
Patrizia Vignolo

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CURRICULUM VITÆ

Personal details

- **First name:** Patrizia
 - **Last name:** Vignolo
 - **Citizenship:** Italian
 - **Date of Birth:** June 1st, 1970
 - **Place of Birth:** Lavagna (Genova, Italy)
 - **Marital status:** Married (three children)
 - **Degree:** PhD in Physics
 - **Present Academic Position:** *Professeur des Universités* at the University of Nice - Sophia Antipolis (France)
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Previous appointments

- 2006 -2007: **Teacher** in Mathematics at the I.T.I. of Pontedera, Italy.
- 2002 -2006: **Research contract** at the Scuola Normale Superiore of Pisa, Italy, in Prof. M. Tosi's group.
- 2001 -2002: **Research fellowship** at the Scuola Normale Superiore of Pisa, Italy, in Prof. M. Tosi's group, with a grant offered by the *Istituto Nazionale di Fisica della Materia*.
- 2000 : **Post-doc** at the Scuola Normale Superiore of Pisa, Italy, in Prof. M. Tosi's group.
- 1999 -2000: **Research contract** at the University of Pisa, Italy, in Prof. G. Grosso's group, with a grant offered by the *Istituto Nazionale di Fisica della Materia*.
- 1995 : 6 month **Research fellowship** at the University of Paris XI, France, in Prof. A. Aspect's group, with a grant offered by the "Human Capital and Mobility" project.

Education

2006 **Qualification** for the position of *Professeur*, conferred by the Comité National Universitaire Français.

February 1999 **PhD in Physics**, University of Pisa, Italy. Project Supervisor: Prof. Giuseppe Grosso. Thesis Title: *Electronic and Transport properties in interacting polymeric chains*.

1995-1998 **Doctoral studies** at the University of Pisa (admission after exam).

July 1994 **Master Degree (Laurea in Physics)**, University of Pisa, Italy. Thesis Advisor: Prof. Alain Aspect. Thesis Co-Advisor: Prof. Ennio Arimondo. Thesis Title: *Non-destructive detection of atoms bouncing on an evanescent wave*. Final result: 110/110 cum Laude.

1989-1994 **Undergraduate studies** at the Physics Department of the University of Pisa (Italy) and of Paris XI (France).

1989 **Baccalaureate** at Liceo Scientifico G. Marconi of Chiavari, Italy. Final result: 60/60.

Distinctions

- **Baccalaureate** with 60/60.
 - **Laurea** in Physics with 110/110 *cum Laude*
 - Human Capital and Mobility grant in the group of Alain Aspect (09/94–03/95)
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Other scientific activities

- **Organizer** of the Third Edition of the Young Atom Optics Physicists Meeting held in the Parco dell'Orecchiella (Lucca, Italie), 14-19 April 1997;
- **Organizer** of the Third International *Theory of Quantum Gases and Quantum Coherence* Workshop held in Cortona (Tuscany, Italy), 29 October - 2 November 2005. The workshop was founded by the European Science Foundation.
- **Organizer** of the Fourth International *Theory of Quantum Gases and Quantum Coherence* Workshop held in Grenoble (France), 3 -7 June 2008. The workshop was founded by the European Science Foundation.
- **Referee** for Physical Review Letters, Physical Review A and B, Journal of Physics A and B, Physics Letter A and Optics Communications.

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- **Guest Editor** of the special issue of the Journal of Physics B (May 2006) devoted to the Third International *Theory of Quantum Gases and Quantum Coherence Workshop*.
 - **Guest Editor** of the special issue of the European Journal of Physics (scheduled for December 2008) devoted to the Fourth International *Theory of Quantum Gases and Quantum Coherence Workshop*.
 - **Lecturer** at the first edition of *Les Houches School in Singapore: Ultracold Gases and Quantum Information*, Singapore, 29 June - 24 July 2009.

