

Jean-Bernard Bru

Ikerbasque Research Professor
BCAM UPV Researcher

Department of Mathematics
University of the Basque Country UPV/EHU
Leioa, Spain
BCAM - Basque Center for Applied Mathematics
Mazarredo, 14. 48009 Bilbao, Spain

jb.bru@ikerbasque.org

http://www.ikerbasque.net/researcher_profiles/view_6.html



EDUCATION

- 2005 **Accreditation to supervise research degree (HDR: Habilitation à Diriger des Recherches) in mathematical physics**, University of Aix-Marseille II, France.
Title: *About the quantum many-body problem*. (cf. [21] in the list of publications)
- 1999 **Ph.D. in mathematical physics** obtained in two years with grade A+,
University of Aix-Marseille II, France.
Title: *Bogoliubov Gas and coexistence of conventional and nonconventional Bose condensations* (cf. [6]). Ph.D. Advisor: V. A. Zagrebnov
- 1997 **Diploma of thorough studies (D.E.A) in mathematical physics**, with grade B,
University of Aix-Marseille II, France.
Master of science degree in Physics,
École Centrale Marseille, France.

PROFESSIONAL EXPERIENCE

Scientific experience

- 2018-2019 FAPESP – Visiting researcher**, mathematical physics department, University of São Paulo.
- 2018- Editorial board member** of the EMS Newsletter (European Mathematical Society).
- 2014- BCAM UPV Researcher** as Research Group Leader and Severo Ochoa - Guarantor Researcher
- 2009- Ikerbasque Research Professor**, Department of mathematics in the Faculty of Science and Technology at the UPV-EHU in Leioa.
- 2006-2009 **Assistant Professor**, (Physics) University of Vienna, Austria.
Carried out research, taught physics and mathematical physics.
- 2004-2006 **E.U.-Postdoctoral position**, (Mathematics) Johannes Gutenberg-University Mainz, Germany.
Carried out research, organized the research seminars and maintained the group's website.
- 2002-2004 **Research Scholarship**, School of Theoretical Physics (D.I.A.S.), Dublin, Ireland.
Carried out research, organized and realized work seminars.
- 2001-2002 **Research Associate**, Centre of Theoretical Physics (C.P.T.), Marseille, France.
Carried out research.
- 2000-2001 **Visiting Research Assistant Professor**, (Mathematics) University of California, Davis, USA.
Carried out research, taught mathematics and directed teaching assistants.
- 1997-2000 **Ph.D. Scholarship**, Centre of Theoretical Physics (C.P.T.), Marseille, France.
Completed a Ph.D. and taught mathematics as teaching assistant.

Teaching experience

2009-2019 As Ikerbasque Research Professor:

2019: Teaching at University of Sao Paulo, **Brazil**: “*Application of Choquet Theory to the Study of Lattice Fermi Systems with Long-Range Interactions*” (postgraduate course). Hours: 60h. In collaboration with W. de Siqueira Pedra.

2018: Teaching at BCAM, Bilbao, **Spain**: “*Semigroup Theory in Quantum Mechanics*” the “VIII Escuela-Taller de Analisis Funcional” (graduate course). Hours: 20h.

2017: Teaching at BCAM, Bilbao, **Spain**: “*The Topos-theoretic Approach to Quantum Physics*” (postgraduate course). Hours: 10h. In collaboration with W. de Siqueira Pedra.

2015: Teaching at BCAM, Bilbao, **Spain**: “*From the 2nd Law of Thermodynamics to AC-Conductivity Measures of Interacting Fermions*” (postgraduate course). Hours: 10h.

2015: Teaching at Roma Tre University, **Italy**: “*Lieb-Robinson Bounds for Multicommutators*” (postgraduate course). Hours: 8h.

2014: Teaching at University of Sao Paulo, **Brazil**: “*From the 2nd Law of Thermodynamics to AC-Conductivity Measures of Interacting Fermions*” (postgraduate course). Hours: 10h.

2010: Teaching at UPV-EHU / BCAM, Bilbao, **Spain**: “*Algebraic Quantum Statistical Mechanics*” (postgraduate course). Hours: 36h.

2006-2009 Assistant Professor, University of Vienna, Austria.

Teaching: *Physics and mathematical physics (quantum mechanics II, quantum mechanics of larges systems, mathematical methods of theoretical physics I & II)*. Hours: 180h.

2000-2001 Visiting Research Assistant Professor, University of California, Davis, USA.

Teaching: *Mathematics (differential equations, integral calculus, linear algebra, introduction to linear algebra)*. Hours: 132h in addition to 120 office hours.

1997-2000 Ph.D. Scholarship, Universities of Aix-Marseille II and Toulon, France.

Teaching: *Mathematics* - Hours: 178h.

Supervision of dissertations and/or final projects

11/2019 Doctoral thesis. Doctorate student: A. Ratsimanetrimanana, UPV-EHU / BCAM. Advisor: J.-B. Bru. Starting date: 01/2016.

03/2019 Doctoral thesis. Title: *A estabilidade do estado BCS no regime de baixas temperaturas sob ação de perturbações genéricas fracas*. Doctorate student: L. C.P.A.M. Müssnich, University of São Paulo. Main advisor: W. de Siqueira Pedra. Starting date: 2015. 75% of the thesis corresponds to the publication [57] and another one in preparation.

12/2018 Doctoral thesis. Title: *Study of a kinetic equation for a boson gas in presence of a condensation and near the critical temperature*. Doctorate student: E. Cortés Giménez-Coral, UPV-EHU / BCAM. Advisors: J.-B. Bru and M. Escobedo Martinez (main advisor). Starting date: 09/2014.

03/2018 Doctoral thesis. Title: *Existence of d-Wave Pairing and Density Waves in a Class of Microscopic Models for High-Tc Superconductors*. Doctorate student: A. de Pasquale, University of São Paulo and BCAM. Advisors: J.-B. Bru and W. de Siqueira Pedra.

10/2017 Doctoral thesis. Title: *Principios de Grandes Desvios para a Condutividade Microscopica de Fermions em Cristais*. Doctorate student: N.J. Buitrago Aza, University of São Paulo. Main advisor: W. de Siqueira Pedra. 85% of the thesis corresponds to the publications [54], [55], [57].

- 07/2013 Doctoral thesis. Title: *Random Lattice Models*. Doctorate student: C. Kurig (Hertling), Johannes Gutenberg University. Main advisor: V. Bach. 50% of the thesis corresponds to the publications [40], [44], [46], [47].
- 08/2011 Doctoral thesis. Title: *Long-Time Dynamics of Open Quantum Systems*. Doctorate student: M. Westrich, Aarhus University. Main advisors: J.S. Møller, V. Bach. 30% of the thesis corresponds to the publication [36].
- 12/2009 Diploma thesis. Title: *C*-algebraic analysis of equilibrium states of magnetic superconductors*. Student: A. Dömel, Johannes Gutenberg University. Main advisor: W. de Siqueira Pedra. 100% of the thesis corresponds to the publication [34].

Private sector experience

- 2000- **Consulting for a private finance institution**, Paris, France
Realized studies of funds (OPCVM) and analysis of financial tools (2000-2003). Committee (since 2009)

SKILLS

Software programming: C, C++, Pascal, Fortran, Assembly.

Software tools: Latex, Matlab, Mathematica, Borland JBuilder, Microsoft Office.

Operating system: Linux, Mac, all Windows systems.

Languages: French: Mother Tongue; English: Fluent; Spanish: Upper intermediate; German: Elementary.

RESEARCH INTERESTS

Mathematical physics: Mathematical studies of the many-body problem. Transport properties. Open quantum systems. Electromagnetism. Constructive methods in QFT. Classical and quantum mechanics.

Operator algebra: KMS states, C*-algebras, von Neumann algebras.

Probability theory: Large deviations and stochastic processes.

