

Joaquin Marro — Curriculum Vitae

EDUCATION:

B.A. and M.Sc., September 1967, Physics and Mathematics, University of Zaragoza, Spain

Doctor in Physics (Ph.D.), March 1973, University of Barcelona, Spain

Doctor of Philosophy (Ph.D.), Physics Major, September 1975, Yeshiva University New York, USA

PRESENT POSITION:

Emeritus Professor —2015-2020 yearly designation by unanimity of UGR Board of Directors; open-ended appointment with honors since 2020

Institute “Carlos I” for Theoretical and Computational Physics, UGR, and
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PREVIOUS POSITIONS

Department of Theoretical Physics, University of Barcelona (14 years); Belfer Graduate School of Science, Yeshiva University of New York (2 years); Courant Institute of Mathematical Sciences, New York University (1 year); Ass. Prof. of Mathematical Physics, Department of PDE, School of Mathematics, Univ. of Barcelona (3 years); Full Professor of Theoretical Physics of the University of Barcelona; Full Professor (Applied and Condensed Matter Physics) at University of Granada 1987-2015; Emeritus Professor October 2015 to date.

Some main visits, courses and talks (roughly chronological)

Institute Lorentz of Theoretical Physics, University of Leiden, Netherlands; Physics Lab., University of Porto, Portugal; XI Sitges Conf. on Neural Networks, University of Barcelona; Departments of Physics and Mathematics (Rutgers University, New Brunswick, New Jersey); Department of Theoretical Physics, University of Geneva; Centro de Física, Venezuelan Institute for Scientific Research, Caracas; STATPHYS, Berlin; *Troisime Cycle de la Physique en Suisse Romande, Enseignement de Physique Theorique*, Lausanne; 14th General Conf. of the Cond. Matter Division of the EPS; Summer Courses of the Complutense Univ. of Madrid, El Escorial, Spain; Enrico Fermi Summer School, Italian Phys.I Society, Como, Italia; Courant Institute of Math. Sciences, New York University; Summer courses of the International University Menéndez Pelayo, Santander, Spain; *Workshop on Dynamics of Non-equilibrium Systems*, ICTP, Trieste; 81st Statistical Mechanics Conference, Rutgers University, New Brunswick, N.J.; Conference on Cognitive and Neural Systems, Center for Adaptive Systems, Boston University; ICSC Symposium on Neural Computation, Berlin; Department of Physics, City University of New York; Euro-physics Conference on Computational Physics, Aachen; *Bridging Time-Scale Gap*, European Science Foundation, Konstanz; 19th CMD/EPS + CMMP 02, European Physical Society, Brighton; Joint Conference of ICCP6 and CCP, IUPAP and EPS, Beijing, China; Conference on Computational Physics CCP2006, Gyeongju, Korea; *40 Years of Green’s Function Monte Carlo*, Courant Institute of Mathematical Sciences, New York University; Conference on Computational Physics CCP2007, Brussels; Symposium on Mathematical Simulation, Ramón Areces Foundation, Sevilla; 104th Statistical Mechanics Conference, Rutgers University, December 2010; Brain Panel Discussion, E.T.S. Computer Science and Communication, UGR, February 2011; *TIC and Neuroscience Days*, Universidad de Oviedo y Vodafone Foundation, February 2011; *Fluctuation Phenomena in Interdisciplinary Science*, Spain Network of Physics of Systems Out of Equilibrium, University of Barcelona, April 2011; Russian Academy of Sciences, Moscow, August 2011; ICCMSP Agadir, Morocco, October 2011; Net-Works 2011, El Escorial, Madrid October 2011; EFE — Asociación de Estudiantes de Física, *Metáforas del cerebro*, UGR, Noviembre 2011; CEO BitBrain Technologies, Zaragoza, November 2011; *Pensamiento Complejo en Humanidades y Ciencias Sociales*, International University of Andalucía, December 2011; *Metáforas Matemáticas para Explorar lo Complejo*, Jornadas de Física en la Universidad de Murcia, Abril 2012; *Modeling of Excitable Media relevant to Brain Structure and Function*, BIOCOMP, Vietri sul Mare, Italy, Julio 2012; *Complex networks in the brain: function vs wiring and excitability*, 12th Granada Seminar, La Herradura 12 September 2012; *El curioso caso de la complejidad en ciencia*, Serie “Fronteras de la Física” del Institute Carlos I, UGR, Mayo 2013; same title in Department of Mathematics, University Carlos III, Leganés, Madrid, and Instituto de Astrofísica de Andalucía, November 2013. *Complejidad, Física y Cerebro*, Centro de Investigación Mente Cerebro y Conocimiento, y Facultad Psicología, UGR, December 2013; same title in Facultad de Ciencias, Universidad de Málaga, y Facultad de Ciencias, Universidad de Zaragoza, January 2014; *¿Somos nuestro cerebro?*, mesa redonda, Facultad de Psicología UGR, Febrero; *Phase*

