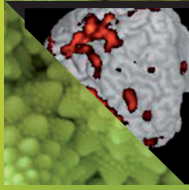
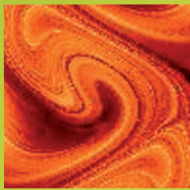
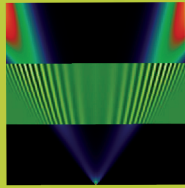
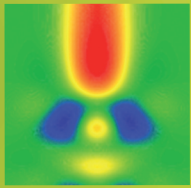




Connecting Science,
Understanding Complexity



IFISC ANNUAL REPORT 2007



Consejo Superior de Investigaciones Científicas
Universitat de les Illes Balears



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1. - PRESENTATION AND RESEARCH LINES

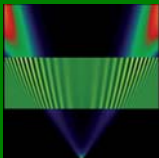

IFISC (Institute for Cross-Disciplinary Physics and Complex Systems) is a joint research Institute of the [University of the Balearic Islands \(UIB\)](#) and the [Spanish National Research Council \(CSIC\)](#) Created in 2007 building upon the former Cross-Disciplinary Physics Department of IMEDEA (Mediterranean Institute for Advance Studies) dating from 1995. Its creation foresees that important avenues of scientific development occur at the borders of established fields. As statement of purpose it aims at developing **interdisciplinary** and **strategic** research from the established practices of physicists.

By **interdisciplinary** research we mean the general attitude of willing to transfer knowledge, concepts and methods across the borders between well established disciplines. By **strategic** research we mean focusing in advanced studies in fields with strong future potential, avoiding incremental research as well as the “basic-applied” polarization. We therefore search for windows of opportunity in emerging areas beyond the traditional subjects that defined Physics in the twentieth century.

The backbone of our research that unifies, percolates, and is the basis of the rest of our activities is the study of generic phenomena in **Nonlinear Physics and Complex Systems**, with strong methodological components from Statistical Physics, Dynamical Systems, Computational Methods and Quantum Mechanics. From this source of concepts and ideas, the researchers face the challenge of cooperatively defining and updating specific research lines and projects within a flexible and changing framework

Research Lines.

In the evolving scheme associated with the programmatic orientation of IFISC there is a unifying transverse line of research of a fundamental nature on Complex Systems: Statistical and Nonlinear Physics. In addition, typically a senior researcher participates in other focused lines with a subject defined by the system under study. This collaborative organization is an alternative to static schemes with disjoint groups of researchers devoted exclusively to a line of research. Participation in the lines of research during 2007 of the staff members and “Ramón y Cajal” postdoctoral associates is summarized in the following scheme.

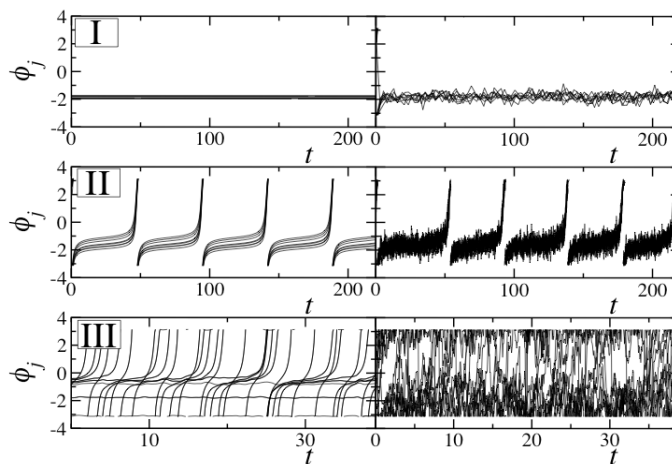
	MONTERRAT CASAS	PERE COLET	EMILIO HERNÁNDEZ-GARCÍA	CRISTÓBAL LÓPEZ	VÍCTOR M. EGUILUZ	MANUEL MATÍAS	CLAUDIO MIRASSO	ORESTE PIRO	MAXI SAN MIGUEL	LLORENÇ SERRA	ALESSANDRO SCIRE	TOMÁS SINTES	RAÚL TORAL	ROBERTA ZAMBRINI
<p>1) COMPLEX SYSTEMS: STATISTICAL AND NONLINEAR PHYSICS.</p> 	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<p>2) NON LINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES.</p> 		X					X		X		X			X
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<p>4) FLUID DYNAMICS, BIOFLUIDS AND GEOPHYSICAL FLUIDS.</p> 			X	X				X			X			
<p>5) BIOPHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY.</p> 			X	X	X	X	X	X				X	X	
<p>6) DYNAMICS AND COLLECTIVE PHENOMENA OF SOCIAL SYSTEMS.</p> 					X				X			X		

1.1. - Some Representative Research Results of 2007.

1. - Collective Firing Induced by Noise or Diversity in Excitable Media.

Physical Review E 75, 016203 (2007)

Excitable behaviour appears in a large variety of physical, chemical and biological systems, typical examples being neuronal and heart tissues. Excitability is characterized by a nonlinear response to perturbations of a stationary state: while small perturbations induce a smooth return to the fixed point, perturbations exceeding a given threshold induce a return through a large phase space excursion (firing), largely independent of the magnitude of the perturbation, followed by a refractory period during which the system cannot be excited again. In many situations of interest, the firings are induced by random perturbations or noise and in coupled excitable systems, macroscopic firing (a significantly large fraction of the units fires simultaneously) excited by noise has been observed in different situations, in what can be considered as a constructive effect induced by the noise. In our work, we have discovered that the diversity in the ensemble, the fact that not all units are identical, is yet a new mechanism for the appearance of collective pulses and we have developed an unifying theory that offers an analytical understanding for the emergence of a coherent regime of collective firing in coupled excitable systems in presence of disorder, either noise or diversity. The collective behaviour emerges as a phase transition whose underground mechanism is the degradation of entrainment originated by the competing effects of disorder and coupling. Paradoxically, this degradation results in establishing a lower effective threshold for collective firing, and thus inducing a somehow ordered state. A second phase transition to the disordered (incoherent) phase is recovered for large enough noise intensity or diversity, or small enough coupling. This mechanism is generic and not restricted to the particular model we considered in our study [*Theory of collective firing induced by noise or diversity in excitable media*, C. J. Tessone, A. Scirè, R. Toral, and P. Colet, *Phys. Rev E* **75**, 016203 (2007)] and it will exist in any physical, chemical or biological excitable system with the aforementioned basic generic ingredients. Our results are likely to be relevant also for non-globally coupled systems, such as extended systems with local couplings and complex networks.



Collective pulses induced by noise (right) and diversity (left) in a particular model of excitable systems for small (top), intermediate (middle) and large (bottom) values of disorder.

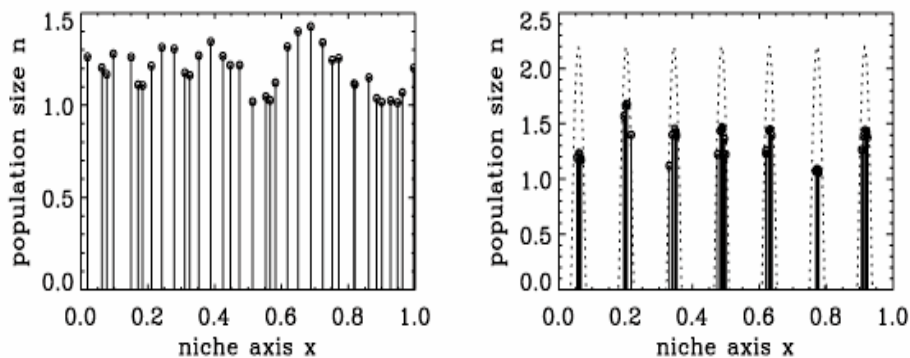
2. - Species Clustering and Exclusion under Competitive Interactions.

Physical Review Letters **98**, 258101 (2007)

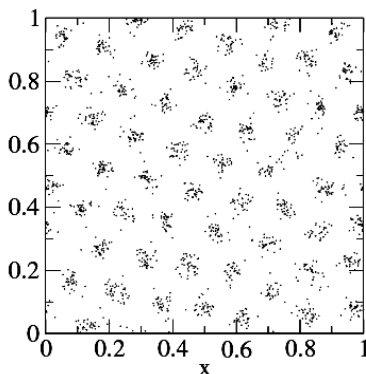
European Physical Journal-Special Topics **146**, 37-45 (2007)

Interactions between different entities which compete for the same resources arise in a large variety of systems including multimode optical devices in which different lasing modes are driven by the same population inversion, technology substitution in which users decide between alternative products, or ecosystems in which similar biological organisms compete for the same resources. In the ecological context, theoretical analysis of this situation has led to the formulation of the 'competitiveness exclusion principle', which in one of its forms implies that only one species will survive among the ones that compete for the same resource. Thus, competing species should specialize in different ranges of the resource spectrum (or *niche space*) or die. This would lead to 'exclusion zones' around the location of viable species in niche space where new organisms can not establish themselves.

The existence of observations both confirming and refuting the above principle has led to some controversy and to the formulation of ad-hoc explanations. Clarifying the conditions for its validity is of interest in ecological theory as well as in other scientific contexts in which one wants to predict if there will be coexistence or exclusion of competing agents.



We have addressed the question by analyzing a classical model, the Lotka-Volterra symmetric competition model, supplemented with mechanisms modelling immigration and extinctions (S. Pigolotti, C. López and E. Hernández-García, Species clustering in competitive Lotka-Volterra models. *Physical Review Letters*, **98**, 258101). We have determined precise conditions under which the competition interaction kernel allows for coexistence of similar species (left panel in the first figure) using close portions of the available resources (represented in the horizontal niche axis) or rather they cluster in groups around which no species can survive (right panel).



We note that a similar mathematical framework is able to predict transitions to inhomogeneous states in which spatially diffusing particles or organisms with a spatially-dependent competition interaction cluster in groups isolated from each other (second figure), giving rise to configurations reminiscent of spatial patterns observed in bacterial cultures (C. López and E. Hernández-García Spatial patterns in non-locally interacting particle systems, *European Physical Journal-Special Topics*, **146**, 37-45).

3. - Evanescent States and Transport in Quantum Wires with Spin-Orbit Interactions.

Physical Review B **76**, 035307 (2007)

Physical Review B **76**, 045339 (2007)

The control of electronic spin in semiconductor devices can be achieved tuning the intensity of the spin-orbit interaction with electric gates. This has motivated a strong research activity on the spin-related properties of semiconductor nanostructures. At IFISC, we have analyzed the relevance of electron-electron interactions for the conductance dips associated with quasibound states in regions with strong spin-orbit coupling. The conductance dips are robust with the addition of electron-electron repulsion and, quite remarkably, at very small temperatures an oscillating behavior of the conductance with the spin-orbit intensity is predicted [R. López, D. Sánchez, Ll. Serra, *Phys. Rev. B* **76**, 035307 (2007)].

Another aspect we have investigated is the spatial decay of electronic states in quantum wires with spin-orbit coupling. The so-called evanescent states manifest around impurities or interfaces in the quantum wire and, therefore, they are crucial for electrical properties such as the conductance of the wire. The figure shows the spatial distribution of electronic density ρ and magnetization (m_x, m_y, m_z) for a quantum wire oriented along x and having a potential step at $x=0$. Electrons incident from the left cannot propagate to the right, where only evanescent modes can be sustained. The spin-orbit coupling induces characteristic oscillations of the density and magnetization in the evanescent side [Ll. Serra, D. Sánchez, R. López, *Phys. Rev. B* **76**, 045339 (2007)].

