

CURRICULUM VITAE

Name	Javier Rodríguez-Laguna
Birth date	August 29, 1973
Birth place	Jerez de la Frontera, Cádiz, Spain
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IDs	ORCID, Scholar, Publons, GitHub

LAST UPDATE: *January 2024*

1. Professional experience

Full professor at *Universidad Nacional de Educación a Distancia* (UNED), Madrid, in the Dto. Física Fundamental, since July 2023.

Associate professor at UNED, Dto. Física Fundamental, March 2020 to July 2023.

Researcher at UNED, Dto. Física Fundamental, Jan. 2015 to Jan. 2020.

Visiting researcher at *Instituto de Física Teórica* (IFT-UAM/CSIC), Madrid, since June 2013.

Visiting researcher at *Instituto de Ciencias Matemáticas* (ICMAT-CSIC), Madrid, Feb. 2013 to May 2013.

Researcher at *Instituto de Estructura de la Materia* (IEM-CSIC), Madrid, July 2012 to Jan. 2013.

Researcher at *Institute of Photonic Sciences* (ICFO), Barcelona, in the Quantum Optics Theory group, Feb. 2011 to June 2012.

Assistant professor at *Universidad Carlos III de Madrid* (UC3M), Madrid, in the the Mathematics Dept. Oct. 2007 to Jan. 2011 and Sept. 2013 to Oct. 2014.

Researcher at *Scuola Internazionale Superiore di Studi Avanzati* (SISSA), Trieste, Italy, in the Condensed Matter Sector, July 2005 to Sept. 2007.

Visiting researcher at IFT-UAM/CSIC and the Theoretical Physics Dept., UCM, 2002 to 2005.

Secondary school (middle/high) teacher for the Spanish government, 1996 to 2005. On leave of absence.

Graduate student at *Instituto de Matemáticas y Física Fundamental* (IMAFF-CSIC), Madrid, 1995 to 2002, under the supervision of prof. M.A. Martín-Delgado and G. Sierra.

2. Degrees and qualifications

I3 certificate for outstanding research, Spanish government, Jul. 2019.

Two research periods (*sexenios*) approved, 2006 to 2017 (saturated), Spanish government.

Qualified for tenure positions (*Acreditación Prof. Titular de Universidad*), Spanish government, Nov. 2014.

Ph.D. in Physics from UCM, in the Theoretical and Mathematical Physics program, with the thesis *Real Space Renormalization Group Techniques and Applications*, supervised by prof. M.A. Martín-Delgado and G. Sierra, qualified as *sobresaliente cum laude* and Extraordinary Award, May 2002.

Graduate in Physics from UCM, specialized in Theoretical Physics, June 1995.

Graduate from *Escuela Oficial de Idiomas Central de Madrid*, English Language, Sept. 1990.

3. Research lines

Research Fields: Quantum Many-Body Physics, Statistical Mechanics, Condensed Matter Physics.

Entanglement and quantum information; Quantum matter on curved spacetimes; Complex and disordered quantum systems; Quantum technologies; Stochastic and emergent geometry; Interfaces far from equilibrium; Statistical mechanics of social systems; Universality and emergent phenomena.

4. Scientific publications

4.1. Indexed publications

72 publications in JCR journals, +1 submitted. Citations: 1260, H: 17, i10: 30 (Scholar).

