



Personal information

Surname(s) / First name(s)

Address(es)

Email(s)

Nationality(-ies)

Date of birth

Skype user

Galve Conde, Fernando

Campus Universitat de les Illes Balears, E-07122 Palma, Mallorca, Spain

fernando@ifisc.uib-csic.es

Spanish

19 May 1979

f.galve@outlook.es

Summary

Research interests

My current research interests are quantum information and dynamics of complex systems, decoherence and dissipation in structured media, quantum probing of complex environments, and implementation of these concepts in trapped ion, optomechanical and other platforms. Recently I have been also interested in quantum simulation of tight binding models with atoms coupled to photonic crystals.

Trajectory

12 years of postdoctoral experience, 11 supervised students at different career stages, 41 articles in international journals, 1 book chapter, involved in 14 funded projects, participation in 32 conferences and 14 seminars, 4 organized conferences (including 2018 CEWQO), leader of 3 funded projects, 3 year experience in University undergraduate teaching in 2 different countries, participation in outreach magazines and radio programme.

WoK data

- h-index 16
- 848 citations (768 without self-citations)
- 4 Phys. Rev. Lett., 4 Sci. Reps., 3 New. J. Phys. and 1 book chapter.

Contact Referees

Prof. R. Zambrini , CSIC- Uni. Balearic Islands (Spain), roberta@ifisc.uib-csic.es

Prof. P. Hänggi , Uni. Augsburg (Germany) hanggi@physik.uni-augsburg.de

Prof. G. Werth , Uni. Mainz (Germany) werth@uni-mainz.de

Prof. S. Maniscalco , Uni. Turku (Finland) smanis@utu.fi

Prof. F. Plastina , Uni. Calabria (Italy) francesco.plastina@fis.unical.it

Work experience

Jul. 2017 - Today	Postdoc, Palma de Mallorca, Spain.
Jul. 2015 - Jul 2017	UIB Postdoc, Palma de Mallorca, Spain.
Feb. 2015 - Jul. 2015	Assistant Professor (and Researcher) [Prof. R. Zambrini] , Palma de Mallorca, Spain.
Jul. 2014 - Feb. 2015	Postdoc, [Prof. R. Zambrini] , Palma de Mallorca, Spain.
Jul. 2011 - Jul. 2014	JaeDoc Postdoc (a special figure in Spanish Research Council), [Prof. R. Zambrini] , Palma de Mallorca, Spain.
May 2009 - Jul. 2011	Postdoc, [Prof. R. Zambrini] , Palma de Mallorca, Spain.
Oct. 2008 - May 2009	Postdoc, [Prof. P. Hänggi] , Augsburg, Germany.
Oct. 2007 - Oct. 2008	Postdoc, [Dr. E. Lutz] , Augsburg, Germany.
Jul. 2003 - Dec. 2006	PhD Thesis, 'A planar Penning trap', theory+design+exp.implementation of a new kind of planar trap for electrons [Prof. G. Werth] , Mainz, Germany.
Jul. 2002 - Jul. 2003	Master Thesis, topological properties glassy systems, [Prof. R. Schilling] , Mainz, Germany.
Aug. 2001 - Jul. 2002	Erasmus student (last year Physics degree) + Research assistant at the neutrino mass laboratory [Prof. E. W. Otten], Mainz, Germany.

Teaching experience

2016+2017	2 lessons in the Master Degree of Physics (Uni. Illes Balears)
2015	1 semester teaching Statistical Physics (3rd course, Physics Degree Uni. Illes Balears)
2015	1 semester teaching Physics (1st course, Computer Engineering Degree Uni. Illes Balears)
2015	Spanish ANECA certification obtained: 'Profesor Contratado Doctor' (entitles to give lessons in public universities)
2003-2006	2,5 years (400 hours) of laboratory teaching (Physics degree's last-year) in the Johannes Gutenberg University in Mainz (Germany)

Student supervision

2017	PhD thesis of Albert Cabot.
2017	Master thesis of Oriol Morguí.

2017	summer undergraduate student Rodrigo Tenorio.
2016	Master thesis of Albert Cabot.
2016	summer undergraduate student Gabriel Torregrosa.
2015	summer undergraduate student Gorka Muñoz.
2015	summer undergraduate student Albert Cabot.
2014	PhD student Johannes Nokkala during his visit to Palma de Mallorca.
2014	PhD student Antonio Mandarino during his visit to Palma de Mallorca.
2014	PhD student Claudia Benedetti during his visit to Palma de Mallorca.
2014	PhD student Antonio Alecce during his visit to Palma de Mallorca.
2011-2017	predoc+PhD cosupervision of student Gonzalo Manzano.
2009	summer Jae-Intro (predoctoral) student Ana Montaner.
2004-2005	master student Paula Fernández during my PhD in Mainz.

