Curriculum Vitae

Dr. Leticia Tarruell
ICFO - The Institute of Photonic Sciences
08860 Castelldefels (Barcelona), Spain

Phone: +34 935 54 22 54
e-mail: leticia.tarruell@icfo.es

born on April 12th 1981 in Madrid, Spain
Spanish and French citizen

Academic positions

since 06/2013 Junior Group leader (NEST fellow), Ultracold Quantum Gases
ICFO - The Institute of Photonic Sciences, Castelldefels (Barcelona), Spain

01/2012–05/2013 Junior CNRS researcher (Chargée de recherche de 2ème classe)
Group of Dr. Philippe Bouyer
Laboratoire Photonique, Numérique et Nanosciences,
Institut d’Optique d’Aquitaine, Bordeaux, France

07/2008–09/2012 Post-doctoral researcher
"Fermi-Hubbard physics, artificial graphene and quantum magnetism with ultracold fermions in optical lattices"
Group of Prof. Tilman Esslinger
ETH Zurich, Switzerland

Education

10/2004–06/2008 PhD thesis, Université Pierre et Marie Curie–Paris 6, France
"Superfluidity in an ultracold Fermi gas"
Group of Dr. Christophe Salomon
Laboratoire Kastler Brossel, Ecole Normale Supérieure, Paris, France

09/2003–06/2004 Master in Quantum Physics, Ecole Normale Supérieure, Paris, France
Master thesis: "Interactions in an ultracold Fermi gas"
Group of Dr. Christophe Salomon
Laboratoire Kastler Brossel, Ecole Normale Supérieure, Paris, France

09/2002–07/2003 Erasmus student, Université Denis Diderot–Paris 7, France
Research internship: "Collective oscillations of a classical gas. Construction of a Zeeman slower"
Group of Dr. David Guéry-Odelin and Dr. Jean Dalibard
Laboratoire Kastler Brossel, Ecole Normale Supérieure, Paris, France

09/1999–07/2002 Undergraduate studies in physics, Universidad Complutense de Madrid, Spain

Awards and scholarships

2013 NEST Fellowship, CELLEX Foundation
2012 Poster prize of the International Conference on Atomic Physics – ICAP 2012
2004–2007 Allocation de Recherche of the French Ministry of Research for the PhD thesis
2003–2004 Scholarship of the French Ministry of Education for the Master studies
2002–2003 Erasmus scholarship for a one-year exchange at Université Paris 7, France
1999 Premio Extraordinario de Bachillerato
Invited talks at conferences

- CLEO Symposium on "Quantum Simulators"
  San José, USA (2013): Simulating graphene with ultracold fermions in a honeycomb optical lattice
- Symposium on "Topological Quantum Information"
  Benasque, Spain (2013): Engineering Dirac points with ultracold fermions in a tunable honeycomb optical lattice
- KITP program on "Quantum Dynamics in Far from Equilibrium Thermally Isolated Systems"
  Santa Barbara, USA (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Session plénière, Groupe de Recherche "Physique Mésoscopique"
  Aussois, France (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Workshop on "Quantum Simulations with Ultracold Atoms"
  ICTP, Trieste, Italy (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Workshop on "Theory of Quantum Gases and Quantum Coherence"
  ENS Lyon, France (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Winter conference on "New directions in Ultracold Atoms"
  Aspen, USA (2012): Creating, moving and merging Dirac points with a Fermi gas in a tunable honeycomb lattice
- Workshop on "Ultracold atoms/molecules"
  National Tsing-Hua University, Hsinchu, Taiwan (2011): Studying the metal-Mott insulator transition with ultracold fermions in an optical lattice
- Workshop on "Ultrafast Dynamics in Strongly Correlated Systems"
  ETH Zurich, Switzerland (2011): Non-equilibrium dynamics of ultracold fermions in optical lattices
- Workshop on "Ultracold Quantum Gases Beyond Equilibrium"
  Natal, Brazil (2010): Equilibrium and out of equilibrium physics with ultracold fermions in optical lattices
- Workshop on "Time-dependent dynamics and non-equilibrium quantum systems"
  Budapest, Hungary (2010): Equilibrium and out of equilibrium physics with ultracold fermions in optical lattices
- Workshop on "Quantum Simulation with Cold Atoms and Molecules"
  Aspen, USA (2009): Exploring the Fermi-Hubbard model with atoms in optical lattices
- International School on "Ultracold Fermi Gases"
  Varenna, Italy (2006): Expansion of $^6$Li in the BEC-BCS crossover