Functional analysis: Spectral theory, evolution equations, flow equations for operators, semi-groups, convex / non-linear analysis, variational problems and game theory.

SEMINARS, CONFERENCES, STAYS ABROAD

Summary:

Participated and conducted more than 94 scientific events and accomplished more than 40 research visits in multiple universities across Europe (Austria, Belgium, Denmark, England, France, Germany, Ireland, Italy, Portugal, Romania, Spain, and Switzerland), Armenia, Canada, Brazil, and the USA. Among those are:

- 94 seminars with an average frequency of more than 4.8 seminars per year,
- 60 conferences,
- More than 40 research visits.

Event details:

Seminars and conferences are detailed in the appendix provided along with the CV. The details of some (long) stays abroad are the followings:

- Department of Mathematical Physics, University of Sao Paulo, Brazil, 97 days (9 stays, 2013-2019);
- Department of Mathematics and Physics, Roma Tre University, Italy (7 days, 2015)
- Hausdorff Research Institute for Mathematics, University of Bonn, Germany, 16 days (4 stays, 2012);
- Johannes Gutenberg University, Mainz, Germany, 11 weeks (11 stays, 2007-2008, 2010-2012);
- Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany, 1 month (2 stays in 2005);
- School of Theoretical Physics, Dublin, Ireland, 2 weeks (2 stays in 2002 and 2004);
- Erwin Schrödinger Institute, Vienna, Austria, 2 months (2004, 2010);
- Institut für Mathematik Technische Universität Berlin, Germany, 2 months (6 stays, 2001-2004);
- Centre for Mathematical Sciences Research, Rutgers, USA, 1 month (2 stays in 2000 and 2001);
- Theoretical Physics Department, Catholic University of Leuven, Belgium, 1 month (1998)

RESEARCH PROJECTS

2018-2021 *Del analisis Armonico a la Geometria y los sistemas cuanticos de multiparticulas*

Project financed by the MICINN through the VI (I+D+I) national plan (Spanish government), (MINECO), reference: MTM2017-82160-C2-2-P (at the UPV/EHU)
Subproject of a coordinated project (MTM2017-82160-C2-1-P at the BCAM, 38,841 €)

Main researchers (PI): Michail Mourgoglou (Ikerbasque Research Fellow, UPV/EHU)

Research team: Jean-Bernard Bru, F. Javier Duoandikoetxea Zuazo (UPV/EHU), Osane Oruechevarria Fernández de la Peña (UPV/EHU)

Work team: Ioannis Parissis (UPV/EHU, ikerbasque), Walter de Siqueira Pedra (University of São Paulo, Brazil), Sébastien Breteaux (Institut Elie Cartan de Lorraine, France)

Duration: 3 years.

Amount: 36,421 €+ one Phd grant.

2018-2019 “*Métodos Constructivos para Férmions Interagentes com Aplicações à Teoria Microscópica da Condutividade e Supercondutividade*”

Financed by the state of São Paulo – FAPESP: process 2017/22340-9

Grant to be one year as visiting scientist at the University of São Paulo (Math. Phys. department)

Beneficiary: Jean-Bernard Bru

Local responsible: Walter de Siqueira Pedra (University of São Paulo, Brazil)

Duration: 1 year, from 01/07/2018 to 30/06/2019

Amount: 47,306 € (1 € = 4.25 BRL & 1.2 \$), split as 190,440 BRL (Salary) & 5,580 BRL (health insurance) & 1420.32 \$ (travel expensive).

2014-2022 *SEVERO OCHOA 2013/2017 PROGRAMME (with the BCAM)*

Project financed by the Spanish Agency MINECO

Severo Ochoa Reference: SEV-2013-0323, SEV-2017-0718



Main researcher (PI): Luis Vega González (BCAM)

Severo Ochoa - Guarantor Researchers: Jean-Bernard Bru and 9 others P.I. of projects.

Duration: 8 years, from 01/07/2014.

Amount: **4,000,000 €**(2014-2018) + **4,000,000 €**(2018-2022)

Previous Projects:

2015-2017 *Analisis Armonico y Mecanica Cuantica (Harmonic Analysis and Quantum Mechanics)*

Project financed by the MICINN through the VI (I+D+I) national plan (Spanish government), reference: MTM2014-53850

Main researchers (PI): Jean-Bernard Bru, Carlos Perez Moreno (UPV/EHU, Ikerbasque)

Research team : F. Javier Duoandikoetxea Zuazo (UPV/EHU), Sébastien Breteaux (BCAM), Osane Oruechevarria Fernández de la Peña (UPV/EHU), Ioannis Parissis (UPV/EHU, Ikerbasque)

Work team: Carmen Ortiz Caraballo (University of Extremadura), Walter de Siqueira Pedra (University of São Paulo, Brazil)

Duration: 3 years from 01/01/2015 to 31/12/2017.

Amount: 71,100 €(ha recibido la calificación A) + one Phd grant.

2013-2018 *Mathematical Physics, Mathematical Analysis and Partial Differential Equations, and Numerical Analysis*

Project financed by the Gobierno Vasco, Reference IT641-13.

Main researcher (PI): Luis Vega González (BCAM)

Research team : Jean-Bernard Bru and many others...

Duration: 5 years, from April, 2013 to February, 2018.

Amount: 303,398 €

2015-2017 *DEDMEE - Derivation of Effective Dynamics from Microscopic Evolution Equation*

Financed by the European Commission, reference: 660021 - DEDMEE

Marie Sklodowska-Curie Individual Fellowship to Sébastien Breteaux (BCAM, QM group)

Supervision: Jean-Bernard Bru

Duration: 2 years, from 01/06/015 to 31/05/2017

Amount: 158,121.60 €

2013-2015 *Heat Production in Infinitely Extended Fermion Systems Subjected to Electric Fields*

Project financed by the Brazilian agency FAPESP, Reference FAPESP 2013/13215-5.

Main researcher (PI): Walter de Siqueira Pedra (University of São Paulo, Brazil)

Research team: Jean-Bernard Bru

Duration: 2 years, from 1/10/ 2013 to 30/09/2015.

Amount: 12,060 €

2011-2013 *Mathematical Foundations of Statistical Mechanics and its Applications*

Project financed by the MICINN through the VI (I+D+I) national plan (Spanish government), reference: MTM2010-16843

Main researcher (PI): Jean-Bernard Bru

Work team: Walter de Siqueira Pedra (University of São Paulo, Brazil), Matthias Westrich (McGill University, Canada).

Duration: 3 years, from January 1st, 2011 to December 31st, 2013.

Amount: 13,100 €

2010-2012 *Mathematical Foundations of Statistical Mechanics and its Applications*

Complementary project to the project MTM2010-16843 financed by the Johannes-Gutenberg University.

Main researcher (PI): Walter de Siqueira Pedra (Johannes-Gutenberg Univ., Germany)

“Kooperationspartner”: Jean-Bernard Bru

Duration: 3 years, from January 1st, 2010 to December 31st, 2012.

Amount: 14,500 €

2009-2012 Evolution Equations, Fourier and Numerical Analysis (EFNA)
Project financed by the Gobierno Vasco, Reference IT-305-07.

Main researcher (PI): Luis Vega González (University of the Basque country UPV/EHU)

Research team: Jean-Bernard Bru and many others...

Duration: 5 years, from January 11th, 2007 to December 31st, 2012.

Amount: 321,881 €

PUBLICATIONS

Summary:

59 publications with papers published in Annals of Probability, Memoirs of the AMS, Comm. on Pure and Applied Math., Physics Report, Springer Briefs in Math. Phys., M3AS, etc. Among those are:

- Monographs: 4
- Articles: 48
- Proceedings: 7
- Theses: 2
- Preprints: 2

Co-authors: S. Adams, N. J. B. Aza, V. Bach, L. Beraldo e Silva, M. Correggi, A. Delgado de Pasquale, W. de Siqueira Pedra, A. Dömel, T. Dorlas, W. König, C. Hertling, L. C. P. A. M. Müssnich, B. Nachtergaele, P. Pickl, A. Ratsimanetrimanana, L. Sodré, M. Valluri, M. Westrich, J. Yngvason, V.A. Zagrebnoy.

