CURRICULUM VITAE

Carlos Navarrete-Benlloch

(January, 2020)

INDEX

1.- PERSONAL INFORMATION

Name: Carlos Navarrete-Benlloch

Birth: February 10th, 1983 (Valencia, Spain)

Address: Office 811, New Physics Building number 5
Wilczek Quantum Center
Shanghai Jiao Tong University
Dongchuan Road 800, Minhang District,
Shanghai, China 200240

Phone: (+86) 13162897467

Email: derekkorg@gmail.com

Web: www.carlosnb.com

Current state: Associate Professor (tenure track).

Research interests: My research is at the interface between theoretical quantum physics and modern technologies, in a field that has come to be known as *Quantum Optics*, dealing with systems described quantum electrodynamics at low energies under open and nonequilibrium conditions. I am particularly interested in *open* and/or *critical quantum optical systems*. By *open* I mean systems that exchange energy and information with its surrounding environment (e.g., through dissipation). By *critical*, I refer to systems that undergo some kind of phase transition or sudden change of behavior as their parameters are changed. I focus on three aspects of such systems: developing or adapting *mathematical techniques* to describe them, proposing *implementations* of interesting models in modern platforms (nonlinear optics, superconducting circuits, mechanical devices, cold atoms, and exciton polaritons), and seeking for *new phenomena* and *applications* such as quantum state preparation. I also work on and off in quantum simulators, quantum information with continuous variables, and quantum walks.

For further references contact:

J. Ignacio Cirac (postdoc adv. 2012-2016)
Director at the
Max-Planck Institute for Quantum Optics
Email: ignacio.cirac@mpq.mpg.de

Florian Marquardt (adv. since 2016)
Director at the
Max-Planck Institute for the Science of Light
Email: florian.marquardt@mpl.mpg.de

Germán J. de Valcárcel (PhD adv.)
Full Professor at
Valencia University
Email: german.valcarcel@uv.es

Eugenio Roldán (PhD adv.)
Full Professor at
University of Valencia
Email: eugenio.roldan@uv.es

2.- ACADEMIC TITLES

- *European PhD degree* at the Universitat de València.
  Feb 2008 - December 2011.
  Summa cum laude (highest honour).
- *Master in Advanced Physics* (specialty on *Theoretical Physics*) at the Universitat de València.
  September 2006 - Nov 2007.
  Global Mark: 9.2 (over 10).
- *5-year Degree* in *Physics* (specialty on *Theoretical Physics*) at the Universitat de València.
  September 2001 – July 2006.
  Global Mark: 9.12 (over 10).

3.- EMPLOYMENT HISTORY

- *Associate professor (tenure track)*
  Place: Wilczek Quantum Center, Shanghai Jiao Tong University.
  April 2019 - present
- *Research group leader*.
  Granted by Florian Marquardt's Theory Division.
  Place: Max-Planck Institute for the Science of Light.
  November 2017 – March 2019
- *Senior postdoctoral research associate*.
  Granted by the Max-Planck Society.
  Place: Max-Planck Institute for the Science of Light.
  November 2016 – October 2017
- *Senior postdoctoral research associate*.
  Granted within the ERC starting grant "Theory of optomechanical circuits".
  Place: Friedrich-Alexander Erlangen-Nürnberg Universität.
  February 2016 – October 2016
- *Senior postdoctoral research associate*.
  Granted by the Max-Planck Society.
  Place: Max-Planck Institute for Quantum Optics, J. Ignacio Cirac's Theory Division.
  February 2015 – January 2016
- *Alexander von Humboldt society fellowship for postdoctoral researchers*.
  Granted by the Alexander von Humboldt society.
  Place: Max-Planck Institute for Quantum Optics, J. Ignacio Cirac's Theory Division.
  February 2013 – January 2015
- *Postdoctoral research associate*.
  Granted by the Max-Planck Society under the European Commission FP7 Project: 265522.
  Place: Max-Planck Institute for Quantum Optics, J. Ignacio Cirac's Theory Division.
  February 2012 – January 2013
- *Beca de formación del profesorado universitario* (*FPU* - Ph.D. grant).
  Granted by the Spanish Education and Science.
  Topic: *Squeezing in Nonlinear Optical Systems*.
  Place: Optics department at Universitat de València.
  May 2007 – April 2011.
- *Becas CSIC de introducción a la investigación para estudiantes de Últimos Cursos*.
  Granted by the Spanish Research Council (CSIC).
  Topic: *Quantum Information and Quantum Optics*.
  Place: IFIC (Particle Physics Institute) - Universitat de València.
  September – December, 2006.
  July and September, 2005.
- *Beca de colaboración para estudiantes de Último Curso*.
  Granted by the Spanish Ministry of Education and Science.
  Topic: *Study of methods for the design of biological systems with given optical functionalities*.
  Place: Optics Department (Universidad de Valencia).
  January – June, 2006.