- 73.-** *Universal fluctuations of global geometrical measurements in planar clusters*,
S.N. Santalla, I. Álvarez Domenech, D. Villarrubia, R. Cuerno, JRL, ArXiv: 2311.15275.
- 72.-** *Shape effects in the fluctuations of random isochrones on a square lattice*,
I. Álvarez Domenech, JRL, R. Cuerno, P. Córdoba-Torres, S.N. Santalla, ArXiv: 2311.01400. Accepted at PRE.
- 71.-** *Long term behavior of the stirred vacuum on a Dirac chain: geometry blur and the random Slater ensemble*,
J. Vinaixa, B. Mula, A. Deaño, S.N. Santalla, JRL, ArXiv: 2310.16693. Accepted at JSTAT.
- 70.-** *Entanglement links and the quasiparticle picture*,
S.N. Santalla, G. Ramírez, S. Singha Roy, G. Sierra, JRL, *Phys. Rev. B* **107**, L121114 (2023).
- 69.-** *Ergotropy and entanglement of critical spin chains*,
B. Mula, E.M. Fernández, J.E. Alvarellos, J.J. Fernández, D. García-Aldea, S.N. Santalla, JRL, *Phys. Rev. B* **107**, 075116 (2023).
- 68.-** *Depletion in fermionic chains with inhomogeneous hoppings*,
B. Mula, N. Samos Sáenz de Buruaga, G. Sierra, S.N. Santalla, JRL, *Phys. Rev. B* **106**, 224204 (2022).
- 67.-** *Segregation in spatially structured cities*,
D. Ortega, JRL, E. Korutcheva, *Physica A* **608**, 128267 (2022).
- 66.-** *Exotic correlation spread in free-fermionic states with initial patterns*,
S. Singha Roy, G. Ramírez, S.N. Santalla, G. Sierra, JRL, *Phys. Rev. B* **105**, 214306 (2022).
- 65.-** *Entanglement in non-critical inhomogeneous quantum chains*,
N. Samos Sáenz de Buruaga, S.N. Santalla, JRL, G. Sierra, *Phys. Rev. B* **104**, 195147 (2021).
- 64.-** *Effects of confinement and vaccination on an epidemic outburst: a statistical mechanics approach*,
Ó. Toledano, B. Mula, S.N. Santalla, JRL, Ó. Gálvez, *Phys. Rev. E* **104**, 034310 (2021).
- 63.-** *Random walkers on a deformable medium*,
C. Lajusticia-Costan, S.N. Santalla, JRL, E. Korutcheva, *JSTAT* 073207 (2021).
- 62.-** *Link representation of the entanglement entropies for all bipartitions*,
S. Singha Roy, S.N. Santalla, G. Sierra, JRL, *J. Phys. A: Math. Theor.* **54**, 305301 (2021).
- 61.-** *A Schelling model with a variable threshold in a closed city segregation model*,
D. Ortega, JRL, E. Korutcheva, *Physica A* **574**, 126010 (2021).
- 60.-** *Avalanches in an extended Schelling model: An explanation of urban gentrification*,
D. Ortega, JRL, E. Korutcheva, *Physica A* **573**, 125943 (2021).
- 59.-** *Bulk-edge correspondence in the Haldane phase of the bilinear-biquadratic spin-1 Hamiltonian*,
S. Singha Roy, S.N. Santalla, JRL, G. Sierra, *JSTAT* 053102 (2021).
- 58.-** *Casimir forces on deformed fermionic chains*,
B. Mula, S.N. Santalla, JRL, *Phys. Rev. Research* **3**, 013062 (2021).
- 57.-** *Nanowire reconstruction under external magnetic fields*,
E.M. Fernández, S.N. Santalla, J.E. Alvarellos, JRL, *J. Chem. Phys.* **153**, 244106 (2020).
- 56.-** *Optimizing the spatial spread of a quantum walk*,
G. Martín-Vázquez, JRL, *Phys. Rev. A* **102**, 022223 (2020).

