



CURRICULUM VITAE

Pietro A. Massignan

OFFICE

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NAME: **Pietro Alberto Massignan**
POSITION: *Ramón y Cajal Research Fellow* at UPC, and guest scientist at ICFO
BIRTH: born in Milano (Italia) on the 20th of December 1977
NATIONALITY: Italian

EDUCATION AND ACADEMIC DEGREES

- Bachelor and Master studies in *Theoretical Physics* at the *Università degli Studi* in Milano, 1996-2002.
- Master thesis developed at *LENS* in Florence, group of Prof. M. Inguscio, 2001-2002.
M.Sc. Thesis: “*One-dimensional model for the study of the expansion of elongated Bose Einstein condensates from optical lattices*”. Thesis defended on March 27th, 2002. Grade: 110/110 “cum laude”.
- Ph.D. studies in *Theoretical Quantum Physics* at the *Niels Bohr Institute* and *NORDITA* in Copenhagen, group of Profs. C. Pethick, H. Smith, and B. Mottelson, 2003-2006. Thesis defended on February 3rd, 2006.
Ph.D. Thesis: “*Positive ions, collective modes and Anderson localization in ultracold gases*”. Grade: “Excellent”.

SCIENTIFIC CAREER

- PostDoc researcher at the *Institute for Theoretical Physics* in Utrecht, group of Prof. H. Stoof, 2006-2008
- Joint PostDoc position at ICFO/UAB in Barcelona, groups of Profs. M. Lewenstein and A. Sanpera, 2008-2010
- Research Fellow at ICFO in Barcelona, group of Prof. M. Lewenstein, 2011-2014
- *Ramón y Cajal* Fellow at ICFO and UPC (personal grant from the Spanish Research Ministry, yielding funding for 5 years of independent research), Jan. 2015-onwards

AREAS OF RESEARCH AND INVESTIGATION

- ultracold quantum gases: quantum engineering (preparation, manipulation, and detection) of exotic states of matter, few- and many-body physics, pairing and superfluidity in unitary Fermi gases and quantum mixtures, synthetic gauge fields for ultracold neutral atoms, disordered interacting systems, open quantum systems
- dynamics of quantum and classical stochastic systems: quantum Brownian motion, and anomalous transport and (multi-scale) self-organization in biological complexes

ORGANIZATION OF INTERNATIONAL CONFERENCES

- April 2017: Workshop *From few to many: exploring quantum systems one atom at a time*, Obergurgl (Austria).

GUEST POSITIONS AND EXTENDED STAYS

- Visiting scientist at *Kavli Institute for Theoretical Physics* in Santa Barbara (USA); one month in 2010, and in 2016.
- Visiting scientist at *Centro de Ciencias* in Benasque (Spain); one week in 2016.
- Visiting scientist at *Institut d'Etudes Scientifiques* in Cargèse (France); one week in 2016.
- Visiting scientist at *Center for Theoretical Physics* in Aspen (USA); three weeks in 2015, and three in 2011.
- Visiting scientist at *Institute for Nuclear Theory* in Seattle (USA); two weeks in 2014.
- Visiting scientist at *Aarhus Institute of Advanced Studies*; one week in 2013, and one in 2014.
- Visiting scientist at *BEC Center* in Trento (Italy); one week in 2013.
- Visiting scientist at *Nordita* in Stockholm; two weeks in 2013.
- Visiting scientist at *Institut Henry Poincaré* and *ENS (LKB)* in Paris; one month in 2012, and one in 2007.
- Visiting scientist at *ITAMP - Harvard-Smithsonian Center for Astrophysics*, Cambridge (USA); two weeks in 2012.
- Visit at *TCM laboratory* in Cambridge (UK); one week in 2011, and one in 2012.
- Visit at *Institut d'Optique* in Palaiseau (Paris, France); one week in 2011.
- Visiting scientist at *BEC Center* in Trento (Italy), group of Profs. S. Stringari and L. Pitaevskii, 2008.
- Visiting Research Fellow at *NORDITA*, Copenhagen; two months in 2006.
- **Long term visiting PhD guest at École Normale Supérieure (LKB) in Paris; nine months in 2004-2005.**
- European grant for preDoctoral studies at *LENS*, Florence; six months in 2002.