Transitions in the Brain, CM workshop, Brussels, and IFISC, CSIC-UIB, Mallorca, May 2014; *Discrete Models of Complex Systems*, Institute Jozef Stefan, Ljubljana, Slovenia June 2014 — *Mind and Phase Transitions*, Universidad de Extremadura, Badajoz December 2014 — El curioso caso de la complejidad en ciencia, *complexitat.cat*, Barcelona, 27 Abril 2015 — Complex Collective Dynamics: Brain and Beyond, Capri, September 2015 — *Brain, Networks and Phase Transitions*, Net-Works 2015 — *Is the Mind a compound of Phase Transitions?* FISES, October 2015 — *¿Qué es la vida?*, Ateneo, May 2016 — *Sobre el azar, ontología y epistemología*, Instituto de Astrofísica de Andalucía, 17 noviembre 2016 — *Complejidad de la Mente y Cambios de Fase*, iC1 25 aniversario, 25 noviembre 2016 — Centre de Recerca Matemàtica, *Mind and Phase Transitions*, Workshop on Avalanche Processes in Condensed Matter Physics and Beyond, Univ. Barcelona, January 2017 — *¡Somos Críticos! Física, Vida y Mente*, Seminario Crónicas de Física, Palacio de la Madraza, 15 march 2017 — *Mind and Phase transitions*, Avalanches and Large Events Workshop, University of Barcelona, 19 October 2017 — *The Mind is a compound of Phase Transitions*, in *Frontiers of Fundamental Physics 15*, Miguel Hernández University, Alicante, 29 November 2017 — *Ludwig E. Boltzmann. Genio Precursor de Ciencia para el Futuro*, iC1 Fronteras de la Física, Facultad de Ciencias UGR, 15 December 2017 — *Seminar on Computational Neuroscience*, 14 February 2018, Instituto Cajal, Madrid — *Collaborative Research on Computational Neuroscience USA-Spain*, a collaboration between US-NSF, US-NIH and Spanish Research Agency AEI, 15-16 February 2018, MINECO, Madrid — “Hay un camino en física para llegar a comprender la mente”, *Instituto U. BIFI – Biocomputación y Física de Sistemas Complejos*, Universidad de Zaragoza, 7 junio 2019 — “Complexity of synaptic nets induces phase transitions and criticality in the mind”, *Complex Networks in the Life Sciences* meeting, Alcalá de Henares, 25 July 2019 — “Is the Mind just an assembly of Phase Transitions?”, September 2019 in the 15th Granada Seminar — 29th [Annual Computational Neuroscience Meeting](#), July 2020 — [Brain Criticality](#) (Virtual Internat. Conf.), 6-8 October 2020 — 7-17 June 2021, 16th [Granada Seminar](#) — [Brain Criticality Hybrid Meeting](#), 7-9 November 2022, NIH – Bethesda and Zoom.

PUBLICATIONS: research papers (with links to preprints) — a few items are missing in this list

- A KINETIC EQUATION FOR DENSE GASES
Physics Letters **44A**, 41-3 (1973), J. Biel, JM, L. Navarro
- MECANICA ESTADISTICA DE LOS PROCESOS IRREVERSIBLES: ABSORCION DE ENERGIA Y FLUCTUACIONES
Revista de la Real Academia de Ciencias Exactas, Físicas y Nat., de Madrid **67**, 289-334 (1973), J. Biel & JM
- MECANICA ESTADISTICA DE LOS PROCESOS IRREVERSIBLES: MOVIMIENTO BROWNIANO
Revista Real Academia de Ciencias Exactas, Físicas y Natur., Madrid **67**, 335-63 (1973), JM & J. Biel
- CONTRIBUCION A LA TEORIA DINAMICOMOLECULAR DE GASES DENSOS FUERA DEL EQUILIBRIO
Secretariado para Publicaciones de la Universidad de Barcelona, 1973, JM (doctoral dissertation)
- ON THE GENERALIZATION OF THE BOLTZMANN EQUATION, *Il Nuovo Cimento* **20B**, 25-54 (1974), J. Biel, JM
- ON THE EXISTENCE OF KINETIC EQUATIONS, *Il Nuovo Cimento* **20B**, 55 (1974), J. Biel, JM, L. Navarro
- [TIME EVOLUTION OF A QUENCHED BINARY ALLOY: II. COMPUTER SIMULATION OF A 3D MODEL SYSTEM](#)
Physical Review **12B**, 2000-11 (1975), JM, A. Bortz, M. H. Kalos, J.L. Lebowitz
- [TIME EVOLUTION OF A QUENCHED BINARY ALLOY: III. COMPUTER SIMULATION OF A 2D MODEL SYSTEM](#)
Physical Review **13B**, 4328 (1976), M. Rao, M.H. Kalos, J.L. Lebowitz & JM.
- ON THE KINETICS OF PHASE TRANSITIONS IN BINARY ALLOYS
University Microf, 300 North Zeeb Road, Ann Arbor, Michigan 1976, (Ph.Thesis), JM
- MONTE CARLO STUDIES OF PERCOLATION PHENOMENA FOR SIMPLE CUBIC LATTICES
Journal of Statistical Physics **15**, 345-55 (1976), A. Sur, J. Lebowitz, JM, M. Kalos, S. Kirkpatrick
- TIME EVOLUTION OF A QUENCHED BINARY ALLOY: COMPUTER SIMULATION OF A 3D MODEL SYSTEM
Nuclear Metallurgy **20**, 89 (1976), JM, A. Bortz, M. Kalos, J. Lebowitz, A. Sur
- COMPUTER SIMULATION OF A QUENCHED BINARY ALLOY: CLUSTER DYNAMICS OF A 2D MODEL SYSTEM
Nuclear Metallurgy **20**, 180-197 (1976), M. Rao, M.H. Kalos, J.L. Lebowitz, JM
- [UNIVERSALITY TESTS FOR CRITICAL AMPLITUDES IN TWO DIMENSIONAL PERCOLATION](#), *Physics Letters* **59A**, 180-4 (1976), JM
- [TIME EVOLUTION OF A QUENCHED BINARY ALLOY: IV. COMPUTER SIMULATION OF A 3D MODEL SYSTEM](#)
Physical Review **15B**, 3014 (1977), Amit Sur, Joel L. Lebowitz, JM
- TIME DISPLACED CORRELATION FUNCTIONS IN INFINITE 1D MIXTURE OF HARD RODS WITH DIFFERENT DIAMETERS
Journal of Statistical Physics **18**, 179-190 (1978), M. Aizenman, J.L. Lebowitz, JM
- [ON THE VALIDITY OF THE BOLTZMANN DESCRIPTION AS A CONSEQUENCE OF THE EXACT LAWS OF MECHANICS](#)
Physics Letters **68A**, 159 (1978), J. Biel, JM
- [STATISTICAL APPROACH TO THE KINETICS OF NONUNIFORM FLUIDS](#), *Physica* **94A**, 297-320 (1978), J. Biel & JM
- GROWTH OF CLUSTERS IN A FIRST-ORDER PHASE TRANSITION
Journal of Statistical Physics **19**, 243-268 (1978), O. Penrose, J.L. Lebowitz, JM, M.H. Kalos, A.Sur
- [COMPUTER EXPERIMENTS ON PHASE SEPARATION IN BINARY ALLOYS](#)
Advances in Colloid and Interface Science **10**, 173-214 (1979), K. Binder, M.H. Kalos, J.L. Lebowitz & JM
- MECANICA ESTADISTICA DE LOS PROCESOS IRREVERSIBLES: IV. ECUACION DE BOLTZMANN
Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales, Madrid **73**, 191-211 (1979), J. Biel, JM
- [COMPUTER SIMULATION OF TIME EVOLUTION OF A QUENCHED MODEL ALLOY IN THE NUCLEATION REGION](#)
Physical Review Letters **43**, 282-6 (1979), JM, J.L. Lebowitz, M.H. Kalos
- COMPUTER EXPERIMENTS ON PHASE SEPARATION IN ALLOYS
Nucleation III, A.C.Zettlemoyer ed., Elsevier Sci. Pub., Amsterdam 1979, K. Binder, J. Lebowitz, M. Kalos, JM
- ON THE 1D KINETIC THEORY OF HARD RODS, *Anales de Física* **76**, 5 (1980), JM
- DINAMICA DE TRANSICIONES DE FASE: TEORIA Y SIMULACION NUMERICA DE LA EVOLUCION TEMPORAL DE ALEACIONES METALICAS ENFRIADAS RAPIDAMENTE, Serie Universitaria, vol. 127, p. 60, Fundación Juan March, Madrid 1980, JM
- TECNICAS MONTE CARLO DE SIMULACION Y CALCULO: UN COMENTARIO