- 55.-** *First-passage percolation under extreme disorder: from bond-percolation to KPZ universality*,
D. Villarrubia, I. Álvarez Domenech, S.N. Santalla, JRL, P. Córdoba, *Phys. Rev. E* **101**, 062124 (2020).
- 54.-** *Entanglement as geometry and flow*,
S. Singha Roy, S.N. Santalla, JRL, G. Sierra, *Phys. Rev. B* **101**, 195134 (2020).
- 53.-** *Piercing the rainbow: entanglement on an inhomogeneous spin chain with a defect*,
N. Samos Sáenz de Buruaga, S.N. Santalla, JRL, G. Sierra, *Phys. Rev. B* **101**, 205121 (2020).
- 52.-** *Efficient computation of matrix elements of generic Slater determinants*,
JRL, L.M. Robledo, J. Dukelsky, *Phys. Rev. A* **101**, 012105 (2020).
- 51.-** *Null models for social hierarchical structure*,
M. Jiménez-Martín, S.N. Santalla, JRL, E. Korutcheva, *Physica A* **545**, 123767 (2020).
- 50.-** *Symmetry protected phases in inhomogeneous spin chains*,
N. Samos Sáenz de Buruaga, S.N. Santalla, JRL, G. Sierra, *JSTAT* 093102 (2019).
- 49.-** *Power accretion in social systems*,
S.N. Santalla, K. Koroutchev, E. Korutcheva, JRL, *Phys. Rev. E* **100**, 012143 (2019).
- 48.-** *Unusual area-law violation in random inhomogeneous systems*,
V. Alba, S.N. Santalla, P. Ruggiero, JRL, P. Calabrese, G. Sierra, *JSTAT* 023105 (2019).
- 47.-** *Engineering large end-to-end correlations in finite fermionic chains*,
H. Santos, J.E. Alvarillos, JRL, *Phys. Rev. B* **98**, 245121 (2018).
- 46.-** *Understanding the enhanced synchronization of delay-coupled networks with fluctuating topology*,
O. D’Huys, JRL, M. Jiménez, E. Korutcheva, W. Kinzel, *Eur. Phys. J. ST* **227**, 1129 (2018).
- 45.-** *Entanglement detachment in fermionic systems*,
H. Santos, J.E. Alvarillos, JRL, *Eur. Phys. J. D* **72**, 203 (2018).
- 44.-** *Non-universality of front fluctuations for compact colonies of non-motile bacteria*,
S.N. Santalla, JRL, J.P. Abad, I. Marín, M.M. Espinosa, J. Muñoz-García, L. Vázquez, R. Cuerno, *Phys. Rev. E* **98**, 012407 (2018).
- 43.-** *Kardar-Parisi-Zhang universality in first-passage percolation: the role of geodesic degeneracy*,
P. Córdoba-Torres, S.N. Santalla, R. Cuerno, JRL, *JSTAT* 063212 (2018).
- 42.-** *Entanglement Hamiltonian and entanglement contour in inhomogeneous 1D systems*,
E. Tonni, JRL, G. Sierra, *JSTAT* 043105 (2018).
- 41.-** *Building an adiabatic quantum computer in the classroom*,
JRL, S.N. Santalla, *Am. J. Phys.* **86**, 360 (2018).
- 40.-** *Tachyonic quench in a free bosonic field theory*,
S. Montes, G. Sierra, JRL, *JSTAT* 023102 (2018).
- 39.-** *BCS wave function, matrix product states, and the Ising conformal field theory*,
S. Montes, JRL, G. Sierra, *Phys. Rev. B* **96**, 195152 (2017).
- 38.-** *Synchronization of fluctuating chaotic networks*,
M. Jiménez-Martín, JRL, O. D’Huys, J. de la Rubia, E. Korutcheva, *Phys. Rev. E* **95**, 052210 (2017).
- 37.-** *More on the rainbow chain: entanglement, space-time geometry and thermal states*,
JRL, J. Dubail, G. Ramirez, P. Calabrese, G. Sierra, *J. Phys. A* **50**, 164001 (2017).
- 36.-** *Local Quantum Thermometry using Unruh-De Witt Detectors*,
S. Robles, JRL, *JSTAT* 033105 (2017).
- 35.-** *Many-body Lattice Wavefunctions From Conformal Blocks*,
S. Montes, JRL, H.H. Tu, G. Sierra, *Phys. Rev. B* **95**, 085146 (2017).
- 34.-** *Topology and the Kardar-Parisi-Zhang universality class*,
S.N. Santalla, JRL, A. Celi, R. Cuerno, *JSTAT* 023201 (2017).
- 33.-** *Synthetic Unruh effect in cold atoms*,
JRL, L. Tarruell, M. Lewenstein, A. Celi, *Phys. Rev. A* **95**, 013627 (2017).
- 32.-** *Entanglement in correlated random spin chains, RNA folding and kinetic roughening*,
JRL, S.N. Santalla, G. Ramírez, G. Sierra. *New J. Phys.* **18**, 073025 (2016).

