

## Short Bio



## Prof. Maxi San Miguel

Maxi San Miguel (PhD in Theoretical Physics, University of Barcelona 1978) is Professor of Physics at the University of the Balearic Islands-UIB (since 1986) and founding Director of IFISC (Institute for Cross-Disciplinary Physics and Complex Systems, UIB-CSIC(Spanish National Research Council), Palma de Mallorca, Spain. His academic career include positions and appointments at University of Barcelona, Temple University (Philadelphia, PA, USA), Università di Roma La Sapienza, University of Arizona (Tucson, AZ, USA), University of Strathclyde (Glasgow), University of Technology of Helsinki and the Complexity Sciences Hub, Vienna. His research activity spans across different fields of Statistical and Nonlinear Physics (Stochastic Processes, Phase Transitions, Pattern Formation and Spatio-temporal Complexity, Complex Networks) and Computational Social Science, as well as Laser Physics and Photonics. He is the author of over 360 papers quoted over 18,600 times (h index=61) in top journals of Physics, Engineering, Ecology, Social Science and Multidisciplinary Science.

Maxi San Miguel was coordinator for Physics and Mathematics of ANEP (Spanish National Evaluation Agency), chairman of the EPS Division on Statistical and Nonlinear Physics (1998-2002), and vice-chair of the IUPAP commission on Statistical Physics (2017-20).

Maxi San Miguel has received the Medal of the Spanish Physical Society-Fundación BBVA in 2010 and the Senior Scientific Award 2015 of the Complex Systems Society.

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## CV SUMMARY

Trained as a theoretical physicist in Statistical Physics and Stochastic Processes I have approached scientific research from a broad perspective aiming to transfer knowledge from this background to different disciplines. Following this cross-disciplinary approach I entered the field of laser physics and quantum and nonlinear optics by looking first at noise problems. I also entered the field of semiconductor lasers and optical communications by considering nonlinear stochastic dynamics. Likewise I entered the field of Game Theory and Social Phenomena by transferring knowledge on collective phenomena of many-body systems and phase transitions. As a consequence, and beyond my publications in Physics journals I have published in engineering journals such as IEEE, ecological journals such as The American Naturalist or Social Science journals such as American Journal of Sociology, or Journal of Conflict Resolution

### Education:

Master in Theoretical Physics: University of Barcelona, September 1974.  
 Ph.D. in Physics, University of Barcelona, February 1978.

### Professional Positions:

Current position: Professor of Physics at the University of the Balearic Islands (UIB) (since 1986) and Director of IFISC (Institute for Cross-Disciplinary Physics and Complex Systems, joint Institute of UIB and CSIC, the Spanish National Research Council), Palma de Mallorca

### Other academic positions:

- Assistant Professor (January 1978-October 1979 and December 1980-January 1982) and Associate Professor (February 1982-May 1986), Department of Theoretical Physics, University of Barcelona,
- Research Associate, Department of Physics, Temple University (Philadelphia), October 1979-December 1980 and April-October 1984.
- Visiting Professor, Dipartimento di Fisica, Università degli Studi di Roma, September-October 1982, June 1983 and March 1989.
- Visiting scientist, Supercomputer Computations Research Institute, Florida State University (Tallahassee, FL, USA). June-July 1993
- Visiting Professor, Advanced Center for Mathematical Studies, Department of Mathematics, University of Arizona (Tucson, AZ, USA). August 1993-August 1994.
- Visiting Professor, Ecole Nationale Supérieure de Sciences Appliquées et de Technologie, (ENSAT, Lannion), University of Rennes (France), February 1996.
- Visiting Professor, INLN (Institut Nonlinéaire Nice), Nice (France), February 1999.
- Appointment as Visiting Professor, Department of Physics, University of Strathclyde (Glasgow) (2001-2006)
- Appointment as "Docent in Computational Science", University of Technology of Helsinki (Finland) (2006-2011)
- External Faculty, Complexity Sciences Hub, Vienna (2017-2020)

