

**FERRIER-BARBUT Igor**  
**Chargé de recherche CNRS**  
Laboratoire Charles Fabry  
Institut d'optique  
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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:

Atomic molecular and optical physics:

### 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 Skłodowska-Curie fellow

5. Physikalisches 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:

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 Skłodowska-Curie individual fellowship, MSCA Actions, European Union, DiplnQuantum, 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 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)

**Preprints:**

- **From superradiance to subradiance: exploring the many-body Dicke ladder**,  
A. Glicenstein, G. Ferioli, A. Browaeys and [I. Ferrier-Barbut](#).  
*arXiv:2112.10635*

**Peer-reviewed:**

1. **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)  
Subject of a *Physics Viewpoint* by A. Asenjo Garcia.
2. **Storage and release of subradiant excitations in dense atomic clouds**  
G. Ferioli, A. Glicenstein, L. Henriot, [I. Ferrier-Barbut](#) and A. Browaeys.  
*Phys. Rev. X* **11**, 021031 (2021)  
Subject of a *Physics Viewpoint* by A. Asenjo Garcia.
3. **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)
4. **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)
5. **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)
6. **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. Sánchez-Baena, J. Boronat and F. Mazzanti.  
*Phys. Rev. Res.* **1**, 033088 (2019)
7. **A fermionic impurity in a dipolar quantum droplet**  
M. Wenzel, T. Pfau and [I. Ferrier-Barbut](#)  
*Physica Scripta* **113**, 104004 (2018)
8. **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)
9. 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)
  10. 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)
  11. 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)
  12. 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
  13. 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)
  14. 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
  15. 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)
  16. 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)
  17. 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)
  18. 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)
  19. 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)
  20. 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)
  21. 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)
  22.  $\Lambda$ -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)
  23. 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:

- 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:

- 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  
Oberurgl, 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  
Oberurgl, 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