Fellowships

2015 - 2017	Univeristat de les Illes Balears Postdoctoral Fellowship
2011 - 2014	JAE-Doc (Spanish Research Council–CSIC) Fellowship.
2003 - 2006	Marie Curie (PhD) Fellowship, under QUELE project of 6th EU FrameWork Programme.

Stays abroad

2018	Max Planck Institut for Quantum Optics, Garching, Germany – 4 days
2018	Max Planck Institute for the Science of Light, Erlangen , Germany – 2 days
2017	Max Planck Institut for Quantum Optics, Garching, Germany – 5 days
2016	Uni. Freiburg, Germany – 3 days
2016	ETH Zürich, Switzerland – 3 days
2014	Heriot Watt Uni. Edinburgh, UK – 5 days

2012 Uni. Zaragoza, Spain – 7 days

2006 Uni. Camerino, Italy – 16 days

2005 Uni. Camerino, Italy – 7 days

Participation in projects

2016 - 2018 Quantum information preserving with structured embeddings (QuStruct, FIS2015-66860-P), Spanish Ministry [12k€]. **PI: F. Galve.**

2017 - 2019 Emergent phenomena and decoherence in quantum complex systems (EPHEQUCS, FIS2016-78010-P), Spanish Ministry [103k€]. **PI: Prof. R. Zambrini.**

2015 - 2018 Quantum Probes for Complex Systems (QuProCS,641277, EU's Horizon 2020, FET Proactive 3: Quantum Simulation), [2.27M€]. **PI: Prof. S. Maniscalco.**

2015 - 2018 Non-Markovian quantum evolutions in structured environments (NOMAQ, FIS2014-60343-P), Spanish Ministry [27k€]. **PI: Prof. R. Zambrini.**

2015 - 2017 Uni. Illes Balears Postdoc Fellowship (Project title 'Quantum effects in artificial photosynthetic complexes') [own salary: 64k€]. **PI: F. Galve.**

2012 - 2015 Transport and Information in Quantum Systems (TIQS, FIS2011 23526), Spanish Ministry [own salary: 184k€]. **PI: Prof. Ll. Serra**

2011 - 2014 JaeDoc Fellowship (Project title 'Quantum properties of complex systems very far from equilibrium') [own salary: 72k€]. **PI: F. Galve.**

2010 - 2011 Dynamics of Quantum Complex Systems, CAIB (AAEE0113/09) [8k€]. **PI: Prof. R. Zambrini.**

2009 - 2012 Complexity and Quantum Systems (COQUSYS, 200450E566), [41k€]. **PI: Prof. M San Miguel**

2008 - 2009 Quantum effects in complex systems (ECUSCO, 2008501047) **PI: Prof. R. Zambrini.**

2007 - 2012 Interdisciplinary Physics of Complex Systems (FISICOS) FIS2007-60327, Spanish Ministry, [1.32M€]. **PI: Prof M. San Miguel**

2007 - 2009 Nanosystems Initiative Munich, German Government, **PI: Dr. E. Lutz.**

2006 - 2009 Kooperative Phänomene im Festkörper, SFB 484(Teilprojekte D7), DFG - German Science Foundation. **PI: Prof. P. Hänggi.**

2004 - 2007 QUELE (quantum computing with electrons) IST-2002-2.3.4.1, 6th Framework Programme (EU), [1.4M€]. **PI: Prof. G. Werth and Prof. P. Tombesi.**