Contributed talks at conferences

- Journées de la Matière Condensée – Société française de physique
  Montpellier, France (2012): Engineering Dirac points with ultra-cold fermions in optical lattices
- Congrès général de la Société française de physique
  Bordeaux, France (2011): Probing nearest-neighbor correlations of ultra-cold fermions in an optical lattice
- Congrès général de la Société française de physique
  Grenoble, France (2007): Superfluidité dans un gaz de fermions ultra-fruits.
- Program and Conference on "Recent progress in the studies of quantum gases"
  Institut Henri Poincaré, Paris, France (2007): $p$-wave Feshbach resonances of ultra-cold $^6$Li
- Workshop on "Quantum engineering with photons, atoms and molecules"
  Les Houches, France (2005): $p$-wave Feshbach resonances of ultra-cold $^6$Li
Seminars

- Institute of Theoretical Physics, Georg-August University, Goettingen, Germany (2013): Engineering synthetic quantum materials with ultracold fermions in a tunable-geometry optical lattice
- Goethe University, Frankfurt, Germany (2013): Engineering artificial materials with ultracold fermions in a tunable-geometry optical lattice
- Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Laboratoire Photonique, Numérique et Nanosciences, Institut d’Optique, Bordeaux, France (2012): Engineering Dirac points with ultracold fermions in optical lattices
- ICTP, Trieste, Italy (2012): Engineering Dirac points with ultracold fermions in optical lattices
- Journée de l’Institut de Physique Fondamentale, Bordeaux, France (2011): Observation et manipulation de points de Dirac dans un gaz de fermions ultra-froids
- Atelier de Physique Théorique, Université de Genève, Switzerland (2011): Creating, moving and merging Dirac points with a Fermi gas in a tunable honeycomb lattice
- Ultracold Atoms Group, University of Nottingham, United Kingdom (2011): Probing nearest-neighbor correlations of ultra-cold fermions in an optical lattice
- Institute of Atomic and Subatomic Physics, Vienna University of Technology, Austria (2011): Simulating strongly correlated materials with ultracold fermions in optical lattices
- Institute of Photonic Sciences, Barcelona, Spain (2011): Simulating strongly correlated materials with ultracold fermions in optical lattices
- Centre de Physique Moléculaire, Optique et Hertzienne, Université Bordeaux 1, France (2010): Transition métal-isolant de Mott avec des fermions ultra-froids piégés dans un réseau optique
- University of Kaiserslautern, Germany (2010): Equilibrium and out of equilibrium physics with ultra-cold fermions in optical lattices
- University of Stuttgart, Germany (2009): Equilibrium and out of equilibrium physics with ultra-cold fermions in optical lattices
- Laboratoire Charles Fabry, Institut d’Optique, Palaiseau, France (2009): Fermions en interaction dans un réseau optique : isolant de Mott et physique hors équilibre
- Laboratoire Agrégats-Collisions-Réactivité, Université Paul Sabatier, Toulouse, France (2008): Systèmes fortement corrélés avec des fermions ultra-froids : de la superfluidité à l’isolant de Mott fermionique
- Ultracold Atoms and Quantum Gases Group, University of Innsbruck, Austria (2007): Superfluidity in an ultra-cold Fermi gas
- Ultracold Atoms Group, University of Mainz, Germany (2007): Superfluidity in an ultra-cold Fermi gas
- Quantum Optics Group, ETH Zurich, Switzerland (2007): Superfluidity in an ultra-cold Fermi gas
- Ultracold Atoms Group, Kirchhoff Institute for Physics, University of Heidelberg, Germany (2007): Experimental study of fermionic lithium in the BEC-BCS crossover

