, T. Pfau, K. Jachymski, and P. S. Julienne
    Phys. Rev. A **92**, 060702 (2015)
20. Emergence of chaotic scattering in ultracold Er and Dy
    T. Maier, H. Kadau, M. Schmitt, M. Wenzel, I. Ferrier-Barbut, T. Pfau, A. Frisch, S. Baier, K. Aikawa, L. Chomaz, M. J. Mark, F. Ferlaino, C. Makrides, E. Tiesinga, A. Petrov, and S. Kotochigova
    Phys. Rev. X **5**, 041029 (2015)
21. The Landau critical velocity for a particle in a Fermi superfluid
    Y. Castin, I. Ferrier-Barbut, C. Salomon
    Comptes Rendus Physique **16**, 241 (2015) (link to french version)
22. A mixture of Bose and Fermi superfluids
    I. Ferrier-Barbut, M. Delehaye, S. Laurent, A. T. Grier, M. Pierce, B. S. Rem, F. Chevy, and C. Salomon
    Science **345**, 1035 (2014)
23. **Λ**-enhanced sub-Doppler cooling of lithium atoms in D1 gray molasses
    A. T. Grier, I. Ferrier-Barbut, B. S. Rem, M. Delehaye, L. Khaykovich, F. Chevy, and C. Salomon
    Phys. Rev. A **87**, 063411 (2013)

24. Lifetime of the Bose Gas with resonant interactions
B. S. Rem, A. Grier, I. Ferrier-Barbut, U. Eismann, T. Langen, N. Navon, L. Khaykovich, F. Werner, D. S. Petrov, F. Chevy, and C. Salomon
Phys. Rev. Lett. **110**, 163202 (2013)

INVITED LECTURES:

- Giryd Summer School (1x90 min lectures)
Weizmann Institute, Rehovot, Israel (2022)
- International school on quantum gases (3x60 min lectures)
Chlef, Algeria (2018)
- Granada quantum matter summer school (2x90 min lectures)
Granada, Spain (2017)

INVITED TALKS IN INTERNATIONAL CONFERENCES:

- Long-range interactions in the ultracold workshop 2022
Innsbruck, Austria (2022)
- Workshop on collective scattering of light COSCALI (2021)
Porquerolles, France (2021)
- Optique 2021 Coloque Horizons de l'Optique (2021)
Dijon, France (2021)
- WE-Heraeus Seminar Collective Effects and Non-Equilibrium Quantum Dynamics
Bad Honnef (online), Germany (2021)
- XXII conference on few-body problems in physics
Caen, France (2018)
- Workshop on long-range interactions in atomic systems
São Carlos, Brazil (2017)
- From few to many, exploring quantum systems one atom at a time
Obergurgl, Austria (2017)
- 47th colloquium on the physics of quantum electronics PQE2017
Snowbird, Utah (2017)
- Gauge field dynamics with ultracold gas systems 2016
Bad Honnef, Germany (2016)
- Long-range interactions in the ultracold workshop 2016
Ercolano, Italy (2016)
- Quantum gases and quantum coherence BEC 2016
Salerno, Italy (2016)
- Ultracold quantum gases, current trends and perspectives Quo Vadis BEC 2016
Bad Honnef, Germany (2016)
- Quantum Optics 2016
Obergurgl, Austria (2016)
- Workshop: Advanced atomic sources and extreme cooling of atoms and molecules 2016
Les Houches, France (2016)
- Synthetic Quantum Magnetism International Workshop 2015
Dresden, Germany (2015)
- 2015 International Symposium on Quantum Fluids and Solids QFS2015
Niagara Falls, NY (2015)

CONTRIBUTED TALKS:

- 7th colloquium of the CNRS research network "quantum engineering, foundations and applications" (2016)
  Paris, France
- Quantum technologies conference V
  Krakow, Poland (2014)
- Laser Physics international workshop LPHYS13
  Prague, Czech Republic (2013)

SEMINARS:

- Laboratoire de physique de l'École Normale Supérieure, France (2021)
- Laboratoire de physique des lasers Université Sorbonne Paris Nord, France (2021)
- Syddansk University, Odense, Denmark - online - (2020)
- Durham University, UK (2019)
- LPTMS, Orsay, France (2019)
- FEMTO-ST Time & Frequency Department, Besançon, France (2019)
- Syddansk University, Odense, Denmark (2018)
- Institute of Photonic Sciences, Barcelona, Spain (2017)
- Weizmann Institute of Science, Rehovot, Israel (2017)
- Institut d'Optique Graduate School, Palaiseau, France (2016)
- Leibnitz Universität Hannover, seminar series of the research training group 1991, Hannover, Germany (2016)
- Heidelberg University, Heidelberg, Germany (2016)
- Toronto University, Toronto, Canada (2015)
- Néel Institut, Grenoble, France (2014)
- Heidelberg University, Kirchhoff Institute, Heidelberg, Germany (2014)
- Cambridge University, Cavendish Laboratory, Cambridge, UK (2014)
- University of Stuttgart in the 5. Physikalisches Institut, Stuttgart, Germany (2014)

MISCELLANEOUS:

- 1st prize of Applied Physics B poster prizes at ICOLS 2017 conference Arcachon, France
- 2017 publication prize, Stuttgart Universität faculty of physics and mathematics