- Libro en memoria del Prof. R. Marqués, pp. 301-16, Ediciones Universidad de Barcelona, Barcelona 1981, JM
- DYNAMICAL SCALING OF STRUCTURE FUNCTION IN QUENCHED BINARY ALLOYS
Acta Metallurgica **30**, 297 (1982), J.L. Lebowitz and JM
 - EQUILIBRIUM CLUSTER DISTRIBUTION OF THE 3D ISING MODEL IN THE ONE PHASE REGION
Physica **122A**, 563-586 (1983), JM & R. Toral
 - RELEVANCE OF THE CAHN-HILLIARD-COOK THEORY AT EARLY TIMES IN SPINODAL DECOMPOSITION
Physics Letters **95A**, 443-6 (1983), JM, J.L. Vallés
 - KINETICS OF PHASE SEGREGATION: A REVIEW OF RECENT RESULTS
Comments on Solid State Physics **10**, 201-18 (1983), J.L. Lebowitz, JM, M.H. Kalos
 - ON THE DYNAMICS OF PHASE SEGREGATION IN QUENCHED BINARY ALLOYS
Revista Mexicana de Física, Suplem., pp. 315-332 (1983), JM, J.L. Lebowitz, M.H. Kalos
 - THE INTERPRETATION OF STRUCTURE FUNCTION IN QUENCHED BINARY ALLOYS
Acta Metallurgica **31**, 1849-1860 (1983), P.Fratzl, J.L. Lebowitz, JM, M.H. Kalos
 - KINETICS OF A FIRST-ORDER PHASE TRANSITION: COMPUTER SIMULATIONS AND THEORY
Journal of Statistical Physics **34**, 399-426 (1984), O. Penrose, J. Lebowitz, JM, M. Kalos, J. Tobochnik
 - APPORT DE LA MICROCALORIMETRIE AUX THEORIES DE DECOMPOSITION DE SOLUTIONS SOLIDES SURSATUREES
Calorimétrie et Analyse Thermique **15**, 52 (1984), A.M. Zahra, R. Toral, JM
 - MODIFIED FISHER DROPLET MODEL
Phase Transformations in Solids, Materials Research Soc. Series, Vol. **21**, pp. 12-18, Elsevier (1984), JM, R. Toral
 - TIME EVOLUTION OF PHASE SEPARATION IN BINARY MIXTURES
Applied Sciences E (ASI) **83**, 125 (1984), JM, M.H. Kalos
 - A NUMERICAL STUDY OF 1D SYSTEMS: KINETICS AND EQUILIBRIUM STATES
Journal of Physics C: Solid State Physics **18**, 4691 (1985), JM & J. Masoliver
 - TIME EVOLUTION OF THE EXCESS ENERGY IN SUPERSATURATED SOLID SOLUTIONS: MICROCALORIMETRIC EXPERIMENTS, COMPUTER SIMULATION AND THEORY, *Journal of Physics C: Solid State Physics* **18**, 1377 (1985), JM, R Toral, AM Zahra
 - LONG-TIME TAILS IN THE VELOCITY AUTOCORRELATION FUNCTION OF HARD-ROD BINARY MIXTURES
Physical Review Letters **54**, 731-735 (1985), JM, J. Masoliver
 - SCALING OF THE EXCESS ENERGY IN THERMODYNAMICALLY UNSTABLE SOLUTIONS
Physical Review Letters **54**, 1424-8 (1985), R. Toral, JM
 - MODEL STUDIES OF THERMAL AND MAGNETIC PROPERTIES IN DISORDERED SYSTEMS
Journal of Magnetism and Magnetic Materials **54** (1986), A Labarta, JM & J Tejada
 - A COMMENT ON CLUSTERS FREE-ENERGY MODELS, *Surface Science Letters* **172**, L539 (1986), JM & R. Toral
 - MICROSCOPIC OBSERVATIONS ON A KINETIC ISING MODEL, *American Journal of Physics* **54**, 1114-1121 (1986), JM, R. Toral
 - EFFECTIVE-FIELD THEORY FOR MAGNETIC AND THERMAL PROPERTIES OF SITE- AND BOND-IMPURE SYSTEMS
Journal of Physics C: Solid State Physics **19**, 1567-1580 (1986), A. Labarta, JM, J. Tejada
 - DYNAMICS OF PHASE SEPARAT.: CLUSTER KINETICS AND SELF-SIMILARITY PROPERTY OF STRUCTURE FUNCTION
Physica **142B**, 253 (1986), JM & R. Toral
 - CRITICAL BEHAVIOR OF ISING MODELS WITH STATIC SITE DILUTION, *Physical Review B* **34**, 347 (1986), JM, A. Labarta, J. Tejada
 - NUCLEATION THEORY AND THE CLOUD POINT, *Surface Science* **177**, 14 (1986), R. Toral & JM
 - EXACT BOUNDS FOR THE CLUSTER FREE ENERGY IN THE 3D LATTICE GAS, *Physica* **135A**, 620 (1986), R. Toral & JM
 - 3D FERROMAGNETIC ISING MODELS WITH QUENCHED, RANDOM NON-MAGNETIC IMPURITIES
Physica **142B**, 31 (1986), A. Labarta, JM & J. Tejada
 - CRITICAL BEHAVIOR IN NONEQUILIBRIUM PHASE TRANSITIONS
Physical Review B **35**, 3372-6 (1987), JM, J.L. Vallés, JM González-Miranda
 - INTEGRAL EQUATIONS FOR DENSE FLUIDS: A PRIORI CONTROLLABLE APPROXIMATIONS
Journal of Chemical Physics **87**, 4042-47 (1987), P.L. Garrido & JM
 - STATIONARY NONEQUILIBRIUM STATES IN THE ISING MODEL WITH LOCALLY COMPETING TEMPERATURES
Journal of Statistical Physics **49**, 551 (1987), P.L. Garrido, A. Labarta & JM
 - NONEQUILIBRIUM PHASE DIAGRAM OF ISING MODEL WITH COMPETING DYNAMICS
Physical Review Letters **59**, 1934-8 (1987), J. González-Miranda, P. Garrido, JM & J.L. Lebowitz
 - EXACTLY SOLUBLE ISING MODELS WITH ANISOTROPIC INTERACTIONS AND ARBITRARY MAGNETIC FIELD
Journal of Physics A: Mathematics and General **20**, 1829 (1987), PL Garrido & JM
 - ISING MODELS WITH ANISOTROPIC INTERACTIONS: STATIONARY NONEQUILIBRIUM STATES WITH A NONUNIFORM TEMPERATURE PROFILE, *Physica* **144A**, 585-603 (1987), PL Garrido & JM
 - CLUSTER KINETICS IN THE LATTICE GAS: THE BECKER-DORING TYPE OF EQUATIONS
Journal of Physics C: Solid State Physics **20**, 2491 (1987), R Toral & JM
 - 1D MIXTURES OF HARD POINTS WITH STOCHASTIC BOUNDARY CONDITIONS
Journal of Physics A: Mathematics and General **22**, 1355 (1987), PL Garrido & JM
 - PHASE TRANSITIONS IN THE ISING FERROMAGNETIC MODEL WITH FIXED SPINS
Physical Review B **38**, 500 (1988), A. Labarta, JM, B. Martinez, J. Tejada
 - EFFECTIVE HAMILTONIAN DESCRIPTION OF NONEQUILIBRIUM SPIN SYSTEMS
Physical Review Letters **62**, 1929 (1989), P.L. Garrido & JM
 - NONEQUILIBRIUM ISING MODELS WITH COMPETING, REACTION-DIFFUSION DYNAMICS, *Physical Review A* **40**, 5802 (1989)
 - CRITICAL AND FINITE-SIZE-SCALING BEHAVIOURS OF SHORT-RANGE ORDER PARAMETERS
Journal of Physics: Condensed Matter **1**, 8147 (1989), JM, PL Garrido, A labarta, R. Toral
 - NONEQUILIBRIUM STATIONARY STATES AND PHASE TRANSITIONS IN A DRIVEN DIFFUSIVE LATTICE SYSTEM
Annals of Physics (N.Y.), **199**, 366-412 (1990), P.L. Garrido, JM, R. Dickman
 - STATIONARY DISTRIBUTIONS FOR SYSTEMS WITH COMPETING CREATION-ANNIHILATION DYNAMICS
Journal of Physics A: Mathematics and General **23**, 3809 (1990), Al Lopez-Lacomba, PL Garrido & JM
 - MONTE CARLO STUDY OF THE GENERALIZED REACTION-DIFFUSION LATTICE-GAS MODEL SYSTEM