4.- Publications

4.1.- Published articles

1. N. Mohseni, S. Saeidian, J. P. Dowling, and C. Navarrete-Benlloch.
Deterministic generation of hybrid high-N00N states with Rydberg atoms trapped in microwave cavities.
Phys. Rev. A **101**, 013804 (2020).

2. E. Roldán, J. Kofler, and C. Navarrete-Benlloch.
Light polarization measurements in tests of macrorealism.
Phys. Rev. A **97**, 062117 (2018).

3. J. Ruiz-Rivas, G. J. de Valcárcel, and C. Navarrete-Benlloch.
Active locking and entanglement in type II optical parametric oscillators.
New J. Phys. **20**, 023004 (2018).

4. C. Navarrete-Benlloch, G. Patera, and G. J. de Valcárcel.
Noncritical generation of nonclassical frequency combs via spontaneous rotational symmetry breaking.
Phys. Rev. A **96**, 043801 (2017).

5. C. Navarrete-Benlloch, T. Weiss, S. Walter, and G. J. de Valcárcel.
General linearized theory of quantum fluctuations around arbitrary limit cycles.
Phys. Rev. Lett. **119**, 133601 (2017).

6. Y. Chang, C. Sánchez Muñoz, C. Navarrete-Benlloch*, A. González-Tudela, and T. Shi.
Deterministic down-converter and continuous photon-pair source within the bad cavity limit.
Phys. Rev. Lett. **117**, 203602 (2016).
*All authors contributed equally, so all authors are to be considered first author.

7. M. Abdi, P. Degenfeld-Schonburg, M. Sameti, C. Navarrete-Benlloch, and M. J. Hartmann.
Dissipative optomechanical preparation of macroscopic quantum superposition states.
Phys. Rev. Lett. **116**, 233604 (2016).

8. J. Ruiz-Rivas, C. Navarrete-Benlloch, G. Patera, E. Roldán, and G. J. De Valcárcel.
Dissipative structures in optomechanical cavities.
Phys. Rev. A **93**, 033850 (2016).

9. S. Pina-Otey, F. Jiménez, P. Degenfeld-Schonburg, and C. Navarrete-Benlloch.
Classical and quantum-linearized descriptions of degenerate optomechanical parametric oscillators.
Phys. Rev. A **93**, 033835 (2016).

10. M. Benito, C. Sánchez Muñoz, and C. Navarrete-Benlloch.
Degenerate parametric oscillation in quantum membrane optomechanics.
Phys. Rev. A **93**, 023846 (2016).

11. P. Degenfeld-Schonburg, M. Abdi, M. J. Hartmann, and C. Navarrete-Benlloch.
Degenerate optomechanical parametric oscillators: cooling in the vicinity of a critical point.
Phys. Rev. A **93**, 023819 (2016).

12. P. Degenfeld-Schonburg, C. Navarrete-Benlloch, and M. J. Hartmann.
Self-consistent projection operator theory in nonlinear quantum systems: A case study on degenerate optical parametric oscillators.
Phys. Rev. A **91**, 053850 (2015).

13. C. Navarrete-Benlloch, J. J. García-Ripoll, and D. Porras.
Nonclassical lasing in circuit quantum electrodynamics.
Physical Review Letters **113**, 193601 (2014).

14. C. Navarrete-Benlloch, E. Roldán, Y. Chang, and T. Shi.
Regularized linearization for quantum nonlinear cavities: *application to degenerate optical parametric oscillators*.
Optics Express **22**, 24010 (2014)

15. C. Navarrete-Benlloch and G. J. de Valcárcel.
Impact of anisotropy in the noncritical squeezing properties of two-transverse-mode optical parametric oscillators.
Physical Review A **87**, 065802 (2013).