Visits to other institutions

- December 1996: Visit to the Clarendon Laboratory of the University of Oxford (UK).
 - December 2005 and March 2006: Visit to the Universitat Autònoma de Barcelona (Spain).
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Languages spoken

- **English**: fluent.
 - **French**: fluent.
 - **Italian**: mother tongue.
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Computer knowledge

- **Computer languages**: Fortran 77, C
- **Software packages**: Mathematica, Matlab
- **Text editors**: Emacs, vi
- **Text formatting language**: LaTeX

Talks at National and International Conferences

- *International Congress of Physics of Liquids*, 22-25 September 2005, Istanbul (Turkey). Title of the seminar: *Demixing and collapse of a boson-fermion mixture at low dimensions*.
- *Meeting of the Turkish Physical Society*, 13-16 September 2005, Mugla (Turkey). Title of the seminar: *Demixing and collapse of a boson-fermion mixture at low dimensions*.
- *International Workshop on Laser Physics*, Trieste, 12-17 July 2004. Title of the seminar: *Condensate localization in a quasi-periodic structure*.
- *International Workshop on Laser Physics*, Bratislava, 1-5 July 2002. Title of the seminar: *Demixing of boson-fermion clouds under harmonic confinement*.
- *International Conference Theory of Quantum gases and Quantum Coherence*, Salerno, 3-5 June 2001. Title of the seminar: *One dimensional non-interacting fermions in harmonic confinement: equilibrium and dynamical properties*.
- *XX Convegno di Fisica Teorica e Struttura della Materia*, Fai della Paganella (Trento, Italy), 25-28 March 2001. Title of the seminar: *Exact equilibrium properties of a one-dimensional non-interacting Fermi gas*.
- *LXXXV Congresso Nazionale Società Italiana di Fisica*, Pavia, 20-24 September 1999. Title of the seminar: *Electronic states and transport in conjugated polymers*.
- *Conference Murmures Quantiques de la Fondation Luis de Broglie*, Peyresq, 2-5 July 1997. Title of the seminar: *Méthodes récursives dans la physique du solide*.
- *II Young Atom Opticists Meeting*, Oxford, 10-14 April 1996. Title of the seminar: *Nondestructive detection of atoms bouncing on an evanescent wave*.

Participation in other conferences or schools

- *Theory of Quantum Gases and Quantum Coherence*, 3-7 June 2008, Grenoble (France).
- *Quantum degenerate gases*, 15-20 September, San Feliu de Guixols (Spain).
- *Recent progress in the studies of quantum gases: theory and experiments*, 27-29 June 2007, Paris (France).
- *Workshop on Disorder in Cold Atoms*, 24-26 January 2007, Barcelona (Spain).
- *Theory of Quantum Gases and Quantum Coherence*, 29 October-2 November 2005, Cortona (Italy).
- *International Conference on Recent Challenges in Novel Quantum Systems*, 6-8 July 2005, Camerino (Italy).

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- *NATO-ASI on Quantum Communication and Information Technologies*, Bilkent (Ankara, Turkey), 2-9 June 2002.
 - *Quantum Monte Carlo Tutorial* organized by the *CECAM* of Lyon, 22-26 October 2001.
 - *Euroconference Atom Optics and Interferometry*, Cargèse, Corse (France), 26-29 July 2000.
 - *Workshop on calculation of material properties using total energy and force methods and ab initio molecular dynamics* près de *the Abdus Salam I.C.T.P.*, Grignano (Trieste), 9-18 August 1999.
 - *General Conference of the Condensed Matter division - European Physical Society et journées de la matière condensée Société Française de Physique*, Grenoble, 25-29 August 1998.
 - *2nd National Conference Materiali avanzati per fotonica ed elettronica*, Alghero (Italy), 22-24 September 1997.
 - *III Young Atom Optics Physicists Meeting*, Parco dell'Orecchiella (Lucca, Italy), 14-19 April 1997.
 - *Atom Optic Congress*, Marciano Marina (Italy), 5-9 June 1996.