- Journal of Statistical Physics* **61**, 1285-96 (1990), J.M. González-Miranda, JM
- KINETICALLY DISORDERED LATTICE SYSTEMS, *Lecture Notes in Physics* **368**, 397 (1990), JM & PL Garrido
 - A NONEQUILIBRIUM VERSION OF THE SPIN-GLASS PROBLEM, *Europhysics Letters* **15**, 375 (1991), P.L. Garrido & JM
 - NONEQUILIBRIUM MODEL OF NEURAL NETWORKS, *Lecture Notes in Computer Science* **540**, (1991), PL Garrido & JM
 - FAST-IONIC-CONDUCTOR BEHAVIOR OF DRIVEN LATTICE-GAS MODELS
- Phase Transitions* **29**, 129-156 (1991), JM, PL Garrido, JL Valles
- NONEQUILIBRIUM PHASE TRANSITIONS IN LATTICE SYSTEMS WITH RANDOM-FIELD COMPETING KINETICS: MEAN-FIELD THEORY
- Journal of Physics: Condensed Matter* **4**, 9309 (1992), JJ Alonso & JM
- NONEQUILIBRIUM PHASE TRANSITIONS IN LATTICE SYSTEMS WITH A RANDOM-FIELD COMPETING KINETICS
- Physical Review B* **46**, 8244-63 (1992), A.I. López-Lacomba & JM
- MEAN FIELD SOLUTION OF A NONEQUILIBRIUM RANDOM-EXCHANGE ISING-MODEL SYSTEM
- Physical Review B* **45**, 10408 (1992), JJ Alonso & JM
- NON-EQUILIBRIUM IMPURE LATTICE SYSTEMS
- Journal of Physics A: Mathematics and General* **25**, 1453-1471 (1992), PL Garrido & JM
- LATTICE GAS NEAR TWO DIMENSIONS, *Physics Letters A* **172**, 29-33 (1992), A. Achahbar, P.L. Garrido and JM
 - DIFFUSION IN A ONE-DIMENSIONAL GAS OF HARD POINT PARTICLES
- Journal of Statistical Physics* **71**, 225-34 (1993), J.F. Fernández, JM
- STEADY STATES IN NONEQUILIBRIUM LATTICE SYSTEMS
- Physics Computing '92* (R.A. de Groot, J. Nadrchal eds., World Sci. P., ISBN 981-02-1245-3), pp.126-34, (1993), JM
- REACTION-DIFFUSION LATTICE GAS: THEORY AND COMPUTER RESULTS
- Physical Review E* **47**, 885-899 (1993), JJ Alonso, JM, JM González-Miranda
- MAGNETIC SYSTEM UNDER A FLUCTUATING FIELD, *Phase Transitions* **42**, 141 (1993), AI Lopez-Lacomba, JM & PL Garrido
 - KINETIC LATTICE MODELS OF DISORDER, *Journal of Statistical Physics* **74**, 663-687 (1994), P.L. Garrido, JM
 - MONTE CARLO STUDY OF A KINETIC LATTICE MODEL WITH RANDOM DIFFUSION OF DISORDER
- Physical Review E* **49**, 2041-49 (1994), JM González-Miranda, A. Labarta, M. Puma, JF Fernández, PL Garrido, JM
- A KINETIC ANNNI MODEL, *Journal of Physics A: Mathematics and General* **27**, 1111 (1994), AI Lopez-Lacomba & JM
 - ISING SYSTEMS WITH CONFLICTING DYNAMICS: EXACT RESULTS FOR RANDOM INTERACTIONS AND FIELDS
- Europhysics Letters* **25**, 169-174 (1994), A.I. López-Lacomba and JM
- ISING CRITICAL BEHAVIOUR OF A NON-HAMILTONIAN LATTICE SYSTEM
- Physical Review E* **50**, 3237 (1994), JM, J.F. Fernández, J.M. González-Miranda, and M. Puma
- NON-EQUILIBRIUM LAYERED LATTICE GASES
- Journal of Physics A: Mathematics and General* **28**, 4669 (1995), JJ Alonso, PL Garrido, JM & A. Achahbar
- PHASE TRANSITIONS IN A DRIVEN LATTICE GAS IN TWO PLANES
- Journal of Statistical Physics* **78**, 1493-1521 (1995), A. Achahbar and JM
- CRITICAL AND SCALING PROPERTIES OF CLUSTER DISTRIBUTION IN NONEQUILIBRIUM ISING-LIKE SYSTEMS