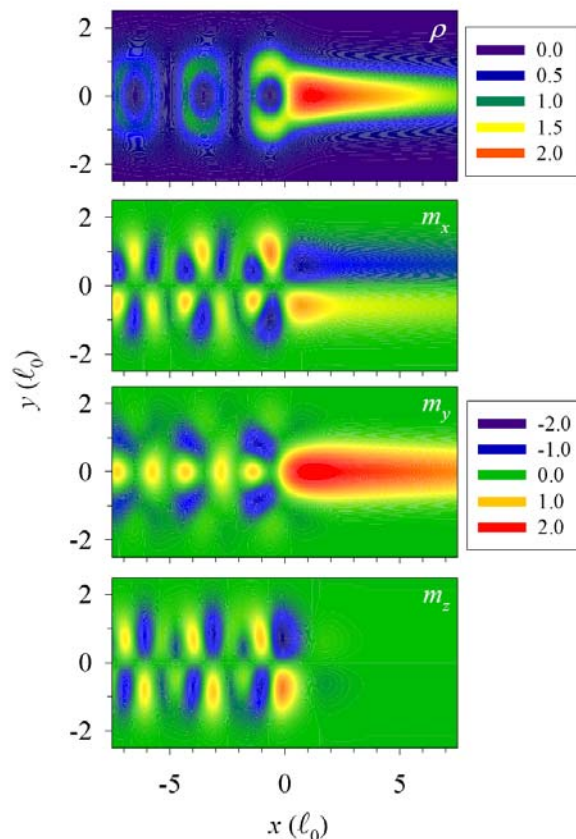


Figure: spatial distribution of density ρ and magnetization (m_x, m_y, m_z).

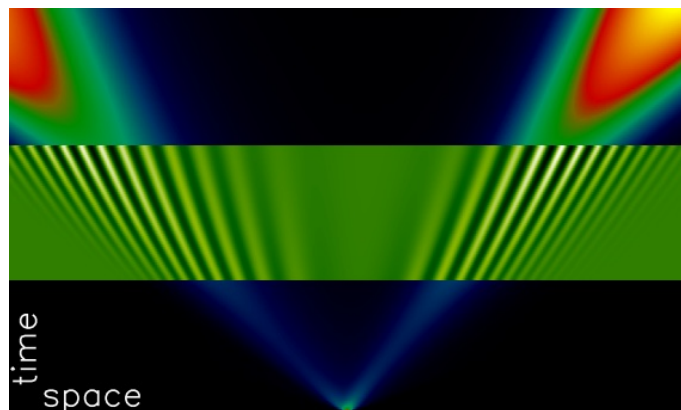
4. - Control of Optical Signals by Two-Point Nonlocality.

Physical Review Letters **99**, 063907(2007)

Feedback loops play a fundamental role in dynamical systems, not only in different fields of physics but also in biology and engineering. In a recent paper [*Signal Amplification and Control in Optical Cavities with off-Axis Feedback*], R. Zambrini and F. Papoff, *Physical Review Letters* **99**, 063907 (2007)], a novel way to control signals in optics by use of feedback loops is shown. The main novelty is the use of off-axis external feedback loops in a broad class of nonlinear optical cavities, including semiconductor lasers. This feedback is modelled by a two-point nonlocality, meaning that each point in the transverse plane of the light beam is coupled with a shifted one. Due to nonlocality, a drift is observed leading to convective instabilities, in which a localized perturbation grows while driven away, so that in the reference frame of the lab the perturbation decays. In this situation a continuous source of perturbations, such as microscopic quantum noise may lead to the formation of macroscopic patterns downstream. The existence of convective instabilities and noise sustained patterns in presence of transverse gradient terms has been recognized in several systems, from plasma to fluids or traffic, and our group has largely contributed to this subject and first showed convective instabilities in optics [M. Santagiustina, P. Colet, M. San Miguel, and D. Walgraef, *Physical Review Letters* **79**, 3633 (1997)].

The potential of the new system considered is that, just by varying the phase of the feedback field, features such as the transverse phase and group velocities as well as the amplification strength of local perturbations can be tuned. Indeed, light signals can be amplified while the background radiation in other regions of the system remains very low and can move across the cavity, being chirped and steered either towards or against the offset direction. A curious situation is found where a local signal can even be split into two counterpropagating components, one in the direction of the nonlocal coupling and the other in the opposite one, leading to a nonlinear signal splitter, shown in the picture. The phenomena here described are interesting not only because introduce unexpected scenarios in the spatio-temporal dynamics of nonlinear optical devices but also because they open new possibilities for light control and can underpin applications in optical communications, imaging, and micromanipulation.

SIGNAL SPLITTER: Temporal evolution of an initial local perturbation of the non-lasing state, in the convectively unstable regime. For this choice of the phase of the feedback, the initial perturbation splits into two counterpropagating signals. Both the intensity and the real part (green stripe) of the field are shown.



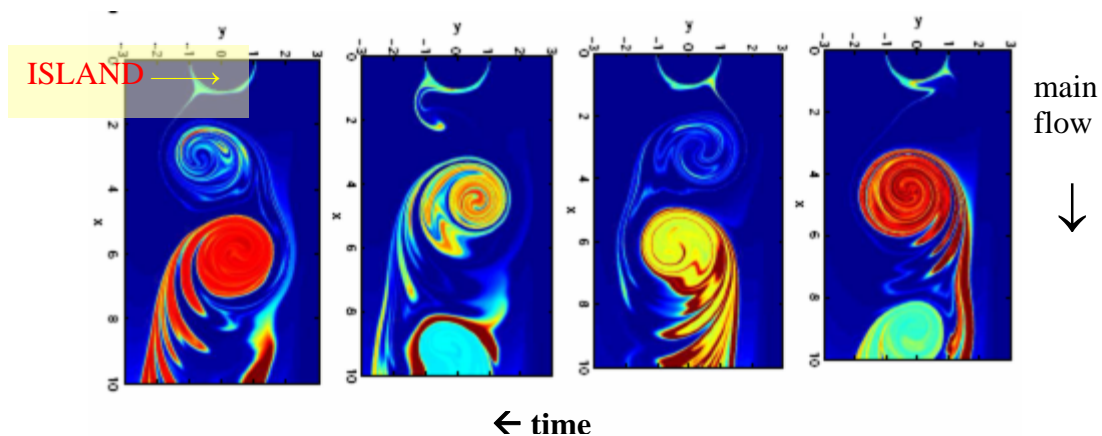
5. - Plankton Dynamics in Vortices in the Wake of an Island.

Nonlinear Processes in Geophysics 14, 443 (2007)

The interplay between physical hydrodynamic forcing and the distribution of marine organisms like phytoplankton and zooplankton is a major challenge for its many environmental consequences but also from the theoretical perspective of understanding the flow of reacting fluids. In particular, the growth of phytoplankton in the world's oceans depends strongly on the availability of nutrients, which are transported from deep waters to the surface by vertical currents. One of the mechanisms of vertical transport is coastal upwelling. It usually occurs when wind-driven currents, in combination with the Coriolis force, produces Ekman transport, by which surface waters are driven away from the coast and replaced by the nutrient-rich deep waters. Because of this enrichment, biological primary production in upwelling areas is strongly boosted, giving also rise to an increase of zooplankton and fish populations.

In many places of the world vertical upwelling appears in connection with strong turbulent mesoscale activity. One of these regions is the Atlantic Ocean area close to the northwestern African coast, near the Canary archipelago. The islands act as obstacles to the main current, leading to the detachment of vortices which interact with the nutrients brought by Ekman flow. Our aim has been to study the interplay, in that flow situation, between the redistribution of plankton by vortices and the primary production.

To approach this problem we have considered (*M. Sandulescu, C. López, E. Hernández-García, U. Feudel, Plankton blooms in vortices: The role of biological and hydrodynamic time scales, Nonlinear Processes in Geophysics 14, 443, 2007*) the coupling of a kinematic flow mimicking the wake of an island to a simplified model of plankton dynamics with three trophic levels, and have studied the impact of the underlying hydrodynamic activity and the upwelling of nutrients on primary production in different spatial areas. Among other results, we point out that under certain conditions a wake vortex may act as an incubator for plankton growth and primary production (see the figure below corresponding to the concentration of phytoplankton at different times. Red colors indicate high plankton concentration). This vortex may then travel far into the open ocean transporting the biologically-rich waters. We have revealed the essential factors for this phenomenon: *i) the long residence times in the vicinity of the islands leading to an enrichment of nutrients and plankton in their neighbourhood, and ii) the transport and subsequent entrainment of nutrients and plankton to the interior of the vortex due to the filamental structures emerging beyond the island.*

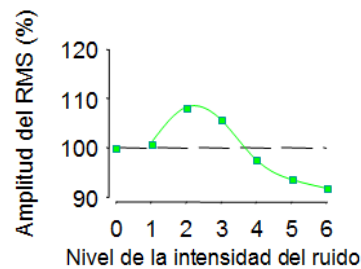
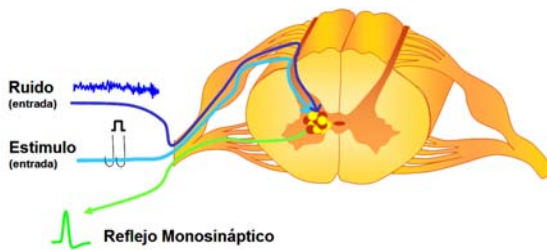


6. - The Constructive Role of Noise in Sensory Systems.

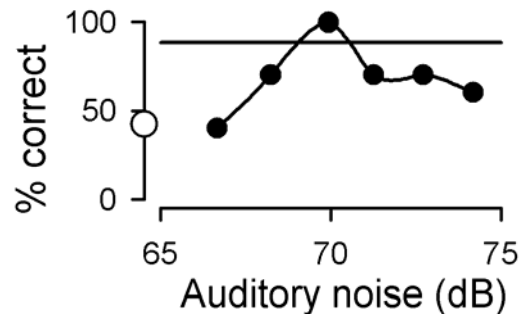
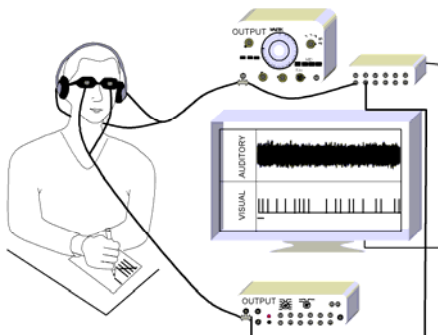
J. of Neurophysiology **97**, 4007 (2007)
Neuroscience Lett. **415**, 231 (2007)

Noise has traditionally been viewed as detrimental for signal detection and information transmission. However, it has also been found that in certain non-linear systems noise can improve the detection and transmission of weak signals. The phenomenon called stochastic resonance can occur in a wide variety of systems and areas such as paleoclimatology, lasers, neurophysiology, etc...

Sensory systems in the presence of a particular nonzero level of noise can improve the ability of an individual to detect weak stimuli. The results published in Journal of Neurophysiology ("Stochastic resonance in the motor system: effects of noise on the monosynaptic reflex pathway of the cat spinal cord," L. Martinez, T. Perez, C. Mirasso and E. Manjarrez, *J. of Neurophys.* 2007) showed, specifically in the synapses of the Ia motor neurons of the cat spinal cord, that the periodically generated monosynaptic reflexes elicited by the electrical stimulation of the medial gastrocnemius nerve are amplified by the noise produced by the mechanical random stretching of the lateral gastrocnemius muscle. In all cats studied the phenomenon of stochastic resonance was observed. The results were validated by numerical simulations



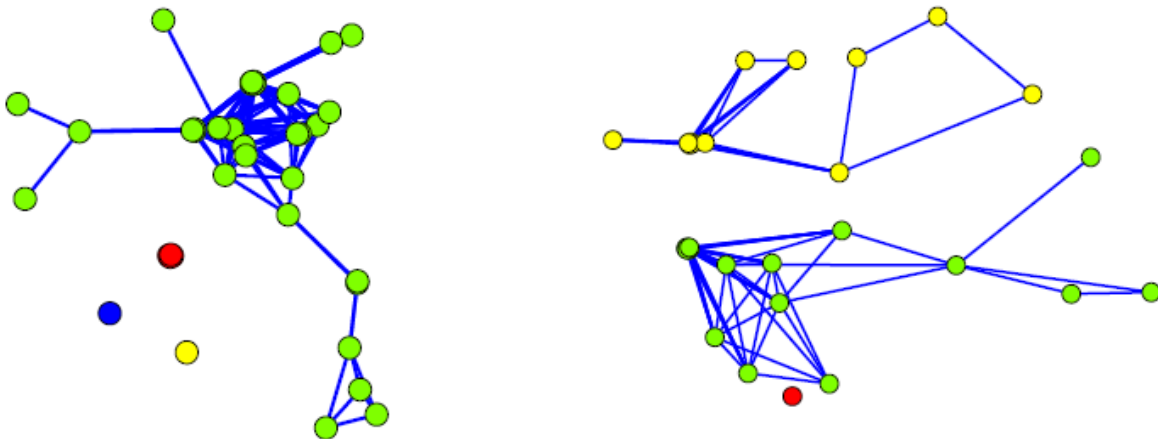
In another similar study it was showed that a nonzero noise applied to the auditory pathway may help in the detection of a periodic weak visual signal. In the paper published in Neuroscience Letters ("Effects of noise on the psychophysical auditory detection of visual signals: Cross-modal stochastic resonance" Manjarrez E., I. Mendeza, L. Martinez, A. Flores and C. Mirasso, *Neuroscience Lett.* 415, 231, 2007) psychophysical evidence in humans were provided, through the yes / no paradigm, of the stochastic resonance in the auditory-visual system.