- 31.-** *Fourier-space entanglement of spin chains*,
M. Ibáñez Berganza, JRL, G. Sierra, *JSTAT* 053112 (2016).
- 30.-** *Entanglement over the rainbow*,
G. Ramírez, JRL, G. Sierra, *JSTAT* P06002 (2015).
- 29.-** *Quantum simulation of non-trivial topology*,
O. Boada, A. Celi, JRL, M. Lewenstein, J.I. Latorre, *New J. Phys.* **17**, 045007 (2015).
- 28.-** *Random geometry and the Kardar-Parisi-Zhang universality class*,
S.N. Santalla, JRL, T. LaGatta, R.Cuerno, *New J. Phys.* **17**, 033018 (2015).
- 27.-** *From conformal to volume-law for the entanglement entropy in exponentially deformed critical chains*,
G. Ramírez, JRL, G. Sierra, *JSTAT* P10004 (2014).
- 26.-** *Splitting a critical spin chain*,
A. Zamora, JRL, M. Lewenstein, L. Tagliacozzo, *JSTAT* P09035 (2014).
- 25.-** *Energy space entanglement spectrum of pairing models with s-wave and p-wave symmetry*,
JRL, M. Ibáñez Berganza, G. Sierra, *Phys. Rev. B* **90**, 041103(R) (2014).
- 24.-** *Multiphoton states related via linear optics*,
P. Migdał, JRL, M. Oszmaniec, M. Lewenstein, *Phys. Rev. A* **89**, 062329 (2014).
- 23.-** *Entanglement in low-energy states of the random-hopping model*,
G. Ramírez, JRL, G. Sierra, *JSTAT* P07003 (2014).
- 22.-** *Physical consequences of $P \neq NP$ and the DMRG-annealing conjecture*,
JRL, S.N. Santalla, *JSTAT* P07006 (2014).
- 21.-** *Circular Kardar-Parisi-Zhang equation as an inflating, self-avoiding ring polymer*,
S.N. Santalla, JRL, R. Cuerno, *Phys. Rev. E* **89**, 010401(R) (2014).
- 20.-** *Entanglement classes of permutation-symmetric qudit states: symmetric operations suffice*,
P. Migdał, JRL, M. Lewenstein, *Phys. Rev. A* **88**, 012335 (2013).
- 19.-** *Qubism: self-similar visualization of many-body wavefunctions*,
JRL, P. Migdał, M. Ibáñez Berganza, M. Lewenstein, G. Sierra, *New J. Phys.* **14**, 053028 (2012).
- 18.-** *Quantum manipulation via atomic-scale magnetoelectric effects*,
A.T. Ngo, JRL, S.E. Ulloa, E.H. Kim, *Nano Lett.* **12** (1), 13-16 (2012).
- 17.-** *Intrinsic geometry approach to kinetic surface roughening*,
JRL, S.N. Santalla, R. Cuerno, *JSTAT* P05032 (2011).
- 16.-** *$H = xp$ model revisited and the Riemann zeros*,
G. Sierra, JRL, *Phys. Rev. Lett.* **106**, 200201 (2011).
- 15.-** *Radiative corrections to the Higgs potential in the LH model*,
A. Dobado, L. Tabares-Cheluci, S. Peñaranda, JRL *Eur. Phys. J. C*, **66**, 429 (2010).
- 14.-** *Reconstruction of the second layer of Ag on Pt(111): extended Frenkel-Kontorova model*,
R. Pushpa, JRL, S.N. Santalla, *Phys. Rev. B* **79**, 085409 (2009).
- 13.-** *Quantum wavefunction annealing of spin glasses in ladders*,
JRL, *JSTAT* P05008 (2007).
- 12.-** *Density matrix renormalization on random graphs and the quantum spin-glass transition*,
JRL, *J. Phys. A: Math. Theor.* **40**, 12043 (2007).
- 11.-** *Vertically extended Frenkel-Kontorova model: a renormalization group study*,
JRL, S.N. Santalla, *Phys. Rev. B* **72**, 125412 (2005).
- 10.-** *Universality classes of diagonal quantum spin ladders*,
M.A. Martín-Delgado, JRL, G. Sierra, *Phys. Rev. B* **72**, 104435 (2005).
- 9.-** *Construction of projection operators for nonlinear evolutionary dynamics*,
A. Degenhard, JRL, *Mult. Model. Simul. (SIAM)*, **4**, 2, 641-663 (2005).
- 8.-** *Density matrix renormalization group approach to non-equilibrium phenomena*,
A. Degenhard, JRL, S.N. Santalla, *Mult. Model. Simul. (SIAM)* **3**, 1, 89 (2004).