Publication list:

- [63] *Macroscopic Long-Range Dynamics of Fermions and Quantum Spins on the Lattice - An Introduction*, with W. de Siqueira Pedra, submitted in (2019) preprint (33 pages).
- [62] *Quantum Dynamics Generated by Long-Range Interactions for Lattice Fermion and Quantum Spins*, with W. de Siqueira Pedra, submitted in (2019) preprint (60 pages).
- [61] *Weak* Hypertopologies with Application to Genericity of Convex Sets*, with W. de Siqueira Pedra, submitted in (2019) preprint (42 pages).
- [60] *Classical Dynamics Generated by Long-Range Interactions for Lattice Fermions and Quantum Spins*, with W. de Siqueira Pedra, submitted in (2019) preprint (56 pages).
- [59] *Classical Dynamics from Self-Consistency Equations in Quantum Mechanics*, with W. de Siqueira Pedra, submitted in (2018) preprint (72 pages).
- [58] *Large Deviations in Weakly Interacting Fermions I - Generating Functions as Gaussian Berezin Integrals and Bounds on Large Pfaffians*, with N. J. B. Aza, W. de Siqueira Pedra, and L. C. P. A. M. Müssnich, submitted in (2018), preprint mp arc 17-70 (57 pages).
- [57] *Accuracy of Classical Conductivity Theory at Atomic Scales for Free Fermions in Disordered Media*, with N. J. B. Aza, W. de Siqueira Pedra and A. Ratsimanetrimanana, J. Math. Pures Appl. **125** (2019) 209-246.

- [56] *The Discreteness-Driven Relaxation of Collisionless Gravitating Systems: Entropy Evolution in External Potentials, N-dependence and the Role of Chaos*, with L. Beraldo e Silva, W. de Siqueira Pedra, M. Valluri, L. Sodré, *Astrophys. J.* **870** (2019) 128-143.
- [55] *Isotropic Bipolaron--Fermion Exchange Theory and Unconventional Pairing in Cuprate Superconductors*, with A. Delgado de Pasquale and W. de Siqueira Pedra, *Ann. Phys. (Berl.)* **531** (2018) 1700235 (17pp).
- [54] *Decay of Complex-time Determinantal Correlation Functionals in Lattices*, with N. J. B. Aza and W. de Siqueira Pedra, *Commun. Math. Phys.* **360**(2) (2018) 715-726.
- [53] *Lieb–Robinson Bounds for Multi–Commutators and Applications to Response Theory*, Proceeding of MFO Workshop 1737 Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications, pp 22-24, Report No. 41/2017, DOI: 10.4171/OWR/2017/41 (2017) (3 pages).
- [52] *Universal Bounds for Large Determinants from Non-Commutative Hölder Inequalities in Fermionic Constructive Quantum Field Theory*, with W. de Siqueira Pedra, *M3AS: Mathematical Models and Methods in Applied Sciences* **27**(10) (2017) 1963-1992.
- [51] *Lieb–Robinson Bounds for Multi–Commutators and Applications to Response Theory*, with W. de Siqueira Pedra, *Springer Briefs in Math. Phys.*, vol. **13**, Springer Nature, (2017) (110 pages).
- [50] *d-Wave Pairing Driven by Bipolaronic Modes*, with W. de Siqueira Pedra and A. Delgado De Pasquale, Proceeding of the International Congress in Mathematical Physics (ICMP) (2016) (7 pages).
- [49] *Diagonalizing Quadratic Bosonic Operators by Non-Autonomous Flow Equation*, with V. Bach, *Memoirs of the AMS* **240**(1138) (2016) (134 pages).
- [48] *Microscopic Conductivity of Lattice Fermions at Equilibrium – Part II: Interacting Particles*, with W. de Siqueira Pedra, *Letters in Mathematical Physics* **106**(1) (2016) 81-107.
- [47] *AC-Conductivity Measure from Heat Production of Free Fermions in Disordered Media*, with W. de Siqueira Pedra and C. Hertling, *Archive for Rational Mechanics and Analysis*, **220** (2016) 445-504.
- [46] *Microscopic Conductivity of Lattice Fermions at Equilibrium – Part I: Non-Interacting Particles*, with W. de Siqueira Pedra and C. Hertling, *J. Math. Phys.* **56** (2015) 051901–1-51.
- [45] *From the 2nd Law of Thermodynamics to AC–Conductivity Measures of Interacting Fermions in Disordered Media*, with W. de Siqueira Pedra, *M3AS: Mathematical Models and Methods in Applied Sciences* **25**(14) (2015) 2587-2632.
- [44] *Heat Production of Non-Interacting Fermions Subjected to Electric Fields*, with W. de Siqueira Pedra and C. Hertling, *Comm. Pure Appl. Math.* **68**(6) (2015) 964-1013.
- [43] *d-Wave Pairing Driven by Bipolaric Modes Related to Giant Electron–Phonon Anomalies in High-Tc Superconductors*, with A. Delgado de Pasquale and W. de Siqueira Pedra, *Journal of Statistical Mechanics: Theory and Experiment* (2015) P03002. doi:10.1088/1742-5468/2015/03/P03002 (36 pages).

- [42] *Characterization of the Quasi-Stationary State of an Impurity Driven by Monochromatic Light II: Microscopic Foundations*, with W. de Siqueira Pedra, *Annales Henri Poincaré* **16**(6) (2015) 1429-1477.
- [41] *Proceeding: Microscopic Foundations of Ohm and Joule's Laws – The Relevance of Thermodynamics*. with W. de Siqueira Pedra, (2014). *Mathematical Results in Quantum Mechanics, Proceedings of the QMath12 Conference*, Eds.: P. Exner, W. König, H. Neidhardt, World Scientific, 2015.
- [40] *Macroscopic conductivity of free fermions in disordered media*, with W. de Siqueira Pedra and C. Hertling, *Rev. Math. Phys.* **26**(5) (2014) 1450008–1-25.
- [39] *Microscopic Foundations of the Meissner Effect – Thermodynamic Aspects*, with W. de Siqueira Pedra, *Rev. Math. Phys.* **25** (2013) 1350011–1-66.
- [38] *Non-cooperative Equilibria of Fermi Systems With Long Range Interactions*, with W. de Siqueira Pedra, *Memoirs of the AMS* **224** (2013), no. 1052 (167 pages).
- [37] *Inhomogeneous Fermi and Quantum Spin Systems on Lattices - I*, with W. de Siqueira Pedra, *J. Math. Phys.* **53** (2012) 123301–1-25.
- [36] *Characterization of the Quasi-Stationary State of an Impurity Driven by Monochromatic Light I - The Effective Theory*, with W. de Siqueira Pedra and M. Westrich, *Annales Henri Poincaré* **13**(6) (2012) 1305-1370.
- [35] *Remarks on the Γ -regularization of Non-convex and Non-Semi-Continuous Functionals on Topological Vector Spaces*, with W. de Siqueira Pedra, *Journal of Convex Analysis* **19**(2) (2012) 467-483.
- [34] *A microscopic two-band model for the electron-hole asymmetry and reentering behaviour in high-Tc superconductors*, with W. de Siqueira Pedra and A. Dömel, *J. Math. Phys.* **52** (2011) 073301- (1-28)
- [33] *Superconductivity, BCS theory and mathematical physics*, with W. de Siqueira Pedra, *IAMP News Bulletin* (pages 4-10, April 2011).
- [32] *The Effect of a locally repulsive interaction on s-wave superconductors*, with W. de Siqueira Pedra, *Rev. in Math. Phys.* **22**(3) (2010) 233-303.
- [31] *Rigorous foundations of flow equations for operators*, with V. Bach, *J. Evol. Equ.* **10**(2) (2010) 425-442.
- [30] *Proceeding: On the Brockett Flow Equation*, *Oberwolfach report* **5**(3) (2 pages, 2008) 2261-2292.
- [29] *The TF Limit for Rapidly Rotating Bose Gases in Anharmonic Traps*, with M. Correggi, P. Pickl and J. Yngvason, *Comm. Math. Phys.* **280**(2) (2008) 517-544.
- [28] *Large Deviations in the Superstable Weakly Imperfect Bose Gas*, with V.A. Zagrebnov, *J. Stat. Phys.* **133**(2) (2008) 379-400.
- [27] *Weakly Imperfect Bose Gases*, to be published in “Modern Encyclopedia of Mathematical Physics” (9 pages, 2007).
- [26] *Dynamical Bose condensations*, to be published in “Modern Encyclopedia of Mathematical Physics” (6 pages, 2007).