Poster presentations

- International Conference in Atomic physics ICAP 2012, Palaiseau, France (2012): Engineering Dirac points with ultracold fermions in an optical lattice– ICAP poster prize 2012
- Conference on "Bose Einstein Condensation 2011", Sant Feliu de Guixols, Spain (2011): Ultracold fermions in a tunable honeycomb optical lattice
- Conference on "Frontiers of Ultracold Atoms and Molecules", Santa Barbara, USA (2010): Quantitative study of the metal-Mott insulator transition with ultracold fermions in optical lattices
- Workshop on "Theory of Quantum Gases and Quantum Coherence", Grenoble, France (2008): A new experimental setup for the study of superfluidity in ultracold Fermi gases
- Conference on "Bose Einstein Condensation 2007", Sant Feliu de Guixols, Spain (2007):
Expansion of a lithium gas in the BEC-BCS crossover

- Summer School on "Coherence and interactions in atomic and condensed matter physics", Boulder, USA (2004): *Experimental study of strongly interacting lithium 6*

Teaching experience

- Development of demonstration and laboratory experiments: "single-photon interference", "entangled photons", "atom-photon interaction" (3rd-4th year)
  Prize of the ETH physics department for the advanced physics laboratory 2012
  ETH Zurich (2008-2012)

- Exercise classes and substitute lecturer, "Quantum gases 1&2" (5th year)
  ETH Zurich (2010-2011)

- Exercise classes, "Physics 1&2" for physicists and non physicists (1st year)
  Université Pierre et Marie Curie–Paris 6 (2004-2006) and ETH Zurich (2009-2010)

- Exercise classes and laboratory experiments, "Lasers" for chemists (3rd year)
  École Normale Supérieure Paris (2006-2008)

- Supervisor of five experimental internships (3rd-5th year)
  University of Zurich (2008), ETH Zurich (2009-2012) and Université Bordeaux 1 (2012).

- Co-supervisor of six PhD students
  ETH Zurich (2008-2012) and Université Bordeaux 1 (2012-2013)

Other scientific activities

- Referee for Physical Review Letters and Physical Review A

- Co-organizer with T. Esslinger, L. Pollet and M. Troyer of the CECAM workshop "Modeling materials with cold gases through simulations", November 9-11, 2011, Zurich

- Member of the ETH administrative team for the conference "Bose-Einstein Condensation 2011" organized by T. Esslinger and E. Altman, September 10-16, 2011, Sant Feliu de Guixols
Research articles

- D. Greif, T. Uehlinger, G. Jotzu, L. Tarruell and T. Esslinger
  *Short-range quantum magnetism of ultracold fermions in an optical lattice*
  *Science* **340**, 1307 (2013) [Selected for a Science "Perspective"]

- T. Uehlinger, D. Greif, G. Jotzu, L. Tarruell, T. Esslinger, L. Wang and M. Troyer
  *Double transfer through Dirac points in a tunable honeycomb optical lattice*
  *Eur. Phys. J. Special Topics* **217**, 121 (2013) [Selected as cover of the issue]

- L. Tarruell, D. Greif, T. Uehlinger, G. Jotzu and T. Esslinger
  *Creating, moving and merging Dirac points with a Fermi gas in a tunable honeycomb lattice*
  *Nature* **483**, 302 (2012) [Selected as cover of the issue, and for a Nature "News and Views"]

- D. Greif, L. Tarruell, T. Uehlinger, R. Jördens and T. Esslinger
  *Probing nearest-neighbor correlations of ultracold fermions in an optical lattice*
  *Phys. Rev. Lett.* **106**, 145302 (2011)

- R. Sensarma, D. Pekker, E. Altman, E. Demler, N. Strohmaier, D. Greif, R. Jördens, L. Tarruell, H. Moritz and T. Esslinger
  *Lifetime of double occupancies in the Fermi-Hubbard model*
  *Phys. Rev. B* **82**, 224302 (2010)