- 7.- *Anderson transition in low-dimensional disordered systems driven by long-range nonrandom hopping*, A. Rodríguez, V.A. Malyshev, G. Sierra, M.A. Martín-Delgado, JRL, F. Domínguez-Adame, *Phys. Rev. Lett.* **90**, 027404 (2003).
- 6.- *Towards the evaluation of the relevant degrees of freedom in nonlinear partial differential equations*, A. Degenhard, JRL, *J. Stat. Phys.* **106**, 5-6, 1093 (2002).
- 5.- *Real space renormalization group approach to field evolution equations*, A. Degenhard, JRL, *Phys. Rev. E* **65**, 036703 (2002).
- 4.- *Density matrix renormalization group study of excitons in dendrimers*, M.A. Martín-Delgado, JRL, G. Sierra, *Phys. Rev. B* **65**, 155116, (2002).
- 3.- *Absence of weak localization in two-dimensional disordered Frenkel lattices*, A. Rodríguez, M.A. Martín-Delgado, JRL, G. Sierra, V.A. Malyshev, F. Domínguez-Adame, J.P. Lemaistre, *J. Lumin.* **94-95**, 359 (2001).
- 2.- *Single block formulation of the DMRG in several dimensions: quantum mechanical problems*, M.A. Martín-Delgado, JRL, G. Sierra, *Nucl. Phys. B* **601**, 569 (2001).
- 1.- *The Correlated Block Renormalization Group*, M.A. Martín-Delgado, JRL, G. Sierra, *Nucl. Phys. B* **473**, 685 (1996).

4.2. Book chapters

Emergent Geometry from Entanglement Structure,

S. Singha Roy, S.N. Santalla, JRL, G. Sierra, chapter in “Quantum Theory and Symmetries”, ed. by M. Paranjape et al. (Springer, 2021).

Breaking the Area Law: The Rainbow State,

G. Ramírez, JRL, G. Sierra, chapter in “Strongly Coupled Field Theories for Condensed Matter and Quantum Information Theory”, ed. by A. Ferraz et al. (Springer, 2020).

Renormalization group methods for coarse-graining of evolution equations,

A. Degenhard, JRL, chapter in “Model Reduction and Coarse-Graining Approaches for Multiscale Phenomena”, ed. by A.N. Gorban et al. (Springer, 2006).

4.3. Relevant non-indexed publications

Ph.D. thesis: *Real Space Renormalization Group Techniques and Applications*. UCM, 2002.

ArXiv: cond-mat/020734.

Hóng-Zì: A Chinese Metafont, *TUGboat* **26** (2), 125 (2005). Contribution to the T_EX Users Group (TUG) meeting in Wuhan (People’s republic of China), Aug. 2005.

Preprint, *Self-replicating functions and the renormalization group*, JRL, G. Sierra (2008). ArXiv: 0809.3694.

Preprint, *Chaos in the Classical Analogue of the Hofstadter Problem*, M. Espinosa, M.A. Martín-Delgado, A. Niella, D. Páramo, JRL. Undergraduate research. ArXiv: chao-dyn/9808012 (1998).

5. Selected talks and seminars

Seminar *Entanglement over the rainbows*, Statphys 28, Tokyo (Japan), August 2023.

Seminar *Universality in geodesics on random media*, National University of Science and Technology, Moscow (Russia), May 2018.

Seminar *Entanglement in curved space-times: horizons and rainbows*, Center for Modern Physics, Chongqing University (People’s republic of China), Dec. 2017.

Seminar *Inhomogeneity and entanglement: from Unruh to the Rainbow*, MathQI group, UCM, March 2017.

Seminar *My computer wants to be quantum (when it grows up)*, Computer Science School, UCM, Madrid, March 2016. <http://github.com/jvrlag/qtoys>.

Seminar *Analog computers and Schrödinger’s cats*, Computer Science School, UCM, Madrid, May 2015.

Talk *Topology and the KPZ universality class*, Interface Fluctuations and KPZ Universality Class, Yukawa Institute of Theoretical Physics, Kyoto (Japan), August 2014.

Talk *Simulated disorder entails perfect discipline*, Quantum Integrability, Conformal Field Theory and Topological Quantum Computation, International Institute of Physics (IIP), Natal (Brazil), March 2014.

Seminar *Simulated disorder entails perfect discipline*, Physics Department, Freie Universität Berlin (Germany), March 2014.