- [25] *Example of a dynamical Bose condensation*, to be published in “Modern Encyclopedia of Mathematical Physics” (2 pages, 2007).
- [24] *Large systems of path-repellent Brownian motions in a trap at positive temperature*, with S. Adams and W. König, *Electronic Journal of Probability*, **11** (2006) 460-485.
- [23] *Large deviations for interacting Brownian Particles and Paths in trap potential* with S. Adams and W. König, *Annals of Probability*, **34** (2006) 1370-1422.
- [22] *Beyond the dilute Bose gas*, *Physica A* **359** (2006) 306-344.
- [21] *Sur le problème quantique à plusieurs corps (About the quantum many-body problem)*, Habilitation à Diriger des Recherches, Aix-Marseille II University, (100 pages, November 28, 2005).
- [20] *Large deviations for the local particle densities*, Preprint DIAS-STP-04-13, (33 pages, 2004).
- [19] *Proceeding: A superfluidity theory for the non-dilute Bose gas*, ed. Anna Grinberg and Helmut Kastenzholz, Workshops on Phase Transition; p.17 (Oberwolfach Report, 2004).
- [18] *A New Microscopic Theory of Superfluidity at all Temperatures*, with S. Adams, *Annales Henri Poincaré* **5** (2004) 435-476.
- [17] *Exact solution of the AVZ-Hamiltonian in the grandcanonical ensemble*, with S. Adams, *Annales Henri Poincaré* **5** (2004) 405-434.
- [16] *Critical Analysis of the Bogoliubov Theory of Superfluidity*, with S. Adams, *Physica A* **332** (2004) 60-78.
- [15] *A new theory of superfluidity*, with S. Adams, Preprint DIAS-STP-03-14 (29 pages, 2003).
- [14] *Exact solution of the infinite range-hopping Bose-Hubbard model*, with T. Dorlas, *J. Stat. Phys.* **113** (2003) 177-196.
- [13] *Proceeding: Difficulties encountered in mixing academic research and the private sector*, ed. A. Stasiak and I. Peñas Jiménez, 14th Workshop of Marie Curie Fellows: Research Training in Progress, p. 21-22, (European Commission – Directorate-General for Research, Brussels & University of Mondragon, 2002).
- [12] *Superstabilization of Bose Systems II : Bose condensations and Equivalence of Ensembles*, *J. Phys. A : Math. Gen.* **35** (2002) 8995-9024.
- [11] *Superstabilization of Bose Systems I : Thermodynamic study*, *J. Phys. A : Math. Gen.* **35** (2002) 8969-8994.
- [10] *The Equilibrium States for a Model with Two Kinds of Bose Condensation*, with B. Nachtergaele and V.A. Zagrebnov, *J. Stat. Phys.* **109** (2002) 143-171.
- [9] *The Bogoliubov model of Weakly Imperfect Bose-Gas*, (144 pages) with V.A. Zagrebnov, *Phys. Rep.* **350** (5/6) (2001) 291-434.
- [8] *An exactly soluble model with non-conventional and non-extensive condensations*, with V.A. Zagrebnov, *J. Phys. A: Math. Gen.* **33** (2000) 449-464.

- [7] *On condensations in the Bogoliubov Weakly Imperfect Bose-Gas*, with V.A. Zagrebnov, J. Stat. Phys. **99**(5/6) (2000) 1297-1338.
- [6] *Gaz de Bogoliubov et coexistence de condensations de Bose conventionnelles et non conventionnelles*, Aix-Marseille II University, Ph.D. Thesis, (211 pages, November 26, 1999).
- [5] *Exactly soluble model with two kinds of Bose-Einstein condensations*, with V.A. Zagrebnov, Physica A **268** (1999) 309-325.
- [4] *Proceeding: Thermodynamic Behavior of the Bogoliubov Weakly Imperfect Bose-Gas*, with V.A. Zagrebnov, ed. S. Miracle-Sole and al., Mathematical Results in Statistical Mechanics, p. 313-321, (World Scientific, Singapore, 1999).
- [3] *Exact Solution of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*, with V.A. Zagrebnov, J. Phys. A : Math. Gen. **31** (1998) 9377-9404.
- [2] *Quantum Interpretation of Thermodynamic Behaviour of the Bogoliubov Weakly Imperfect Bose-Gas*, with V.A. Zagrebnov, Phys. Lett. A **247** (1998) 37-41.
- [1] *Exact Phase Diagram of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*, with V.A. Zagrebnov, Phys. Lett. A **244** (1998) 371-376.

| |
|--------------------|
| CV-APPENDIX |
|--------------------|

Enclosed for your review is the following additional information:

- Juries for my accreditation to supervise research degree and my Ph.D.;
- Detailed list of workshops/conferences;
- Detailed list of seminars;
- Detailed list of teaching experience;

| |
|---------------|
| JURIES |
|---------------|

2005 **Accreditation to supervise research degree (HDR: Habilitation à Diriger des Recherches) in mathematical physics**, University of Aix-Marseille II, France. (100 pages, November 28, 2005).

Title: *About the quantum many-body problem.*

Jury:

- Volker Bach (Referee), Professor, Johannes Gutenberg University, Mainz, Germany.
- François Bentosela, Professor, University of Aix-Marseille II, France.
- Philippe-André Martin (President), Professor, Ecole polytechnique fédérale de Lausanne, Switzerland.
- Claude-Alain Pillet, Professor, University of Sud Toulon-Var, France.
- Joseph V. Pulé (Referee), Professor, University College Dublin, Ireland.
- Jakob Yngvason (Referee), Professor, University of Vienna, Austria.

1999 **Ph.D. in mathematical physics** obtained in two years with grade A+, University of Aix-Marseille II, France. (211 pages, November 26, 1999).