SCIENTIFIC ADMINISTRATION TRAINING AND EXPERIENCE

- Training program on “*Patent Engineering and Management*” at ICFO (Barcelona), 2012.
- Training program “*From Science to Business*” at ESADE international business school (Barcelona), 2012.
- Responsible of the ICFO collaboration in the ESF *EuroQuam* network (completed), and in a EC FP7 Training Network proposal (currently under evaluation).

PEER-REVIEWING EXPERIENCE

- Referee of: PRX, PRL, EPL, Nature Comm., NJP, PRA, J. Stat. Mech., Ann. Phys., J. Phys. A and B, EPJB, Few-Body Syst., Fortschritte der Physik, Photonics. [IOP Outstanding Reviewer 2016]
- Referee of the European Commission (FP7 and CoFund calls).

OUTREACH ACTIVITIES

- Author of a general public review titled “*Quantum Technologies and Society*”, published by ICFO in the framework of the ICFO/CatalunyaCaixa “Ignacio Cirac Program Chair” in 2010.
- Guide to the exhibition “*Som’Hi*” organized at *Universitat Autònoma de Barcelona* by Prof. A. Sanpera in 2010, in collaboration with Prof. Tilman Pfau, Univ. of Stuttgart; in a single month, it attracted 5000 students, aged 5-18.
- Museum guide for the exhibition “*The electrical revolution*” at *la Triennale* in Milano; three months in 1999.

TALKS AT INTERNATIONAL CONFERENCES

- 2017 Workshop on *Synthetic dimensions in quantum engineered systems*, ETH, Zurich (Switzerland). [invited]
- 2017 Conference on *Quantum Simulation*, Ecole Normale Supérieure, Paris (France).
- 2017 Workshop on *Correlations and Entanglement in and out of Equilibrium*, Aspen (CO-USA).
- 2016 KITP program *Universality in Few-Body Systems*, Santa Barbara (CA-USA).
- 2016 Workshop on *Disorder in Condensed Matter and Ultracold Atoms*, Cargèse (France). [invited]
- 2015 Autumn Meeting on *Imbalanced Fermi-Fermi mixtures*, Maria Waldrast (Austria).
- 2015 Workshop on *Ultra-Cold Quantum Matter with Atoms and Molecules*, Aspen (CO-USA).
- 2015 Conference *UPoN: Unsolved Problems on Noise*, Barcelona (ES). [invited]
- 2015 POLATOM ESF Conference *Cold atoms, excitons and polaritons*, Bad Honnef (DE).
- 2014 Workshop *New Trends in Topological Insulators*, Berlin-Brandenburg Academy of Sciences, Berlin (Germany).
- 2014 AIAS workshop *Cold atoms and beyond*, Aarhus Institute for Advanced Studies, Aarhus (Denmark). [invited]
- 2014 INT program *Universality in few-body systems*, Seattle (USA).
- 2013 Guest Lecture at AIAS (the Aarhus Institute of Advanced Studies, Denmark).
- 2013 Summer Programme on *Synthetic Gauge Fields for Photons and Atoms*, BEC Center in Trento (Italy).
- 2013 OIST workshop *Coherent Control of Complex Quantum Systems*, Okinawa (Japan).
- 2013 NORDITA workshop *Pushing the Boundaries with Cold Atoms*, Stockholm (Sweden).
- 2012 joint ICFO-Hamburg Meeting, Center for Optical Quantum Technologies, Hamburg (Germany).
- 2012 POLATOM ESF workshop *Cold atoms, excitons and polaritons*, Cambridge (UK).
- 2012 Workshop on *Advances in Quantum Technologies*, International Institute of Physics, Natal (Brasil).
- 2012 Workshop on *Research Frontiers in Ultra-Cold Atoms and Molecules*, ITAMP, Harvard (MA-USA). [invited]
- 2012 joint LENS-ICFO Meeting, Institute of Photonic Sciences, Castelldefels (Spain).
- 2012 Winter Meeting on *Imbalanced Fermi-Fermi mixtures*, Maria Waldrast (Austria).
- 2011 Summer Meeting on *Coherent quasiparticle spectroscopy in Fermi-Fermi mixtures*, Maria Waldrast (Austria).
- 2011 Workshop on *Few- and Many-Body Physics in cold quantum gases near resonances*, Aspen (CO-USA).
- 2011 *IFRAF-FerMix* meeting, Paris (France).
- 2011 Spring Meeting on *Strongly-imbalanced Fermi-Fermi mixtures*, Maria Waldrast (Austria).
- 2010 ICFO-MPQ Joint meeting *New trends in Quantum Information and Quantum Optics*, Sant Benet (Spain).
- 2010 KITP program *Beyond Standard Optical Lattices*, Santa Barbara (CA-USA).
- 2010 Symposium on *Cold Atoms and Condensed Matter*, Vedbaek (Denmark).
- 2010 Workshop on *Correlations in Quantum Gases*, Maò (Menorca-Spain).
- 2010 Workshop on *Theory of quantum gases and quantum coherence*, Nice (France).
- 2009 ITAMP Conference on *Efimov States in molecules and nuclei*, Roma (Italy).
- 2009 *FerMix* meeting, Trento (Italy).
- 2008 *Physics@FOM*, Veldhoven (The Netherlands).