16. C. Navarrete-Benlloch, R. García-Patrón, J. H. Shapiro, and N. J. Cerf.
Enhancing entanglement by photon addition and subtraction.
Physical Review A **86**, 012328 (2012).

17. G. Patera, C. Navarrete-Benlloch, G. J. de Valcárcel, and C. Fabre.
Quantum coherent control of highly-multipartite continuous-variable entangled states by tailoring parametric interactions.
European Physical Journal D **66**, 241 (2012).

18. R. García-Patrón, C. Navarrete-Benlloch, S. Lloyd, J. H. Shapiro, and N. J. Cerf.
Majorization theory approach to the Gaussian channel minimum entropy conjecture.
Physical Review Letters **108**, 110505 (2012).

19. C. Navarrete-Benlloch, E. Roldán, and G. J. de Valcárcel.
Squeezing properties of a two-transverse-mode degenerate optical parametric oscillator with an injected signal.
Physical Review A **83**, 043812 (2011).

20. C. Navarrete-Benlloch, I. de Vega, D. Porras, and J. I. Cirac.
Simulating quantum-optical phenomena with cold atoms in optical lattices.
New Journal of Physics **13**, 023024 (2011).

21. F. V. Garcia-Ferrer, C. Navarrete-Benlloch, G. J. de Valcárcel, and E. Roldán.
Noncritical quadrature squeezing through spontaneous polarization symmetry breaking.
Optics Letters **35**, 2194 (2010).

22. C. Navarrete-Benlloch, A. Romanelli, E. Roldán, and G. J. de Valcárcel.
Noncritical quadrature squeezing in two-transverse-mode optical parametric oscillators.
Physical Review A **81**, 043829 (2010).

23. F. V. Garcia-Ferrer, C. Navarrete-Benlloch, G. J. de Valcárcel, and E. Roldán.
Squeezing via spontaneous rotational symmetry breaking in a four-wave mixing cavity.
IEEE Journal of Quantum Electronics **45**, 1404 (2009).

24. C. Navarrete-Benlloch, G. J. de Valcárcel, and E. Roldán.
Generating highly squeezed Hybrid Laguerre-Gauss modes in large-Fresnel-number degenerate optical parametric oscillators.
Physical Review A **79**, 043820 (2009).

25. C. Navarrete-Benlloch, E. Roldán, and G. J. de Valcárcel.
Noncritically squeezed light via spontaneous rotational symmetry breaking.
Physical Review Letters **100**, 203601 (2008).

26. C. Navarrete-Benlloch, A. Pérez, and Eugenio Roldán.
Non-linear optical Galton board.
Physical Review A **75**, 062333 (2007).

27. M.C. Bañuls, C. Navarrete, A. Pérez, Eugenio Roldán, and J.C. Soriano.
Quantum walk with a time-dependent coin.
Physical Review A **73**, 062304 (2006).

4.2.- Preprints

28. J. Ruiz-Rivas, C. Navarrete-Benlloch, E. Roldán, and G. J. de Valcárcel.
Dissipative structures in an optomechanical cavity model with a microstructured oscillating end mirror.
arXiv:1609.07405.

4.3.- Books and lecture notes

1. *An introduction to the formalism of quantum information with continuous variables*.
   Morgan and Claypool Publishers – Institute of Physics Publishing
   December, 2015; Concise Physics series.
2. *Open systems dynamics: simulating master equations in the computer*.
   arXiv: 1504.05266.
3. *An introduction to open quantum optical systems*.
   Morgan and Claypool Publishers – Institute of Physics Publishing
   In preparation.

5.- TEACHING ACTIVITY

- *Open quantum optical systems*
  Friedrich-Alexander University (Erlangen, Germany).
  2017/2018 Winter Semester. Elective Bachelor, Master, PhD course, 5 ECTS credits (3 hours/week).
- *A primer on quantum optics and open systems*
  Max-Planck Institute for the Science of Light (Erlangen, Germany).
  OMT Marie-Curie Training Network Summer School.
  July 5^{th} – 7^{th}, 3.5 hours.
- *An introduction to the formalism of quantum information with continuous variables*
  Universitat de València (Burjassot, Spain).
  November-December, 2011. 10-hour seminar for the PhD program.
- *San José de Calasanz High School* (Valencia).
  January 23^{th} – 25^{th}, 2006.
  Physics and *Mathematics* to 4 groups in the last 3 high-school grades.
- *Individual Teaching of Physics and Mathematics*.
  More than 20 students along the period 1998 – 2003 (*all high-school levels*).