Talk *Simulating the Unruh effect in artificial Rindler spacetime*, Relativistic Quantum Information meets Analogue Gravity, Nottingham (UK), March 2013.

Talk *Simulating quantum matter near event horizons*, Quantum Gases Meeting, CSIC, Madrid, Jan. 2013.

Talk *Simulating quantum matter near event horizons*, Quantum Simulators, Bilbao (Spain), October 2012.

Poster *Topological effects on the KPZ universality class*, FisEs'12, Palma (Spain), October 2012.

Seminar *Quantum entanglement, complexity and problem solving*, Geometry and Physics Seminar at UCM, Madrid, Dec. 2010.

Seminar *Introduction to the renormalization group for mathematicians*, Geometry and Physics Seminar at UCM, Madrid, June 2008.

Talk *Quantum phase transitions and information complexity*, IBM Research Center, Almaden (USA), Jan. 2008.

Talk *Spin glasses: exploring the connection between quantum phase transitions and information theory*, Physics Department, Stanford University (USA), Jan. 2008.

Talk *Quantum optimization: spin glasses and wavefunction annealing*, American Physical Society (APS) March Meeting, Denver (USA), March 2007.

Seminar *Quantum spin glasses: phase transitions and optimization* Statistical Physics PhD Program, SISSA, Trieste (Italy), Jan. 2007.

Seminar *Relevant characteristics governing dynamical processes*, Strukturbildungsprozesse Graduate School, Universität Bielefeld (Germany), Dec. 2004.

Talk *DMRG applied to diagonal ladders* and poster *Real space RG methods for quantum mechanics in $> 1D$* , Density Matrix Renormalization workshop, Lorentz Center, Leiden (Netherlands), Aug. 2004.

Seminar *Density matrix renormalization group approach to excitons in dendrimers*, Theoretische Physik Dep., Universität Bielefeld (Germany), July 2002.

Talk *The density matrix renormalization group and its nearest neighbours* and poster *On the evolution of a closed filament in bidimensional flows*, FisEs'00, Universidad de Santiago de Compostela (Spain), Sept. 2000.

6. Teaching

23 years of teaching experience: 9 in secondary and 14 in higher education.

6.1. Thesis supervision

Casimir forces, entanglement and conformal symmetry in inhomogeneous spin chains, Begoña Mula, UNED, July 2023. With Silvia N. Santalla.

Sociophysical analysis of urban segregation processes, Diego Ortega, UNED, May 2023. With Elka Korutcheva.

Entanglement in inhomogeneous quantum chains, Nadir Samos Sáenz de Buruaga, IFT-UAM/CSIC, April 2022. With Germán Sierra.

Gaussian many-body states: tachyonic quenches and conformal blocks, Sebastián Montes, IFT-UAM/CSIC, April 2018. With Germán Sierra.

Quantum entanglement in random and inhomogeneous systems, Giovanni Ramírez, IFT-UAM/CSIC, July 2015. With Germán Sierra.

Symmetries and self-similarity of many-body wavefunctions, Piotr Migdał, ICFO, Dec. 2014. With Maciej Lewenstein.

In progress: José Vinaixa at UNED, due in 2024.

6.2. Bachelor and Master

- Teaching Physics at UNED since 2015 (9 years).

Bachelor studies: General Physics, Mechanics, Experimental Physics, Dynamical Systems, Solid State Physics, Advanced Quantum Mechanics. Area coordinator.

Master studies: Kinetic roughening, Quantum information and computation, Pedagogical innovation. Area coordinator.

Supervision of 14 bachelor thesis and 9 master thesis.

Coordinator (*vice dean*) for the Physics Bachelor Degree at UNED since 2023.

- Teaching Mathematics at *Escuela Politécnica Superior* (engineering school), UC3M, from 2007 (5 years).

Bachelor studies: Linear Algebra and Calculus. Outstanding evaluation from students (average $\sim 4,5/5$). Teaching in Spanish and English. Area coordinator.

6.3. Secondary education

Secondary school teacher at public schools in Madrid from 1996 (9 years). Mathematics, physics, chemistry, biology, geology, technology, computer science, astronomy and economics.

6.4. Didactic projects

Class notes for different topics in mathematics and physics.

On-line tutorial of numerical computation using free software for students in science and engineering.