Conferences

- 2018 [Poster] 'Completely subradiant atom architectures and exotic coherent couplings through 2D photonic crystals', Quantum Simulation & Computation, (Bilbao, Spain).
- 2017 [Talk] 'Geometric aspects of extended quantum dissipative systems', Crossroads in Complex Systems (Palma de Mallorca, Spain).
- 2017 [Talk] 'Microscopic origins of collective dissipation in extended systems', 14th Granada Seminar, Quantum Systems In and Out of Equilibrium: Fundamentals, dynamics and applications (Granada, Spain).
- 2017 [Poster] 'Microscopic origins of collective dissipation in extended systems', Quantum Optics to Quantum Technology (Royal Society London, UK).
- 2017 [Talk] 'Microscopic origins of collective dissipation in extended systems', Quantum 2017, (Torino, Italy).
- 2017 [Talk] 'A 2-ions probe for anomalous heating', QuProCS meeting (Palma de Mallorca, Spain).
- 2016 [Talk] 'Microscopic description for the emergence of collective decoherence in extended systems', QuProCS meeting (Milan, Italy).
- 2016 [Talk] 'Microscopic description for the emergence of collective decoherence in extended systems', 9th Italian Quantum Information Science Conference (Rome, Italy).
- 2016 [Poster] 'Quantum Darwinism and memory effects in bosonic and spin environments', 9th Italian Quantum Information Science Conference (Rome, Italy).
- 2016 [Talk] 'Microscopic description for the emergence of collective decoherence in extended systems', ICE-3 Quantum Information in Spain Conference (Palma de Mallorca, Spain).
- 2015 [Invited Talk] 'Quantum Darwinism with finite environment', 586 Heraeus Seminar: Quantum Correlations beyond Entanglement (Bad Honnef, Germany).
- 2015 [Talk] 'Quantum Darwinism and memory effects in spin and bosonic environments', ICE-2 Quantum Information in Spain Conference (Bilbao, Spain).
- 2014 [Poster] 'On the spectral origin of non-Markovianity: an exact finite model', Thermodynamics in the quantum regime (Potsdam, Germany).
- 2014 [Talk] 'Discarding and entangling power of quantum evolutions', ICE-1 Quantum Information in Spain Conference (Zaragoza, Spain).
- 2014 [Invited Talk] 'Spectral origin of non-Markovianity in an exact finite harmonic model', LPHYS'14 (Sofia, Bulgaria).

- 2014 [Poster] 'On the spectral origin of non-Markovianity: an exact finite model', 576 Heraeus Seminar: Designed Quantum States of Matter (Bad Honnef, Germany).
- 2012 [Talk] 'Bringing entanglement to the high temperature limit', Quantum Information and Measurement (QIM, OSA) (Berlin, Germany).
- 2012 [Talk] 'Quantum discord of two qubits: Maximally correlated states and sufficiency of perfect measurements', Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons (Torino, Italy).
- 2012 [Poster] 'Bringing entanglement to the high temperature limit', Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons (Torino, Italy).
- 2012 [Talk] 'Quantum discord of two qubits: Maximally correlated states and sufficiency of perfect measurements', ICE-0 Quantum Information in Spain (Madrid, Spain).
- 2011 [Talk] 'Bringing entanglement to the high temperature limit', Central European Workshop on Quantum Optics (CEWQO) (Madrid, Spain).
- 2010 [Talk] 'Bringing entanglement to the high temperature limit', Quantum Information Concepts for Condensed Matter Problems, at MPIPKS (Dresden, Germany).
- 2010 [Talk] 'Quantum correlations of dissipative oscillators: Driving and synchronization effects', Complex Quantum Systems (Palma de Mallorca, Spain).
- 2009 [Poster] 'Disappearance of the classical limit: Entangled oscillators at room temperature', 2nd Vienna Symposium on the Foundations of Modern Physics (Vienna, Austria).
- 2008 [Talk] 'Optimal Nonequilibrium Entanglement at the nanoscale', NIM Focus 'Nonequilibrium thermodynamics at the nanoscale' (Augsburg, Germany).
- 2008 [Poster] 'Optimal nonequilibrium entanglement of nanomechanical oscillators', NIM 'Interactions in Hybrid Nanosystems' (Frauenworth, Germany).
- 2006 [Talk] 'A Planar Penning Trap', Jahrestagung der Deutschen Physikalischen Gesellschaft (DPG) (Frankfurt, Germany).
- 2006 [Poster] 'QUELE project: A Planar Penning Trap', ICAP (Int. Conference on Atomic Physics) Satellite Meeting "Atomic Physics with trapped ions" (Innsbruck, Austria).
- 2004 [Poster] 'A Planar Penning Trap', Symposium "Cryptography and Quantum Information" (La Thuile, Italy).