7. - Networks of Genetic Similarity in Plant Populations.

Journal of the Royal Society Interface 4, 1093-1102 (2007)

The study of complex networks, representing interactions among components, has become a central tool in the science of complex systems. Evolutionary relationships between species are usually represented in phylogenies, i.e. evolutionary trees. One branching event represents the evolution of an ancestral species into descendent ones. The whole set of relationships among all known species is conceptually represented as a huge Tree of Life. A tree is a network, in which there are no cycles, i.e., there is a unique path from one node to another inside the network. This is probably a good approximation to the correct large scale structure of the Tree of Life, but processes such as lateral gene transfer or hybridization would need a richer network structure to be properly represented. If analyzing the Tree of Life at a finer detail, entering the scale appropriate for ecological interactions, we observe that species are composed of different populations, and that those are made of individuals that interchange genes and recombine their genomes in processes such as sexual reproduction. Thus, there are gene flow processes, particularly obvious when looking at the intraspecific level, which add loops to the Tree of Life, and make the whole structure a rather complex object.



In a collaboration with marine ecologists and population geneticists (A.F. Rozenfeld, S. Arnaud-Haond, E. Hernández-García, V.M. Eguíluz, M.A. Matías, E. Serrão, and C.M. Duarte, Spectrum of genetic diversity and networks of clonal organisms, *Journal of the Royal Society Interface*, **4**, 1093-1102) we have applied network methods (leading to *networks of genetic similarity*) to genetic data to reconstruct the genetic relationships among individual plants in populations of the marine seagrass *Posidonia oceanica*. The figure shows two examples of the networks obtained in such a way (from the plant populations in Es Pujols, Formentera (left) and Campomanes, Alicante (right)), being the nodes individual plants and the links representing genetic relationship. The network representation visually highlights the main features of the population structure (a central core for Es Pujols and two main components in Campomanes), which makes it a useful tool for population assessment. Network analysis reveals also a small world character for these structures.

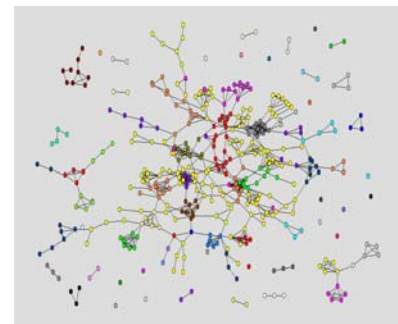
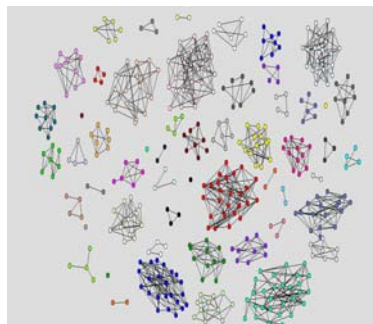
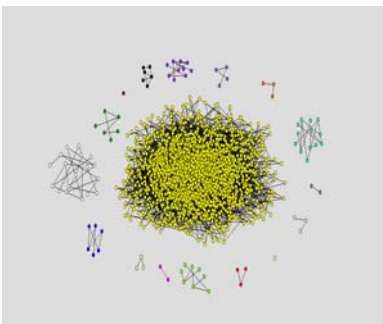
8. - Modeling Group Formation in Collective Social Phenomena.

Journal of Conflict Resolution **51**, 905-929 (2007)
Physical Review E **76**, 046120 (2007)

Do your neighbors influence your opinions? Or, do you choose your friends according to your and their opinions? This dichotomy characterizes in a simple way two political views: the left, where an individual is conditioned by the social structure in which he is embedded, and the right, where the individual shapes his neighborhood. However in most situations both mechanisms are at work.

Based on homophily, the tendency to interact between similar people (opinions, cultural traits), and social pressure, the neighbors' opinions affect our ones, we show that individuals form communities with individuals sharing similar features [D. Centola, J.C. González-Avella, V.M. Eguíluz, M. San Miguel, *Homophily, Cultural Drift and the Co-Evolution of Cultural Groups*, *Journal of Conflict Resolution* **51**, 905-929 (2007)]. Depending on the initial cultural diversity present in the system, the control parameter, different phases are observed. An ordered phase, composed by a large network component where the individuals share the same state, is obtained if the initial diversity is smaller than a critical value. Increasing the diversity, the network fragmentizes in several small components, where each component is again composed by individuals with the same state: the disordered phase. However, if the initial diversity is large enough, individuals are unable to find partners sharing cultural traits and thus, due to the homophily, keep rewiring their links continuously and the systems doesn't stop evolving. The fragmentation transition between an ordered phase and a disordered phase displays a power law distribution of group sizes at the critical point. It is described as a competition between the time scales characterizing, on the one hand, the evolution of the interaction network and, on the other, the states of the individuals [F. Vazquez, J.C. González-Avella, V.M. Eguíluz, M. San Miguel, *Time-scale competition leading to fragmentation and recombination transitions in the coevolution of network and states*, *Physical Review E* **76**, 046120 (2007)].

The figure illustrates the fragmentation and recombination transitions: when the control parameter is small, the system organizes in a large homogenous network component, increasing the control parameter leads to the fragmentation of the system in small social groups; for larger values of the control parameter the system continuously evolves due to the impossibility to find partners with similar cultural traits.



2. - PEOPLE






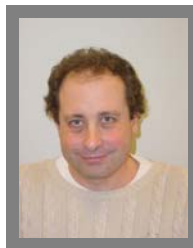








IFISC at *Ca'n Canet*, December 2007



IFISC first staff meeting (*Claustro*), November 2007

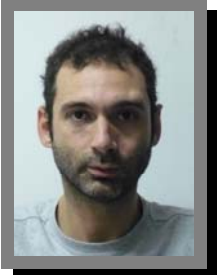

2.1. - Permanent Staff

<ul style="list-style-type: none">▪ Montserrat Casas, University Full Professor UIB (CU).	
<ul style="list-style-type: none">▪ Pere Colet, CSIC Research Professor (PI).	
<ul style="list-style-type: none">▪ Víctor M. Eguíluz, CSIC Tenured Scientist (CT).	
<ul style="list-style-type: none">▪ Emilio Hernández-García, Deputy Director, CSIC Research Professor (PI).	
<ul style="list-style-type: none">▪ Cristóbal López, University Professor UIB (CD).	
<ul style="list-style-type: none">▪ Manuel Matías, CSIC Senior Researcher (IC).	

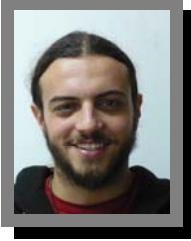
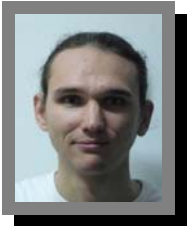




<ul style="list-style-type: none">▪ Claudio Mirasso, University Professor UIB (TU).	
<ul style="list-style-type: none">▪ Oreste Piro, University Professor UIB (TU).	
<ul style="list-style-type: none">▪ Maxi San Miguel, Director, University Full Professor UIB (CU).	
<ul style="list-style-type: none">▪ Llorenç Serra, University Professor UIB (TU).	
<ul style="list-style-type: none">▪ Tomàs Sintes, University Professor UIB (TEU).	
<ul style="list-style-type: none">▪ Raúl Toral, University Full Professor UIB (CU).	

2.2. - Postdoctoral Research Associates.






<ul style="list-style-type: none">▪ Miguel Cornelles, Postdoctoral Contract Project CONOCE2.	
<ul style="list-style-type: none">▪ Damià Gomila, Postdoctoral Contract I3P CSIC.	
<ul style="list-style-type: none">▪ Rene Medrano, FAPESP Fellowship, Brazil.	
<ul style="list-style-type: none">▪ Adrián C. Murza, Postdoctoral Contract Project BIOSIM.	
<ul style="list-style-type: none">▪ Simone Pigolotti, Postdoctoral Contract I3P CSIC.	

<ul style="list-style-type: none">▪ Alessandro Sciré, Ramón y Cajal Postdoctoral Contract.	
<ul style="list-style-type: none">▪ Vasile Z. Tronciu, Postdoctoral Contract Project PICASSO.	
<ul style="list-style-type: none">▪ Guy Van der Sande, Contract FWO, Belgium.	
<ul style="list-style-type: none">▪ Federico Vázquez, Postdoctoral Contract Project CONOCE2.	
<ul style="list-style-type: none">▪ Roberta Zambrini, Ramón y Cajal Postdoctoral Contract.	

2.3. - PhD Students.

<ul style="list-style-type: none">▪ Xavier Castelló, Fellowship Balear Government, Spain.	
<ul style="list-style-type: none">▪ Ilya Ermakov, Fellowship Russian Ministry Education, Russia.	
<ul style="list-style-type: none">▪ Michael Gelfand, Fellowship University Rockefeller New York. USA.	
<ul style="list-style-type: none">▪ Juan Carlos González-Avella, Fellowship MEC-FPI, Project CONOCE2.	
<ul style="list-style-type: none">▪ Ismael Hernández, Fellowship Projects EDEN and OCEANTECH.	
<ul style="list-style-type: none">▪ Alejandro Herrada, Fellowship Balear Government, Spain	

<ul style="list-style-type: none">▪ Romain Modeste Ngumdo, Fellowship MEC-FPI, Project PhoDeCC.	
<ul style="list-style-type: none">▪ Adrián Jacobo, Fellowship MEC-FPU.	
<ul style="list-style-type: none">▪ Niko Komin, Fellowship CE, Project BIOSIM.	
<ul style="list-style-type: none">▪ Leonardo Lyra Gollo, Fellowship CE, Project GABA.	
<ul style="list-style-type: none">▪ María Moreno, Contract Project QULMI.	
<ul style="list-style-type: none">▪ Teresa Martins, Fellowship FCT (<i>Fundação para a Ciência e a Tecnologia</i>) Portugal.	

<ul style="list-style-type: none">▪ Antonio Pérez López, Fellowship Balear Government, Spain.	
<ul style="list-style-type: none">▪ Antonio Pérez Serrano, Fellowship CE, Project IOLOS.	
<ul style="list-style-type: none">▪ Flavio Rodrigo Ruíz, Fellowship Center of Optical Research, Mexico and Fellowship CE Project PICASSO.	
<ul style="list-style-type: none">▪ Pedro A. Sánchez, Fellowship project PIF-CSIC HIELOCRIS.	
<ul style="list-style-type: none">▪ Flora Souza Bacelar, Fellowship CE, Project THRESHOLDS.	

2.4. - Technical and Administrative Support.

<ul style="list-style-type: none"> ▪ Rubén Tolosa, Computing lab technician. 	
<ul style="list-style-type: none"> ▪ Marta Ozonas, Secretary. 	

2.5. - Visitors.

a) Sabbatical and visiting scientists.