Title: *Bogoliubov Gas and coexistence of conventional and nonconventional Bose condensations.*

Jury:

- François Dunlop (Referee), Professor, University of Cergy-Pontoise, France.
- Bruno Iochum, Professor, University of Provence, Marseille, France.
- Thierry Martin (President), Professor, University of Aix-Marseille II, Marseille, France.
- Salvador Miracle-Solé, Research Director (CNRS), Centre of Theoretical Physics (C.P.T.), Marseille, France.
- Leonid Pastur, Professor, Mathematical Division, Institute for Low Temperature Physics, Kharkiv, Ukraine.
- Joseph V. Pulé, Professor, University College Dublin, Ireland.
- André Verbeure (Referee), Professor, Catholic University of Leuven, Belgium.
- Valentin A. Zagrebnov (Ph.D. Advisor), Professor, University of Aix-Marseille II, France.

| |
|--------------------|
| CONFERENCES |
|--------------------|

❖ **As organizer:**

- [5] *Topics in Mathematical Physics*, University of São Paulo, Brazil, (July 26-31, 2018). Official satellite meeting of the 2018 International Congress of Mathematicians (ICM 2018, Rio de Janeiro, Brazil). See <https://www.ime.usp.br/~mathphys/index.html> for more details.
- [4] *Bilbao summer school “Probabilistic approaches in Mathematical Physics”*, Basque Center for Applied Mathematics (BCAM), Spain (July 17-22, 2017). See <http://www.bcamath.org/en/workshops/sspamp> for more details.
- [3] *Mathematical Many-Body Theory and its Applications*, Basque Center for Applied Mathematics (BCAM), Spain (June 13-19, 2016). See <http://www.bcamath.org/es/workshops/mmbta> for more details.
- [2] *Operator Algebras and Quantum Physics*, University of São Paulo, Brazil, (July 17-23, 2015). Satellite conference of the International Congress in Mathematical Physics (ICMP). See <http://www.icmp2015.cl/> and <http://icmp2015.satellite.ime.usp.br/> for more details.
- [1] *Colloquium on Mathematical Physics*, University of the Basque Country UPV/EHU, June 24, 2011.

❖ **As participant:** 60 across Armenia, Austria, Belgium, Canada, Chile, Denmark, France, Germany, Ireland, Italy, Portugal, Spain, Switzerland, Romania, USA. See below. The workshops/conferences where I gave a seminar, a poster, as well as the ones where I was invited have their reference number in bold.

P.S.: Participation on more than 9 Ikerbasque Workshops from Sept. 2009.

2018 (2)

- [60] *Random Physical Systems*, December 11-15, Puerto Natales, Patagonia, Chile.
- [59] *XIV Encuentro de la Red de Análisis Funcional y Aplicaciones & VIII Escuela-Taller de Análisis Funcional*, March 5-10, BCAM, Bilbao, Spain. Invited. Cf. Seminar [93].

2017 (4)

- [58] *Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications*, September 10-16, Oberwolfach, Germany. Invited. Cf. Seminar [92].
- [57] *Mathematical Aspects of Disordered Systems*, May 29 - June 2, ETH Zurich, Switzerland. Invited. Cf. Seminar [91].
- [56] *ERCOM (European Research Centres on Mathematics) Meeting*, April 28-29, Johann Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences. Invited.
- [55] *9ème rencontre du GDR Dynamique Quantique (DYNQUA)*, February 22-24, University of Toulon, France. Invited. Cf. Seminar [90].

2016 (5)

- [54] *Synergies between Mathematical and Computational Approaches to Quantum Many-Body Physics*, October 3-7, Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria. Invited. Cf. Seminar [89].
- [53] *X International Conference of Mathematical Physics in Armenia*, September 4-11, American University of Armenia, Yerevan. Invited. Cf. Seminar [88].

- [52] *SOLID MATH 2016*, May 26-28, Aalborg University, Denmark. Invited. Cf. Seminar [87].
- [51] *Bilbao Meeting on Analysis and PDEs*, May 5-6, 2016, BCAM, Bilbao. Invited. Cf. Seminar [86].
- [50] *Spectral Theory of Novel Materials*, April 18-22, Centre International de Rencontres Mathématiques (CIRM), Marseille, France. Invited. Cf. Seminar [85].

2015 (2)

- [49] *BCAM Workshop on Mathematics and its Applications*, May 27, Bilbao. Invited. Cf. Seminar [82].
- [48] *2nd Joint Thematic Workshop CSMA-SEMNI: Numerical techniques for computation speedup: towards real-time simulation*, February 2-4, 2015, ESTIA-École Supérieure des Technologies Industrielles Avancées, Biarritz, France. Invited.

2014 (4)

- [47] *Selected Problems in Mathematical Physics Statistical Mechanics, Many-Body Quantum Physics and PDEs*, September 1 – 5, 2014, La Spezia (Italy). Invited. Cf. Seminar [81].
- [46] *Mathematical Methods in Atomic and Molecular Physics (Quantum Days in Bilbao IV)*, July 15-16, 2014, Bilbao. Invited. Cf. Seminar [80].
- [45] *Theoretical and Numerical Aspects of Quantum Transport*, Department of Mathematical Sciences, Aalborg University, Denmark (April 25-26, 2014). Invited. Cf. Seminar [79].
- [44] *Electrons in quantum disordered media*, Université de Cergy-Pontoise, France (March, 12). Invited. Cf. Seminar [78].

2013 (2)

- [43] *Mathematical properties of large quantum systems*, Institut Henri Poincaré, 11 rue Pierre et Marie Curie, Paris, France (June, 17-21). Invited.
- [42] *Variational and spectral methods in Quantum Field Theory*, Institut Henri Poincaré, 11 rue Pierre et Marie Curie, Paris, France (April, 22-26). Invited. Cf. Seminar [75].

2012 (4)

- [41] *Workshop: Quantum Physics and Bethe Ansatz*, School of Theoretical Physics, Dublin Institute for Advanced Studies (DIAS), 10 Burlington Road, Dublin 4, Ireland (October, 8-10). Invited. Cf. Seminar [69].
- [40] *Workshop: Dynamical systems on random graphs*, CIEM (International Centre for Mathematical meetings), Castro Urdiales, Spain (September 18-21). Invited.
- [39] *XVII International Congress on Mathematical Physics*, Aalborg - Denmark (August, 6-11). Invited. Cf. seminar [68].
- [38] *Workshop: Coarse graining and condensed matter physics*, Hausdorff Research Institute for Mathematics, University of Bonn, Germany (June 18 - 20). Invited. Cf. seminar [66]. Participation to the program *Mathematical challenges of materials science and condensed matter physics* (May 2012 – August 2012).

2011 (3)

- [37] *Cinquième Journée Henry EY*, Hôpital Henri Ey, Paris, France (Juin, 15). Invited. Cf. seminar [61].
- [36] *BIRS Workshop 11w5124, Gradient Random Fields*, Banff International Research Station, Canada (May, 29 – June, 3). Invited. Cf. seminar [60].
- [35] *Workshops on “The Renormalization Group”*, Oberwolfach, Germany (March, 13-19). Invited.

2010 (1)

- [34] *Program Matter and radiation*, Erwin Schrödinger International Institute for Mathematical Physics (ESI), Austria (May, 3 – July, 30).

2008 (2)

- [33] *Quantum many-body systems; Bose-Einstein condensation*, C.R.M., Montréal, Canada (29 September, 29 - October, 4). Invited. Cf. seminar [50].
- [32] *Mathematical Approaches to Collective Phenomena in Large Quantum Systems*, Oberwolfach, Germany (August, 31- September, 6). Invited. Cf. seminar [49].

2007 (4)

- [31] *10th Quantum Mathematics International Conference*, Moeciu, Romania, (September, 10-15). Invited. Cf. seminar [43].
- [30] *INSTANS Summer School 2007*, Oxford (August, 26 – September, 2). Invited.
- [29] *Analysis and Stochastics in Quantum Many-Body Systems*, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany (May, 17-19). Invited.
- [28] *Mathematical Analysis of Quantum Systems*, D.I.A.S, Dublin, Ireland (April, 2-4). Invited. Cf. seminar [40].

2006 (4)

- [27] *Bose-Einstein-Kondensation*, Evangelisches Studienwerk, Germany (May, 8-10). Invited. Cf. seminar [39].
- [26] *The Rigorous Renormalization Group*, Oberwolfach, Germany (April, 9-15). Invited.
- [25] *Frankfurter Stochastik-Tage 2006*, Goethe-Universität, Frankfurt, Germany (March, 14-17).
- [24] *5th International Conference on Analysis and Quantum*, Erwin-Schrödinger Institute, Vienna, Austria (March, 4-6).