Publication List

International Journal Publications

1. *Optical reversibility theorems for polarization: application to remote control of polarization*, N. Vansteenkiste, P. Vignolo, A. Aspect, J. Opt. Soc. Am. A **10**, 2240 (1993).
2. *Non-destructive detection of atoms bouncing on an evanescent wave*, A. Aspect, R. Kaiser, N. Vansteenkiste, P. Vignolo and C. I. Westbrook, Phys. Rev. A **52**, 4704 (1995).
3. *Density of states of multichannel systems*, P. Vignolo, R. Farchioni and G. Grosso, Phys. Rev. B **59**, 16065 (1999).
4. *Transport properties of emeraldine salts: the nature of the metallic state*, R. Farchioni, P. Vignolo and G. Grosso, Phys. Rev. B **60**, 15705 (1999).
5. *Momentum distribution of an interacting Bose-Einstein condensed gas at finite temperature*, A. Minguzzi, P. Vignolo and M.P. Tosi, Phys. Rev. A **62**, 023604 (2000).
6. *Exact particle and kinetic energy densities for one-dimensional confined gases of non-interacting fermions*, P. Vignolo, A. Minguzzi and M.P. Tosi, Phys. Rev. Lett. **85**, 2850 (2000).
7. *Density of states for energy-dependent effective Hamiltonians*, R. Farchioni, G. Grosso and P. Vignolo, Phys. Rev. B **62**, 12565 (2000).
8. *Tight-binding effective Hamiltonians for the electronic states of polyaniline chains*, P. Vignolo, R. Farchioni and G. Grosso, Phys. Stat. Sol. (b) **223**, 853 (2001).
9. *Momentum flux density, kinetic energy density and their fluctuations for one-dimensional confined gases of non-interacting fermions*, A. Minguzzi, P. Vignolo and M.P. Tosi, Phys. Rev. A **63**, 063604 (2001).
10. *Light scattering from a degenerate quasi-one-dimensional confined gas of non-interacting fermions*, P. Vignolo, A. Minguzzi and M.P. Tosi, Phys. Rev. A **64**, 023421 (2001).
11. *Hydrodynamic excitations in a spin-polarized Fermi gas under harmonic confinement in one dimension*, A. Minguzzi, P. Vignolo, M.L. Chiofalo, and M.P. Tosi, Phys. Rev. A **64**, 033605 (2001).
12. *One-dimensional non-interacting fermions in harmonic confinement: equilibrium and dynamical properties*, P. Vignolo and A. Minguzzi, J. Phys. B: At. Mol. Opt. Phys. **34**, 4653 (2001).
13. *Momentum distribution of Bose-condensed atomic hydrogen*, P. Vignolo, A. Minguzzi and M. P. Tosi, Phys. Lett. A **289**, 333 (2001).
14. *Collective excitations of a one-dimensional Fermi gas under harmonic confinement*, A. Minguzzi, P. Vignolo, M.L. Chiofalo, and M.P. Tosi, J. Low T. Phys. **126**, 443 (2002).

15. *Phase separation in a boson-fermion mixture of Lithium atoms*, Z. Akdeniz, P. Vignolo, A. Minguzzi and M. P. Tosi, J. Phys. B **35**, L105 (2002).
16. *High-momentum tail in the Tonks gas under harmonic confinement* A. Minguzzi, P. Vignolo, and M.P. Tosi, Phys. Lett. A **294**, 222 (2002).
17. *Degenerate gases under harmonic confinement in one dimension: rigorous results in the impenetrable-bosons/spin polarized-fermions limit*, P. Vignolo, A. Minguzzi, and M.P. Tosi, Int. J. Mod. Phys. B **16**, 2161 (2002).
18. *Explicit finite-difference and direct-simulation-MonteCarlo method for the dynamics of mixed Bose-condensate and cold-atom clouds*, P. Vignolo, M. L. Chiofalo, S. Succi and M.P. Tosi, J. Comp. Phys. **182**, 368 (2002).
19. *Demixing in mesoscopic boson-fermion clouds inside cylindrical harmonic traps: quantum phase diagram and role of temperature*, Z. Akdeniz, A. Minguzzi, P. Vignolo, and M.P. Tosi, Phys. Rev. A **66**, 013620 (2002).
20. *Density profile of a Bose-Einstein condensate inside a pancake-shaped trap: observational consequences of the dimensional cross-over in the scattering properties*, B. Tanatar, A. Minguzzi, P. Vignolo, M.P. Tosi, Phys. Lett. A **302**, 131 (2002).
21. *Temperature dependence of density profiles for a cloud of noninteracting fermions moving inside a harmonic trap in one dimension*, Z. Akdeniz, P. Vignolo, A. Minguzzi, and M.P. Tosi, Phys. Rev. A **66**, 055601 (2002).
22. *Dynamics of trapped two-component Fermi gas: Temperature dependence of the transition from collisionless to collisional regime*, F. Toschi, P. Vignolo, S. Succi, and M.P. Tosi, Phys. Rev. A **67**, 041605(R) (2003).
23. *Shell structure in the density profiles for non-interacting fermions in anisotropic harmonic confinement*, Patrizia Vignolo and Anna Minguzzi, Phys. Rev. A **67**, 053601 (2003).
24. *Collective dynamics of fermion clouds in cigar-shaped traps*, Z. Akdeniz, P. Vignolo, and M.P. Tosi, Phys. Lett. A **311**, 246 (2003).
25. *Free expansion of two-dimensional condensates with a vortex*, O. Hosten, P. Vignolo, A. Minguzzi, B. Tanatar and M.P. Tosi, J. Phys. B **36**, 2455 (2003).
26. *Transmittivity of a Bose-Einstein condensate on a lattice: interference from period doubling and the effect of disorder*, P. Vignolo, Z. Akdeniz, and M.P. Tosi, J. Phys. B **36**, 4535 (2003).
27. *Density profile of a strictly two-dimensional Bose gas at finite temperature*, K.K. Rajagopal, P. Vignolo and M.P. Tosi, Physica B **344** 157 (2004).
28. *Transition to hydrodynamics in colliding fermion clouds*, F. Toschi, P. Capuzzi, S. Succi, P. Vignolo, and M.P. Tosi J. Phys. B **37**, S91 (2004).