- **James Gunton**, Lehigh University, Pennsylvania, USA. May.
- **Ritta Toivonen**, Tecnology University of Helsinki. Finland. March-May.
- **Angelo Vulpiani**, Universita di Roma La Sapienza, Italia. April.
- **Lendert Gelens**, Vrije Universiteit Brussels, Belgium. April-May and July.
- **Ingo Fischer**, Vrije Universiteit Brussels, Belgium. May.
- **Ezequiel Albano**, Universidad Nacional de la Plata, Argentine. July.
- **Wojtek Korneta**, Technical University of Radom, Poland. July.
- **Mario Cosenza**, Centro de Física Fundamental, Universidad de Los Andes, Mérida. Venezuela. August-September.

b) Short visits.

- **Ken H. Andersen**, Danish Institute for Fisheries Research, Charlottenlund Slot, Denmark. July.
- **Mauro Copelli**, Universidade Federal de Pernambuco, Brazil. April.
- **Damon Centola**, Institute for Quantitative Social Science, Harvard University, USA. August.
- **Jan Dackaert**, Vrije Universiteit Brussels, Belgium. August.

- **Giampaolo D'Alessandro**, School of Mathematics, University of Southampton, UK. September.
- **Ramón Ferrer i Cancho**, Universitat de Barcelona, Spain. April.
- **Fritz Henneberger**, Humboldt-Universität Berlin, Germany. October.
- **Pablo Kaluza**, Department of Physical Chemistry, Fritz Haber Institute of the Max Planck Society, Berlin, Germany. October.
- **Kimmo Kaski**, Centre of Excellence in Computational Complex Systems Research and Laboratory of Computational Engineering, Helsinki University of Technology, Finland. May.
- **Jan Lorenz**, ETH, Zurich, Switzerland. June.
- **Francesc Malet Giralt**, Universitat de Barcelona. October.
- **Alexander S. Mikhailov**, Department of Physical Chemistry, Fritz Haber Institute of the Max Planck Society, Berlin, Germany. October.
- **Patrik Ohberg**, Heriot-Watt University, Edingurgh. July.
- **Ernesto Pereda**, Departamento de Física Básica, Universidad de La Laguna, Tenerife, Spain. April.
- **Miguel Pineda**, Leibniz University Hannover, Hannover, Germany. August.
- **Gordon Pipa**, Max Planck Institute for Brain Research, Frankfurt, Germany. September.
- **Filippo Radicchi**, School of Engineering and Science, International University Bremen, Germany. January.
- **Stephen C. Rand**, University of Michigan. USA. May.
- **Mindaugas Radziunas**, Weierstrat-Institut für Angewandte Analysis und Stochastik, Berlin, Germany. May.
- **Vicente Rossi**, CNRS, Toulouse, France.
- **Jan-Michael Rost**, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany. April.
- **Marta Sales**, Northwestern University, USA. May.
- **Jesús M. Sanz Serna**, Departamento de Matemática Aplicada, Universidad de Valladolid. Spain. December.
- **M. Ángeles Serrano**, Institute of Theoretical Physics, LBS, SB, EPFL, Lausanne, Switzerland. October.
- **Kamal Singh**, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany. September.
- **Jong Soo Lim**, University of Korea, Seoul, Korea. November.
- **Enrique Tirapegui**, Departamento de Física, Universidad de Chile, Santiago, Chile. July. Planck Society, Berlin, Germany. October.
- **Giovanna Tissoni**, Dipartimento de Fisica, Università dell'Insubria, Como, Italy, July.
- **Steve Tomsovic**, Department of Physics and Astronomy, Washington State University, USA. May.

- **Murat Tugrul**, Koc University, Istanbul, Turkey. June.
- **Alexandra Tzella**, Department of Applied Mathematics and Theoretical Physics (DAMTP), Centre for Mathematical Sciences, University of Cambridge, United Kingdom. November.
- **Atsushi Uchida**, Takushoku University, Tokyo, Japan. June.
- **Alessandro E.P. Villa**, University Joseph Fourier - Grenoble, France. November.
- **Hans-Jurgen Wuensche**, Humboldt Berlin, Institut für Physik, Berlin, Germany. May.

3. - RESEARCH PROJECTS

3.1. - Research Projects Funded by the European Commission.

BIOSIM: Biosimulation, a new tool in drug development. [LSHB-CT-2004-005137]. Network of Excellence 6th EC Framework Programme, Priority "Genomics and Biotechnology of Health". Coordinator: Erik Mosekilde (Technical University Denmark). Principal Investigator: Raúl Toral. (2004-2009). Budget: 217.000€

EDEN: Ecological Diversity and Evolutionary Networks. [FP6-2005-NEST-Path-043251] Program "NEST: New Emerging Science and Technology. "Call on Tackling Complexity". European Coordinator and Principal Investigator: E. Hernández-García (2007-2009). Budget: 305.276 €

GABA: Global Approach to Brain Activity: From Cognition to Disease. [FP6-2005-NEST-Path-043309] Program "NEST: New Emerging Science and Technology." Call on Tackling Complexity". European Coordinator: J. García-Ojalvo. Principal Investigator: Claudio R. Mirasso, Subcontract of the Universidad Politécnica de Cataluña. (2007-2009). Budget: 50.000 €

THRESHOLDS: Thresholds of Environmental Sustainability. [003933 (GOCE)] Integrated Project of 6th EC Framework Programme at the priority "Global Change and Ecosystems". European Coordinator: C. Duarte (Recursos Naturales -IMEDEA). Scientific in charge of workpackage S2WP1 "regime modelling": Emilio Hernández-García. (2005-2008). Budget: 126.225 €

PICASSO: Photonic Integrated Components Applied to Secure Chaos Encoded Optical communication systems. [IST-2005-34551] STREP within the program Information Society Technologies. Principal Investigator: Claudio R. Mirasso (2006-2009). Budget: 250.000 €

ONCE-CS: Open Network of Centres of Excellence in Complex Systems. [FP6-IST-3-015539] Network of the Priority 2 "Information Society Technologies". Future and Emerging Technologies. Principal Investigator: Maxi San Miguel. (2005-2008).

PATRES: Pattern Resilience. [FP6-2005-NEST-Path-043268] of the Program "NEST: New Emerging Science and Technology. "Call on Tackling Complexity". Principal Investigator: Maxi San Miguel (2007-2009). Budget: 232.670 €

IOLOS: Integrated Optical Logic and Memory using Ultra-fast Micro-ring Bistable Semiconductors Lasers. [IST-2005-34743] STREP within the program Information Society Technologies of the European Commission. Principal Investigator: Alessandro Scirè (2006-2009). Budget: 91.000 €

PHYSBIO: Interactive training and research in nonlinear science from physics to biology. [MSCF-CT-2004-013119] European Coordinator: A. Buka (Budapest, Hungary) Principal Investigator: Raúl Toral. (2005-2007). Budget: 137.917 €

Physics of Risk. European COST ACTION P102. Coordinator: P. Richmond (Trinity, Dublin, Ireland). Principal Investigator: Maxi San Miguel, Spanish representative at the Steering Committee. (2003-2007).

3.2. - Research Projects of the Spanish National Plan for Science.

CONOCE 2: Cooperación y fenómenos no lineales en sistemas complejos extendidos. [FIS2004-00953] Programa Nacional de Física. Principal Investigator: Maxi San Miguel. (2004-2007). Budget: 302.500 €

PhoDeCC: Dispositivos Fotónicos para Comunicaciones Basadas en Caos. [TEC2006-10009/MIC]. Programa Nacional de Tecnologías Electrónica y de las Comunicaciones. Principal Investigator: Pere Colet. (2006-2009). Budget: 71.390.

SICOFIB: Sistemas complejos entre la Física y la Biología [FIS2006-09966] *Programa Nacional de Física*. Principal Investigator: Manuel Matías (2006-2007). Budget: 18.150 €

FÍSICOS: Física Interdisciplinar y Sistemas Complejos. [FIS2007-60327] Principal Investigator: Maxi San Miguel. Deputy Investigator: Raúl Toral. (2007-2012). Budget: 1.318.900 €

EnvFlows. Transport in Chaotic Environmental Flows. [HH2006-0031] Integrated Action Spain-Hungary. Principal Investigator: Cristóbal López. (2007-2008). Budget: 8.830 €

Chaos synchronization and on/off phase shift keying encryption. [HA2005-0051] Integrated Action Spain-Germany. Principal Investigator: Claudio Mirasso. (2006-2007) Budget: 10.000 €

EDEN-AC. [FIS 2007-29087-E] Complementary Action. Principal Investigator: Emilio Hernández-García. (2007-2010). Budget: 25.100 €

PICASSO-AC: Photonics Integrated Components Applied to Secure Chaos Encoded Optical Communication Systems. [TEC-2006-28105] Complementary Action. Principal Investigator: Claudio Mirasso. (2006-2009). Budget: 23.700€

PATRES-AC: Pattern Resilience [FIS2007-29083-E]. Complementary Action. Principal Investigator: Maxi San Miguel. (2007-2010). Budget: 18.500 €

3.3. - Other IFISC Research Projects.

Grupo de investigación competitivo de Física Interdisciplinar. [PCTIB-2005GC4-05] Balear Government. Principal Investigator: Maxi San Miguel. (2006-2008) Budget: 48.000 €

QULMI: Luz cuántica en microdispositivos. [PROGECIB-5]. Balear Government. Principal Investigator: Roberta Zambrini. (2007-2008). Budget: 33.000 €

HIELOCRIIS: Crecimiento cristalino y química de películas de hielo en condiciones extremas. Subproyecto IFISC: Modelado y caracterización del crecimiento y la morfología de películas de hielo [200530F0052] CSIC's PIF Project. Principal Investigator: Oreste Piro. (2005-2007). Budget: 43.500 €

Física Estadística y No lineal: dinámica y redes complejas en sistemas biológicos y sociales. [PIE2007501016]. CSIC. Principal Investigator: Víctor M. Eguíluz. (2007-2008). Budget: 30.000€

OCEANTECH: Herramientas avanzadas para el estudio de la dinámica oceánica y la gestión medio-ambiental. [PIF06-059] CSIC's PIF Project. Principal Investigator: Cristóbal López. (2007-2008). Budget: 50.000€

Estados entrelazados y puertas cuánticas. [2005AR0004, CSIC-CONICET]. Principal Investigator: Montserrat Casas. (2006-2007).

3.4. - Research Projects with Participation of IFISC'S Members.

Información cuántica y dinámica electrónica en nanoestructuras [FIS2005-02796] Ministerio de Educación y Ciencia. Involved Investigators: Montserrat Casas (IP), Llorenç Serra. (2005-2008). Budget: 104.762 €

MARBEF: Marine Biodiversity and Ecosystem Function. [GOCE-2003-505446] European Network. Principal investigator: C. M. Duarte (RRNN-IMEDEA). IFISC Participating Scientist: Tomás Sintés. (2004-2009) Budget: 118450 €

EUR-OCEANS: European Network of Excellence for Ocean Ecosystems Analysis. [Number 511106-2] 6th FP CE, Priority "Global Change and Ecosystems" Principal investigator: C.M. Duarte, (RRNN-IMEDEA). IFISC Participating Scientists: E. Hernández-García, C. López. (2005-2008)

STOCHDYN: Stochastic Dynamics. Fundamentals and Applications. Program of the European Science Foundation. IFISC Principal Investigator: Maxi San Miguel. (2002-2007).

Aplicaciones de la física estadística y no-lineal a la economía y ciencias sociales. [FIS2004-22008-E, FIS2005-25318-E, SCO2006-28541-E] MEC Thematic Network. Principal Investigator: A. Díaz Guílera (Barcelona). IFISC Participating Scientists: Maxi San Miguel, Raúl Toral, Víctor M. Eguíluz. (2005-2007).

Red Temática de Óptica Cuántica y No Lineal: [FIS2005-24371-E.] MEC Thematic Network: Participating Scientists: Maxi San Miguel, Pere Colet, Claudio R. Mirasso, Alessandro Scire, Roberta Zambrini, Damià Gomila (2006-2008).