- 2007 *International Trimester on Quantum Gases*, Institut Henry Poincaré, Paris (France).
- 2007 *Spring Meeting of the Dutch Physical Society*, Lunteren (The Netherlands).
- 2005 *Conference Ultracold Plasma and Rydberg Systems*, Gif-sur-Yvette, Paris (France).

REFEREED PUBLICATIONS

My most important publications are marked with an asterisk (*)
for continuously updated information, see my webpage <http://www.fen.upc.edu/users/pietro/>

PAPERS

40	<i>Quantized superfluid vortex dynamics on cylindrical surfaces and planar annuli</i> N.-E. Guenther, P. Massignan, and A. L. Fetter arXiv:1708.08903.
39	<i>Bose polarons at finite temperature and strong coupling</i> N.-E. Guenther, P. Massignan, M. Lewenstein, and G. M. Bruun arXiv:1708.08861.
38	<i>Topological characterization of chiral models through their long time dynamics</i> M. Maffei, A. Dauphin, F. Cardano, M. Lewenstein, and P. Massignan arXiv:1708.02778
37	<i>Measuring Chern numbers in Hofstadter strips</i> S. Muga, A. Dauphin, P. Massignan, L. Tarruell, M. Lewenstein, C. Lobo, and A. Celi SciPost Physics 3 , 012 (2017).
36	(*) <i>Detection of Zak phases and topological invariants in a chiral quantum walk of twisted photons</i> F. Cardano, A. D'Errico, A. Dauphin, M. Maffei, B. Piccirillo, C. de Lisio, G. De Filippis, V. Cataudella, E. Santamato, L. Marrucci, M. Lewenstein, and P. Massignan Nature Comm. 8 , 15516 (2017).
35	<i>Universality of the unitary Fermi gas: A few-body perspective</i> J. Levinsen, P. Massignan, S. Endo, and M. M. Parish J. Phys. B: At. Mol. Opt. Phys. 50 072001 (2017). [Topical review]
34	<i>Repulsive Fermi Polarons in a Resonant Mixture of Ultracold 6Li Atoms</i> F. Scazza, G. Valtolina, P. Massignan, A. Recati, A. Amico, A. Burchianti, C. Fort, M. Inguscio, M. Zaccanti, and G. Roati Phys. Rev. Lett. 118 , 083602 (2017). [Editor's suggestion]
33	<i>Vortex dynamics in coherently coupled Bose-Einstein condensates</i> L. Calderaro, A. L. Fetter, P. Massignan, and P. Wittek Phys. Rev. A 95 , 023605 (2017). [Editor's suggestion]
32	<i>Lindblad Model of Quantum Brownian Motion</i> A. Lampo, S. H. Lim, J. Wehr, P. Massignan, and M. Lewenstein Phys. Rev. A 94 , 042123 (2016).
31	<i>Topological bound states of a quantum walk with cold atoms</i> S. Muga, A. Celi, P. Massignan, J. K. Asbóth, M. Lewenstein, and C. Lobo Phys. Rev. A 94 , 023631 (2016).
30	(*) <i>Magnetism in strongly interacting one-dimensional quantum mixtures</i> P. Massignan, J. Levinsen, and M. M. Parish Phys. Rev. Lett. 115 , 247202 (2015).
29	<i>Crossover between few and many fermions in a harmonic trap</i> T. Grining, M. Tomza, M. Lesiuk, M. Przybytek, M. Musiał, R. Moszynski, M. Lewenstein, and P. Massignan Phys. Rev. A 92 , 061601(R) (2015) (2015).
28	<i>Many interacting fermions in a one-dimensional harmonic trap: a quantum-chemical treatment</i> T. Grining, M. Tomza, M. Lesiuk, M. Przybytek, M. Musiał, P. Massignan, M. Lewenstein, and R. Moszynski New J. of Phys. 17 , 115001 (2015).
27	(*) <i>Strong-coupling Ansatz for the one-dimensional Fermi gas in a harmonic potential</i> J. Levinsen, P. Massignan, G. M. Bruun, and M. M. Parish Science Advances 1 , e1500197 (2015).

