

Toni Pérez

Institute for Cross-Disciplinary Physics and Complex Systems
Campus Universitat de les Illes Balears,
Palma de Mallorca E-07122 Spain

ResearcherID: G-6815-2011

Phone: +34 971 173 369

email: toni@ifisc.uib-csic.es

URL: <http://www.ifisc.uib-csic.es/~toni>

Born: March 10, 1978—Jerez de la Frontera, Spain

Nationality: Spanish

Current position

Juan de la Cierva Postdoctoral Research Associate, Institute for Cross-Disciplinary Physics and Complex Systems (IFISC)

Areas of specialization

Physics • Complex Systems • Nonlinear Dynamics • Computational Neuroscience • Biophysics

Education

2009 PHD in Physics, IFISC- Universitat de les Illes Balears, Palma de Mallorca.
2004 MSC in Physics, Universitat de Barcelona, Barcelona.

Appointments held

2014-now Juan de la Cierva Postdoctoral Research Associate at IFISC, Spain
2013-2014 Postdoctoral Research Associate at IFISC, Spain
2011-2012 Postdoctoral Research Associate at Newcastle University, Newcastle upon Tyne, UK
2009-2011 Postdoctoral Research Associate at Lehigh University, Bethlehem, USA
2005-2009 PhD Fellow at Intitute for Cross Disciplinary Physics and Complex Systems (IFISC), Palma de Mallorca, Spain

Accreditations and Teaching

2012 Positive review from the National Spanish Agency for Quality and Accreditations (ANECA) for the positions of: Profesor Contratado Doctor (2012-210), Profesor Ayudante Doctor (2012-211) and Profesor de Universidad Privada (2012-212).
2011-2012 Teaching Assistant at University of Newcastle. Computational Analysis of Complex Biological Systems, Bioinformatics, MSc.
2006-2009 Teaching Assistant at University of Balearic Islands. Physics, Chemical Engineering Degree.

Participation in Research Projects

- 2013-2015 MODASS: *MODElización y Analisis de Sistemas Sociales* (FIS2011-24785). Ministerio de Ciencia e Innovación. IP: Víctor M. Eguíluz.
- 2009-2011 *Kinetic Pathways to Phase Separation* (DMR-0702890). National Science Foundation. IP: James D. Gunton.
- 2007-2009 *Global Approach to Brain Activity: From Cognition to Disease* (FP6-2005-NEST-Path-043309). European Commission. IP: Claudio R. Mirasso
- 2006-2009 *Photonic Integrated Components Applied to Secure Chaos Encoded Optical Communications Systems* (PICASSO IST-2005-34551). European Commission. IP: Claudio R. Mirasso
- 2006-2009 *Dispositivos Fotónicos para Comunicaciones Basadas en Caos* (PhoDeCC). Plan Nacional de Tecnología Electrónica y de las Comunicaciones del MICINN. IP: Pere Colet
- 2006-2008 *Chaos Synchronization and On/Off Phase Shift Keying Encryption* (HA2005-0051). Acción Integrada España-Alemania. IP: Claudio R. Mirasso
- 2006 *Dinámica y sincronización de láseres de semiconductor y aplicaciones*. Ministerio de Ciencia y Tecnología. IP: Claudio R. Mirasso

Stays at Research Centers

- 16/11/2009 to 20/11/2009 at the Department of Physics, Kansas State University, Manhattan, USA, under the supervision of Professor Amit Chakrabarti.
- 21/08/2008 to 14/11/2008 at the Department of Information and Computer Sciences, Saitama University, Saitama, Japan, under the supervision of Professor Atsushi Uchida.
- 18/05/2008 to 24/05/2008 at the Max-Planck-Institute for Brain Research, Frankfurt, Germany, in collaboration with Dr R. Vicente.
- 02/12/2006 to 10/12/2006 at the Institute für Physik, Humboldt Universität, Berlin, Germany, under the supervision of Professor H. J. Wünsche.
- 20/05/2006 to 23/07/2006 at the Institute of Neurophysiology, Benemerita Universidad de Puebla, Puebla, Mexico, under the supervision of Professor Elías Manjarrez.
- 19/02/2006 to 06/03/2006 at the Institute für Physik, Humboldt Universität, Berlin, Germany, under the supervision of Professor H. J. Wünsche.
- 20/06/2005 to 24/06/2005 at the Institute für Physik, Humboldt Universität, Berlin, Germany, under the supervision of Professor H. J. Wünsche.