Red Temática de Física estadística y No Lineal: [FIS2006-28412-E.] MEC Thematic Network: Coordinator: Pedro L. Garrido, Universidad de Granada. IFISC Principal Investigator: Pere Colet (2007-2008).

Grupo de investigación competitivo de Física Atómica molecular y Nuclear.FAMN [PCTIB-2005GC3-02] Balear Government, IFISC Participating Scientists: Montserrat Casas, Llorenç Serra. (2006-2008).

3.5. - Other Funding.

Personal Tècnic de Suport. Balear Government. Principal Investigator: Maxi San Miguel (2007-2009). Budget: 20400 €

IFISC-AE. Posta en marxa IFISC. Balear Government. Principal Investigator: Maxi San Miguel. (2007-2008). Budget: 12000 €

HIELOCRIIS-2007. International Conference on Crystal Growth and Chemistry of Ice Thin Films under extreme conditions. Balear Government. Principal Investigator: Tomàs Sintes. (2007-2007). Budget: 6000 €

CoBeNN-MEC. Coherent Behavior in Neuronal Networks. [FIS2007-29095-E]. Principal Investigator: Manuel Matías. (2007-2007). Budget: 6.000 €

CoBeNN-CSIC. Coherent Behavior in Neuronal Networks. CSIC Principal Investigator: Manuel Matías. (2007-2008). Budget: 2500 €

CoBeNN-GB. Coherent Behavior in Neuronal Networks. Balear Government. Principal Investigator: Manuel Matías. (2007-2008). Budget: 6000 €

CoBeNN-ONR. Coherent Behavior in Neuronal Networks. Office of Naval Research (USA). Principal Investigator: Manuel Matías. (2007-2007). Budget: 4.230 €

CoBeNN-UIB. Coherent Behavior in Neuronal Networks. UIB. Principal Investigator: Manuel Matías. (2007-2007). Budget: 3.000 €

4. - INTERNAL ACTIVITIES: IFISC SEMINARS

Raúl Toral (IFISC): *Different is more.* [January 11]

Julien Javaloyes (IMEDEA): *Passive Mode-Locking of Lasers induced by Cross Polarization Gain Modulation.* [January 16]

Filippo Radicchi (School of Engineering and Science, International University Bremen, Germany): *Reducing Frustration in Social Systems: Regular and Random Networks.* [January 22]

Vasile Tronciu (IFISC): *Semiconductor laser dynamics - from blue to infrared emission.* [February 2]

Miguel Cornelles (IFISC): *Aspects of Feedback and Noise in Vertical-Cavity Surface-Emitting Lasers.* [February 15]

Simone Pigolotti (IFISC): *Stochastic dynamics of tropical forests.* [February 20]

Guy Van der Sande (Vrije Universiteit Brussels, Belgium): *Dissipative structures in cavities containing left-handed materials.* [February 27]

Pere Colet (IFISC): *Nuredduna: configuration and efficient use.* [February 28]

Llorenç Serra (IFISC): *Evanescence modes in spintronics.* [March 6]

Damià Gomila (IFISC): *Growth laws, pinning and localized structures: the last sodium experiment.* [March 20]

Ernesto Pereda (Departamento de Física Básica, Universidad de La Laguna, Tenerife): *Experimental study of synchronization phenomena in the electromagnetic activity of the brain.* [April 4]

Ramón Ferrer i Cancho (Universitat de Barcelona): *How the principle of economy shapes language.* [April 17]

Mauro Copelli (Universidade Federal de Pernambuco, Brazil). *Physics of Psychophysics: Optimal Dynamic Range in a Critical Network.* [April 19]

Jan-Michael Rost. (Director at the Max Planck Institute for the Physics of Complex Systems. Dresden, Germany): *Ultracold atomic dynamics: From plasma to Rydberg molecules.* [April 24]

Angelo Vulpiani (Universita di Roma La Sapienza, Italia): *Transport Properties in Chaotic and Non-Chaotic Many Particles Systems.* [April 26]

Steve Tomsovic (Department of Physics and Astronomy, Washington State University, USA): *Sensitivity of Wave Field Evolution in Chaotic Systems: the Fidelity and Structural Stability.* [May 5]

Federico Vázquez, (IFISC): *Fragmentation and recombination transitions in the co-evolution of network and states.* [May 5]

Marta Sales (Northwestern University, USA): *Topology and dynamics of complex biological systems.* [May 21]

Kimmo Kaski (Centre of Excellence in Computational Complex Systems Research and, Laboratory of Computational Engineering, Helsinki University of Technology, Finland): *Structure and diffusion in a mobile communication network.* [May 29]

Stephen C. Rand. (University of Michigan): *Dynamic Optical Magnetism: First Observations and Predictions.* [May 31]

Rene Medrano (Instituto de Física de la Universidad de Sao Paulo - USP- Brasil): *Homoclinic Bifurcation in the Parameter Space.* [June 6]

Jan Lorenz (ETH, Zurich): *Threshold models of continuous opinion dynamics: Clustering, Drifting and Convergence.* [June 19]

Murat Tugrul (Koc University, Istanbul, TURKEY): *Structural & Dynamical Aspects of Transcriptional Regulation in YEAST Genetic Network.* [June 25]

Atsushi Uchida (Takushoku University, Tokyo, Japan): *Consistency in driven nonlinear systems.* [June 26]

Ken H. andersen (Danish Institute for Fisheries Research, Charlottenlund Slot, Denmark.): *The Marine Size Spectrum* [July 3]

Patrik Ohberg (Heriot-Watt University, Edingurgh): *Ultracold quantum gases.* [July 10]

Enrique Tirapegui (Departamento de Física, Universidad de Chile, Santiago, Chile): *Inestabilidades cuasi reversibles genéricas: la universalidad de las ecuaciones de Lorenz y Maxwell Bloch y un caso predictable de caos à la Shilnikov.* [July 16]

Damon Centola (Institute for Quantitative Social Science, Harvard University): *Diffusion in Social Networks: New Theory and Experiment.* [August 8]

Miguel Pineda (Leibniz University Hannover, Hannover, Germany): *Fluctuations in heterogeneous catalysis: CO oxidation as a case study.* [August 30]

Mario Cosenza (Centro de Física Fundamental, Universidad de Los andes, Merida, Venezuela): *Synchronization in driven vs. autonomous systems with intermittent interactions.* [September 4]

Simone Pigolotti. (IFISC): *Oscillation and feedback loops in regulatory networks.* [September 11]

Kamal Singh (Max Planck Institute for the Physics of Complex Systems, Dresden, Germany): *Noise embedded Femtosecond Photoionization of Atoms.* [September 14]

Roberta Zambrini (IFISC): *Two-point nonlocality.* [September 18]

Giampaolo D'Alessandro (School of Mathematics, University of Southampton, UK): *Spectra of nearly hemi-spherical microcavities.* [September 25]

Raúl Toral (IFISC): *Active rotators: an unupdate.* [October 10]

Alexander S. Mikhailov, (Department of Physical Chemistry, Fritz Haber Institute of the Max Planck Society, Berlin, Germany): *Towards synthetic biology: design of artificial molecular machines.* [October 10]

Rosa López Gonzalo (Departamento de Física, Universitat de les Illes Balears): *Pair Tunneling and Shot Noise through Molecular Transistor.* [October 10]

Pablo Kaluza (Department of Physical Chemistry, Fritz Haber Institute of the Max Planck Society, Berlin, Germany): *Evolutionary design of functional networks robust against local damages and noise.* [October 15]

M. Ángeles Serrano (Institute of Theoretical Physics, LBS, SB, EPFL, Lausanne, Switzerland): *Structural efficiency of percolation landscapes in flow networks.* [October 16]

Francesc Malet Giralt. (Universitat de Barcelona): *Quantum wires with spin-orbit interactions and magnetic fields.* [October 23]

Fritz Henneberger (Humboldt-Universität Berlin, Germany): *Electron Spin Dynamics in semiconductor Quantum Dots.* [November 8]

Jong Soo Lim. (University of Korea, Seoul, Korea): *Andreev Bound states in the Kondo Quantum Dots Coupled to Superconducting Leads.* [November 13]

Alexandra Tzella (Department of Applied Mathematics and Theoretical Physics–DAMTP-Centre for Mathematical Sciences, University of Cambridge, United Kingdom): *Spatial structure of Reactive scalars in chaotic advection flows.* [November 21]

Alessandro E. P. Villa: (University Joseph Fourier, Grenoble, France): *Spatiotemporal patterns of activity in cerebral neural networks: a dynamical systems perspective.*[November 29]

Adrián Murza (IFISC): *Mathematical Modeling in Protein Folding.* [December 12]

Jesús M. Sanz Serna. (Departamento de Matemática Aplicada, Universidad de Valladolid): *Stabilizing with a hammer.* [December 14]

Toni Pérez. (IFISC): *Resonance in Biophysical Systems.* [December 18]

5. - PUBLICATIONS

Publications are available from IFISC web page: <http://ifisc.uib.es/>

5.1. - JCR Journals

- [Message Encryption by Phase Modulation of a Chaotic Optical Carrier.](#)

Annovazzi-Lodi, V.; Benedetti, M.; Merlo, S.; Perez, T.; Colet, P.; Mirasso C.R.
Photonics Technology Letters, **19**, 76-78

- [Embryonic nodal flow and the dynamics of nodal vesicular parcels.](#)

Cartwright, J.H.E.; Piro, N.; Piro, O.; Tuval, I.
Journal of the Royal Society Interface, **4**, 49-55.

- [Ostwald ripening, chiral crystallization, and the common-ancestor effect](#)

Cartwright, J.H.E.; Piro, O.; Tuval, I.
Physical Review Letters, **98**, 165501(1-4)

- [Fronts between rhythms: Spatiotemporal dynamics of extended polyrhythmic media](#)

Cartwright, J.H.E.; Montagne, R.; Piro, N.; Piro, O.
Physical Review Letters, **99**, 174101 (1-4)

- [Anomalous lifetime distributions and topological traps in ordering dynamics.](#)

Castelló, X.; Toivonen, R.; Eguíluz, V. M.; Saramäki, J.; Kaski, K. M.; San Miguel, M.
Europhysics Letters, **79**, 66006 (1-6)

- [Ghost resonance in a pool of heterogeneous neurons.](#)

Balenzuela, P.; Garcia-Ojalvo, J.; Manjarrez, E.; Martínez, L.; Mirasso, C.
Biosystems, **89**, 166-172

- [Discreteness effects in a reacting system of.](#)

Berti, S.; López, C.; Vergni, D.; Vulpiani, A.
Physical Review E **76**, 031139, ,

- [Multiqubit systems: highly entangled states and entanglement distribution.](#)

Borras, A.; Plastino, A.R.; Batle, J.; Zander, C.; Casas, M.; Plastino, A.
Journal of Physics A, **40**, 13407-13421

- [Macroscopic equations for the adiabatic piston .](#)

Cencini, M.; Palatella, L.; Pigolotti, S.; Vulpiani A.
Physical Review E, **76**, 051103 (1-12)

- [Cascade Dynamics of Complex Propagation.](#)

Centola, D.; Eguíluz, V.; Macy, M.W.
Physica A, **374**, 449-456

- [Homophily, Cultural Drift and the Co-Evolution of Cultural Groups.](#)

Centola, D.; González-Avella, J.C.; Eguíluz, V.; San Miguel, M.
Journal of Conflict Resolution, **51**, 905-929

- [Dynamic instabilities of microwaves generated with optoelectronic oscillators.](#)

Chembo Kouomou, Y.; Larger, L.; Tavernier, H.; Benduola, R.; Colet, P.; Rubiola, E.
Optics Letters, **32**, 2571-2573.

- [Development of an MSFIA-MPFS pre-treatment method for radium determination in water samples.](#)

Fajardo, Y.; Gómez, E.; Garcías, F.; Cerdá, V.; Casas, M.
Talanta, **71**, 1172-1179

- [Initial growth of Boltzmann entropy and chaos in a large assembly of weakly interacting systems.](#)

Falcioni, M.; Palatella, L.; Pigolotti, S.; Rondoni, L.; Vulpiani, A.
Physica A, **385**, 170-184.