2005 (6)

- [23] *Bose-Einstein Condensation and Quantum information*, Erwin-Schrödinger Institute, Vienna, Austria (December, 18-20).
- [22] *Workshops on Analysis and Quantum Theory*, Oberwolfach, Germany (September, 18-24). Invited.
- [21] *2nd Joint Meeting of AMS, DMV, ÖMG*, Johannes Gutenberg University, Mainz, Germany (June, 16-19).
- [20] *4th International Conference on Analysis and Quantum*, Mathematics Institute of LMU, Munich, Germany (April, 9-11). Invited. Cf. seminar [35].
- [19] *Berlin 2005, "Physik seit Einstein"*, Technische Universität Berlin, Germany (March, 4-9). Cf. seminar [34].
- [18] *Stochastic models for materials*, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany (February, 7-17).

2004 (6)

- [17] *Progress in Mathematical Many-Body Quantum Theory*, Workshop at the Erwin-Schrödinger Institute, Vienna, Austria (December, 1-4).
- [16] *International Meeting on Mathematical Analysis of Quantum Systems IV*, D.I.A.S, Dublin, Ireland (September 29 - October 1). Cf. seminar [31].
- [15] *New Mathematical Problems in Quantum Many Body Theory*, Workshop at the Erwin Schrödinger Institute, Vienna, Austria (September, 6-10). Invited.
- [14] *Workshops on Phase Transition*, Oberwolfach, Germany (June, 20-25). Cf. seminar [29], invited.

- [13] *The Mathematics of the Bose Gas and its Condensation*, Oberwolfach, Germany (30th May-5th June). Invited.
- [12] *Workshop on Aspects of Large Quantum Systems Related to Bose-Einstein Condensation*, Department of Mathematical Sciences, University of Aarhus, Denmark (April, 14-18).

2003 (2)

- [11] *International Meeting on Mathematical Analysis of Quantum System*, D.I.A.S, Dublin, Ireland (October, 2-4). Cf. seminar [26].
- [10] *XIV International Congress on Mathematical Physics*, University of Lisbon, Portugal (July 28 - August 2).

2002 (3)

- [9] *Marie Curie Scientific Workshops: Special European Event*, San Sebastian, Spain (November, 28-30). Cf. seminar [23], invited.
- [8] *International Meeting on Mathematical Analysis of Quantum Systems* D.I.A.S, Dublin, Ireland (September, 19-21). Cf. seminar [21].
- [7] *Rencontre de Physique Statistique*, ESCPI and ENS, Paris, France (January, 24-25). Cf. seminar [20].

1999 (2)

- [6] *Congrès général de la S.F.P.*, Clermont-Ferrand, France (July, 5-9). Cf. seminar [9].
- [5] *Rencontre de Physique Statistique*, ESCPI and ENS, Paris, France (January, 28-29). Cf. séminaire [7].

1998 (4)

- [4] *17th General Conference of the Condensed Matter Division European Physical Society*, Grenoble, France (August, 25-29). Poster (*Exact solution of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*).
- [3] *Mathematical Results in Statistical Mechanics*, University of Aix-Marseille II, Marseille, France (July, 27-31). Cf. seminar [4].
- [2] *STATPHYS20*, UNESCO and Sorbonne, Paris, France (July, 20-24). Poster (*Exact solution of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*).
- [1] *Mathematical Physics Days*, Theoretical Physics Department, Catholic University of Leuven, Belgium (May, 18-19). Cf. seminar [3], invited.

| |
|-----------------|
| SEMINARS |
|-----------------|

[94 across Armenia, Austria, Belgium, Brazil, Canada, Denmark, England, France, Germany, Ireland, Italy, Romania, Spain, Switzerland, USA]

2018 (2)

-
- [94] *Classical Dynamics From Self-Consistency Equations in Quantum Mechanics*, Institut Elie Cartan de Lorraine, Université de Lorraine, France. (April 19).
 - [93] *Classical Dynamics From Self-Consistency Equations in Quantum Mechanics*, BCAM, Bilbao, Spain. (March 10).

2017 (3)

-
- [92] *Lieb-Robinson Bounds for Multi-Commutators*, Oberwolfach, Germany. (September 13).
 - [91] *Lieb-Robinson Bounds for Multi-Commutators*, ETH Zurich, Switzerland. (May 30).
 - [90] *Lieb-Robinson Bounds for Multi-Commutators*, University of Toulon, France. (February 23).

2016 (5)

-
- [89] *Universal Bounds for Large Determinants from Non-Commutative Hölder Inequalities in Fermionic Constructive Quantum Field Theory*, Schrödinger International Institute for Mathematics and Physics. (October 5).
 - [88] *Universal Bounds for Large Determinants from Non-Commutative Hölder Inequalities in Fermionic Constructive Quantum Field Theory*, American University of Armenia. (September 6).
 - [87] *Universal Bounds for Large Determinants from Non-Commutative Hölder Inequalities in Fermionic Constructive Quantum Field Theory*, Aalborg University, Denmark. (May 26).
 - [86] *On Charged Transport Properties from Quantum Mechanics*, BCAM, Bilbao. (May 5).
 - [85] *From the 2nd Law of Thermodynamics to AC-Conductivity Measures of Interacting Fermions in Disordered Media*, Centre International de Rencontres Mathématiques (CIRM), Marseille, France (April 19).

2015 (3)

-
- [84] *Témoignage éclectique autour de la Physique Mathématique*, ESTIA, France (October 8).
 - [83] *Spins or Fermi Systems With Long Range Interactions*, University of São Paulo, Brazil (July 18).
 - [82] *Mathematical approach to d-wave superconductivity*, BCAM, Spain (May, 27).

2014 (4)

-
- [81] *From the 2nd Law to AC-Conductivity Measures of Interacting Fermions in Disordered Media*, La Spezia University, Italy (September, 2).
 - [80] *Brocket-Wegner Flow and Diagonalization of Quadratic Operators in Boson Quantum Field Theory*, Basque Center for Applied Mathematics (BCAM), Spain (July, 16).
 - [79] *Conductivity Measure for Lattice Fermions from the Second Law of Thermodynamics*, Department of Mathematical Sciences, Aalborg University, Denmark (April 25).
 - [78] *Conductivity Measure for Lattice Fermions from the Second Law of Thermodynamics*, Université de Cergy-Pontoise, France (March, 12)

2013 (6)

-
- [77] *Conductivity Measure for Lattice Fermions from the Second Law of Thermodynamics*, ICTP South American Institute for Fundamental Research, (December, 9).

- [76] *Conductivity Measure for Lattice Fermions from the Second Law of Thermodynamics*, Department of Mathematics, University of the Basque Country UPV/EHU (November, 21).
- [75] *AC-Conductivity Measure from the Entropy Production of Fermions in Disordered Media*, Institut Henri Poincaré, 11 rue Pierre et Marie Curie, Paris, France (April, 25).
- [74] *A microscopic two-band model for the electron-hole asymmetry in high-Tc superconductors and reentering behavior*, Department of Mathematical Physics, University of Sao Paulo (March, 20).
- [73] *AC-Conductivity Measure from the Entropy Production of Fermions in Disordered Media*, Department of Mathematical Physics, University of Sao Paulo, Brazil (March, 13).
- [72] *AC-Conductivity Measure from the Entropy Production of Fermions in Disordered Media*, Department of Mathematics, University of the Basque Country UPV/EHU (January, 17).