6.- SUPERVISED THESES AND MENTORING

- Current students and postdocs: Naeimeh Mohseni (Postdoc), Emmanouil Grigoriu (PhD), Benjamin Löckler (MSc), and Naeem Khan (PhD visitor, Barry C. Sanders' group).
- Akash nag Oruganti, Master Thesis (*2.7 - Satisfactory*)
  Quantum theory of actively-phase-locked optical parametric oscillators subject to limit-cycle motion.
  Max-Planck Institute for the Science of Light
  and Friedrich-Alexander Erlangen-Nuremberg University (Germany).
- Benjamin Löckler, Bachelor Thesis (*1.0, highest honour*)
  Study of many-body bosonic Hamiltonians under the action of particle non-conserving processes .
  Max-Planck Institute for the Science of Light
  and Friedrich-Alexander Erlangen-Nuremberg University (Germany).
- Naeimeh Mohseni, PhD Thesis (*Excelent*, highest honour)
  Quantum Optical Proposals with Application to Quantum Computation, Simulation, and Metrology.
  December 2019, Institute for Advanced Studies in Basic Sciences (Zanjan, Iran).
- Emmanouil Grigoriu, Master Thesis (*La plus haute distinction*, highest honour).
  Study of autonomous quantum thermodynamical machines.
  September 2018, Free University of Brussels (Belgium).
- Mentor of the 2016/2017 and 2017/2018 *International Mentor Program* of the International Mentoring. Foundation for the Advancement of Higher Education (www.imfahe.org).
- Joaquín Ruiz-Rivas, PhD Thesis (*Summa cum laude*, highest honour).
  Contributions to three models related to cavity quantum optics.
  July 2015, Universitat de València (Valencia, Spain).
- Sebastian Pina-Otey, Bachelor's Thesis (*Extraordinary prize* for theses defended in 2015).
  Classical and quantum linearized descriptions of degenerate optomechanical parametric oscillators.
  July 2015, Universitat Autónoma de Barcelona (Barcelona, Spain).

7.- PARTICIPATION IN RESEARCH PROJECTS

- *Quantum fluctuations and dynamics of optical cavities*.
  Spanish National Project: FIS2011-60715-P
  Full time researcher; scientist in charge: Eugenio Roldán Serrano.
  January 2014 – December 2017.

- *Light-Matter interaction in absence of cavities* (MALICIA).
  European Commission FP7 Project (Information and Communication Technologies): 265522
  Full time researcher; scientist in charge of the MPG node: J. Ignacio Cirac
  February 2012 – January 2013.

- *Classical and quantum dynamics of multimode optical systems*.
  Spanish National Project: FIS2011-26960
  Full time researcher; scientist in charge: Germán J. De Valcárcel.
  January 2012 – December 2014.

- *Spatio-temporal dynamics and quantum fluctuations in optical cavities*.
  Spanish National Project: FIS2008-06024-C03-01
  Full time researcher; scientist in charge: Eugenio Roldán.
  January 2009 – December 2011.

- *Valencian* iGEM[1] *team*.
  January 2006 – November 2006.
  Project: * *Characterization of E.Coli as a pH sensor using the signal transduction system EnvZ-OmpR.*
  * *Design and synthesis of a vanillin-binding periplasmic protein.*
  * *Design and synthesis of a genetic network inside* E.Coli *being able to detect three different levels of an external stimulus.*

- *Collaboration* with the *Quantum and Non Linear Optics Group* belonging to the Optics department at the Universitat de València from April 2005 to May 2007.
  Work topics: *Quantum Walks* and *Squeezed States of Light from Nonlinear Optical Cavities.*

8.- PRIZES AWARDED

- Extraordinary PhD prize of the University of Valencia,
  for theses defended between 2011 and 2013.

- 2nd Prize at the *Certamen Arquímedes para jóvenes investigadores*[2] for
  the work *Non Linear Quantum Walk* (December 1st, 2006).

- 1st place on the local phase (Valencia, Spain) of the XIII *Physics Olympiad* (February 20th, 2001).