- [Projected single-spin-flip dynamics in the Ising model.](#)

Ferreira, A.L.C.; Toral, R.
Physical Review E, **76**, 011117 (1-10)

- [Impact of nonlocal interactions in dissipative systems: towards.](#)

*Gelens, L.; Van der Sande, G.; Tassin, P.; Tlidi, M.; Kockaert, P.; Gomila, D.; Veretennicoff, I.; Danckaert, J J .*Physical Review A, **75**, 063812 (1-4)

- [Quantum formulation of fractional orbital angular momentum.](#)

Goette, J.B.; Franke-Arnold, S.; Zambrini, R.; Barnett, S.M.
Journal of Modern Optics, **54**, 1723-1738

- [Dynamics of hexagonal patterns in a self-focusing Kerr cavity.](#)

Gomila, D.; Colet, P.
Physical Review E, **76**, 016217 (1-10)

- [Domain wall dynamics: growth laws, localized structures and stable droplets.](#)

Gomila, D.; Colet, P.; San Miguel, M.; Oppo, G.L.

European Physical Journal Special Topics, **146**, 71-86

- [Phase-space structure of two-dimensional excitable localized structures.](#)

Gomila, D.; Jacobo, A.; Matías, M. A.; Colet, P.

Physical Review E, **75**, 026217 (1-10)

- [Subcritical patterns and dissipative solitons due to intra-cavity photonic crystals.](#)

Gomila, D.; Oppo, Gian-Luca

Physical Review A, **76**, 043823 (1-7)

- [Bifurcation Structure of Dissipative Solitons.](#)

Gomila, D.; Scroggie, Andrew J.; Firth, W. J.

Physica D, **227**, 70-77.

- [Information Feedback and Mass Media Effects in Cultural Dynamics.](#)

González-Avella, J.C.; Cosenza, M.G.; Klemm, K.; Eguíluz, V.; San Miguel, M.

JOURNAL OF ARTIFICIAL SOCIETIES AND SOCIAL SIMULATION :

<http://jasss.soc.surrey.ac.uk/10/3/9.html> , **10**, 1-17

- [Spatial patterns in non-locally interacting particle systems.](#)

Lopez, C.; Hernández-García, E.

European Physical Journal-Special Topics, **146**, 37-45.

- [Multiple time-scale approach for a system of Brownian particles in a non-uniform temperature field.](#)

Lopez, C.; Marini B.; Marconi, U.

Physical Review E, **75**, 021101

- [An absorbing phase transition from a structured active particle phase.](#)

Lopez, C.; Ramos, F.; Hernandez-Garcia, E.

Journal of Physics: Condensed Matter, **19**, 065133 (1-8).

- [From Coulomb blockade to the Kondo regime in a Rashba dot.](#)

López, R; Sánchez, D.; Serra, Ll.

Physical Review B, **76**, 035307 (1-6).

- [Exchange-correlation effects on quantum wires with spin-orbit interactions under the influence of in-plane magnetic fields.](#)

Malet, F.; Pi, M.; Barranco, M.; Serra, Ll.; Lipparini, E.

Physical Review B, **76**, 115306 (1-12).

- [Addition energies and density dipole response of quantum rings under the influence of in-plane electric fields.](#)

Malet, F.; Pi, M.; Barranco, M.; Serra, Ll.; Lipparini, E.

Physical Review B, **76**, 245302 (1-6)

- [Phantom reflexes: Muscle contractions at a frequency not physically present in the input stimuli.](#)

Manjarrez, E.; Balenzuela, P.; García-Ojalvo, J.; Vázquez, E.; Martínez, L.; Flores, A.; Mirasso, C.

BioSystems, **90**, 379-388

- [Effects of auditory noise on the psychophysical detection of visual signals: Cross-modal stochastic resonance.](#)

Manjarrez, E.; Mendez, I.; Martínez, L.; Flores, A.; Mirasso, C. R.

Neuroscience Letters, **415**, 231-236

- [Chaotically spiking canards in an excitable system with 2D Inertial fast Manifolds](#)

Marino, F.; Marin, F.; Balle, S.; Piro, O.

Physical Review Letters, **98**, 7, 074104 (1-4)

- [Synchronization Properties of Bidirectionally Coupled Semiconductor Lasers Under Asymmetric Operating Conditions.](#)

Martínez Avila, J.F.; Vicente R.; Rios Leite, J.R.; Mirasso C.R.

Physical Review E, **75**, 066202 (1-6)

- [Stochastic Resonance in the Motor System: Effects of Noise on the Monosynaptic Reflex Pathway of the Cat Spinal Cord.](#)

Martínez, L.; Pérez, T.; Mirasso, C.; Manjarrez, E.

Journal of Neurophysiology, **97**, 4007-4016

- [Elementary Excitations of a Bose-Einstein Condensate in an Effective Magnetic Field.](#)

Murray, D.R.; Barnett, S.M.; Ohberg, P.; Gomila, D.

Physical Review A, **76**, 053626 (1-8)

- [Bistability and all-optical switching in semiconductor ring lasers.](#)

Perez, T.; Scirè, A.; Van der Sande, G.; Colet, P.; Mirasso, C.R.

Optics Express, **15**, No **20**, 12941-12948

- [Two-dimensional front dynamics and spatial solitons in a nonlinear optical system.](#)

Pesch, M.; Lange, W.; Gomila, D.; Ackemann, T.; Firth, W.J.; Oppo, G.-L.

Physical Review Letters, **99**, 153902 (1-4)

- [Species clustering in competitive Lotka-Volterra models.](#)

Pigolotti, S.; López, C.; Hernández-García, E.

Physical Review Letters, **98**, 258101(1-4)

- [Oscillation patterns in negative feedback loops.](#)

Pigolotti, S.; Krishna, S.; Jensen, Mogens, H.

- [Spectrum of genetic diversity and networks of clonal organisms.](#)

Rozenfeld, A.F.; Arnaud-Haond, S.; Hernandez-García, E.; Eguíluz, V.M.; Matías, M.A.; Serrao, E.; Duarte, C.M.

Journal of the Royal Society Interface, **4**, 1093-1102

- [Plankton blooms in vortices: The role of biological and hydrodynamic time scales.](#)

Sandulescu, M.; López, C.; Hernández-García, E.; Feudel, U

Nonlinear Processes in Geophysics, **14**, 443-454

- [Maximum entropy principle and continuity evolution equation with source terms.](#)

Schonfeldt, J.H.; Jimenez, N.; Plastino, A. R.; Plastino, A.; Casas, M.

Physica A, **374**, 573-584

- [Evanescent states in quantum wires with Rashba spin-orbit coupling.](#)

Serra, Ll.; Sánchez, D.; López, R.

Physical Review B, **76**, 045339 (1-8)

- [Clonal growth dynamics of the invasive *Carpobrotus affine acinaciformis* in Mediterranean coastal systems: a non-linear model..](#)

Sintes, T.; Moragues, E.; Traveset, A.; Rita, J.

Ecological Modelling, **206**, 110-118.

- [Microscopic Abrams-Strogatz model of language competition.](#)

Stauffer, D.; Castelló, X.; Eguíluz, V.M.; San Miguel, M.

Physica A, **374**, 835-842

- [Theory of collective firing induced by noise or diversity in excitable media.](#)
Tessone, C.J.; Scirè, A.; Toral, R.; Colet, P.
Physical Review E, **75**, 016203 (1-5)

- [Stochastic resonance in an extended FitzHugh-Nagumo system: The role of selected coupling.](#)
Tessone, C.J.; Wio, H.S.
Physica A, **374**, 46-54

- [Oscillations and temporal signalling in cells.](#)
Tiana, G.; Krishna, S.; Pigolotti, S.; Jensen, M.H.; Sneppen, K.
Physical Biology, **4**, R1-R17

- [Finite size effects in the dynamics of opinion formation.](#)
Toral, R.; Tessone, C.J.
Communications in Computational Physics, **2**, 177-195

- [Collective effects induced by diversity in extended systems.](#)
Toral, R.; Tessone, C.J.; Viana, Lopes, J.
European Physical Journal-Special Topics, **143**, 59-67

- [Dynamics of a Nonlinear Ring Cavity: Excitability and Coherent Resonance.](#)
Tronciu, V.Z.; Abram, R.A.; Rusu, S.S.; Bardetski, P.I.
Physics of the Solid State, **49**, 426-430

- [Time scale competition leading to fragmentation and recombination transitions in the co-evolution of network and states..](#)
Vázquez, F.; Gonzalez-Avella, J.C.; Eguiluz, V. M.; San Miguel, M.
Physical Review E, **76**, 046120 (1-5)

- [Non-monotonicity and divergent time scale in Axelrod model dynamics.](#)
Vázquez, F.; Redner, S.
Europhysics Letters, **78**, 18002

- [Bidirectional Message Transmission in a Chaos-Based Communication Scheme.](#)
Vicente, R.; Mirasso, C.R.; Fischer, I.
Optics Letters, **32**, 403-405

- [Angular momentum of multimode and polarization patterns.](#)
Zambrini, R.; Barnett, S.M.
OPTICS EXPRESS, **15**, 15214-15227

- [Signal amplification and control in optical cavities with off-axis feedback.](#)

Zambrini, R.; Papoff, F.

Physical Review Letters, **99**, 063907

- [Entanglement and the speed of evolution of multi-partite quantum systems.](#)

Zander, C.; Plastino, A.R.; Plastino, A.; Casas, M.

Journal of Physics A, **40**, 2861-2872

5.2. - Book Chapters.

- [The fate of bilingualism in a model of language competition.](#)

Castelló, X.; Loureiro-Porto, L.; Eguíluz, V.; San Miguel, M.

Advancing Social Simulation: The First World Congress. Takahashi, Shingo; Sallach, David; Rouchier, Juliette (Eds.), Springer, 83-94

- [Optical Image Processing in Second-Harmonic Generation.](#)

Scotto, P.; Colet, P.; Jacobo, A.; San Miguel, M.

Quantum Imaging, (Mikhail I. Kolobov, ed.), Springer, 167-200.

- [Quantum transmitting boundary algorithm with local spin orbit coupling.](#)

Serra, L.I.; Sánchez, D.

Mathematics in Industry. (L.L Bonilla, M. Moscoso, G. Platero, J. M. Vega, Eds), Springer 449-453.

5.3. -Other Publications in 2007.

- [Modelling bilingualism in language competition: the effects of complex social structure.](#)

Castelló, X.; Toivonen, R.; Eguíluz, V.; San Miguel, M.

Proceedings of the 4th Conference of the European Social Simulation Association, IRIT Editions 581-584

- [Excitability Mediated by Localized Structures in Kerr Cavities.](#)

Gomila, D.; Jacobo, A.; Matías, M.A.; Colet, P.

PIERS Online, **3**, 349-353.

- [Evolutionary and Ecological Trees and Networks.](#)

Hernandez-Garcia, E.; Herrada, E. A.; Rozenfeld, A.F.; Tessone, C.J.; Eguíluz, V.; Duarte, C.M.; Arnaud-Haond, S.; Serrao, E.

Nonequilibrium Statistical Mechanics and Nonlinear Physics: XV Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics, American Institute of Physics AIP Conf. Proc. **913**, 78-83.

- [Correlations in semiconductor ring laser in the bidirectional regime.](#)

Pérez Serrano, A. Memoria de Máster, UIB.

- [The Fano-Rashba effect.](#)

Serra, Ll., Sánchez, D.

Journal of Physics: Conference Series, **61**, 1037-1041

- [Zero-lag Long Range Synchronization of Neurons Is Enhanced by Dynamical Relaying.](#)

Vicente, R.; Pipa, G.; Fischer, I.; Mirasso, C.R.

Lecture Notes in Computer Science, Springer **4688**, 904-913

6. - CONFERENCES AND WORKSHOPS

6.1. - Invited Talks.

Colet, Pere.

Excitability mediated by localized structures in nonlinear optical cavities.

Progress in Electromagnetics Research Symposium, PIERS 2007 Pekin, (China).