Seminars

- 2018 'Dissipation of multi-partite systems under structured environments', Max Planck for the Science of Light (Erlangen, Germany).

- 2016 'Quantum Darwinism and non-Markovian evolution', IFISC seminar (Palma de Mallorca, Spain).
- 2014 'Programming with Mathematica: Advanced', IFISC seminar (Palma de Mallorca, Spain).
- 2014 'Programming with Mathematica: Basics', IFISC seminar (Palma de Mallorca, Spain).
- 2013 'Discording power of quantum evolutions', IFISC seminar (Palma de Mallorca, Spain).
- 2009 'How to entangle two objects at room temperature', IFISC seminar (Palma de Mallorca, Spain).
- 2008 'Optimal entanglement production in engineered quantum systems', IFISC seminar (Palma de Mallorca, Spain).
- 2008 'Entanglement localization and ratchet-like effects in driven spin chains', Institut fuer Physik seminar (Augsburg, Germany).
- 2006 'Frequencies and anharmonicities measurements with the QUELE planar trap', QUELE network collaboration meeting (Innsbruck, Austria).
- 2005 'A planar trap for QUELE', Uni. Ulm (Ulm, Germany).
- 2004 'Topological and non-topological properties of a one dimensional model', Condensed matter weekly seminar, Uni. Mainz (Mainz, Germany).
- 2002 'Suitability and properties of a dipole field to avoid trapping conditions in the primary spectrometer', KATRIN collaboration meeting, Uni. Karlsruhe (Karlsruhe, Germany).
- 2001 'Trapping conditions in the KATRIN neutrino experiment mass spectrometer', S.e.a.c.a.v.a Summer programme for physicists, Uni. Mainz (Mainz, Germany).

Event organization

- 2018 Organizing & Scientific committee of forthcoming CEWQO 2018 (Central European Workshop on Quantum Optics).
- 2017 Organizing committee of QuProCS (European H2020 project) meeting, with invited external international speakers (Palma de Mallorca, Spain).
- 2016 Organizing & Scientific committee ICE3, Quantum Information in Spain (Palma de Mallorca, Spain)..
- 2015 Organizing committee in QTD2 (2nd Quantum Thermodynamics Conference of the COST action1209 'Quantum Thermodynamics').

Publications

2018

- [1] F. Galve, R. Zambrini, 'Completely subradiant multi-atom architectures through 2D photonic crystals', *Ann. Phys. (Berlin)* **530**, 1800017 (2018)
- [2] F. Galve, R. Zambrini, 'Coherent and radiative couplings through 2D structured environments', *Phys. Rev. A* **97**, 033846 (2018).
- [3] J. Nokkala, F. Arzani, F. Galve, R. Zambrini, S. Maniscalco, J. Piilo, N. Treps, V. Parigi, 'Reconfigurable optical implementation of quantum complex networks', *New J. Phys.* **20**, 053024 (2018).

2017

- [4] F. Galve, G. L. Giorgi, R. Zambrini, **book chapter**: 'Quantum correlations and synchronization measures', in the book 'Lectures on general quantum correlations and their applications', Springer, 2017, ISBN 978-3-319-53412-1. Available on-line at: <http://www.springer.com/gp/book/9783319534107>.
- [5] F. Galve, J. Alonso, R. Zambrini, 'Multi-ion sensing of dipolar noise sources in ion traps', *Phys. Rev. A* **96**, 033409 (2017).
- [6] A. Cabot, F. Galve, R. Zambrini, 'Dynamical and quantum effects of collective dissipation in optomechanical systems', *New J. Phys.* **19** 113007 (2017)
- [7] F. Galve, A. Mandarino, M. G. A. Paris, C. Benedetti, R. Zambrini, 'Microscopic description for the emergence of collective dissipation in extended systems', *Sci. Reps.* **7**, 42050 (2017).