[1] iGEM stands for *international Genetically Engineered Machine* competition, a non-lucrative contest promoted by the Massachusetts Institute of Technology (MIT) devised to promote research in Synthetic Biology.
To this aim, the participating teams have to develop a project with the following characteristics:
- Design of a metabolic or/and genetic network with an interesting function inside a cell.
- Mathematical simulation of that network.
- Experimental implementation of the network in a cell (typically, the bacterium *E.Coli*).

Finally, teams from all over the world meet at MIT in order to show and discuss their results.

[2] This is a competition organized by both the Spanish Science Ministry and the Spanish Research Council where undergraduate students can present original, non-published research work. There are two first prizes (science and humanities) of 9.200 €, a second prize of 6.000 €, a third prize of 4000 € and two consolation prizes of 3.000 €.

9.- SEMINARS AND COURSES ATTENDED

- *Quantum Information Processing and Communication* 2011 *school*.
  Included courses: *Superconducting circuits* (*A. Blais*),
  Quantum computing (*D. DiVincenzo*),
  Cold atoms (*J. Home*),
  Opto-mechanical systems (*F. Marquardt*),
  Quantum information theory (*R. Renner*),
  Charges and spins (*S. Tarucha*) and
  Quantum information with photons (*I. Walmsley*).
  Berghaus Diavolezza, Pontresina (Switzerland).
  September 2nd – 4th, 2011.

- *Lindau Nobel Meeting*[3] *2008*, as a young researcher.
  Lectures and scientific discussions with Nobel Laureates:
  W. Arber, *N. Bloemberger*, *J. Deisenhofer*, *M. Eigen*, *R. Giacconi*, *I. Giaever*, *D.A. Glasser*, *R J. Glauber*, *D. Gross*, *P. Grünberg*, *J.L. Hall*, *T.W. Hänsch*, *G. 't Hooft*, *R. Huber*, *B.D. Josephson*, *K. von Klitzing*, *H. Michel*, *C. Rubbia*, *D.D. Osheroff*, *W.D. Philips*, *R.C. Richardson*, *J.R. Schrieffer*, *G.F. Smoot*, *J. Steinberger*, and *M.J.G. Veltman*.
  Lindau, Germany.
  June 29th – July 4th, 2008.

- *Winter school in Optical Sciences*, as a granted student.
  Included courses: *Quantum Gases and Atom Optics* (*T. Esslinger*),
  Nonlinear Optical Microscopy in Life Sciences (*F. Helmchen*),
  Quantum Optics of Mesoscopic Systems (*A. Imamoglu*),
  Ultrafast Laser Physics (*U. Keller*) and
  Light-Matter Interaction at the Nanometre Scale (*V. Sandoghdar*).
  ETH University, Zurich.
  February 25th –March 2nd, 2007.

- *Introduction to Synthetic Biology*.
  Included courses: *Cellular, Genetic and Molecular Biology (both Theory and Lab Work),*
  Mathematical Models for Cellular Metabolism and Genetic Networks,
  Control Theory, Bioinformatics.
  Universidad Politécnica de Valencia - Universidad de Valencia.
  February – June, 2006.

[3] This is a unique meeting where young researchers from all over the world spend an entire week interacting with Nobel Laureates. In the year I participated in the meeting more than 25000 researchers applied, and 551 where finally selected (14 Spanish). Visit www.lindau-nobel.de for more details.

10.- COMMUNICATIONS PRESENTED AT CONGRESSES AND WORKSHOPS

- *Opportunities in quantum simulators subject to particle non-conserving processes.*
  Int. Workshop for Young Researchers: Future of Quantum Science and Technology – Tokyo (Japan)
  Invited talk.
  February 3rd – 8th, 2020

- *Many-body models in quantum simulators subject to particle non-conserving processes.*
  Workshop on quantum simulations and quantum devices – Beijing (China)
  Invited talk.
  November 18th – 22nd, 2019

- *Opportunities in quantum simulators subject to particle non-conserving processes.*
  Symposium of Optical Quantum Technologies – Shanghai (China)
  Invited talk.
  November 5th – 7th, 2019

- *Opportunities in quantum simulators subject to particle non-conserving processes.*
  International conference on optical communications and networks – Huangshan (China)
  Invited talk.
  August 5th – 8th, 2019

- *Many-body models in quantum simulators subject to particle non-conserving processes.*
  Conference of the Royal Spanish Physical Society – Zaragoza (Spain).
  Invited talk.
  July 15th – 18th, 2019

- *Spontaneous symmetry breaking of time translational invariance in open quantum systems*
  Quantum Topology and Time Workshop – Stockholm (Sweden).
  Invited talk.
  June 25th – 29th, 2018.