March 26 to 30.

Eguíluz, Víctor

Dynamics of language competition: bilingualism and social structure. Working Group Physics of Socio-Economic Systems.

(AKSOE), in the 71 Annual Meeting of the Deutsche Physikalische Gesellschaft, Regensburg (Germany).

March 26 to 30.

Eguíluz, Víctor.

Modelos dinámicos de fenómenos sociales.

VIII Universitat d'Estiu d'Eivissa i Formentera 2007, El cervell social, Ibiza,(Spain)

September 17 to 21.

Hernández-García, Emilio.

Transport dynamics in the Western Mediterranean: Stretching fields and hyperbolic lines.

European Geosciences Union General Assembly 2007, Viena, (Austria).

April 17.

Hernández-García, Emilio.

Stretching fields and lines in the transport dynamics of the Western Mediterranean.

Minisymposium on Mixing in Industry and the Environment, 6th International Congress on Industrial and Applied Mathematics (ICIAM07). Zürich, (Switzerland).

July 19

Gomila, Damià; Oppo, Gian-Luca.

Spatial Instabilities and Pattern Formation in Periodic Media.

SIAM Conference on Applications of Dynamical Systems Snowbird, Utah, (USA)

May 28 to 01.

Mirasso, Claudio.

Zero-Lag Chaos Synchronization in a Chain of Mutually Delay-Coupled Lasers:

II. "Synchronization Robustness and its Application to Bidirectional Communications.

Workshop on Statistical Physics and its Applications to Complex Problems in Communications.

Eilat, (Israel)

March 13.

Mirasso, Claudio.

Synchronization and correlation properties of n delay-coupled semiconductor lasers in a ring configuration.

3rd International IEEE Scientific Conference on Physics and Control (PhysCon2007) (Germany)

September 07

Mirasso, Claudio.

Dynamical Relying Yields Zero-Lag Synchronization Between Interacting Neurons.

Coherent Behavior in Neuronal Networks Workshop, Palma de Mallorca, (Spain).

October 20

Mirasso, Claudio.

Dynamics and Synchronization of N delay coupled lasers in a ring configuration.

Workshop "Nonlinear dynamics in semiconductor lasers", WIAS, Berlin, (Germany)

November 20.

San Miguel, Maxi.

Fenómenos colectivos de consenso en redes sociales.

Simposio de redes complejas: Biología-Ecología-Sociedad, Santiago de Compostela, (Spain)

June 22.

San Miguel, Maxi.

Language competition as an example of social consensus.

"Statistical Physics of Social Dynamics: Opinions, Semiotic Dynamics and Language". Ettore Majorana Foundation, Erice, Sicily, (Italy)

July 14 to 19.

San Miguel, Maxi.

Dynamics of language competition: voter model, bilingualism and social structure.

Summer workshop on Complex Networks and Social Dynamics, (Finland)

July 31.

San Miguel, Maxi.

Network fragmentation and recombination in a coevolution model of cultural dynamics.

Summer workshop on Complex Networks and Social Dynamics, (Finland)

August 02 to 03

San Miguel, Maxi.

Collective Phenomena in Complex Social Networks. International Conference on Applications of Nonlinear Dynamics.

ICAND2007. Kauai Hawaii, (USA).

September 24 to 27.

Scire A. et al.

Bistability and all-optical switching in semiconductor ring lasers. ICTON - International conference on transparent networks, Rome, (Italy)

July 01 to 04.

Scirè, A.; Perez, A.; Furst, S.; Javaloyes, J.; Zambrini, R.; Sorel, M.; Balle, S.

Semiconductor Ring Laser Modelling.

WORKSHOP "NONLINEAR DYNAMICS IN SEMICONDUCTOR LASERS", organized by: Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, (Germany)

November 19 to 21.

Toral, Raúl.

The role of system size in the dynamics of social systems.

Summer Workshop on Complex Networks and Social Dynamics, Innopoli 2, Espoo, (Finland)

July-August 31 to 02.

Toral, Raúl.

Constructive effects induced by heterogeneity: an application to a model for opinion formation. Summer Workshop on Complex Networks and Social Dynamics, Innopoli 2, Espoo, (Finland)

July- August 31 to 02.

Toral Raúl.

Similar effects of noise and diversity in the dynamics of nonlinear systems.

ESF-Stochdyn conference *Fluctuations and Noise in Out of Equilibrium Systems*, Niza, (France).

September 03 to 09.

Toral, Raúl .

Constructive role of diversity in a model for opinion formation.

4-th Annual Meeting COST Action P10 Physics of Risk, Palermo,(Italy)

September 21 to 23

Toral, Raúl.

Constructive role of diversity in the synchronization of dynamical systems. Equilibrium and Nonequilibrium Structures XI, Viña del Mar, (Chile).

December 17 to 21.

6.2. - Seminar Talks in other Research Centers.

Castelló Xavier.

Dynamics of language competition: bilingualism and social structure effects.

Xerrada al Grup de Biolingüística. Universitat de Barcelona, Barcelona (Spain)

Juny 12

López, Cristóbal.

Estudios de transporte y mezcla oceánica con métodos de la Física del Caos.

Seminario en el departamento de recursos naturales del IMEDEA, Esporles (Spain)

May 11.

Matías, Manuel

Excitability of localized structures.

Instituto de Física de Cantabria, Santander (Spain)

June 13.

Ruíz, Flavio.

Dynamics of semiconductor lasers with external cavities.

Universidad de Barcelona, Barcelona (Spain)

January 17.

San Miguel, Maxi.

La ciencia de los fenómenos colectivos: de la Física a las Ciencias Sociales.

Facultad de Física, Universidad de Valencia, Valencia (Spain).

May 27.

San Miguel, Maxi.

Cultural globalization-polarization transition, cultural drift, co-evolution and group formation. CABDyN Seminar Series, Saïd Business School, University of Oxford (United Kingdom).

November 13.

Toral, Raúl.

Diversity induced effects in the dynamics of social systems.

Chair of Systems Design, ETH Zurich (Switzerland)

September 19.

Tronciu, V. Z.

Blue Lasers A Key Element for New Generation of Dvd & Bd Systems.

Departamento de tecnología fotónica, Universidad Complutense de Madrid , Madrid (Spain)

January 01 to 04.

Zambrini, Roberta.

Two-point nonlocality in extended systems.

Universidad Autónoma de Barcelona, Barcelona, (Spain)

May 16 .

6.3. - Talks in Conferences and Workshops.

Annovazzi-Lodi, V.; Merlo, S.; Benedetti, M.; Pérez, T.; Colet, P.; Mirasso, C.

Optical cryptography by phase modulation of a chaotic carrier.

CLEO/Europe-IQEC 2007; Joint Symposium: Cryptographic Techniques in Photonics, Munich, (Germany)

June 21.

Cartwright, Julyan H. E.; Escribano, B.; Piro, O.; Sainz-Díaz, C.; Sánchez, P. A.; Sintès, T.

Ice film morphologies and the Structure Zone Model. International Workshop on Complex Systems, IWCS2007, Sendai (Japan)

September 25 to 28

Chembo Kouomou, Y.; Colet, P.; Fischer, I.; Mandre, S. K.; Elsässer, W.

Frequency- and polarization-selective feedback control of broad-area VCSELs.

CLEO/Europe-IQEC 2007, Munich (Germany).

June 17 to 22.

Chembo Kouomou, Y.; Colet, P.; Larger, L.; Tavernier, H.; Rubiola, E.;

Dynamical instabilities in opto-electronic ultra-pure microwave generators.

CLEO/Europe-IQEC 2007, Munich (Germany)

June 17 to 22.

Gelens, L.; Tassin, P.; Van Der Sande, G.; Veretennicoff, I.; Kockaert, P.; Tlidi, M.; Gomila, D.; Danckaert, J.

Influence of nonlocal interactions on the formation and stability of cavity solitons.

Workshop on Instabilities, Patterns and Optical Solitons (IPSSO 2007) Supélec, Metz (France).

March 28 to 30.

Gelens, L.; Van Der Sande, G.; Tassin, P.; Scire, A.; Danckaert, J.

Asymptotic bifurcation analysis of the dynamical behavior of a semiconductor.

European Semiconductor Laser, Workshop, Berlin (Germany)

September 14 to 15.

Gomila, D.; Oppo, G.L.

Spatial dissipative solitons with intra-cavity photonic crystals.

CLEO-EUROPE/IQEC 2007. Munich (Germany)

June 17 to 22.

Gomila, D.; Jacobo, A.; Matías, M.; Colet, P.

Excitability mediated cavity solitons in nonlinear optical cavities.

Segundo encuentro general de la Red Temática de Óptica Cuántica y No Lineal, Salamanca (Spain)

September 05 to 07.

Gomila, D.; Oppo, G.L.

Spatial Dissipative Solitons with intra-cavity photonic crystals.

Instabilities, Patterns and Spatial Solitons (IPSSO 2007) Supélec, Metz (France)

March 28 to 30.

González-Avella, J. C.; Cosenza, M. G.; Klemm, K.; Eguíluz V.; San Miguel, M.

Information feedback and mass media effects in cultural dynamics.

The Fourth European Social Simulation Association Conference Toulouse (France)

September 10 to 15.

Hernández-García, E.

Universal scaling in phylogenetic branching.

European Conference on Complex Systems. (ECCS07), Dresden (Germany)

September 30 to 06.

Hernández-García, E.

Genetic similarity networks: Weak and strong links in populations and in metapopulations.

European Conference on Complex Systems (ECCS07). Dresden (Germany)

September 30 to 06.

Hernández-García, E.

Ecological Diversity and Evolutionary Networks: The EDEN project.

Showcase of European Complexity Science Projects (CRP Forum). Dresden (Germany)

October 06.

González-Avella, J. C., Vázquez, F.; Centola, D.; Eguíluz, V.; San Miguel, M.

The Co-evolution of Cultural Groups and Cultural Drift.

Conference and Research Workshop: Perspective on Nonlinear Dynamics (Satellite Meeting 23) (ICTP). Trieste (Italy)

July 16 to 27.

Jacobo, A.; Gomila, D.; Matias M.A.; Colet, P.

Cavity Solitons in Kerr Media: control, interaction and noise effects.

Third "Rio de la Plata" Workshop on Noise, Chaos and Complexity in Lasers and Nonlinear Optics. (Uruguay)

December 3 to 07

Jacobo, A.; Gomila, D.; Matías, M.A.; Colet, P.

Dynamics of Localized Structures in a nonlinear cavity with an addressing Gaussian beam.

International Workshop on Instabilities, Patterns and Spatial Solitons, IPSSO 2007.Metz (France)

March 26 to 27.

Larger, L.; Chembo, Y.; Erneux, T. ; Tavernier, H.; Bendoula, R.; Colet, P.; Rubiola, E.

Bifurcation developpe d'un oscillateur optoélectronique micro-onde à retard, à haute pureté spectrale.

10e Reencontre du Non Linéaire Paris, (France)

March 14 to 16.

Larger, L.; Peil, M.; Grapinet, M.; Mirasso. C.; Fischer, I.

Optoelectronic nonlinear delay dynamics.

Practical Analysis, Stabilization, and Exploitation of Nonlinear Dynamics in RF, Microwave, and Optical Circuits (Hawaii)

May 04

Mirasso, C.; Toral, R.; Calvo, Ó.; Ciszak, M.

Predict prevent control method for perturbed excitable system.

3rd International IEEE Scientific Conference on Physics and Control (PhysCon2007).

May 05

Mirasso, C.; Toral, R.; Tessone, C.; Pérez, T.; Gunton, J.

Diversity Induced Resonance.

3rd International IEEE Scientific Conference on Physics and Control (PhysCon2007), Dresden, (Germany)

September 05.

Pérez, S. A.; Scirè, A.; Zambrini, R.; Colet, P.

Noise properties of semiconductor ring lasers.

CLEO 2007. Munich (Germany)

June 17 to 22.

Pérez, S. A.; Scirè, A.; Javaloyes, J.; Balle, S.; Sorel, M.

Modal properties of a ring laser with imperfections.

