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Born: June 7, 1978—Valencia, Spain

Current position

Professor (tenured), University of Valencia, Spain

Areas of specialization

Complex systems • Statistical Physics • Transport phenomena • Nonlinear dynamics • Cellular automata • Time series analysis • Quantum mechanics

Appointments held

2007-2014 Technische Universität München (TUM), Munich, Germany
2010-2013 Institute for Advanced Study (TUM-IAS), Munich, Germany
2017 Polytechnic University of Valencia, Spain
2018-2019 Valencian International University, Spain
2019- University of Valencia, Spain

Education

2001 Licenciate in Physics, Grade A, University of Valencia, Spain
2003 MSc in Physics, Grade A, University of Valencia, Spain
2005 PhD in Physics, Summa cum laude (European Doctorate), University of Valencia, Spain

Grants, honors & awards

2001 Prize for outstanding degree in Physics (awarded by the University of Valencia)
2002-2005 Training of Future Professors (FPU) grant (pre-doctoral, highly competitive grant awarded by the Spanish Ministry of Education)
2006 DAAD Scholarship

2007 Prize for outstanding PhD Thesis (awarded by the University of Valencia to the best PhD theses of years 2005 and 2006)

2010-2013 Carl von Linde Junior Fellowship, Technische Universität München - Institute for Advanced Study

Scientific publications & invited talks

Journal articles

55. B. Martinez, V. Garcia-Morales, J. A. Manzanares and M. A. Gilabert, *The nonlinear embeddings method for long-term vegetation dynamics*, ISPRS J. Photogramm. Remote Sens. **226** (2025) 364-380

54. P. Ramirez, J. Cervera, V. Garcia-Morales, S. Nasir, M. Ali, W. Ensinger and S. Mafe, *Equivalent circuits in nanopore-based electrochemical systems*, Electrochim. Acta. **484** (2024) 144057

53. V. García-Morales, S. Tandon, J. Kurths and R. I. Sujith, *Universality of oscillatory instabilities in fluid mechanical systems*, New J. Phys. **26** (2024) 033005

52. V. García-Morales, J. A. Manzanares and K. Krischer, *Chimera states under genuine local coupling*, Chaos Sol. Fract. **165** (2022) 112808

51. V. García-Morales, *Replication of spatial patterns with reversible and additive cellular automata*, J. Phys. A: Math. Theor. **55** (2022) 355201

50. J. J. Perez-Grau, P. Ramirez, V. Garcia-Morales, J. Cervera, S. Nasir, M. Ali, W. Ensinger and S. Mafe, *Fluoride-Induced Negative Differential Resistance in Nanopores: Experimental and Theoretical Characterization*, ACS Appl. Mater. Interfaces. **13** (2021) 54447-54455

49. V. García-Morales, *A constructive theory of shape*, Chaos Sol. Fract. **152** (2021) 111426

48. K. Froehlich, M. Ali, P. Ramirez, J. Cervera, V. García-Morales, M. Erdmann and W. Ensinger, *Effect of cationic polyamidoamine dendrimers on ionic transport through nanochannels*, Electrochim. Acta **367** (2021) 137263

47. V. García-Morales, *Unifying vectors and matrices of different dimensions through nonlinear embeddings*, J. Phys. Complex. **1** (2020) 025008

46. V. Garcia-Morales, *A new approach to fuzzy sets: Application to the design of nonlinear time series, symmetry breaking patterns and non-sinusoidal limit-cycle oscillations*, Chaos Sol. Fract. **128** (2019) 191-202

45. V. Garcia-Morales, *Diagrammatic approach to cellular automata and the emergence of form with inner structure*, Comm. Nonlinear Sci. Numer. Simulat. **63** (2018) 117-134

44. P. Ramirez, V. Garcia-Morales, V. Gomez, M. Ali, S. Nasir, W. Ensinger and S. Mafe, *Hybrid Circuits with Nanofluidic Diodes and Load Capacitors*, Phys. Rev. Applied **7** (2017) 064035

43. V. Garcia-Morales, *Nonlinear embeddings: Applications to analysis, fractals and polynomial root finding*, Chaos Sol. Fract. **99** (2017) 312-324

42. V. Garcia-Morales, J. A. Manzanares and S. Mafe, *Weakly coupled map lattice models for multicellular patterning and collective normalization of abnormal single-cell states*, Phys. Rev. E **95** (2017) 042324