### Other positions:

- Coordinator of Physics and Mathematics of ANEP (Spanish National Agency of Evaluation, CICYT) (Madrid), July 1990-February 1993
- Member of the Advisory Committee on Physics and Mathematics of the Spanish National Commission for the Evaluation of the Research Activity (Madrid, 1995-1996)
- Deputy Director of the Mediterranean Institute for Advanced Studies, IMEDEA (CSIC-UIB) (1995-1999)
- Chairman of the Cross-Disciplinary Physics Department of IMEDEA (2000-2007)
- Chairman of the Board of the Division of "Statistical and Nonlinear Physics" of the European Physical Society (July 2002-January 2004). Member of the Board (2004-2008)

- Member of the Advisory and follow-up committee for the Spanish National Program on Physics (2004-2007)
- Member (2011-2016) and vice-chair (2017-20) of the C3 commission on Statistical Physics of the International Union on Pure and Applied Physics (IUPAP)
- Member of the steering committee of ECCS (European Conference on Complex Systems (2013-15)

### **Scientific Awards:**

- Medal of the Spanish Physical Society- BBVA 2010
- Senior Scientific Award of the Complex Systems Society 2015

**Scientific Publications:** Over 360 publications quoted 18,623 times (Google Scholar)

**h index=61**

**Link to [Topics and collaborators](#)**

### **Research fields:**

#### **- Statistical Physics. Dynamics of phase transitions.**

Representative publications: "*The Dynamics of First Order Phase Transitions*" (J. D. Gunton M. San Miguel and P.S. Sahni), in "Phase Transitions and Critical Phenomena", vol. 8 pp. 269-466. Academic Press, London (1983) Eds. C. Domb and J. Lebowitz (Over 2,600 citations); *Phase separation in two-dimensional binary fluids* Physical Review A **31**, 1001 (1985) (M. San Miguel, M. Grant and J.D. Gunton) (182 citations)

#### **- Stochastic processes and fluctuations in nonequilibrium systems.**

Representative publications: "*Analytical and numerical studies of multiplicative noise*". (J. M. Sancho, M. San Miguel, S. Katz and J. D. Gunton). Physical Review, A **26**, 1589-1609 (1982) (652 citations). *Adiabatic elimination for systems of Brownian particles with nonconstant damping coefficients* J. Statistical Physics **28**, 291 (1982) (186 citations); *Stochastic effects in physical systems* (M. San Miguel and R. Toral), en Instabilities and Nonequilibrium structures VI, 35-130 (2000) (151 citations)

#### **- Nonlinear phenomena, pattern formation and spatio-temporal complexity.**

Representative publications: *Phase instabilities in the Vector Complex Ginzburg Landau Equation*. Phys. Rev. Lett. **75**, 425-428 (1995) (M. San Miguel) (85 citations); *Synchronization of spatiotemporal chaos: The regime of coupled spatiotemporal intermittency*. Phys. Rev. Lett. **78**, 4379 (1997) (A. Amengual, E. Hernández-García, R. Montagne y M. San Miguel) (102 citations)

#### **- Laser noise, Nonlinear and quantum optics.**

Representative publications: *Stochastic-dynamics characterization of delayed laser threshold instability with swept control parameter* Physical Review A **38**, 245 (1988) (M.C. Torrent and M. San Miguel) (123 citations); *Intensity correlation functions in the colored gain-noise model of dye lasers*, Physical Review A **42**, 6823 (1990) (E. Hernández-García, R. Toral and M. San Miguel) (115 citations); *Noise-sustained convective structures in nonlinear optics*, Physical Review Letters **79**, 3633-3636 (1997). (M. Santagiustina, P. Colet, M. San Miguel, D. Walgraef) (106 citations).