2012 (10)

- [71] *Microscopic Foundations of the Meißner Effect - Thermodynamic Aspects*, Department of Mathematics, University of the Basque Country UPV/EHU (December, 20).
- [70] *Analysis of a Non-Autonomous Non-Linear Operator-Valued Evolution Equation to Diagonalize Quadratic Operators in Boson Quantum Field Theory*, Basque Center for Applied Mathematics (BCAM), Spain (October, 19).
- [69] *AC-Conductivity Measure from the Entropy Production of Fermions in Disordered Media*, School of Theoretical Physics, Dublin Institute for Advanced Studies (DIAS), 10 Burlington Road, Dublin 4, Ireland (October, 9).
- [68] *Spins or Fermi Systems With Long Range Interactions*, XVII International Congress on Mathematical Physics, Aalborg - Denmark (August, 6).
- [67] *Microscopic Foundations of the Meißner Effect - Thermodynamic Aspects*, Mathematics Department, Braunschweig University, Germany (July, 3).
- [66] *Microscopic Foundations of the Meißner Effect - Thermodynamic Aspects*, Hausdorff Research Institute for Mathematics, Bonn, Germany (June, 18).
- [65] *Diagonalization of Quadratic Operators via Non-Autonomous Evolution Equations*, Department of Mathematics, University of the Basque Country UPV/EHU (June, 7).
- [64] *Fermi Systems With Long Range Interactions*, Laboratoire d'Analyse, Topologie et Probabilités (UMR 6632), Centre de Mathématiques et Informatique, Aix-Marseille Université, Marseille Cedex 13, France (May, 22).
- [63] *Fermi Systems With Long Range Interactions*, School of Theoretical Physics, Dublin Institute for Advanced Studies (DIAS), 10 Burlington Road, Dublin 4, Ireland (April, 24).
- [62] *Diagonalization of Quadratic Operators via Non-Autonomous Evolution Equations*, FB 08 Institute of Mathematics, Johannes Gutenberg-University Mainz, Germany, (February, 22).

2011 (2)

- [61] *Ethique et Sciences*, Hôpital Henri Ey, Paris, France (Juin, 15).
- [60] *Diagonalization of Quadratic Operators via Non-Autonomous Evolution Equations*, Banff International Research Station, Canada (May, 29).

2010 (1)

- [59] *Non-cooperative Equilibria of Fermi Systems With Long Range Interactions*, Instituto de Ciencias Matemáticas (Institute for the Mathematical Sciences), Spain (November, 4).

2009 (7)

- [58] *Non-cooperative Equilibria of Fermi Systems With Long Range Interactions*, Department of Mathematics, University of the Basque Country UPV/EHU, Spain (December, 11).
- [57] *Effect of locally repulsive interactions on s-wave superconductors*, Department of Theoretical Physics, University of the Basque Country UPV/EHU, Spain (November, 18).

- [56] *Mathematics of the quantum many-body problem and condensed matter physics*, University of the Basque Country UPV/EHU, Spain (June, 30).
- [55] *Mathematics of the quantum many-body problem and condensed matter physics*, Basque Center for Applied Mathematics (BCAM), Spain (June, 2).
- [54] *Effect of locally repulsive interactions on s-wave superconductors*, Institut für theoretische Physik, Heidelberg University, Germany (May, 19).
- [53] *Equilibrium states of Fermi systems*, FB 08 Institute of Mathematics, Johannes Gutenberg-University Mainz, Germany (February, 3).
- [52] *Equilibrium states of Fermi systems and superconductivity*, Warwick Mathematics Institute, England (January, 22).

2008 (4)

- [51] *On the Brockett Flow Equation*, Fakultät für Physik, Universität Wien, Austria (October, 21).
- [50] *Effect of locally repulsive interactions on s-wave superconductors*, C.R.M., Montréal, Canada (October, 3).
- [49] *On the Brockett Flow Equation*, Oberwolfach, Germany (September, 4).
- [48] *The Effect of a locally repulsive interaction on s-wave superconductors*, Fakultät für Physik, Universität Wien, Austria (May, 13).

2007 (8)

- [47] *Perspectives technologiques des condensats de Bose-Einstein, Part II*, Sochrastem, Paris, France, (December, 17).
- [46] *Large Deviations Principles in the Superstable Weakly Imperfect Bose Gas Part II*, Fakultät für Physik, Universität Wien, Austria (November, 27).
- [45] *Large Deviations Principles in the Superstable Weakly Imperfect Bose Gas Part I*, Fakultät für Physik, Universität Wien, Austria (November, 13).
- [44] *Perspectives technologiques des condensats de Bose-Einstein, Part I*, Société Sochrastem, Paris, France, (November, 5).
- [43] *Flow equations for operators and non-autonomous evolution equations*, 10th Quantum Mathematics International Conference, Moeciu, Romania (September, 10).
- [42] *Rapidly Rotating Bose Gases in Anharmonic Traps*, FB 08 Institute of Mathematics, Johannes Gutenberg-University Mainz, Germany (July, 17).
- [41] *Flow equations for operators and non-autonomous evolution equations*, Centre of Theoretical Physics (C.P.T.), Marseille, France, (June, 20).
- [40] *Flow equations for operators and non-autonomous evolution equations*, Workshop on Mathematical Analysis of Quantum Systems, D.I.A.S, Dublin, Ireland (April, 3).

2006 (1)

- [39] *Depletion of the Bose condensate: new insights*, Workshop on Bose-Einstein-Kondensation, Evangelisches Studienwerk, Germany (May, 9).

2005 (6)

- [38] *An attempt beyond the non-dilute Bose gas*, Mathematical institute at University of Tübingen, Germany (December, 8).
- [37] *About the quantum many-body problem*, University of Aix-Marseille II, France (November, 28).
- [36] *An attempt beyond the non-dilute Bose gas*, Institut für Analysis, Dynamik und Modellierung, Fachbereich Mathematik, Stuttgart University, Germany (November, 15).
- [35] *An attempt beyond the non-dilute Bose gas*, 4th International Conference on Analysis and Quantum, Mathematics Institute of LMU, Munich, Germany (April, 9).
- [34] *New superfluidity theory: a weakly interacting but non-dilute Bose Gas*, Conference: Berlin 2005, "Physik seit Einstein", Germany (March, 4).

- [33] *A superfluidity theory for the non-dilute Bose gas*, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany (February, 8).

2004 (6)

- [32] *A new microscopic theory of superfluidity at non-zero temperatures*, LPTMS, Paris-Sud University, Orsay, France (October, 12).
- [31] *A new superfluidity theory for the non-dilute Bose gas*, Meeting on Mathematical Analysis of Quantum Systems IV, D.I.A.S., Dublin, Ireland (September, 30).
- [30] *A new superfluidity theory for the non-dilute Bose gas*, Erwin Schrödinger Institute, Vienna, Austria (September, 20).
- [29] *A superfluidity theory for the non-dilute Bose gas*, Workshops on Phasenübergänge, Oberwolfach, Germany (June, 23).
- [28] *A new microscopic theory of superfluidity at all temperatures*, Kastler Brossel, Physics Department of “Ecole Normale Supérieure”, France (May, 26).
- [27] *A new microscopic theory of superfluidity at all temperatures*, FB 08 Institute of Mathematics, Johannes Gutenberg-University Mainz, Germany (May, 24).

2003 (2)

- [26] *A new microscopic theory of superfluidity*, International Meeting at the School of Theoretical Physics on "Mathematical Analysis of Quantum Systems", Ireland (October, 4).
- [25] *A new microscopic theory of superfluidity*, the Dublin QFT seminar, School of Mathematics, Trinity College, Dublin, Ireland (February).

2002 (6)

- [24] *The Bose condensation phenomenon*, UC Dublin, Ireland (December, 5).
- [23] *Difficulties encountered in mixing academic research and the private sector*, 14th Workshop of Marie Curie Fellows, San Sebastian, Spain (November, 30).
- [22] *The Bose condensation phenomenon*, Institut für Mathematik Technische Universität Berlin, Germany (October, 2).
- [21] *Equivalence of ensembles and superstabilization of Bose systems*, in a workshop on Theoretical Physics, D.I.A.S., Dublin, Ireland (September).
- [20] *Equivalence of ensembles and superstabilization of Bose systems*, “Rencontre de Physique Statistique”, ESCPI and ENS, Paris, France (January, 24).
- [19] *Equivalence of ensembles and superstabilization of Bose systems*, Centre of Theoretical Physics (C.P.T.), Marseille, France, (January).