6.5. Outreach and popularization

Collaborations at [The Conversation](#) (with Celia González Sánchez, 2022), [the IFT blog at MadrI+D](#) (2017-18) and [100cias@uned](#) (2016-18).

Scientific blog: *Physics Napkins* (2010-2015).

Didactic article: *Un álgebra computacional para generar patrones geométricos*, *SUMA*, **46**, 45-50 (2004).

Popular science talks at different institutions. Examples (in Spanish):

- *De Planilandia a los agujeros negros*, Abr. 2021, Ateneo de Madrid.
- *Del gato (de) Schrödinger al ordenador cuántico*, Nov. 2020, Ateneo de Madrid.
- *La Vida y el Segundo Principio*, Apr. 2018, IFT.
- *¡Entropía! Las fuerzas del desorden en el Universo*, Oct 2017, IFT.
- *Computadores analógicos y gatos de Schrödinger*, May 2015, UCM.
- *Estrellas, llamas y remolinos: estudiamos la naturaleza porque es hermosa*, May 2015, Canal UNED.
- *Cosmología, de la A a la B*, Oct. 2009, UC3M.

7. Funding

Quantum complex systems: fundamentals and applications (COSY-QUEST, PID2019-105182GB-I00, Spanish Gov.). PI: Eva M. Fernández and Javier Rodríguez-Laguna. June 2020 to Feb. 2024.

Quantum information technologies –Madrid (QUITEMAD-CM, P2018-TCS434, Madrid local Gov.). PI: Miguel Ángel Martín-Delgado (UCM). Jan. 2019 to Dec. 2022.

Quantum entanglement in quantum many particle systems (FIS2015-69167-C2-1, Spanish Gov.).

PI: Germán Sierra. Jan. 2016 to Dec. 2018.

Modelling and simulation of interface dynamics in hard and soft matter systems (FIS2012-38866-C05-01, Spanish Gov.). PI: Rodolfo Cuerno (UC3M). Jan. 2013 to Dec. 2015.

Topological quantum matter: in the boundary between condensed matter, quantum optics and quantum information (FIS2012-33642, Spanish Gov.). PI: Belén Paredes (UAM-CSIC). Jan. 2013 to Dec. 2015.

Theoretical physics of condensed matter and quantum information (FIS2009-11654, Spanish Gov.).

PI: Germán Sierra (UAM-CSIC). Jan. 2010 to Dec. 2012.

Theoretical approaches to the dynamics and fluctuations of (sub)microscopic interfaces (FIS2009-12964-C05-01, Spanish Gov.). PI: Rodolfo Cuerno (UC3M). Jan. 2010 to Dec. 2012.

Analytical and exact numerical methods in condensed matter (FIS2006-04885, Spanish Gov.).

PI: Germán Sierra (UAM-CSIC). Jan. 2007 to Dec. 2009.

8. Miscellanea

Member of *Real Sociedad Española de Física*.

Referee for Physical Review Letters, A, B, E, X and Research; PLOS One; Journal of Physics A and Communications; Central European Journal of Physics; Journal of Statistical Mechanics; Europhysics Letters; Revista Mexicana de Física; Revista Española de Física; Quantum Information Processing; Physica A; American Journal of Physics; SciPost.

8.1. Computational projects

HVB, general purpose scientific C++ library.

Hóng Zì, a Chinese METAFONT.

Geometrical Description Language (GDL), didactic software for geometry exploration.

SciToys, small computational physics & mathematics demonstrations.

8.2. Other

Regular collaboration at *Verböten*, on-line magazine in Spanish, on politics and economics, 2012-13 (Spanish).

Crastina column: *Occupy Science!* (2015).

Short fiction stories (in Spanish): “*Ella misma*”, Sci-Fdi **6** (2012); “*En ti*”, Sci-Fdi **9** (2014) (Spanish); “*Empuñar la libertad*”, in *De la libertad y otros cuentos*, Ed. J.M. Enríquez et al., Amargord (2016).

Students’ representative at the Physics School Council and the Theoretical Physics Dept., UCM (Spain) in 1995 and 1996.

Staff member of |QUANTO), students’ journal at the Physics School, UCM (Spain), 1994-98.

Philosophy student at UNED (Spain), 1998-2009.

Languages: Native Spanish speaker. Fluent in English and Italian. Can read and communicate in French and German. Basic Chinese, Russian and Hindi.