- Physical Review E* **52**, 6606-13 (1995), J.J. Alonso, A.I. López-Lacomba, and JM
- INTERACTING PARTICLE LATTICE SYSTEMS: SOME RECENT RESULTS ON NONEQUILIBRIUM STEADY STATES AND PHASE TRANSITIONS, *Chaos, Solitons and Fractals* **6**, 305 (1995), JM
 - SCHEMATIC MODELLING OF SUPERIONIC CONDUCTION
- Monte Carlo and Molecular Dynamics of Condensed Matter Systems*, K. Binder and G. Ciccotti Eds., Italian Physical Society, Conference Proceedings vol. 49, pp.843-58, Editrice Compositori, Bologna (1996), ISBN 88-7794-078-6, JM
- ON THE EQUILIBRIUM AND TIME RELAXATION OF A LATTICE GAS IN SEVERAL BOXES
- Molecular Physics* **88**, 1157-1171 (1996), A Achahbar, P Garrido & JM
- COMPLEXITY AND NONEQUILIBRIUM STEADY STATES: AN EXAMPLE
- The Non Linearity and the Disorder*, p. 97, Editorial Complut., Madrid (1996), P Garrido, JR Linares, JM, M Muñoz
- PHASE TRANSITIONS IN DRIVEN LATTICE GASES, *Physical Review E* **53**, 6038 (1996), JM, A Achahbar, P Garrido, JJ Alonso
 - A KINETIC DESCRIPTION OF DISORDER, *Lecture Notes in Physics* **492** (1997), PL Garrido, JM & MA Muñoz
 - DEMAGNETIZATION OF SPIN SYSTEMS AT LOW TEMPERATURE, *Physical Review B* **56**, 8863 (1997), JM & J.A. Vacas
 - NEURAL NETS WITH FAST TIME-VARIATION OF SYNAPSES
- Journal of Physics A: Mathematics and General* **30**, 7801 (1997), JJ Torres, PL Garrido & JM
- ANISOTROPIC LATTICE GASES, *Journal of Statistical Physics* **90**, 817 (1998), JM and A. Achahbar
 - DEMAGNETIZATION AT LOW TEMPERATURE VIA COMPETING DYNAMICS
- Anales de Física, Monografías RSEF* **4**, 337 (1998), J.A. Vacas & JM
- EFFECT OF CORRELATED FLUCTUATIONS OF SYNAPSES IN THE PERFORMANCE OF NEURAL NETWORKS
- Physical Review Letters* **81**, 2827 (1998), JM, P.L. Garrido, and J.J. Torres
- NONEQUILIBRIUM NEURAL NETWORK WITH COMPETING DYNAMICS
- Physica A* **253**, 57 (1998), P.L. Garrido, JM & JJ Torres
- MODELLING IONIC DIFFUSION IN MAGNETIC SYSTEMS, *Physical Review B* **58**, 11488-92 (1998), P.L. Garrido, JM, and J.J. Torres
 - METASTABILITY AND QUANTUM TUNNELING
- Quantum Systems in Chemistry and Physics*, Kluwer Academic Pub., vol. 3, p.43 (1999), JM, JA Vacas, PL Garrido
- ON THE EFFECT OF SYNAPTIC FLUCTUATIONS DURING RETRIEVAL PROCESSES IN NEURAL NETWORK MODELS
- Computer Physics Comm.* **121**, 98 (1999), JJ Torres, JM & PL Garrido
- NEURAL NETWORKS IN WHICH SYNAPTIC PATTERNS FLUCTUATE WITH TIME
- Journal of Statistical Physics* **94**, 837-859 (1999), J. M., J. Torres and P.L. Garrido
- MONTE CARLO STUDY OF THE CO-POISONING DYNAMICS IN THE ZGB MODEL
- Journal of Chemical Physics* volume **113**, 10279 (2000), Ezequiel V. Albano & JM
- CRITICAL PROPERTIES OF NONEQUILIBRIUM ANISOTROPIC LATTICE GASES, *Physica A* **279**, 143 (2000), P.L. Garrido & JM
 - IS THE PARTICLE CURRENT A RELEVANT FEATURE IN DRIVEN LATTICE GASES?
- Physical Review Letters* **87**, 195702 (2001), A. Achahbar, P. Garrido, JM, M.A. Muñoz
- NONEQUILIBRIUM PHASE TRANSITIONS AND CRITICAL BEHAVIOR