Seminars

- “A voter model with aging”, 30/04/2014, IFISC, University of Balearic Islands, Palma de Mallorca, Spain.
- “Modeling and synchronization in neuronal networks”, 04/08/2011, Newcastle University, Newcastle upon Tyne, United Kingdom.
- “Effects of topology and delayed connections in a neuronal network”, 05/06/2008, IFISC, University of Balearic Islands, Palma de Mallorca, Spain.
- “Resonance in Biophysical Systems”, 18/10/2008, Saitama University, Saitama, Japan.

- “*Introduction to neuronal systems: basics concepts about modeling neurones*”, 17/10/2008, Saitama University, Saitama, Japan.
- “*Resonance in Biophysical Systems*”, 18/12/2007, IFISC, University of Balearic Islands, Palma de Mallorca, Spain.
- “*Synchronization in Biophysical Systems*”, 13/07/2006, Institute of Neurophysiology, Benemerita Universidad de Puebla, Puebla, Mexico.
- “*Chaos Synchronization: Applications to Data Encryption*”, 23/06/2005, Weierstrass Institute for Applied Analysis and Stochastic (WIAS), Berlin, Germany.

Publications

JOURNAL ARTICLES

20. Pérez, Toni; Zamora-Munt, Jordi; Eguíluz, Víctor, “*Collective intelligence: aggregation of information from neighbors in a guessing game*”, PLoS ONE 11(4): e0153586. (2016).
19. Pérez, Toni; Klemm, Konstantin; Eguíluz, Víctor, “*Competition in the presence of aging: Dominance, coexistence, and alternation between states*”, Scientific Reports, **6**, 21128, (2016).
18. Liu, Ya; Li, Wei; Pérez, Toni; Gunton, James; Brett, G., “*Self Assembly of Janus Ellipsoids*”, Langmuir, **28**, 3. (2012)
17. Li, Wei; Liu, Ya; Pérez, Toni; Gunton, James; Sorensen, C.M; Chakrabarti, A., “*Kinetics of nanochain formation in a simplified model of amelogenin biomacromolecules*”, Biophysical Journal, **101**, 2502. (2011)
Selected for the cover of the Biophysical journal, Volume 101, Issue 10 (2011).
16. Pérez, Toni; Liu, Ya; Li, Wei; Gunton, James; Chakrabarti, A., “*Pathways of cluster growth and kinetics slowing down in a model of short-range attractive colloids*”, Langmuir, **27**, 11401. (2011)
15. Pérez, Toni; Eguíluz, Víctor; Arenas, Alex, “*Inferring statistical structural properties from functional networks of delay-coupled oscillators*”, Chaos, **21**, 025111. (2011)
14. Pérez, Toni; Uchida, Atsushi, “*Reliability and synchronization in a delay-coupled neuronal network with synaptic plasticity*”, Physical Review E, **83**, 061915. (2011)
13. Pérez, Toni; Garcia, Guadalupe; Eguíluz, Víctor; Vicente, Raúl; Pipa, Gordon; Mirasso, Claudio; “*Effect of the topology and delayed connections in a neuronal network*”, PLoS ONE 6(5): e19900. (2011)
12. Eguíluz, Víctor; Pérez, Toni; Borge-Holthoefer, Javier; Arenas, Alex, “*Structural and functional networks in complex systems with delay*”, Physical Review E, **83**, 056113. (2011)
11. Liu, Ya; Pérez, Toni; Li, Wei; Gunton, James; Green, Amanda, “*Statistical mechanics of helical wormlike chain model*”, Journal of Chemical Physics, **134**, 065107. (2011)
Selected for the February 2011 issue of JCP: BioChemical Physics
Selected for the February 2011 issue of Virtual Journal of Biological Physics Research