- R. Jördens, L. Tarruell, D. Greif, T. Uehlinger, N. Strohmaier, H. Moritz, T. Esslinger, L. De Leo, C. Kollath, A. Georges, V. Scarola, L. Pollet, E. Burovski, E. Kozik and M. Troyer
  *Quantitative Determination of Temperature in the Approach to Magnetic Order of Ultracold Fermions in an Optical Lattice*
  *Phys. Rev. Lett.* **104**, 180401 (2010)

- N. Strohmaier, D. Greif, R. Jördens, L. Tarruell, H. Moritz, T. Esslinger, R. Sensarma, D. Pekker, E. Altman and E. Demler
  *Observation of elastic doublon decay in the Fermi-Hubbard model*
  *Phys. Rev. Lett.* **104**, 080401 (2010)

- S. Nascimbène, N. Navon, K. Jiang, L. Tarruell, M. Teichmann, J. McKeever, F. Chevy and C. Salomon
  *Collective Oscillations of an Imbalanced Fermi Gas: Axial Compression Modes and Polaron Effective Mass*
  *Phys. Rev. Lett.* **103**, 170402 (2009)

- F. Werner, L. Tarruell and Y. Castin
  *Number of closed-channel molecules in the BEC-BCS crossover*
  *Eur. Phys. J. B* **68**, 401 (2009)

- F. Chevy, E. G. M. van Kempen, T. Bourdel, J. Zhang, L. Khaykovich, M. Teichmann, L. Tarruell, S. J. J. M. F. Kokkelmans and C. Salomon
  *Resonant scattering properties close to a p-wave Feshbach resonance*
  *Phys. Rev. A* **71**, 062710 (2005)
• J. Zhang, E. G. M. van Kempen, T. Bourdel, L. Khaykovich, J. Cubizolles, F. Chevy, M. Teichmann, L. Tarruell, S. J. J. M. F. Kokkelmans and C. Salomon

_Expanding the BEC:BCS crossover region in lithium 6 Li_

*Phys. Rev. A* **70**, 030702 (2004)

• T. Bourdel, L. Khaykovich, J. Cubizolles, J. Zhang, F. Chevy, M. Teichmann, L. Tarruell, S. J. J. M. F. Kokkelmans and C. Salomon

_Expansion of an ultra-cold lithium gas in the BEC-BCS crossover)_

*ATOMIC PHYSICS 19: XIX International Conference on Atomic Physics ICAP 2004. AIP Conference Proceedings, Volume 770, pp. 228-237 (2005)*

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_Conference proceedings_

• C. Guerlin, K. Baumann, F. Brennecke, D. Greif, R. Jördens, S. Leinss, N. Strohmaier, L. Tarruell, T. Uehlinger, H. Moritz and T. Esslinger

_Synthetic Quantum Many-Body Systems_

LASER SPECTROSCOPY: Proceedings of the XIX International Conference on Laser Spectroscopy ICOLS 2009. World Scientific, pp. 212-221 (2010)

• L. Tarruell, M. Teichmann, J. McKeever, T. Bourdel, J. Cubizolles, L. Khaykovich, J. Zhang, N. Navon, F. Chevy and C. Salomon

_Expansion of an ultra-cold lithium gas in the BEC-BCS crossover_

Proceedings of the International School on Physics Enrico Fermi 2006, Ultracold Fermi Gases (eds. Inguscio, M., Ketterle, W. and Salomon, C.), pp. 845-855. IOS Press, Amsterdam (2007)

• J. Zhang, E.G.M. Van Kempen, T. Bourdel, L. Khaykovich, J. Cubizolles, F. Chevy, M. Teichmann, L. Tarruell, S. J. J. M. F. Kokkelmans and C. Salomon

_Expansion of a lithium gas in the BEC-BCS crossover_

*ATOMIC PHYSICS 19: XIX International Conference on Atomic Physics ICAP 2004. AIP Conference Proceedings, Volume 770, pp. 228-237 (2005)*