- *General linearized theory of quantum fluctuations around arbitrary limit cycles.*
  APS March Meeting – Los Angeles (USA).
  Contributed talk.
  March 4th – 9th, 2018.

- *General linearized theory of quantum fluctuations around arbitrary limit cycles.*
  GRC on Mechanical Systems in the Quantum Regime– Ventura (USA).
  Poster communication.
  February 25th – March 2nd, 2018.

- *Dissipative optomechanical preparation of macroscopic spatial superpositions.*
  Central European Workshop in Quantum Optics – Copenhagen (Denmark).
  Poster communication.
  June 26th – 30th, 2017.

- *Dissipative optomechanical preparation of macroscopic quantum spatial superpositions.*
  APS March Meeting – New Orleans (USA).
  Contributed talk.
  March 13th – 17th, 2017.

- *Degenerate parametric oscillation in membrane cavity quantum optomechanics.*
  QIPC – Leeds (UK).
  Contributed talk.
  September 13th – 18th, 2015.

- *Degenerate parametric oscillation in membrane cavity quantum optomechanics.*
  QIPC – Leeds (UK).
  Contributed talk.
  September 13th – 18th, 2015.

- *Degenerate parametric oscillation in membrane cavity quantum optomechanics.*
  CEWQO – Warsaw (Poland).
  Contributed talk.
  July 6th – 10th, 2015.

- *Degenerate parametric oscillation in membrane cavity quantum optomechanics.*
  ICSSUR – Gdańsk (Poland).
  Contributed talk.
  June 29th – July 3rd, 2015.

- *Degenerate parametric oscillation in membrane cavity quantum optomechanics.*
  CQSD – Cartagena (Spain).
  Poster communication.
  May 25th – 29th, 2015.

- *Generation of nonclassical microwave fields through cooling and lasing in circuit QED.*
  23rd International Commission of Optics conference – Santiago de Compostela (Spain).
  Invited talk.
  August 26th – 29th, 2014.

- *Regularized linearization for nonlinear optical cavities.*
  23rd International Commission of Optics conference – Santiago de Compostela (Spain).
  Invited talk.
  August 26th – 29th, 2014.

- *Nonclassical lasing in circuit quantum electrodynamics.*
  Conference on Resonator QED – Munich (Germany).
  Poster communication.
  September 9th – 13th, 2013.

- *Dissipative structures in cavity optomechanics.*
  Reunión bienal de la Real Sociedad Española de Física – Valencia (Spain).
  Contributed talk.
  July 15th – July 19th, 2013.

- *Nonclassical lasing in circuit quantum electrodynamics.*
  Reunión bienal de la Real Sociedad Española de Física – Valencia (Spain).
  Poster communication.
  July 15th – 19th, 2013.

- *Nonclassical lasing in circuit quantum electrodynamics.*
  Quantum Information Processing and Communication international conference – Florence (Italy).
  Contributed talk.
  June 30th – July 5th, 2013.

- *Nonclassical lasing in circuit quantum electrodynamics.*
  Central European Workshop in Quantum Optics – KTH, Stockholm (Sweeden).
  Contributed talk.
  June 16th – 20th, 2013.

- *Quantum coherent control of Gaussian multipartite entanglement.*
  CLEO/EQEC – Munich (Germany).
  Contributed talk.
  May 12th – 16th, 2013.

- *Dissipative structures in cavity optomechanics.*
  CLEO/EQEC – Munich (Germany).
  Poster communication.
  May 12th – 16th, 2013.

- *Nonclassical lasing in circuit quantum electrodynamics.*
  CLEO/EQEC – Munich (Germany).
  Poster communication.
  May 12th – 16th, 2013.

- *Simulating quantum-optical phenomena with cold atoms in optical lattices.*
  Quantum Information Processing and Communication international conference – ETH University, Zurich (Switzerland).
  Contributed talk.
  September 5th – 9th, 2011.