29. *Numerical methods for atomic quantum gases with applications to Bose-Einstein condensates and to ultracold fermions*, A. Minguzzi, S. Succi, F. Toschi, M.P. Tosi and P. Vignolo, Phys. Rep. **395**, 223 (2004).
30. *Temperature dependence of the energy of a vortex in a two-dimensional Bose gas*, K.K. Rajagopal, B. Tanatar, P. Vignolo, M.P. Tosi, Phys. Lett. A **328**, 500 (2004).
31. *Boson-fermion demixing in a cloud of lithium atoms in a pancake trap*, Z. Akdeniz, P. Vignolo and M.P. Tosi, Phys. Lett. A **331**, 258 (2004).
32. *Feshbach resonances in a strictly two-dimensional atomic Bose gas*, K.K. Rajagopal, P. Vignolo and M.P. Tosi, Physica B **353**, 59 (2004).
33. *Matter-wave interferometry in periodic and quasi-periodic arrays*, Y. Eksioglu, P. Vignolo and M.P. Tosi, Opt. Comm. **243**, 175 (2004).
34. *Effects of collisions against thermal impurities in the dynamics of a trapped fermion gas*, P. Capuzzi, P. Vignolo, F. Toschi, S. Succi and M.P. Tosi, Phys. Rev. A **70**, 043623 (2004).
35. *Effects of trap anisotropy on impurity scattering regime in a Fermi gas*, P. Capuzzi, P. Vignolo, and M.P. Tosi, Phys. Rev. A **72**, 013618 (2005).
36. *Shell structure in the density profile of a rotating gas of spin-polarized fermions*, P. Vignolo, Z. Akdeniz, and M.P. Tosi, Physica B **365** 208 (2005).
37. *Coherent transport in linear arrays of quantum dots: the effects of period doubling and of quasi-periodicity*, M.R. Bakhtiari, P. Vignolo, M.P. Tosi, Physica E, **28**, 385 (2005).
38. *Boson-fermion mixtures inside an elongated cigar-shaped trap*, Z. Akdeniz, P. Vignolo, and M.P. Tosi, J. Phys. B: At. Mol. Opt. Phys. **38**, 2933 (2005).
39. *Bose-Einstein condensates and the numerical solution of the Gross-Pitaevskii equation*, S. Succi, F. Toschi, M.P. Tosi and P. Vignolo, Computing in Science and Engineering **7**, 48 (2005).
40. *Sound propagation in elongated superfluid fermion clouds*, P. Capuzzi, P. Vignolo, F. Federici, M.P. Tosi, Phys. Rev. A. **73**, 021603 (2006).
41. *Sound wave propagation in strongly elongated fermion clouds at finite collisionality*, P. Capuzzi, P. Vignolo, F. Federici, M.P. Tosi, J. Phys. B **39**, S25 (2006).
42. *Theory of coherent transport by an ultra-cold atomic Fermi gas through linear arrays of potential wells*, M.R. Bakhtiari, P. Vignolo, M.P. Tosi, Physica E **33**, 223 (2006).
43. *Comment on "Sound velocity and multibranch Bogoliubov spectrum of an elongated Fermi superfluid in the BEC-BCS crossover"*, P. Capuzzi, P. Vignolo, F. Federici, M. P. Tosi, Phys. Rev. A. **74**, 057601 (2006).