2001 (4)

- [18] *Equivalence of ensembles and superstabilization of Bose systems*, Institut für Mathematik Technische Universität Berlin, Germany, (December, 17).
- [17] *Les condensations de Bose*, Theoretical Physics Department, University of Paris-Sud, Orsay, France (September).
- [16] *Bose condensations: experiment and theory*, UC Davis Department of Physics, Davis, California, USA (June, 8).
- [15] *Le phénomène de condensation de Bose et le Gaz de Bogoliubov*, CPHT-Ecole Polytechnique, Palaiseau, France (March).

2000 (3)

- [14] *Bogoliubov Gas and coexistence of conventional and non-conventional condensations*, “Laboratoire de Physique Quantique”, University of Paul Sabatier, Toulouse, France (December, 19).

- [13] *Bogoliubov Gas and coexistence of conventional and non-conventional condensations*, Center for Mathematical Sciences Research, Rutgers, The State University, New Jersey, USA (September).
- [12] *Conventional and non-conventional condensations - Bogoliubov Gas*, UC Davis Department of Mathematics, Davis, California, USA (September).

1999 (6)

- [11] *Bogoliubov Gas and coexistence of conventional and non-conventional condensations*, Department of Theoretical Physics and Modelisation, Cergy-Pontoise, France (October, 1).
- [10] *Bogoliubov Gas and coexistence of conventional and non-conventional condensations*, Centre of Theoretical Physics (C.P.T.), Marseille, France (September).
- [9] *Thermodynamic of the Bogoliubov Bose-Gas: non-conventional and conventional condensations*, “Congrès général de la Société Française de Physique”, Clermont-Ferrand, France (July).
- [8] *Bose-Einstein condensation in trapped alkali dilute-gases*, Centre of Theoretical Physics (C.P.T.), Marseille, France (February).
- [7] *Thermodynamic of the Bogoliubov Bose-Gas*, “Rencontre de Physique Statistique”, ESCPI and ENS, Paris, France (January).
- [6] *Thermodynamic of the Bogoliubov Bose-Gas: non-conventional and conventional condensations*, Centre of Theoretical Physics (C.P.T.), Marseille, France (January).

1998 (4)

- [5] *Modèles manifestant deux types de condensations de Bose*, Centre of Theoretical Physics (C.P.T.), Marseille, France (December).
- [4] *Exact solution of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*, Mathematical Results in Statistical Mechanics, University of Aix-Marseille II, Marseille, France (July, 27).
- [3] *Bogoliubov theory for superfluidity*, Mathematical Physics Days, Theoretical Physics Department, Catholic University of Leuven, Belgium (May, 19).
- [2] *Exact solution of the Bogoliubov Hamiltonian for Weakly Imperfect Bose-Gas*, Centre of Theoretical Physics (C.P.T.), Marseille, France (March).

1997 (1)

- [1] *Rôles des fluctuations quantiques dans l'instabilité du modèle de Bogoliubov*, Centre of Theoretical Physics (C.P.T.), Marseille, France (June).

TEACHING EXPERIENCE**2009-2017 Ikerbasque Research Prof., BCAM-UPV/EHU. Hours: 76**

- 03/2018: Working group on “*Semigroup Theory in Quantum Mechanics*” (8 students, from bachelor to predoc, graduate course, 20 hours) within the “VIII Escuela-Taller de Analisis Funcional”. Review article to be submitted by the students to [TEMat](#).
- 10/2017: BCAM-Lectures on “*The Topos-theoretic Approach to Quantum Physics*” (3 students, postgraduate course, 10 hours). In collaboration with W. de Siqueira Pedra.
- 11/2015: BCAM-Lectures on “*From the 2nd Law of Thermodynamics to AC-Conductivity Measures of Interacting Fermions*” (4 students, postgraduate course, 10 hours).

10/2010-02/2011: BCAM-Lectures on “*Algebraic Quantum Statistical Mechanics*” (4 students, postgraduate course, 36 hours).

2015 Ikerbasque Research Prof., Roma Tre University, Italy. Hours: 8



17/03 - 19/03: Lectures on “*Lieb-Robinson Bounds for Multicommutators*” (about 8 students, postgraduate course, 8 hours in the Department of Mathematics and Physics).

2014-2019 Ikerbasque Research Prof., University of Sao Paulo, Brazil. Hours: 40



04/2019 - 06/2019: Lectures on “*Application of Choquet Theory to the Study of Lattice Fermi Systems with Long-Range Interactions*” (6 students +, graduate course, 60 hours in the Department of Mathematical Physics, in collaboration with W. de Siqueira Pedra).

11/2014: Lectures on “*From the 2nd Law of Thermodynamics to AC-Conductivity Measures of Interacting Fermions*” (about 10 students, postgraduate course, 10 hours in the Department of Mathematical Physics).

2006-2008 Assistant Professor, Physics University of Vienna, Austria. Hours: 240



Winter semester 2008: - Lectures on “*mathematical methods of theoretical physics II*” (67 students, 1st and 2nd years, 45 hours).
 - Exercise class on “*mathematical methods of theoretical physics II*” (24 students, 1st and 2nd years, 15 hours).
 See <http://www.thp.univie.ac.at/deutsch/institut/studies.htm>

Summer semester 2008:- Exercise class on “*mathematical methods of theoretical physics I*” (24 students, 1st year, 30 hours).
 - Exercise class on “*quantum mechanics II*” (14 students, 2nd and 3rd years, 30 hours).

Winter semester 2007: - Exercise class on “*mathematical methods of theoretical physics I*” (23 students, 1st year, 30 hours).
 - Exercise class and some lectures (10 hours) on “*quantum mechanics of large systems*” (5 students, 5th year, 30 hours).

Summer semester 2007:- Exercise class on “*mathematical methods of theoretical physics II*” (30 students, 1st and 2nd years, 30 hours).

Winter semester 2006: - Some exercise classes (4 hours) and some lectures (16 hours) on “*quantum mechanics II*” (2nd and 3rd years).

2000-2001 V. R. Assistant Professor, UC Davis, USA. Hours: 132+120 office hours.



Spring quarter 2001: - Lectures on “*differential equations*” (65 students, 1st year, 30 hours in addition to 30 office hours).
 See <http://homepage.univie.ac.at/jean-bernard.bru/MAT22B.htm>

Winter quarter 2001: - Lectures on “*integral calculus*” (108 students, 1st year, 30 hours in addition to 30 office hours).
 See [http://homepage.univie.ac.at/jean-bernard.bru/MAT21B\(L\).htm](http://homepage.univie.ac.at/jean-bernard.bru/MAT21B(L).htm)

Fall quarter 2000: - Lectures on “*linear algebra*” (51 students, 3rd and 4th years, 30 hours in addition to 30 office hours).
 See <http://homepage.univie.ac.at/jean-bernard.bru/MAT167.htm>

- Lectures on “*introduction to linear algebra*” (27 students, 1st year, 30 hours in addition to 30 office hours).

See <http://homepage.univie.ac.at/jean-bernard.bru/MAT022A.htm>

1997-2000 PhD Scholarship, Aix-Marseille II University, France. Hours: 165

1997-2000: - Exercise classes at the Mathematical Department of Aix-Marseille II University (1st and 2nd years, 150 hours).

1998: - Exercise class and one lecture (2 hours) in mathematics at the Sport Department of Aix-Marseille II University (1st year, 13 hours).

1998 PhD Scholarship, University of Toulon, France. Hours: 13

1998: - Exercise class at the Mathematical Department of University of Toulon (1st year, 13 hours).