26	<i>Quantum Brownian motion with inhomogeneous damping and diffusion</i> P. Massignan, A. Lampo, J. Wehr, M. Lewenstein Phys. Rev. A 91 , 033627 (2015).
25	(*) <i>Weak ergodicity breaking of receptor motion in living cells stemming from random diffusivity</i> C. Manzo, J.A. Torreno-Pina, P. Massignan, G. J. Lapeyre Jr., M. Lewenstein, and M. F. Garcia Parajo Phys. Rev. X 5 , 011021 (2015).
24	<i>Efimov trimers under strong confinement</i> J. Levinsen, P. Massignan, and M. M. Parish Phys. Rev. X 4 , 031020 (2014).
23	(*) <i>Non-ergodic subdiffusion from Brownian motion in an inhomogeneous medium</i> P. Massignan, C. Manzo, J.A. Torreno-Pina, M. F. García-Parajo, M. Lewenstein, G. J. Lapeyre Jr Phys. Rev. Lett. 112 , 150603 (2014).
22	(*) <i>Polarons, Dressed Molecules, and Itinerant Ferromagnetism in ultracold Fermi gases</i> P. Massignan, M. Zaccanti, and G. M. Bruun Rep. Prog. Phys. 77 , 034401 (2014). (long invited review paper)
21	(*) <i>Synthetic gauge fields in synthetic dimensions</i> A. Celi, P. Massignan, J. Ruseckas, N. Goldman, I.B. Spielman, G. Juzeliunas, and M. Lewenstein Phys. Rev. Lett. 112 , 043001 (2014).
20	<i>Itinerant Ferromagnetism in a polarized two-component Fermi gas</i> P. Massignan, Z. Yu, G. M. Bruun Phys. Rev. Lett. 110 , 230401 (2013).
19	<i>p-Wave Polaron</i> J. Levinsen, P. Massignan, F. Chevy, and C. Lobo Phys. Rev. Lett. 109 , 075302 (2012).
18	(*) <i>Metastability and Coherence of Repulsive Polarons in a Strongly Interacting Fermi Mixture</i> C. Kohstall, M. Zaccanti, M. Jag, A. Trenkwalder, P. Massignan, G. M. Bruun, F. Schreck, and R. Grimm Nature 485 , 615 (2012).
17	<i>Polarons and dressed molecules near narrow Feshbach resonances</i> P. Massignan Europhysics Letters 98 , 10012 (2012).
16	<i>Glass to superfluid transition in dirty bosons on a lattice</i> J. Stasinska, P. Massignan, M. Bishop, J. Wehr, A. Sanpera, and M. Lewenstein New J. of Phys. 14 , 043043 (2012).
15	(*) <i>Repulsive polarons and itinerant ferromagnetism in strongly polarized Fermi gases</i> P. Massignan and G. M. Bruun, Eur. Phys. J. D 65 , 83 (2011), topical issue on "Cold Quantum Matter".
14	<i>Metastability in spin polarised Fermi gases and quasiparticle decays</i> K. Sadeghzadeh, G. Bruun, C. Lobo, P. Massignan, and A. Recati New J. of Phys. 13 , 055011 (2011).
13	<i>Atomic wave packet dynamics in finite time-dependent optical lattices</i> T. Lauber, P. Massignan, G. Birkl, and A. Sanpera J. Phys. B 44 , 065301 (2011).
12	<i>Topological superfluids on a lattice with non-Abelian gauge fields</i> A. Kubasiak, P. Massignan, and M. Lewenstein EuroPhysics Letters 92 , 46004 (2010).
11	<i>Decay of polarons and molecules in a strongly polarized Fermi gas</i> G. M. Bruun and P. Massignan Phys. Rev. Lett. 105 , 020403 (2010).
10	<i>Creating p-wave superfluids and topological excitations in optical lattices</i> P. Massignan, A. Sanpera, and M. Lewenstein Rapid Communication in Phys. Rev. A 81 , 031607(R) (2010).