2016

- [8] J. Nokkala, F. Galve, R. Zambrini, S. Maniscalco, J. Piilo, 'Complex quantum networks as structured environments: engineering and probing', *Sci. Reps.* **6**, 26861 (2016).
- [9] G. Manzano, F. Galve, R. Zambrini, J. Parrondo, 'Entropy production and thermodynamic power of the squeezed thermal reservoir', *Phys. Rev. E* **93**, 052120 (2016).
- [10] G. L. Giorgi, F. Galve, R. Zambrini, 'Probing the spectral density of a dissipative qubit via quantum synchronization', *Phys. Rev. A* **94**, 052121 (2016).
- [11] C. Benedetti, F. Galve, A. Mandarino, M. G. A. Paris, R. Zambrini, 'Minimal model for spontaneous synchronization', *Phys. Rev. A* **94**, 052118 (2016).
- [12] F. Galve, R. Zambrini, S. Maniscalco, 'Non-Markovianity hinders Quantum Darwinism', *Sci. Reps.* **6** 19607 (2016).

2015

- [13] G. L. Giorgi, F. Galve, R. Zambrini, 'Quantum Darwinism and non-Markovian dissipative dynamics from quantum phases of the spin-1/2 XX model', *Phys. Rev. A* **92**, 022105 (2015).
- [14] A. Alecce, F. Galve, N. Lo Gullo, L. Dell'Anna, F. Plastina, R. Zambrini, 'Quantum Otto cycle with inner friction: finite-time and disorder effects.', *New J. Phys.* **17**, 075007 (2015).
- 2014
- [15] R. Vasile, F. Galve, R. Zambrini, 'On the spectral origin of non-Markovianity: an exact finite model.', *Phys. Rev. A* **89**, 022109 (2014).
- [16] Z. Guan, H. He, Y. J. Han, C. F. Li, F. Galve, G. C. Guo, 'Entangling power of two-qubit gates on mixed states', *Phys. Rev. A* **89**, 012324 (2014).
- [17] F. Plastina, A. Alecce, T. J. G. Apollaro, G. Falcone, G. Francica, F. Galve, N. Lo Gullo, R. Zambrini, 'Irreversible work and inner friction in quantum thermodynamic processes', *Phys. Rev. Lett.* **113**, 260601, (2014).
- [18] F. Galve, R. Zambrini, 'Energy and information propagation in a finite coupled bosonic heat bath', *Int. J. Q. Inf.* **12**, 1560022 (2014).
- 2013
- [19] F. Galve, F. Plastina, M. G. A. Paris, R. Zambrini, 'Discording power of quantum evolutions', *Phys. Rev. Lett.* **110**, 010501 (2013).
- [20] G. Manzano, F. Galve, R. Zambrini, 'Avoiding dissipation in a system of three quantum harmonic oscillators', *Phys. Rev. A* **87**, 032114 (2013).
- [21] A. Cardillo, F. Galve, D. Zueco, J. Gómez Gardeñes, 'Information sharing in quantum complex networks', *Phys. Rev. A* **87**, 052312 (2013).
- [22] G. Manzano, F. Galve, G. L. Giorgi, E. Hernández-García, R. Zambrini, 'Synchronization, quantum correlations and entanglement in oscillator networks', *Sci. Reps.* **3**, 1439 (2013).
- 2012
- [23] B. Bellomo, G. L. Giorgi, F. Galve, R. L. Franco, G. Compagno, R. Zambrini, 'Unified view of correlations using the square-norm distance', *Phys. Rev. A* **85**, 032104 (2012).
- [24] G. L. Giorgi, F. Galve, G. Manzano, P. Colet, R. Zambrini, 'Quantum correlations and mutual synchronization', *Phys. Rev. A* **85**, 052101 (2012).
- 2011
- [25] F. Galve, 'Propagation properties and limitations on the attainable entanglement in a driven harmonic chain', *Phys. Rev. A* **84**, 012318 (2011).