- *Simulating quantum-optical phenomena with optical lattices.*
  CLEO/EQEC – Munich (Germany).
  Contributed talk.

May 22th – 26th, 2011.

- *Generation of squeezed light by spontaneous polarization symmetry breaking.*
  Meeting of the Quantum Optics and Nonlinear Optics committee of SEDOPTICA – Valladolid (Spain).
  Contributed talk.
  February 10th – 11th, 2011.

- *Generation of squeezed light via spontaneous symmetry breaking.*
  Central European Workshop on Quantum Optics – St. Andrews (Scottland).
  Poster communication.
  June 7th – 11th, 2010.

- *Superradiance and subradiance of collective states of atoms in lattices.*
  Quantum Information Workshop *an der Donau* – Ulm University (Germany).
  Invited talk.
  May 19th, 2010.

- *Spontaneous symmetry breaking as a resource for perfect non-critically squeezed light.*
  SPIE Photonics Europe – Brussels (Belgium).
  Contributed talk.
  April 12th – 16th, 2010.

- *Utilizando la ruptura espontánea de simetrías espaciales para generar luz comprimida*.
  IX Reunión Nacional de Óptica – Ourense (Spain).
  Contributed talk.
  September 14th – 17th, 2009.

- *Generation of squeezed states of light via spontaneous rotational symmetry breaking*.
  18th International Laser Physics Workshop 2009 – Barcelona (Spain).
  Poster communication.
  July 13th – 17th, 2009.

- *Creating Highly Squeezed Vacua in Hybrid Laguerre-Gauss Modes*.
  CLEO/EQEC 2009 – Munich (Germany).
  Poster communication.
  June 14th – 19th, 2009.

- *Squeezing induced by rotational symmetry breaking*.
  CLEO/EQEC 2009 – Munich (Germany).
  Poster communication.
  June 14th – 19th, 2009.

- *Reducción de Ruido en Cavidades Ópticas por Ruptura Espontánea de Simetría Rotacional*.
  No Lineal 2008 – Universitat Politècnica de Catalunya, Barcelona (Spain).
  Contributed talk.
  June 16th – 19th, 2008.

- *Type I Optical Parametric Oscillators above threshold are perfect squeezers for empty Gauss-Hermite modes at any pumping level.*
  9th Coherence and Quantum Optics conference – University of Rochester, Rochester (New York, USA).
  Poster communication.
  June 10th – 13th, 2007.

- *Tablero de Galton Óptico No Lineal.*
  No Lineal 2007 – Universidad de Castilla-La Mancha, Ciudad Real (Spain).
  Contributed talk.
  June 6th – 9th, 2007.

- *Valencia iGEM'06 project: Making E.Coli sense Flavours*.
  iGEM 2006 jamboree – Massachusetts Institute of Technology, Cambridge (Massachusetts, USA).
  Contributed talk and *Poster communication*.
  November 4th and 5th, 2006.

- *Valencia iGEM'06 project: Modular sensing system*.
  XXIX Congress of the *Sociedad Española de Bioquímica y Biología Molecular* – Universidad Miguel Hernández, Elche (Spain).
  Poster communication.
  September 8th – 10th, 2006.

11.- PUBLIC TALKS

- *Quantum physics and the computers to come*
  A Drink with Science series – SAPiencia association.
  December 26th, 2019; Sagunto, Spain.
- *Quantum physics and modern technologies*
  Bétera Science and Technology Foundation.
  December 22nd, 2017; Bétera, Spain.
- *Quantum technologies*
  Valencia Foundation for Advanced Studies.
  October 20th, 2016; Valencia, Spain.
- *Modern quantum technologies*
  A Pint for Science series.
  June 22nd, 2016; Valencia, Spain.