41. V. Garcia-Morales, *Semipredictable dynamical systems*, Comm. Nonlinear Sci. Numer. Simulat. **39** (2016) 81-98

40. V. Garcia-Morales, *Digit replacement: A generic map for nonlinear dynamical systems*, Chaos **26** (2016) 93109

39. V. Garcia-Morales, *From deterministic cellular automata to coupled map lattices*, J. Phys. A: Math. Theor. **49** (2016) 295101

38. V. Garcia-Morales, *Cellular automaton for chimera states*, EPL **114** (2016) 18002

37. V. Garcia-Morales, *Fractal surfaces from simple arithmetic operations*, Physica A **447** (2016) 535-544

36. V. Garcia-Morales, *The $p\lambda n$ fractal decomposition: Nontrivial partitions of conserved physical quantities*, Chaos Sol. Fract. **83** (2016) 27-37

35. V. Garcia-Morales, *Substitution systems and nonextensive statistics*, Physica A **440** (2015) 110-117

34. V. Garcia-Morales, *Quantum Mechanics and the Principle of Least Radix Economy*, Found. Phys. **45** (2015) 295-332

33. L. Schmidt, K. Schoenleber, K. Krischer and V. Garcia-Morales, *Coexistence of synchrony and incoherence in oscillatory media under nonlinear global coupling*, Chaos **24** (2014) 013102

32. V. Garcia-Morales, *Origin of complexity and conditional predictability in cellular automata*, Phys. Rev. E **88** (2013) 042814

31. V. Garcia-Morales, *Symmetry analysis of cellular automata*, Phys. Lett. A **377** (2013) 276-285

30. V. Garcia-Morales, *Universal map for cellular automata*, Phys. Lett. A **376** (2012) 2645-2657

29. V. Garcia-Morales and K. Krischer, *The complex Ginzburg-Landau equation: an introduction*, Contemp. Phys. **53** (2012) 79-95

28. V. Garcia-Morales and K. Krischer, *Superstatistics in nanoscale electrochemical systems*, PNAS **108** (2011) 19535-19539

27. V. Garcia-Morales and K. Krischer, *Kinetic enhancement in nanoscale electrochemical systems caused by non-normal distributions of the electrode potential*, J. Chem. Phys. **134** (2011) 244512

26. H. A. Santos, V. Garcia-Morales and C. M. Pereira, *Electrochemical Properties of Phospholipid Monolayers at Liquid-Liquid Interfaces*, Chem. Phys. Chem. **11** (2010) 28-41

25. V. Garcia-Morales, A. Orlov and K. Krischer, *Subharmonic phase clusters in the complex Ginzburg-Landau equation with nonlinear global coupling*, Phys. Rev. E **82** (2010) 065202

24. V. Garcia-Morales and K. Krischer, *Fluctuation enhanced electrochemical reaction rates at the nanoscale*, PNAS **107** (2010) 4528-4532

23. I. Miethe, V. Garcia-Morales and K. Krischer, *Irregular Subharmonic Cluster Patterns in an Autonomous Photoelectrochemical Oscillator*, Phys. Rev. Lett. **102** (2009) 194101

22. V. Garcia-Morales and K. Krischer, *Normal-form approach to spatiotemporal pattern formation in globally coupled electrochemical systems*, Phys. Rev. E **78** (2008) 057201

21. V. Garcia-Morales, J. Pellicer and J. A. Manzanares, *Thermodynamics based on the principle of least abbreviated action: Entropy production in a network of coupled oscillators*, Ann. Phys (New York) **323** (2008) 1844-1858

20. V. Garcia-Morales, R. W. Hoelzel and K. Krischer, *Coherent structures emerging from turbulence in the nonlocal complex Ginzburg-Landau equation*, Phys. Rev. E **78** (2008) 026215

19. V. Garcia-Morales and K. Krischer, *Nonlocal complex Ginzburg-Landau equation for electrochemical systems*, Phys. Rev. Lett. **100** (2008) 054101

18. V. Garcia-Morales and S. Mafe, *Monolayer-protected metallic nanoparticles: Limitations of the concentric sphere capacitor model*, J. Phys. Chem. C **111** (2007) 7242-7250

17. M. C. Martins, C. M. Pereira, H. A. Santos, R. Dabirian, F. Silva, V. Garcia-Morales and J. A. Manzanares, *Analysis of adsorption of phospholipids at the 1,2-dichloroethane/water interface by electrochemical impedance spectroscopy: A study of the effect of the saturated alkyl chain*, J. Electroanal. Chem. **599** (2007) 367-375

16. V. Garcia-Morales, J. Cervera and J. A. Manzanares, *Pore entrance effects on the electrical potential distribution in charged porous membranes and ion channels*, J. Electroanal. Chem. **599** (2007) 203-208

