

CURRICULUM VITAE

Carlos Navarrete-Benlloch

(January, 2024)

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1.- PERSONAL INFORMATION



Name: Carlos Navarrete-Benlloch

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

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Position: Distinguished Researcher (equivalent to tenure track Associate Professor) within the GenT program of Generalitat Valenciana.

Summary of my academic trajectory

Since January 2024 I am a faculty member of the Universitat de València. Prior to this, since April 2019, I was an associate professor at the Wilczek Quantum Center of Shanghai Jiao Tong University, one of the ivy-league (top 7) universities in China. The center is led by Nobel laureate Prof. Frank Wilczek. Prior to that I was leading my own junior group at the Max-Planck Institute for the Science of Light. Before that, I was a postdoctoral researcher, spending 4 years with one of the most influential quantum theorists and Wolf Prize awardee, Prof. Ignacio Cirac, director of the Max-Planck Institute of Quantum Optics. I cherish the support from two of my scientific heroes, Prof. Frank Wilczek and Prof. Ignacio Cirac, as one of my main accomplishments.

I received my education at the University of Valencia. I had a very happy and successful time there, culminating in the “extraordinary prize” award for my PhD (whose work I partially developed at the Massachusetts Institute of Technology and the Max-Planck Institute of Quantum Optics).

My main research field is theoretical quantum optics. This allows me to cover an extremely diverse set of topics, ranging from technological applications (quantum computation, simulation, communication, and sensing) to fundamental questions in theoretical physics (phase transitions, spontaneous symmetry breaking, quantum/classical boundary). So far, I have published 34 articles in peer-reviewed journals (including 7 in *Physical Review Letters*) and one book with the Institute of Physics, which have been cited more than 1100 times according to Google Scholar. I have an h index of 18, which receives contributions from more than half of my papers. I believe this to be further proof of what has been the main motto of my career: quality over quantity. I am a very social researcher, as proved by the more than 50 collaborators from around 15 countries that I’ve had over the years. I typically contribute to a few important conferences every year, and I’ve given an average of one invited talk per year since I got my PhD.

At each stage of my career, my research has also been recognized in the form of awards. Among the latest ones, this includes the most prestigious prize in China at my career stage, the Thousand Young Talents award, given only to around 1000 young researchers of all fields of basic sciences and humanities within the giant 1.4-billion-people country. In China I have also obtained other important academic awards, detailed below, adding up to a total funding of around 800.000€. Let me also mention that two of my postdoctoral years were funded by the prestigious Alexander von Humboldt fellowship.

I’ve always been very committed to mentoring, science popularization, and service duties. So far, I have supervised 3 PhD theses officially (plus one more to be completed this summer), as well as 7 Bachelor/Master thesis. I have also had 2 postdoctoral researchers under my guidance. In addition, I mentored 4 students between 2016 and 2018 within the *International Mentor Program* originated from Harvard’s Spanish community. Since 2016, I also try to give yearly a popular talk about quantum physics and their modern technological applications.

Regarding service to the community, I serve as a board member for the Specialized Group for Women in Physics of the Royal Spanish Physical Society. I have also organized several workshops (the last two in 2018 and 2019, with about 100 participants each) and I hosted an online seminar series between 2020 and 2023 with more than 40 speakers and an average of about 40 participants per seminar.

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

- *GenT Distinguished researcher (tenure track Associate Professor equivalent)*
Granted by Generalitat Valenciana
Place: Optics Department, Universitat de València.
January 2024 – Present
- *Associate professor (tenure track)*
Place: Wilczek Quantum Center, Shanghai Jiao Tong University.
April 2019 – December 2024
- *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
- *Postdoctoral research associate.*
Place: Max-Planck Institute for Quantum Optics, J. Ignacio Cirac's Theory Division.
February 2015 – January 2016; Granted by the Max-Planck Society.
February 2013 – January 2015; Granted by the Alexander von Humboldt society.
February 2012 – January 2013; Granted under the European Commission FP7 Project: 265522
- *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

[* denotes co-first author, # denotes co-corresponding author]