44. *Quantum vortices in optical lattices*, P. Vignolo, R. Fazio, M.P. Tosi **76**, Phys. Rev. A 023616 (2007).
45. *Faraday waves in elongated superfluid fermionic clouds*, P. Capuzzi and P. Vignolo, Phys. Rev. A **78**, 043613 (2008).
46. *Fermionization of a strongly interacting Bose-Fermi mixture in a one-dimensional harmonic trap*, B. Fang, P. Vignolo, C. Miniatura, and A. Minguzzi, Phys. Rev. A **79**, 023623 (2009).
47. *Photonic spectrum of bichromatic optical lattices*, S. Rist, P. Vignolo, G. Morigi, Phys. Rev. A **79** 053822 (2009).
48. *Dynamical instability of a boson-fermion mixture at low dimensions*, Z. Akdeniz and P. Vignolo, Phys. Lett. A **373**, 2471 (2009).
49. *Two-dimensional boson-fermion mixtures*, A.L. Subaşı, S. Sevinçli, P. Vignolo and B. Tanatar, Phys. Rev. A **79**, 063632 (2009).

Books or chapters of books

1. *Recursive algorithms for conjugated polymeric chains*, R. Farchioni, G. Grosso and P. Vignolo, in *Electronics of Molecular Materials - Polymers and Organic Solids*, R. Farchioni and G. Grosso Eds., Springer-Verlag (Berlin-Heidelberg, 2001).
2. *Solid state methods in the theory of condensed atomic gases*, M. L. Chiofalo, A. Minguzzi, M.P. Tosi, P. Vignolo, in *Electrons and Photons in Solid*, Edizioni della Normale, (Pisa, 2001).
3. *Introduction to Statistical Mechanics and the Physics of Fluids*, M.P. Tosi and P. Vignolo, Edizioni della Normale (Pisa, 2005).
4. *Solid state methods applied to a condensate travelling through one-dimensional arrays*, Z. Akdeniz and P. Vignolo in *Highlights in the quantum theory of condensed matter, A symposium to honour Mario Tosi on his 72nd birthday*, Edizioni della Normale, (Pisa, 2005).
5. *Trapped boson-fermion mixtures*, P. Vignolo and M. Tosi in *Focus on Boson Research*, A. V. Ling Ed., Nova Science Publishers (New York, 2005).
6. *Sound wave propagation in elongated fermion clouds*, P. Capuzzi, P. Vignolo, F. Federici and M.P. Tosi in *Science and Supercomputing at CINECA: 2005 Report*, M. Voli and P. Coluccia Eds., CINECA (Bologna, 2006).

Proceedings

- *Demixing of boson-fermion clouds under harmonic confinement*, Z. Akdeniz, A. Minguzzi, and P. Vignolo, Laser Phys. **13**, 577 (2003).

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- *Dynamics of trapped fermion clouds*, F. Toschi, P. Vignolo, P. Capuzzi, S. Succi and M.P. Tosi, *Laser Phys.* **14**, 302 (2004).
 - *A particle-dynamics study of dissipation in colliding clouds of ultracold fermions*, S. Succi, F. Toschi, P. Capuzzi, P. Vignolo and M.P. Tosi, *Phil. Trans. R. Soc. A* vol. 362, 1605 (2004).
 - *Condensate localization in a quasi-periodic structure*, Y. Eksioglu, P. Vignolo and M.P. Tosi, *Laser Phys.* **15**, 356 (2005).
 - *Anisotropy-driven transition from collisionless to collisional regime in the dipolar modes of a trapped gaseous mixture*, P. Capuzzi, P. Vignolo and M.P. Tosi, *Laser Phys.* **15**, 383 (2005).
 - *Boson-Fermion demixing and collapse in low dimensions*, Z. Akdeniz, P. Vignolo and M.P. Tosi, *Laser Phys.* **16**, 1005 (2006).