- NIC Series* (Publication Series of the John von Neumann Institute) **8**, 119 (2001), JM
- [MODELING NONEQUILIBRIUM PHASE TRANSITIONS AND CRITICAL BEHAVIOR IN COMPLEX SYSTEMS](#)
Computer Physics Comm. **147**, 115 (2002), JM, J.M. Cortés, P.I. Hurtado
 - [GROWTH AND SCALING IN ANISOTROPIC SPINODAL DECOMPOSITION](#)
Europhysics Letters **59**, 14 (2002), P. Hurtado, JM, E.V. Albano
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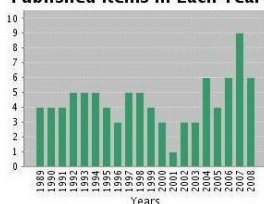
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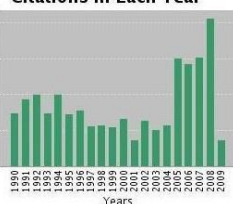
PUBLICATIONS: some statistics

- More than 200 publications with 57 collaborators. [Google Scholar](#): around 5700 citations; one cited by more than 1700 authors; 20 papers, more than 50 citations; 80 papers, more than 10 citations; mean is more than 25 citations/paper; and $h = 31$. [ResearchGate score](#) = 39,81 (higher than 97.5% of RG members); best APS's [Phys Author Rank](#) = 2,1 %

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- See statistics for partial lists of publications at [Google Scholar Profile](#), [Research Gate](#) and [ResearchID](#).
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- “*Estudis bibliomètrics sobre la recerca en Física a Catalunya*”, by L. Rovira, P. Sandra and D. Jou, *Institut D’Estudis Catalans*, Barcelona 2001: we are authors of the 6th more cited papers during 1981-1998 with participation from Cataluña.