4.1.- Published articles

1. N. Yazdi, J. J. García-Ripoll, D. Porrás, and C. Navarrete-Benlloch
Cooling microwave fields into general multimode Gaussian states
New J. Phys. **25**, 083052 (2023)
2. N. Mohseni, C. Navarrete-Benlloch[#], T. Byrnes, and F. Marquardt
Deep recurrent networks predicting the gap evolution in adiabatic quantum computing
Quantum **7**, 1039 (2023)
3. N. Mohseni, T. Fösel, L. Guo, C. Navarrete-Benlloch[#], and F. Marquardt
Deep Learning of Quantum Many-Body Dynamics via Random Driving
Quantum **6**, 714 (2022).
4. C. Navarrete-Benlloch, R. Garcés, N. Mohseni, and G. J. de Valcárcel.
Floquet theory for temporal correlations and spectra in time-periodic open quantum systems. Application to squeezed parametric oscillation beyond the rotating-wave approximation.
Editor's suggestion in Physical Review A **103**, 023713 (2021).
5. N. Akhtar, B. C. Sanders, and C. Navarrete-Benlloch.
Sub-Planck structures: Analogies between the Heisenberg-Weyl and SU(2) groups.
Physical Review A **103**, 053711 (2021).
6. Z. Wang, C. Navarrete-Benlloch*, and Z. Cai.
Pattern formation and exotic order in driven-dissipative Bose-Hubbard systems.
Phys. Rev. Lett. **125**, 115301 (2020).
7. J. Ruiz-Rivas, G. Patera, C. Navarrete-Benlloch[#], E. Roldán, and G. J. de Valcárcel.
Spatial localization and pattern formation in discrete optomechanical cavities and arrays.
New J. Phys. **22**, 093076 (2020).
8. 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).
9. E. Roldán, J. Kofler, and C. Navarrete-Benlloch.
Light polarization measurements in tests of macrorealism.
Phys. Rev. A **97**, 062117 (2018).
10. 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).
11. 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).
12. 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).
13. Y. Chang, A. González-Tudela, C. Sánchez Muñoz, C. Navarrete-Benlloch*, and T. Shi.
Deterministic down-converter and continuous photon-pair source within the bad cavity limit.
Phys. Rev. Lett. **117**, 203602 (2016).
14. 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).
15. 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).

16. 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).
17. M. Benito, C. Sánchez Muñoz, and C. Navarrete-Benlloch.
Degenerate parametric oscillation in quantum membrane optomechanics.
Phys. Rev. A **93**, 023846 (2016).
18. 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).
19. 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).
20. C. Navarrete-Benlloch, J. J. García-Ripoll, and D. Porras.
Nonclassical lasing in circuit quantum electrodynamics.
Phys. Rev. Lett. **113**, 193601 (2014).
21. 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)
22. 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).
23. 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).
24. 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).
25. 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).
26. 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).
27. 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).
28. 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).
29. 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).
30. 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).

31. 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).
32. C. Navarrete-Benlloch, E. Roldán, and G. J. de Valcárcel.
Noncritically squeezed light via spontaneous rotational symmetry breaking.
Physical Review Letters **100**, 203601 (2008).
33. C. Navarrete-Benlloch, A. Pérez, and Eugenio Roldán.
Non-linear optical Galton board.
Physical Review A **75**, 062333 (2007).
34. 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

35. Y. Chen and Carlos Navarrete-Benlloch
Collectively pair-driven-dissipative bosonic arrays: exotic and self-oscillatory condensates
arXiv:2111.07326
36. E. Grigoriou and C. Navarrete-Benlloch
Signatures of a quantum phase transition on a single-mode bosonic model
arXiv:2303.12894
37. E. Grigoriou, Z. Ning, H. Su, B. Löckler, M. Li, Y. Kamiya, and C. Navarrete-Benlloch
Coherent pair injection as a route towards the enhancement of supersolid order in many-body bosonic models
arXiv:2312.03624
38. X. Kong, C. Navarrete-Benlloch*, and Y. Chang
Accessing strongly-coupled systems without compromising them
arXiv: 2204.04212

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* (two volumes).
Institute of Physics Publishing
To appear from 2024; working draft: arXiv:2203.13206