12.- VISITS TO RESEARCH INSTITUTIONS AND UNIVERSITIES

- *Wilczek Quantum Center*.
  Shanghai, China.
  October 24th–29th, 2018.
  Invited by *Frank Wilczek* and *Vincent Liu*.
- *Université Libre de Bruxelles*.
  Brussels, Belgium.
  April 16th–20th; June 18th–19th; September 4th–7th, 2018.
  Invited by *Nicolas Cerf* at the *Centre for Quantum Information and Communication*.
- *Chinese Academy of Sciences*.
  Beijing, China.
  March 14th – 16th, 2018
  Invited by *Tao Shi* at the *Institute of Theoretical Physics*.
- *University of California*.
  Berkeley, CA, USA.
  May 11th – 12th, 2015
  Invited by *Irfan Siddiqi*.
- *UC San Diego*.
  La Jolla, CA, USA.
  May 3rd – 15th, 2015
  Invited by *Julio T. Barreiro*.
- *Beijing Computational Science Research Center*.
  Beijing, China.
  June 26th – July 8th, 2014
  Invited by *ChangPu Sun*.
- *University of Sussex*.
  Brighton, United Kingdom.
  April 13th – 19th, 2014
  Invited by *Diego Porras* at the *Department of Physics and Astronomy*.
- *Université Lille 1*.
  Lille, France.
  June 5th – 8th, 2014
  Invited by *Giuseppe Patera* at the *Laboratoire de Physique des Lasers, Atomes et Molecules*.
- *Institute for Quantum Optics and Quantum Information*.
  Innsbruck, Austria.
  October 21th – 25th, 2013; June 11th – 12th, 2013; April 2nd – 5th, 2013; January 25th – 27h, 2013; September 5th, 2012;
  Invited by *Peter Zoller* at the *Quantum Optics and Quantum Information group*.

- *Max-Planck Institut for the Science of Light*.
  Erlangen, Germany.
  September 25th – 26h, 2013.
  Invited by *Gerd Leuchs and Christoph Marquardt* at the *Quantum Information Processing group*.

- *Instituto de Física Fundamental - CSIC*.
  Madrid, Spain.
  February 25th – 27th, 2013.
  Invited by *Juan José García-Ripoll* at the *Quantum Information and Foundations group*.

- *Texas A&M University at Qatar*.
  Doha, Qatar.
  April 8th – 24th, 2012.
  Invited by *Hyunchul Nha* at the *Physics department*.

- *Université Libre de Bruxelles*.
  Brussels, Belgium.
  February 12th –27th, 2011.
  Invited by *Nicolas Cerf* at the *Centre for Quantum Information and Communication.*

- *Massachusetts Institute of Technology*.
  Cambridge, United States of America.
  September 20th – December 20th, 2010.
  Supervised by *Jeffrey H. Shapiro* at the *Research Laboratory of Electronics.*

- *Ulm University*.
  Ulm, Germany.
  May 17th – 21st, 2010.
  Invited by *Susana Huelga* and *Inés de Vega* at the *Institute of Theoretical Physics.*

- *Universidad Complutense de Madrid*.
  Madrid, Spain.
  March 29th – 31st, 2010; July 11th – 15th, 2011; December 21th – 23th, 2012.
  Invited by *Diego Porras* at the *Theoretical Physics I department*.

- *Swinburne University of Technology*.
  Melbourne, Australia.
  September 26th – December 11th, 2009.
  Supervised by *Peter D. Drummond* at the *Theory Division* of the *ACQAO group*.

- *Universidad Complutense de Madrid*.
  Madrid, Spain.
  September 16th – 18th, 2009.
  Invited by *Diego Porras* at the *Theoretical Physics I department*.

- *Max Planck institute for Quantum Optics*.
  Garching, Germany.
  July 16th – 31th 2009 and March 21st – 27th 2010.
  Invited by *Juan Ignacio Cirac* and *Inés de Vega* at the *Theory Division*.

- *Max Planck institute for Quantum Optics*.
  Garching, Germany.
  September 21th – December 21th, 2008.
  Supervised by *Juan Ignacio Cirac* at the *Theory Division*.

- *Laboratoire Kastler Brossel*.
  Paris, France.
  April 14th – 19th, 2008.
  Invited by *Claude Fabre* at the *Multimode Quantum Optics Group*.

13.- OTHER MERITS

- Referee of *Physical Review A* (since July, 2008), *Physical Review Letters* (June, 2010), *International Journal of Theoretical Physics* (April, 2012), *Optics Communications* (December, 2012), *European Physical Journal D* (November, 2013), and *Physical Review E* (since July 2015).
- Founding member of the Progressive-Jazz band *Versus Five*.
  Find us at *www.youtube.com/vs5creativesounds*.
- *Elite sportsman* (greatest Spanish honour for a young sportsman) in the period 1997-1998.