RESEARCH TOPICS

- **Theoretical and Computational Neuroscience — Statistical Physics of Condensed Matter** (incl. theory of phase transitions and critical phenomena, non-equilibrium steady states, complex systems, cooperative behavior, stochastic processes) — **Computational Physics** (incl. Monte Carlo, Molecular Dynamics, modelling and simulation of systems and processes) — **Kinetic Theory** (incl. kinetic and master equations, integral equations, fluids).
- **Key Words:** theoretical and computational neuroscience, statistical mechanics, cooperative properties in solid state physics, lattice models, disordered and impure systems, complex systems, reaction-diffusion systems, neural networks, neurophysics.
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DIRECCION DE TRABAJOS

Advisor of Ph.D. THESIS:

- “Evolución dinámica de sistemas de muchos cuerpos: propiedades estocásticas y ergódicas”, [Jaime Masoliver García](#), Enero 1983, “cum laude”. Actual Full Professor, University of Barcelona, Spain
- “Teoría de la nucleación en las proximidades de una transición de fase de 1er orden”, [Raúl Toral Garcés](#),

- Abril 1985, "cum laude", Ph.D. Prize, Actual Full Professor, University of Balearic Islands, Spain.
- "Estudio de sistemas ferromagnéticos diluidos", Amílcar Labarta Rodríguez, Octubre 1985, "cum laude" Ph.D. Prize, Actual Full Professor, University of Barcelona, Spain.
 - "Transiciones de fase lejos del equilibrio en modelos reticulares de superconductores iónicos", José Lorenzo Vallés Brau, Octubre 1986, "cum laude". Actual Head of R+D Unit of European Comm., Brussels.
 - "Cambios de fase en sistemas reticulares en régimen estacionario fuera del equilibrio", Pedro Garrido Galera, Abril 1988, "cum laude", Ph.D. Prize, Actual Full Professor, University of Granada, Spain.
 - "Sistemas reticulares con difusión de desorden: teoría cinética de campo medio y deducción de ecuaciones hidrodinámicas", Juan José Alonso Pereda, Julio 1992, "Cum laude". Actual Full Professor, University of Malaga, Spain.
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 - "Fenómenos cooperativos en autómatas neuronales probabilísticos con sinapsis dinámicas", Jesús Cortés Díaz, sobresaliente "cum laude", Ph.D. Prize, Abril 2005 (*fisymat #16*). Actual Ikerbasque Research Professor, Bilbao, Spain.
 - "Inestabilidades, nucleación y comportamiento crítico en fluidos con arrastre fuera del equilibrio: teoría y simulación", Manuel Díez Minguito, "cum laude", Febrero 2007 (*press news; fisymat #33*). Actual Associated Professor, University of Granada.
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RESEARCH PROJECTS as Main Researcher

Direction, since 1980, of national and international research projects among others:

- **Historical:** Fulbright Foundation — Comité Conjunto Hispano-Norteamericano para la Coop. Científica — TXT96-1809 CAICYT, Plan Nac. Investig. Científica y Desarrollo Tecn. — PB91-0790 DGICYT, Programa Nac. Nuevos Materiales — Plan Andaluz de Investig. Junta de Andalucía (varias convocatorias) — C11-0494 "Phase Transitions in Disordered Magnetic Systems", 1899-1992, Commission of the European Communities (DG XII, International Scientific Coop.), Fomento de Cooper. Científica con países de la Comunidad Europea — Dirección Gral. de Enseñanza Superior e Investigación Científica del Ministerio de Educación y Cultura — SCI-118/89 Programa SCIENCE — European Science Foundation Network.
- **More recently:** Programa Sectorial Promoc. Gral. Conocimiento (BFM2001-2841), Min. Ciencia y Tecnología — Acciones Integradas, con Italia (HI2001-0173) y con Portugal (NP2003-0028) — Promoción Gral. Conocimiento (PB97-0842), Ministerio Educación, C. y D. — Acción Especial CECAM (BFM2002-12513E), Ministerio Ciencia y Tecn. — Comisión Comunidades Europeas (Dirección General XII para Ciencia, Investig. y Desarrollo, programa "Human Capital and Mobility", subsección "Scientific and Tech. Cooperation Networks") — Contratos EU-UGR nº ERB-4050-PL93-2146, 1995-1998, y nº ERB-4061-PL97-0655, TMR Programme of European Union (DG XII Science, Research & Development) — MADOC (Mando Adiestr. y Doctr., Ministerio Defensa de España) — Programa "Grupos de Excelencia" de Junta de Andalucía, Ref. FQM1505-2006, "*Modelos fisicomatemáticos de procesos cooperativos en el cerebro y sus aplicaciones en biología, neurociencia y computación*", 2007-2009 — Agencia Española Coop. Intern., Ministerio Asuntos Exter.; "*Física estadística de sistemas complejos: teoría y aplicaciones interdisciplinarias*", con Univ. Tetuán — FIS2005-00791 (Plan Nacional I+D, MEC), 11 invests., 2005-2008 — MICINN-FEDER, FIS2009-08451, "*Física Estadística, Teoría y Simul. de Sists. Complejos, y Aplicaciones Multi-disciplinarias*", 15 invests., 2009-2014 — MINECO FIS2013-43201-P "*Física estadística de sists. complejos: de los principios básicos a las fronteras de la física de la materia, ecología y neurociencia*", (IP con M.A. Muñoz), 18 investigadores + 1 técnico muy especializado, hasta 31 de marzo 2018 — Spanish MINECO FIS2017-84256-P (Proyecto de Excelencia), "*Fronteras en Física Estadística y de los*