5.- PRIZES AND FUNDING AWARDED

- **2022:** Yangyang Young Scholars Talent Plan, consisting of: RMB150k (20.000€) contribution to salary.
- **2020:** Thousand Young Talents Program of China, consisting of: RMB2M (250.000€) funds (+SJTU's match) and RMB600k (75.000€) allowance.
- **2020:** Shanghai's Thousand Young Talents Award, worth RMB750k (95.000€).
- **2020:** Foreign Young Talent Award, worth RMB220k (30.000€); Chinese Ministry of Science and Technology.
- **2013:** Alexander von Humboldt Foundation postdoctoral fellowship, including salary and 23.000€ research/mobility funds.
- **2013:** Extraordinary PhD prize of the University of Valencia, for theses defended in 2011-2013.
- **2006:** 2nd Prize at the *Certamen Arquímedes para jóvenes investigadores*¹ for the work *Non Linear Quantum Walk* (December 1st, 2006). Worth 6.000€.
- **2001:** 1st place on the local phase (Valencia, Spain) of the XIII *Physics Olympiad* (February 20th, 2001).

6.- TEACHING ACTIVITY

- *Optics II (Problems)*
Universitat de València
2024 Second Semester. Core 3rd year bachelor, 1.5 credits (15 hours).
- *Quantum Optics*
Universitat de València
2024 Second Semester. Elective 4th year bachelor, 2 credits (20 hours).
- *Quantum Mechanics 2*
School of Physics and Astronomy, Shanghai Jiao Tong University (China)
2023 Spring Semester. Core Bachelor, 3 credits (48 hours; 3 hours/week).
- *Introduction to quantum optics*
Zhiyuan College, Shanghai Jiao Tong University (China).
Four Spring Semesters 2020-2023. Elective Bachelor, 3 credits (48 hours; 3 hours/week).
- *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 5th – 7th, 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 23rd – 25th, 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*).

¹ 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 €.

7.- SUPERVISED THESES AND MENTORING

- Current supervised group members:
Ming Li (Postdoc), Emmanouil Grigoriou (PhD), Benjamin Löckler (MSc), Faizan Anwar (MSc).
- Former postdocs: Naeimeh Mohseni (2019-2021)
- PhD theses:
 - Naeem Khan, PhD Thesis (*Excellent*, highest honour)
The Heisenberg-Weyl and SU(2) groups: Coherent-state superpositions and sub-Planck structures.
April 2021, University of Science and Technology of China (Hefei, China).
 - Naeimeh Mohseni, PhD Thesis (*Excellent*, highest honour)
Quantum Optical Proposals with Application to Quantum Computation, Simulation, and Metrology.
December 2019, Institute for Advanced Studies in Basic Sciences (Zanjan, Iran).
 - 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).
- Master and bachelor theses:
 - Tianli Liu, bachelor thesis (B+)
Quantum properties of limit cycles in type II optical parametric oscillators.
July 2022, Zhiyuan College, Shanghai Jiao Tong University (China).
 - Yinan Chen, bachelor thesis (A)
Bosonic Many-body Models Subject to Particle-non-conserving Processes.
June 2021, Zhiyuan College, Shanghai Jiao Tong University (China).
 - Danyang Chen, bachelor thesis (A)
Nonequilibrium quantum phenomena through the Van der Pol model.
June 2021, School of Physics and Astronomy, Shanghai Jiao Tong University (China).
 - Akash nag Oruganti, Master Thesis (2.7 - *Satisfactory*)
Quantum theory of actively-phase-locked optical parametric oscillators subject to limit-cycle motion.
September 2019, 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.
September 2019, Max-Planck Institute for the Science of Light and Friedrich-Alexander Erlangen-Nuremberg University (Germany).
 - Emmanouil Grigoriou, Master Thesis (*La plus haute distinction*, highest honour).
Study of autonomous quantum thermodynamical machines.
September 2018, Free University of Brussels (Belgium).
 - 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 Autònoma de Barcelona (Barcelona, Spain).
- 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).