9	<i>Strongly interacting Bose gas: Nozières and Schmitt-Rink theory and beyond</i> A. Koetsier, P. Massignan, R.A. Duine, and H. T. C. Stoof Phys. Rev.A 79 , 063609 (2009).
8	<i>Spin polarons and molecules in strongly-interacting atomic Fermi gases</i> P. Massignan, G. M. Bruun, and H.T. C. Stoof Rapid Comm. in Phys. Rev.A 78 , 031602(R) (2008).
7	<i>Efimov states near a Feshbach resonance</i> P. Massignan and H.T. C. Stoof Rapid Comm. in Phys. Rev.A 78 , 030701(R) (2008).
6	<i>Twin peaks in rf spectra of Fermi gases at unitarity</i> P. Massignan, Georg M. Bruun, and H.T. C. Stoof Rapid Comm. in Phys. Rev.A 77 , 031601(R) (2008).
5	<i>Energy-dependent effective interactions for dilute many-body systems</i> A. Collin, P. Massignan, and C. J. Pethick Phys. Rev.A 75 , 013615 (2007).
4	(*) <i>Three-dimensional strong localization of matter waves by scattering from atoms in a lattice with a confinement-induced resonance</i> P. Massignan and Y. Castin Phys. Rev.A 74 , 013616 (2006).
3	(*) <i>Viscous relaxation and collective oscillations in a trapped Fermi gas near the unitarity limit</i> P. Massignan, G. M. Bruun, and H. Smith Phys. Rev.A 71 , 033607 (2005).
2	<i>Static properties of positive ions in atomic Bose-Einstein condensates</i> P. Massignan, C. J. Pethick, and H. Smith Phys. Rev.A 71 , 023606 (2005).
1	<i>One-dimensional model for the dynamics and expansion of elongated Bose-Einstein condensates</i> P. Massignan and M. Modugno Phys. Rev.A 67 , 023614 (2003).

CITATION METRICS (NOVEMBER 2017)

SOURCE	CITATIONS	H-INDEX
Web of Science (^)	1.052	19
Google Scholar (including citations to preprints)	1.637	22

Highly-cited papers (Essential Science Indicators - Web of Science): papers # 25, 23, 22, 21, 18

Five most cited publications on Google Scholar: papers # 18 (227 cits.), 21 (194 cits.), 3 (110 cits.), 22 (115 cits.), 23 (85 cits.)

(^*) Web of Science database doesn't contain paper # 27, which has collected as of today 54 citations on Google Scholar

PH.D. AND MASTER THESES

- *Positive ions, collective modes and Anderson localization in ultracold gases*
(developed at Niels Bohr Institute and NORDITA in Copenhagen, under the supervision of Profs. Chris Pethick and Henrik Smith).
- *Modello unidimensionale per lo studio dell'espansione di condensati di Bose-Einstein da reticoli ottici*
(developed at LENS in Florence, under the supervision of Profs. Michele Modugno and Massimo Inguscio).

PUBLIC OUTREACH

- *Quantum technologies and society*
P. Massignan and A. Valencia,
ICFO and CatalunyaCaixa-Ignacio Cirac Program Chair.