15. H. A. Santos, V. Garcia-Morales, L. Murtomäki, J. A. Manzanares and K. Kontturi, *Preparation of nanostructures composed of dextran sulfate/ruthenium nanoparticles and their interaction with phospholipid monolayers at a liquid-liquid interface*, J. Electroanal. Chem. **599** (2007) 194-202

14. V. Garcia-Morales and J. Pellicer, *Microcanonical foundation of nonextensivity and generalized thermostatistics based on the fractality of the phase space*, Physica A **361** (2006) 161-172

13. M. Chirea, V. Garcia-Morales, J. A. Manzanares, C. M. Pereira, R. Gulaboski and F. Silva, *Electrochemical characterization of polyelectrolyte/gold nanoparticle multilayers self-assembled on gold electrodes*, J. Phys. Chem. B **109** (2005) 21808-21817

12. H. A. Santos, M. Chirea, V. Garcia-Morales, F. Silva, J. A. Manzanares and K. Kontturi, *Electrochemical study of interfacial composite nanostructures: Polyelectrolyte/gold nanoparticle multilayers assembled on phospholipid/dextran sulfate monolayers at a liquid-liquid interface*, J. Phys. Chem. B **109** (2005) 20105-20114

11. T. H. Silva, V. Garcia-Morales, C. Moura, J. A. Manzanares and F. Silva, *Electrochemical impedance spectroscopy of polyelectrolyte multilayer modified gold electrodes: Influence of supporting electrolyte and temperature*, Langmuir **21** (2005) 7461-7467

10. H. A. Santos, V. Garcia-Morales, R. J. Roozeman, J. A. Manzanares and K. Kontturi, *Interfacial interaction between dextran sulfate and lipid monolayers: An electrochemical study*, Langmuir **21** (2005) 5475-5484

9. V. Garcia-Morales, J. Cervera and J. Pellicer, *Correct thermodynamic forces in Tsallis thermodynamics: connection with Hill nanothermodynamics*, Phys. Lett. A **336** (2005) 82-88

8. S. V. P. Barreira, V. Garcia-Morales, C. M. Pereira, J. A. Manzanares and F. Silva, *Electrochemical impedance spectroscopy of polyelectrolyte multilayer modified electrodes*, J. Phys. Chem. B **108** (2004) 17973-17982

7. V. Garcia-Morales, J. Cervera and J. Pellicer, *Coupling theory for counterion distributions based in Tsallis statistics*, Physica A **339** (2004) 482-490

6. V. Garcia-Morales, T. H. Silva, C. Moura, J. A. Manzanares and F. Silva, *Ion transport through polyelectrolyte multilayers under steady-state conditions*, J. Electroanal. Chem. **569** (2004) 111-119

5. S. Mafe, V. Garcia-Morales, and P. Ramirez, *Estimation of pK(a) shifts in weak polyacids using a simple molecular model: effects of strong polybases, hydrogen bonding and divalent counterion binding*, Chem. Phys. **296** (2004) 29-35

4. J. Cervera, V. Garcia-Morales, and J. Pellicer, *Ion size effects on the electrokinetic flow in nanoporous membranes caused by concentration gradients*, J. Phys. Chem. B **107** (2003) 8300-8309

3. V. Garcia-Morales, J. Cervera and J. Pellicer, *Calculation of the wetting parameter from a cluster model in the framework of nanothermodynamics*, Phys. Rev. E **67** (2003) 062103

2. J. Pellicer, V. Garcia-Morales, L. Guanter, M. J. Hernández and M. Dolz, *On the experimental values of the water surface tension used in some textbooks*, Am. J. Phys. **70** (2002) 705-709

1. J. Pellicer, V. Garcia-Morales and M. J. Hernández, *On the demonstration of the Young-Laplace equation in introductory physics courses*, Phys. Educ. **35** (2000) 126-129

Book chapters

2011 V. Garcia-Morales, J. Cervera and J. A. Manzanares, *Nanothermodynamics* in K. Sattler (ed.) *Handbook of Nanophysics, Vol. 1: Principles and Methods* CRC Press-Taylor and Francis, Boca Raton (USA) ISBN 978-1-4200-7540-3 (2011), Chapter 15.

2013 V. Garcia-Morales and K. Krischer, *Turbulence and synchrony in spatially extended electrochemical oscillators* in A. Mikhailov and G. Ertl (eds.) *Engineering of Chemical Complexity* World Scientific Lecture Notes in Complex Systems, Singapore, ISBN: 978-981-4390-45-3 (2013), Chapter 12, pp. 237-260.