10. Pérez, Toni; Mirasso, Claudio; Toral, Raúl; Gunton, James, "The constructive role of diversity on the global response of coupled neuron systems", *Philosophical Transactions of the Royal Society A*, **368**, 5619-5632. (2010)
9. Pérez, Toni; Tapia, Jesus; Mirasso, Claudio; García-Ojalvo, Jordi; Quevedo, Jorge; Cuellar, Carlos; Manjarrez, Elias, "An intersegmental neuronal architecture for deletion-proof spinal wave propagation", *Journal of Neuroscience*, **29**, 10254-10263. (2009)
8. Pérez, Toni; Scirè, Alessandro; Van der Sande, Guy; Colet, Pere and Mirasso, Claudio, "Bistability and all-optical switching in semiconductor ring lasers", *Optics Express*, **20**, 12941-12948. (2007)
7. Martínez, Lourdes; Pérez, Toni; Mirasso, Claudio; Manjarrez, Elías, "Stochastic Resonance in the Motor System: Effects of Noise on the Monosynaptic Reflex Pathway of the Cat Spinal Cord", *Journal of Neurophysiology*, **97**, 4007-4016. (2007)
6. Valerio Annovazzi-Lodi, Mauro Benedetti, Sabina Merlo, Toni Pérez, Pere Colet and Claudio R. Mirasso, "Message Encryption by Phase Modulation of a Chaotic Optical Carrier", *IEEE Photonics Technology Letters*, **19**, 76-78. (2007)
5. Pérez, Toni; Radziunas, Mindaugas; Wunsche, Hans-Jurgen; Mirasso, Claudio R.; Henneberger, Fritz, "Synchronization Properties of Two Coupled Multisection Semiconductor Lasers Emitting Chaotic Light", *IEEE Photonics Technology Letters*, **18**, 2135-2137. (2006)
4. C.R. Mirasso, R. Vicente, P. Colet, J. Mulet, and T. Pérez, "Synchronization Properties of Chaotic Semiconductor Lasers and Applications to Encryption", *Comptes Rendus de l'Académie de Sciences, Physique*, **5**, pp. 613-622, (2004).
3. J.M. Buldú, M.C. Torrent, J. García-Ojalvo, R. Vicente, T. Pérez, and C.R. Mirasso, "Low Frequency Fluctuations Entrainment is Enhanced by Coupling", *Fluctuation and Noise Letters*, **3**, pp.127-134, (2003).
2. J.M. Buldú, R. Vicente, T. Pérez, C.R. Mirasso, M.C. Torrent, and J. García-Ojalvo, "Periodic Entrainment of Power Dropouts in Mutually Coupled Semiconductor Lasers", *Applied Physics Letters*, **81**, pp. 5105-5107, (2002).
1. R. Vicente, T. Pérez, and C.R. Mirasso, "Open- versus Closed- Loop Performance of Synchronized Chaotic External Cavity Semiconductor Lasers", *IEEE Journal of Quantum Electronics* **38**, pp. 1197-1204 (2002).

PROCEEDINGS

7. Pérez, Toni; Fernández-Gracia, Juan; Ramasco; José J.; Eguíluz, Víctor, "Persistence in Voting Behavior: Stronghold Dynamics in Elections", *Social Computing, Behavioral-Cultural Modeling, and Prediction Lecture Notes in Computer Science*, **9021**, pp. 173-181, (2015).
6. Gunton, James D.; Li, Wei; Liu, Ya; Pérez, Toni; Khan, Siddique; Chakrabarti, Amit, "Some topics in the kinetics of protein aggregation", *Physics Procedia*, **4**, pp. 35-49, (2010).

5. Scirè, A. ; Pérez-Serrano, A. ; Pérez, T. ; Van der Sande, G. ; Colet, P. ; Mirasso, C.R. ; Balle, S., “*Bistability and all optical switching in semiconductor ring lasers*”, Proceeding of 9th International Conference on Transparent Optical Networks, ICTON, (2007).
4. Scirè, A; Colet, P; Pérez, Toni; Mirasso, C.R., “*All-optical two-mode switching in semiconductor ring lasers*”, Proc. SPIE Proceedings, **6184**, pp. 70-75, (2006).
3. R. Vicente, T. Pérez, Y. Chembo, P. Colet, and C.R. Mirasso, “*Performance comparison of different encoding schemes in chaotic optical communication systems*”, Quantum Electronics Conference EQEC 03, pp. 20, (2003).
2. C.R. Mirasso and T. Pérez, “*Chaos control and synchronization in diode lasers*”, Optical Society of America Meeting, Frontiers in Optics, (2003).
1. T. Pérez, R. Vicente, C.R. Mirasso and P. Colet, “*Dynamical Entrainment of Unidirectionally Coupled Single-Mode Diode Lasers*”, Physics and Simulation of Optoelectronic Devices X. SPIE Proceedings, **4646**, pp. 479-486, (2002).