TEACHING EXPERIENCE

- Lecturer within the *Theory Lectures* at ICFO in Barcelona, 2015; course on Many-Body Methods for Ultracold Gases for Master and Ph.D students
- Lecturer within the *Joint Master in Photonics* at UPC-UB-UAB-ICFO in Barcelona, 2009: course on Atom Optics for Physics majors
- Teaching Assistant at the *Niels Bohr Institutet* in Copenhagen, 2004-2005: courses on Electromagnetism and Solid State Physics for Physics majors
- Teaching Assistant at the *Niels Bohr Institutet* in Copenhagen, 2004: supervision of laboratory experiments
- Tutor at the dept. of Physics, *Università degli Studi* (Milan), 1998-2001: supervision of laboratory experiments

PH.D. AND MASTER SUPERVISION

- Co-supervision of Anna Kubasiak and Julia Stasinska (Ph.D. studies completed in 2011 and 2012)
- Co-supervision of Samuel Muguel and Aniello Lampo (Ph.D. studies started in 2013 and 2014)
- Co-supervision of Maria Maffei and Nils Günther (Ph.D. studies started in 2015 and 2016)
- Master co-supervision: Iason Tsiamis (2014), Julio Sanchez (2015), and Luca Calderaro (2015)

LANGUAGE SKILLS

Italian	mother tongue
English, French, and Spanish	fluent
German	advanced knowledge (five years of studies)
Catalan and Portuguese	intermediate knowledge
Danish and Dutch	basic knowledge

NETWORK OF COLLABORATIONS

In the course of my research career, I had the pleasure to interact and work with a number of renowned scientists.

I have been participating in several collaborations with the experimental groups studying ultracold quantum gases in:

- Amsterdam (F. Schreck)
- Barcelona (L. Tarruell)
- Florence (M. Inguscio, G. Modugno, M. Zaccanti, L. Fallani)
- Hamburg (K. Sengstock)
- Heidelberg (S. Jochim)
- Innsbruck (R. Grimm, F. Ferlaino)
- JQI-NIST (I. Spielman).

On the theoretical side, I am collaborating with physicists in:

- Aarhus (G. Bruun)
- Barcelona (M. Lewenstein and A. Sanpera).
- Beijing (Z. Yu)
- Berlin (A. Saenz)
- Bruxelles (N. Goldman)
- Budapest (J. Asbóth)
- Copenhagen (C. Pethick, H. Smith)
- Darmstadt (G. Birkl)
- Madrid (M.A. Martin-Delgado)
- Melbourne (J. Levinsen, M. Parish, and S. Endo)
- Paris (Y. Castin and F. Chevy [ENS], L. Sanchez-Palencia [Institut d'Optique])
- Southampton (C. Lobo)
- Stanford (A. Fetter)
- Trento (A. Recati)
- Tucson (J. Wehr)
- Utrecht (H. Stoof)
- Vilnius (G. Juzeliunas)
- Warsaw (R. Moszynski)

I am also running a joint project with the Single Molecule Biophotonics experimental group of M. García-Parajo (ICFO-Barcelona), investigating stochastic models of anomalous transport and (multi-scale) self-organization in cellular systems, and another joint project with the experimental group of L. Marrucci (Napoli), studying topological properties of quantum walks with twisted photons.

EXTERNAL FUNDING SECURED

- *Ramón y Cajal* Fellowship: the most prestigious personal research grant in Spain, designed to lead the researcher to a tenured position, awarded to me by the Ministry of Research, yielding funding for 5 years of independent research; I am employed at ICFO in Barcelona under this grant since Jan. 2015 (EUR 300k)
- Grant for the organization of the Obergurgl Conference/School “From few to Many”, awarded from the Extreme Matter Institute EMMI in 2017 (EUR 20k)
- Research grant for PostDoctoral studies at ICFO, awarded to me by the Cellex Foundation in 2013 (EUR 35k)
- Grants for research stays at the Aspen Center for Theoretical Physics, Aspen (CO, USA), awarded to me in 2011 and 2015 (USD 2k)
- Grant for a research stay at ITAMP - Harvard-Smithsonian Center for Astrophysics, Cambridge (MA, USA), awarded to me in 2012 (USD 2k)
- Grant for a research stay at the KITP - Kavli Institute for Theoretical Physics, Santa Barbara (CA, USA), awarded to me in 2010 (USD 2k) and 2016 (USD 1.6k)
- Postdoctoral Fellowship at ICFO, granted within the EuroQuam-FerMix network, awarded by the European Science Foundation in 2008; principal investigator: Prof. M. Lewenstein (EUR 45k)
- Full PhD Fellowship granted by the University of Copenhagen, awarded to me in 2003
- Pre-Doctoral grant to pursue studies at LENS, awarded in 2002 by the European Union under the 5th Framework Programme; principal investigator: Prof. M. Inguscio