8.- PUBLIC TALKS

- *Quantum optics and technologies.*
45' interview for the 'El oscilador armónico' podcast from CSIC's Particle Physics Institute in Spain.
March 1st, 2023.
- *How is a scientific project funded?*
20' interview at 'La brújula' from Onda Cero, conducted by Carlos Alsina and Alberto Aparici.
April 8th, 2022.
- *New quantum platforms for fundamental physics and technology*
Lecture at the Summer School of the University of Valencia
July 5th, 2021.
- *Research in China: opportunities and experiences*
Online "round table" organized by Fundación Consejo España China – RICE – Casa Asia
February 25th, 2021.
- *New technologies from and for quantum physics*
Meeting of the Network of Researchers China-Spain (RICE)
December 19th, 2020; Beijing, China.
- *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.

9.- SCIENTIFIC TALKS

- *Time-crystalline order in lone and coupled self-sustained oscillators.*
Biannual Meeting of the Royal Spanish Physical Society – Murcia (Spain)
Invited talk.
July 13th, 2022
- *Opportunities in quantum simulators subject to particle non-conserving processes.*
Physics Colloquium – Institute of Physics, Nicolaus Copernicus University, Torun, Poland
Invited colloquium.
May 6th, 2021
- *Opportunities in quantum simulators subject to particle non-conserving processes.*
QUANTUM 2020 – Virtual (organized by IOP Publishing and Chinese Academy of Sciences)
Contributed talk.
October 19th – 22nd, 2020
- *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.* ^[1]_[SEP]
Symposium of Optical Quantum Technologies – Shanghai (China)
Invited talk.
November 5th – 7th, 2019
- *Opportunities in quantum simulators subject to particle non-conserving processes.* ^[1]_[SEP]
International conference on optical communications and networks – Huangshan (China) ^[1]_[SEP]
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). ^[1]_[SEP] ^[1]_[SEP]
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 (Sweden).
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 (Scotland).
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.

10.- ORGANIZED WORKSHOPS AND CONFERENCES

- *Online meetings of the Wilczek Quantum Center*
Virtual periodic (~monthly) meetings open to all researchers interested in the physics surrounding Prof. Frank Wilczek and the people connected to the centers that he leads around the world. So far, we've had more than 40 speakers in the series, with an average participation of 50 people on each colloquium.
September, 2020 – present.
- *Quo vadis quantum simulators*
Wilczek Quantum Center, Shanghai Jiao Tong University, Shanghai (China).
November 13 – 15, 2019; around 100 participants
- *Current trends in open and nonequilibrium quantum optical systems.*
Max-Planck Institute for the Science of Light, Erlangen (Germany).
July 16 – 18, 2018; around 100 participants.

- *Winter workshop of the Theory Division.*
Max-Planck Institute of Quantum Optics, Garching (Germany).
November 26 – 29, 2014; around 30 participants.
- *Winter workshop of the Theory Division.*
Max-Planck Institute of Quantum Optics, Garching (Germany).
December 11 – 14, 2013; around 30 participants.

11.- PARTICIPATION IN RESEARCH PROJECTS

- *Coherent dynamics and quantum fluctuations in nonlinear optical systems.*
Spanish National Project: PID2020-120056GB-C22; funding: 111.320€.
Team member; PIs: Germán J. de Valcárcel Gonzalvo and Adolfo Esteban Martín.
September 2021 – August 2024.
- *Nonlinear dynamics and quantum fluctuations of optical cavities.*
Spanish National Project: FIS2017-89988-P; funding: 30.250€.
Team member; PIs: Germán J. de Valcárcel Gonzalvo and Eugenio Roldán Serrano.
January 2018 – December 2020.
- *Theory of optomechanical circuits (OPTOMECH).*
European Research Council Starting Grant.
Full time researcher; scientist in charge: Florian Marquardt.
February 2016 – October 2016.
- *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 iGEM² 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.*

² 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.

12.- 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 Meeting³ 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.

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*.
More info at: www.youtube.com/derekkorg
- *Elite sportsman* (greatest Spanish honour for a young sportsman) in the period 1997-1998.

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 were finally selected (14 Spanish). Visit www.lindau-nobel.de for more details.