- [26] F. Galve, G. L. Giorgi, R. Zambrini, 'Maximally discordant mixed states of two qubits', *Phys. Rev. A* **83**, 012102 (2011).
- [27] G. L. Giorgi, B. Bellomo, F. Galve, R. Zambrini, 'Genuine Quantum and Classical Correlations in Multipartite Systems', *Phys. Rev. Lett.* **107**, 190501 (2011).
- [28] F. Galve, G. L. Giorgi, R. Zambrini, 'Orthogonal measurements are almost sufficient for quantum discord of two qubits', *Europhys. Lett.* **96**, 40005 (2011).
- [29] G. L. Giorgi, F. Galve, R. Zambrini, 'Robustness of different indicators of quantumness in the presence of dissipation', *Int. J. Q. Inf.* **9**, 1825 (2011).
- 2010
- [30] F. Galve, L. A. Pachón, D. Zueco, 'Bringing entanglement to the high temperature limit', *Phys. Rev. Lett.* **105**, 180501 (2010); reviewed by Prof. V. Vedral in *Nature* **468**, 769 (2010), selected as Physical Review Focus (<http://physics.aps.org/story/v26/st17>), and highlighted too at MIT's blog Technology Review (<http://www.technologyreview.com/view/417469/physicists-discover-how-to-entangle-at-high-temperatures/>)
- [31] G. L. Giorgi, S. Paganelli, F. Galve, 'Ion-trap simulation of the quantum phase transition in an exactly solvable model of spins coupled to bosons', *Phys. Rev. A* **81**, 052118 (2010).
- [32] F. Galve, G. L. Giorgi, R. Zambrini, 'Entanglement dynamics of nonidentical oscillators under decohering environments', *Phys. Rev. A* **81**, 062117 (2010).
- [33] F. Galve, D. Zueco, G. M. Reuter, S. Kohler, P. Hänggi, 'Creation and manipulation of entanglement in spin chains far from equilibrium', *Eur. J. Phys. - ST (Special Topics)* **180**, 237 (2010).
- 2009
- [34] F. Galve, D. Zueco, S. Kohler, P. Hänggi, 'Quantum router based on ac control of qubit chains', *Phys. Rev. A* **80**, 042303 (2009).
- [35] F. Galve, E. Lutz, 'Nonequilibrium Thermodynamic Analysis of Squeezing', *Phys. Rev. A* **79**, 055804 (2009).
- [36] F. Galve, D. Zueco, S. Kohler, E. Lutz, P. Hänggi, 'Entanglement resonance in driven spin chains', *Phys. Rev. A* **79**, 032332 (2009).
- [37] F. Galve, E. Lutz, 'Energy cost an optimal entanglement production in harmonic chains', *Phys. Rev. A* **79**, 032327 (2009).
- 2007
- [38] F. Galve, G. Werth, 'Motional frequencies in a planar penning trap', *Hyperfine Interactions* **174**, 41 (2007).
- 2006

- [39] F. Galve, P. Fernández, G. Werth, 'Operation of a planar penning trap', *Eur. Phys. J. D* **40**, 201 (2006).
- [40] F. Galve, G. Werth, 'Confinement study in a planar penning trap', *AIP Conference Proceedings* **862** (1), 313 (2006).
- 2005
- [41] G. Ciaramicoli, F. Galve, I. Marzoli, P. Tombesi, 'Array of Planar Penning Trap as a nuclear magnetic Resonance molecule for quatum computation', *Phys. Rev. A* **72** 042323 (2005).
- 2004
- [42] S. Stahl, F. Galve, *et al.*, 'A Planar Penning Trap', *Eur. Phys. J. D* **32** 139 (2004).

External evaluations

- 2017 Evaluation of a 'Mobilitas Pluss postdoctoral grant' for the Estonian Research Council.
- 2017 Project evaluation for the Estonian Research Council 'Relativistic entanglement from algebraic and geometric perspectives.'
- 2016 Evaluation of a 'Mobilitas Pluss postdoctoral grant' for the Estonian Research Council.

Outreach

- 2017 Outreach article about our work on Quantum Darwinism (doi:10.1038/srep19607), in the *Revista de Física* (<http://revistadefisica.es>) belonging to Spanish Royal Society of Physics (www.rsef.org) <http://revistadefisica.es/index.php/ref/article/download/2177/1749>
- 2011 Participation in a personal radio interview about quantum physics in IB3 (Palma de Mallorca's local radio).
- 2011 Publication in a national journal on Optics on the work done in our group, *Opt. Pura Apl.* **44** (2) 301-307 (2011).