#### **- Photonics: Semiconductor Lasers.**

Representative publications: *Light polarization dynamics in semiconductor lasers*. Physical Review A **52**, 1728-1739 (1995) (M. San Miguel, Q. Feng and J. V. Moloney) (731 citations); *Polarization properties of Vertical Cavity Surface Emitting Lasers*, IEEE J. Quantum Electronics **33**, 765-783 (1997) (J. Martin-Regalado, M. San Miguel, N.B. Abraham, F. Prati) (583 citations)

#### **- Computational Social Sciences.**

Representative publications: *Cooperation and emergence of role differentiation in the dynamics of social networks*, American Journal of Sociology **110**, 977 (2005) (V.M. Eguíluz, M.G. Zimmermann, C. J. Cela-Conde, M. San Miguel) (302 citations); *Nonequilibrium transitions in complex networks: A model of social interaction*, Physical Review E **67**, 026120 (2003) (K. Klemm, V.M. Eguíluz, R. Toral

and M. San Miguel) (260 citations); *Homophily, Cultural Drift and the Co-Evolution of Cultural Groups*. Journal of Conflict Resolution, **51**, 905-929 (2007) (D. Centola, J. C. González-Avella, V.M. Eguíluz, M. San Miguel) (397 citations); *Ordering dynamics with two non-excluding options: bilingualism in language competition* New Journal of Physics **8**, 308 (2006) (X. Castello, V.M. Eguíluz and M. San Miguel) (177 citations); *Manifesto of computational social science*, European Physical Journal-Special Topics, **214**, 325 (2005) (R. Conte et al ) (299 citations); *Is the voter model a model for voters?* Physical Review Letters **112**, 158701 (2014) (J. Fernández-Gracia, K. Suchecki, J.J. Ramasco, M. San Miguel and V.M. Eguíluz) (131 citations)

### **- Complex Networks**

Representative publications: *Coevolution of dynamical states and interactions in dynamic networks*, Physical Review E **69**, 06512 (2004). (M.G. Zimmermann, V.M. Eguíluz, , M. San Miguel) (520 citations). *Generic absorbing transition in coevolution dynamics*, Physical Review Letters **100**, 108702 (2008) (F. Vazquez, V.M. Eguíluz, M. San Miguel) (234 citations); *Voter model dynamics in complex networks: Role of dimensionality, disorder and degree distribution* Phys. Rev. E **72**, 036132 (2005) (K. Suchecki, V. M. Eguíluz, M. San Miguel) (239 citations)

### **Community services:**

-Founder of FISES in 1986 (Main meeting of Statistical Physics in Spain), now with 23 editions all over Spain.

-Founder and Deputy Director of IMEDEA (Mediterranean Institute of Advanced Studies, UIB-CSIC, Mallorca) in 1995

-Founder of IFISC (Institute for Cross-Disciplinary Physics and Complex Systems. UIB-CSIC, Mallorca) in 2007 building upon the Cross-Disciplinary Physics Department of IMEDEA.

-Spokesperson for the Spanish Consortium FuturICT-Spain for the European Flagship proposal FuturICT (2011-12)

-Founder 2013 of COMSOTEC (Spanish association for Complexity, Society and Technology)

-Chairperson of the Board of Statistical and Nonlinear Physics of the European Physical Society (2002-2004)

-Vicechair of IUPAP C3 Commission on Statistical Physics (2017-2020)

- Referee for 30 different international journals (multidisciplinary, physics, engineering, biology and social sciences). Member of Editorial Boards of Journal of European Optical Society B (1995-97), European Physical Journal D (2001-2005), European Physical Journal B (2006-2010), EPJ Data Science (2012-2014), J. Phys. Complexity (IOP) (2020-22)

- Referee for research proposals and committee member for evaluation processes of CICYT (Spain), NSF (USA), NATO, European Commission, European Science Foundation, DFG (Germany), Volkswagen Foundation (Germany), EPSRC and Royal Society (UK), Science Foundation (Ireland), Belgian Science Policy Office, NWO (Netherlands), Research Foundation Flanders (FWO, Belgica), ANR (France), Swiss National Science Foundation, A3es (Portugal), FONCyT, ANPyCT and CONICET (Argentina), CONICYT (Chile) and CONICYT - CSIC (Uruguay)

### **Other data:**

- Participation and/or principal investigator of over 50 research projects funded by Spanish, European, US or international agencies. Partner leader in 13 projects funded by the European Commission.

- Invited speaker in over 100 international conferences. Invited talks, seminar and colloquia in 23 Spanish Universities, 45 European and 25 American Universities or Research Institutes.

- Advisor of 15 PhD students.