Sistemas Complejos”, IP Miguel A. Muñoz (UGR), 2018-2020, 157.000 € — “Fluctuaciones: Relevancia y Funcionalidad en Sistemas Biológicos”, A-FQM-175-UGR18, IP M.A. Muñoz (UGR), 2020-2021 —

MISCELANEOUS

- **Scientific Distinctions.** Juan March Prize. Fulbright Fellow. Elected as an active member by The New York Academy of Sciences 1980 confirmed 1988. Member of the Real Sociedad Española de Física, European Physical Society since 1988, and American Physical Society. Member and founder Institute BIFI, for Bio computation and Physics of Complex Systems, UNIZAR.
- **Committee Service:**
 - European Physical Society Mobility/EMSPS Committee (ERASMUS antecedent), 1995–2006.
 - President or member of Committees for the Evaluation of Spanish Universities quality and of European Committees FP6, FP7 and PRACE (Advanced Computing in Europe), in several occasions.
 - Committee for Evaluation of Physics for Tomorrow's Europe Euro-conferences, EU DG XII, and Advisory Committee for many conferences, including IUPAP/EPS series, since 1990.
 - IUPAP (International Union for Pure and Applied Physics) C3 (statistical physics) member, 1999–2006
 - Jury member: 2010 Berni J. Alder – CECAM Prize; IUPAP Best Young Scientist Prizes in Computational Physics, 2008–2013; Physics Prizes of the BBVA Foundation - RSEF, 2013, 2014.
 - Advisor for Information Technologies and Communications (CATIC, UGR), 2008–2010.
 - Spanish Representative to the Board of Directors of the CECAM (Centre Européen de Calcul Atomique et Moléculaire), 1999–2005.
 - Board member of the EPS Computational Physics Interdivisional Group since 1997.
 - IUPAP's C20 (computational physics), member 1999–2006 and 2008–2014.
 - Editorial Board of “Revista Española de Física”, Spanish Royal Society for Physics, 2011-2013
 - Bio-Cruces Health Research Institute, Basque Foundation for Science and Health – UPV/EHU, external member of the Scientific Advisers Committee, 2012 – 2013.
 - Institute for Biocomputation and Physics of Complex Systems (BIFI), Universidad de Zaragoza, member of Board since its creation.
 - Director of the RSEF “Revista Española de Física” 2013-2015; General Editor and Steering Board member of the Spanish Royal Society for Physics 2013-2017.
 - Associate Editor of Frontiers in Computational Neuroscience, from September 2023.
- **Regular Courses Lectured** on Quantum Mechanics, General Physics, Quantum Field Theory, Solid State Physics, Statistical Mechanics, Mathematics for Physicists, Classical Mechanics, Physics for Mathematicians, Mathematical Physics, Quantum Physics, Quantum Many Body Mechanics, Physics of Materials, Non Linear Physics, Statistical Physics, Complex Systems Physics, and a Doctorate course approximately each year on various topics.
- **Edition of course notes and course web pages** on "Correlaciones y fenómenos críticos: I. Introducción y teorías del equilibrio", and "II. Teorías de escala dinámica"; "Notas sobre teoría ergódica" (with R. Toral); "Notas sobre teoría de la información" (with J.L. Vallés); "Nonequilibrium statistical physics" (edited by University of Geneva). Course notes on-line: “Física no-lineal”, “Física estadística”, “Mecánica estadística” and “Física de Sistemas Complejos”
- **Academic responsibilities:**
 - Head of Department of Theoretical Physics, University of Barcelona, 1986–1987.
 - Deputy Dean, Faculty of Sciences, University of Granada, 1987–1999.
 - Local coordinator for the (ERASMUS-SOCRATES) EMSPS program, 1992–2002
 - Institute *Carlos I* for Theoretical and Computational Physics: Cofounder with Prof. J. Sánchez-Dehesa, Deputy Director 1993-2004, and member of its Board of Directors from 1993.
 - Cofounder with Profs. Payá and Soler, and member of the Scientific Board for the third cycle program “FISYMAT” (for students of physics and mathematics) 1998–2010.
 - Direction (and founder) of ACTO (a post-graduate program on sci. computer applications), since 2001
 - Head of Department of Electromagnetism and Physics of Matter, Univ. of Granada, 2002-2014.
 - Founder, and Director of the Granada Seminar 1990-2015.
- **Other:**

Scientific Productivity: granted by national committee all the possible salary complements (“sexenios”)

for research, teaching and other merits (total of 8 continuously covering from 1968 to 2015 incl.) — Fulbright Fellow — Juan March Fellow — Founder Member of the Institute BIFI, for Biocomputation and Physics of Complex Systems, University of Zaragoza — *2009 UGR Prize to Scientific Popularization* — Setting up and initial development of **PROTEUS**, a high performance cloud computing system.