BOOKS

- Pérez, Toni, “*Dynamics and Synchronization in Neuronal Models*”, Lambert Academic Publishing, Germany, ISBN 978-3-8484-3634-7 (2012).

Congress Presentations

TALKS

- *Persistence in collective behavior: stronghold dynamics in elections*, 10/06/2015, ICCSS2015. Helsinki (Finland).
- *A web-based platform for analysing decision making choices from a collective guessing game*, 08/06/2015, ICCSS2015. Helsinki (Finland).
- *Age-dependent voter model*, 02/04/2014, DPG Spring Meeting. Dresden (Germany).
- *Synchronization of Neuronal Complex Networks in the presence of delayed interactions*, 03/06/2013, XXXIII Dynamics Days Europe. Madrid (Spain).
- *Synchronization of Neuronal Complex Networks in the presence of delayed interactions*, 06/07/2012, International Conference on Delayed Complex Systems DCS12. Palma de Mallorca (Spain).
- *Relationship between structural and functional networks in complex systems with delay*, 25/03/2011, APS March Meeting. Dallas (USA).
- *Phase clustering of delay-coupled phase oscillators on complex networks*, 06/02/2010, BIFI2010 IV International Conference, Networks: A framework for cross-disciplinary applications. Zaragoza (Spain).
- *Enhancement of neural response by diversity*, 18/03/2010, APS March Meeting 2010, Portland (USA).

- *Effects of the topology and delay in a neuronal network*, 26/03/2009, GABA Workshop 2009, Paris (France).
- *Synchronization of chaotic unidirectionally coupled multisection lasers*, 21/06/2007, CLEO Europe/IQEC 2007, Munich (Germany).
- *Synchronization of chaotic unidirectionally coupled multisection lasers*, 30/03/2007, PHASE IPSSO 2007, Metz (France).
- *Chaos Synchronization of Unidirectionally Coupled Multisection Lasers*, 26/11/2006, Cleo Focus Meeting 2006, Cannes (France).
- *All-Optical Two-modes Switching in Semiconductor Ring Lasers.*, 03/04/2006, Photonics Europe 2006, Strasbourg (France).

POSTERS

- *Age-dependent voter model*, 25/09/2014, European Conference on Complex Systems ECCS14, Lucca (Italy).
- *Hierarchical neuronal networks exhibit similar oscillation patterns across different species*, 06/03/2012, ICMS Neurodynamics Workshop, Edinburgh (UK).
- *Hierarchical connectivity provides a structural backbone for distinct species-independent oscillations*, 29/11/2011, UK Neuroinformatics Workshop, Manchester (UK).
- *Effects of the range and strength of interparticle attraction on gelation*, 23/03/2011, APS March Meeting, Dallas (USA).
- *Nucleation Dynamics of Particles with Directional Interactions*, 15/03/2010, APS March Meeting, Portland (USA).
- *Diversity-induced resonance in a FitzHugh-Nagumo neuronal network*, 09/10/2008, Dynamics Days Asia Pacific 5 Nara (Japan).
- *Study of the Role of diversity of Synaptically-Coupled Neurons*, 08/11/2007, Noise in Life 07, Dresden (Germany).
- *Bistability and Optical Switching in Semiconductor Ring Lasers*, 20/06/2007, CLEO Europe/IQEC 2007, Munich (Germany).
- *All-Optical Two-modes Switching in Semiconductor Ring Lasers.*, 25/09/2006, Cleo Focus Meeting 2006, Cannes (France).
- *Optical-Mode Commutation in Semiconductor Ring Lasers*, 27/06/2005, XIII Congreso de Física Estadística (FISES 2005), Madrid (Spain).
- *Synchronization of Chaotic Semiconductor Lasers and its Applications to Optical Communications*, 27/09/2004, XX Trobades científiques de la Mediterranea, Mahon (Spain).

Miscellanea

OUTREACH

- 2009 Involved in Modern Optics Days celebrated at IFISC.
- 2007-2008 Active part of the IFISC team participating in the Balearic Islands Science Fair organized in Palma de Mallorca and Ibiza.

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