2015 L. Schmidt, K. Schoenleber, V. Garcia-Morales and K. Krischer, *Unusual synchronization phenomena during the electrodissolution of silicon: the role of nonlinear global coupling* in A. Mikhailov and G. Ertl (eds.) *Engineering of Chemical Complexity II* World Scientific Lecture Notes in Complex Systems, Singapore, ISBN: 978-9-8146-1612-6 (2015), Chapter 14, pp. 239-260.

2020 V. Garcia-Morales, J. Cervera and J. A. Manzanares, *Nanothermodynamics: Fundamentals and Applications* in K. Sattler (ed.) *21st Nanoscience: A Handbook, Vol 5: Exotic nanostructures and quantum systems.* CRC Press Boca Raton (USA) ISBN 9780815356264 (2020), Chapter 22.

2022 V. Garcia-Morales, J. Cervera and J. A. Manzanares, *Modeling Tumor Growth with a Modulated Game of Life Cellular Automaton Under Global Coupling* in I. Balaz and A. Adamatzky (eds.) *Cancer, complexity, computation.* Springer series "Emergence, Complexity and Computation" (ECC), volume 46. Springer, Cham, (Switzerland) ISBN 978-3-031-04378-9 (2022) https://doi.org/10.1007/978-3-031-04379-6. Chapter 5, pp. 117-132.

Invited Talks (Selection)

2006 *De la dinámica microscópica a la Termodinámica* ("From microscopic dynamics to macroscopic thermodynamics"), invited talk at the Universidad Complutense de Madrid, 22th November 2006, Madrid (Spain)

2010 *Fluctuation enhanced electrochemical reaction rates at the nanoscale* invited talk at the Humboldt-Universität Berlin, Institut für Physik-Stochastische Prozesse, 10th February 2010, Berlin (Germany)

2010 *Spatiotemporal pattern formation in chemical oscillators* invited talk at the Dipartimento de Chimica of the Università degli Studi di Modena e Reggio Emilia, 17th September 2010, Modena (Italy)

2012 *Mathematical Physics of Cellular Automata* invited talk held at the *General Assembly of the Institute for Advanced Study, TUM*, 25 April 2012. Petershausen (Germany)

2013 *Superstatistics on nanoscale electrochemical systems: an experimental challenge* invited talk at the *Discussion Workshop on New Horizons in Electrochemistry - at the Boundary to Physics and Materials Science*, 26-28 August 2013. Capri (Italy)

2023 *Geometría de lo vivo y de lo inerte* ("Geometry of the living and the inert"), invited talk at the Department of Applied Mathematics, Polytechnic University of Madrid, 1st December 2023, Madrid (Spain)

Teaching

2004-2005 Physics of Fluids, Universitat de València, Spain
2007-2014 Nonlinear Dynamics and Complex Systems I, Technische Universität München, Munich, Germany
2007-2014 Nonlinear Dynamics and Complex Systems II, Technische Universität München, Munich, Germany
2011-2013 Nanothermodynamics, Technische Universität München, Munich, Germany (for master students)
2019-2022 Laboratory of Thermodynamics, Universitat de València, Spain
2019- Thermodynamics, Universitat de València, Spain
2019- Supervisor of Final Degree Projects (for the degree in Physics and the double degree in Physics and Mathematics), Universitat de València, Spain
2024- Statistical Physics, Universitat de València, Spain (for advanced undergraduate students in the Double Degree of Physics and Mathematics)

Service to the profession

Since 2005, regular referee for the American Physical Society (Physical Review Letters, Physical Review X, Physical Review E, Physical Review B), the American Mathematical Society, the American Chemical Society (JACS, Langmuir), Nature MacMillan (Scientific Reports), Elsevier (Physica A, Physics Letters A, Communications in Nonlinear Science and Numerical Simulation), Institute of Physics Publishing (New Journal of Physics, Journal of Physics A: Mathematical and Theoretical, Nanotechnology), EPL, Nonlinear Dynamics and Proceedings of the Royal Society A.

Regular reviewer for MathSciNet since year 2017 with 20 published reviews.

Special Issue Editor of the "Symmetry in Statistical Mechanics and Complex Dynamical Systems" issue of the journal *Symmetry* (ISSN 2073-8994). https://www.mdpi.com/journal/symmetry/special_issues/NWN18YRN99

Spoken languages

English (C1), German (C1), Catalonian (C1) and Spanish (mother tongue)

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