European Semiconductor Laser Workshop, ESLW 2007, HHI, Berlin (Germany)

September 14 to 15.

Pesch, M.; Ackemann, T.; Gomila, D.; Lange, W.

Growth laws, pinning and localized structures: an experiment in sodium vapor. Instabilites, Patterns and Spatial Solitons.(IPSSO 2007) Supélec, Metz (France).

March 28 to 30.

Pesch, M.; Lange, W.; Gomila, D.; Ackemann, T.

Growth laws, pinning and localized structures: an experiment in sodium vapor.

CLEO-EUROPE/IQEC 2007. Munich (Germany)

June 17 to 22

Sánchez, P.A.; Sintés, T.; Piro, O.; Cartwright, J. H. E.

Effects of microstructural symmetries on the morphology of thin solid films.

HIELOCRIS 2007. Maó, Menorca, (Spain)

April 26 to 28

Sandulescu, M.; Lopez, C.; Hernández-García, E.; Feudel, U.

Biological activity in the wake of an island close to a coastal upwelling.

European Geosciences Union General Assembly 2007. Vienna, (Austria)

April 17.

Pérez T.; Mirasso, C.; Radziunas, M.; Wünsche, H. J.; Henneberger, F.

Synchronization of chaotic unidirectionally coupled multisection lasers.

PHASE/IPSSO 2007. Metz, (France)

March 28 to 30.

Pérez T.; Mirasso, C.; Radziunas, M.; Wünsche, H. J.; Henneberger, F.

Synchronization of chaotic unidirectionally coupled multisection lasers.

CLEO EUROPE/IQEC 2007. Munich (Germany)

June 21.

Tronziu, V. Z.; Mirasso, C.; Colet, P.

Chaos based communication using multisection semiconductor laser.

Segundo encuentro general de la Red Temática de Óptica Cúantica y No Lineal. Salamanca (Spain)

September 05 to 07.

Tronciu, V. Z.; Mirasso, C.; Colet, P.

Chaos based communication using multi-section semiconductor lasers.

WORKSHOP "NONLINEAR DYNAMICS IN SEMICONDUCTOR LASERS", organized by: Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, (Germany)

November 19 to 21.

Castelló, X.; Toivonen, R.; Eguíluz, V.; Saramäki, J.; Kaski, K.; San Miguel, M.

Social structure effects on the dynamics of language competition.

International School on complexity. Statistical physics of social dynamics: opinions, semiotic dynamics and language. Erice (Italy).

July 14 to 19.

Castelló, X.; Toivonen, R.; Eguíluz, V.; Saramäki, J.; Kaski, K.; San Miguel, M.

Modelling bilingualism in language competition: the effects of complex social structure.

The Fourth European Social Simulation Association Conference, Toulouse (France).

October 10 to 15.

Zambrini, R.

Two-point nonlocality in nonlinear optical devices

Workshop PHASE-IPSSO 2007. Supélec, Metz, (France)

March 28 to 30.

Zambrini, R.

Resolution in image rotation measurements

CLEO Europe-IQEC Conference, World of Photonics Congress 2007. International Congress Centre. Munich, (Germany)

June 17 to 22.

Zambrini, R.

Quasi intrinsic angular momentum

CLEO Europe-IQEC Conference, World of Photonics Congress 2007. International Congress Centre. Munich (Germany)

June 17 to 22.

6.4. - Poster Presentations.

Bacelar, F. S.; Zaldivar-Comenges, J. M.; Dueri, S.; Hernández-García, E.

Regime changes in competing floating-submerged plant ecosystems.

European Conference on Complex Systems - ECCS07 Dresden (Germany).

September 30 to 06.

Cerdà, J. J.; Sintès, T.; Chakrabarti, A.; Sorensen, C.

Polymer depletion driven colloids: shear effect in the induction times of kinetic phase transformations.

International Soft Matter Conference, Aachen (Germany).

October 01 to 04

Cerdà, J. J.; Sintes, T.

Monte Carlo simulations of stiff block-copolymer adsorption onto stripe-patterned surfaces.

International Soft Matter Conference ,Aachen (Germany).

October 01 to 04.

Cornelles Soriano, Miguel; Mirasso, Claudio R; Colet, P.; Rosso, Oswald.

Statistical Complexity Analysis of the Chaotic Response of a Semiconductor Laser subject to Optical Feedback.

CLEO/Europe-IQEC 2007, Munich (Germany)

June 17 to 22

Gelens, Lendert; Gomila, Damià; Van Der Sander, Guy; Danckaert, Jan; Colet, Pere; Matías, Manuel.

Instabilities of Localized Structures in cavities with a layer of a left handed material.

Segundo encuentro general de la Red Temática de Óptica Cuántica y No Linea Salamanca(Spain)

September 05 to 07.

Hernández-García, E.The Members of the Eden Team, Presented by E. Hernández-García.

Ecological Diversity and Evolutionary Networks: The EDEN project

Showcase of European Complexity Science Projects (CRP Forum), Dresden (Germany)

October 06.

Hernández-García, E.; Rozenfeld, A. F.; Arnaud-haond, S.; M. Eguíluz, V.; Serrão, E.; Duarte, C.M.

Genetic similarity networks: Weak and strong links in populations and in metapopulations.

European Conference on Complex Systems- ECCS07. Dresden (Germany).

September-October 30 to 06.

Herrada, E. A.; Tessone, C. J.; M, Eguíluz, V.; Hernández-García, E.; Duarte, C. M.

Universal scaling in phylogenetic branching.

European Conference on Complex Systems (ECCS07). Dresden (Germany)

September-October 30 to 06.

Jacobo A.; Colet, P.

Optical image and data processing with cavity type-II Second Harmonic Generation.

2ª Encuentro General de la Red temática óptica cuántica y no lineal. Salamanca (Spain)
September 05 to 07.

Jacobo, A.; Colet, P.; Hernández-García, E.

ThEnhancer, a computer program to detect jumps in ecological time series.

2nd Assembly of the Thresholds Integrated Project ,Helsinki,(Finland)
January 22 to 24.

Jacobo, A.; D'alessandro, G.; Colet, P.; Gomila, D.

Hysteresis in planar liquid crystal cell illuminated by polarized light.

Third "Rio de la Plata" Workshop on Noise, Chaos and Complexity in Lasers and Nonlinear Optics. (Uruguay)
December 03 to 07.

Komin, N.; Toral, R.

Absorption of Pharmaceuticals Through Cell Monolayers.

3rd BioSim Conference, Potsdam, (Germany)
October 10 to 12.

Komin, N.; Toral, R.

Absorption of Pharmaceuticals Through Cell Monolayers.

simCYP Hands-on Experience with Automated in Vitro-in Vivo Extrapolation – Applications
Praga, (CZY)
May 14 to 18.

Komin, N.; Toral, R.

Absorption of Pharmaceuticals Through Cell Monolayers. Workshop: "From Complex Systems Theory to Clinical Neurology, Dresden (Germany)

June 04 to 08.

López, C.; Pigolotti, S.; Hernández-García, E.

Species clustering in competitive Lotka Volterra models.

23rd International Conference on Statistical Physics (STATPHYS 23) ,Genova, (Italy)
July 09 to 13.

Malet, F.M.; Pi, M.; Serra, LL.; Lipparini, E.

Spin phase diagram and dipole response of quantum rings under the influence of in plane magnetic fields.

17th International conference on electronic properties of two dimensional systems.

July 15 to 20.

Murza, A.; Komin, N.; Pérez, T.; Mirasso, C.; Hernández-García E.; Toral, R.

The role of light - dark cycle and constructive diversity in synchronizing circadian oscillators.

EUFEPS (European Federation of Pharmaceutical Science) Conference on optimizing Drug Discovery and Development, Basel (Switzerland)

December 04 to 07.

Pérez, T.; Scirè, A.; Van Der Sande, G.; Mirasso, C.; Colet, P.

Bistability and optical switching in semiconductor ring lasers.

CLEO EUROPE/IQEC 2007

Munich (Germany).

June 17 to 22.

Pérez, S. A.; Scirè, A.; Zambrini, R.; Colet, P.

Noise properties of semiconductor ring lasers.

2º Encuentro de la Red Temática Óptica Cuántica y No Lineal, Salamanca, (Spain)

September 06.

Pérez, T.; Scirè, A.; Van Der Sande, G.; Mirasso, C.; Colet, P.

Bistability and Optical Switching in Semiconductor Ring Lasers.

2ª Encuentro General de la Red Temática Óptica Cuántica y No lineal.

Salamanca, (Spain)

September 05 to 07.

Pérez, T.; Mirasso, C.; Toral, R.

Study of the Role of Diversity in Synaptically-Coupled Neurons.

Noise in Life 07, Dresden. (Germany)

November 06 to 09.

Rossi, V.; López, C.; Sudre, J; Charria, G.; Garçon, V.;

Comparative study of the Benguela and Canary upwelling systems with Finite-Size Lyapunov Exponents.

European Geosciences Union 2007, Vienna, (Austria)

April 17.

Serra, Ll.; Sánchez, D.; López, R.

Evanescent states in quantum wires with Rashba spin-orbit coupling.

17th International conference on electronic properties of two dimensional systems.

July 15 to 20.

Serra, Ll.; Sánchez, D.; López, R.

Evanescent states in quantum wires with Rashba spin-orbit coupling. Nanospintronic design and realization.

May 21 to 25.

Soriano, M.C.; Ruíz-Oliveras, F.; Colet, P.; Mirasso, C.

Synchronization properties of coupled semiconductor lasers subject to filtered optical feedback.

2º Encuentro de la Red Temática Óptica Cuántica y No Lineal, Salamanca, (Spain)

September 05 to 07.

Vaz, Martins, T.M.; Toral, R.

Resonance Induced by the Presence of Inhibitory Couplings

International Conference on Applications in Nonlinear Dynamics (ICAND 2007), Poipu Beach, Koloa (Hawaii).

September 24 to 27

Vázquez, F.; González-Avella, J.C.; M. Eguíluz, V.; San Miguel, M.

Group dynamics in the coevolution of states and networks.

23rd International Conference on Statistical Physics (STATPHYS 23) Genova (Italy)

July 09.

Zaldivar-Comenges, J.M.; S, Bacelar, F.; Dueri, S.; Hernández-García, E.; Viaroli, P.

A modelling approach to nutrient-driven regime shifts in shallow coastal systems: competition between seagrass and macroalgae.

6th International Congress on Industrial and Applied Mathematics (ICIAM07) Zürich, (Switzerland)

July 16 to 20.

Zambrini, R.; Barnett, S.M.

Quasi intrinsic angular momentum.

CLEO Europe-IQEC Conference, World of Photonics Congress 2007.

International Congress Centre, Munich (Germany.)

June 17 to 22.

7. - OTHER ACTIVITIES

7.1. - PhD Thesis.

Nonlinear dynamics and synchronization of bidirectionally coupled semiconductor lasers

(http://qeod.epsdivisions.org/qeod_prizes)

Raúl Vicente.

PhD Thesis supervisor: Claudio Mirasso

Raúl Vicente received the 2007 European Physical Society (EPS) Quantum Electronics and Optics Division Thesis Prize, category of applied aspects (<http://qeod.epsdivisions.org/qeod-prizes>) for his thesis "Nonlinear dynamics and synchronization of bidirectionally coupled semiconductor lasers" presented in 2006. PhD Thesis supervisor: Claudio Mirasso

7.2. - Research Stays in Other Centers.

Castelló, Xavier. Dipartimento de Física, Universita di Roma "La Sapienza" (Italy) September 24 to 15.

Castelló, Xavier. LCE (Laboratory of Computational Engineering). Helsinki University of Technology (Finland), December 10 to 21.

Eguíluz, Víctor M. Laboratory of Computational Engineering, Helsinki University of Technology, Helsinki (Finland), August 07 to 10.

Jacobo, Adrian. University of Southampton, Southampton, (United Kingdom), June 1 to 31.

Komin, Niko. A Theoretical Work on Efflux Transporters. Facultad de Farmacia. Universidad de Valencia (Spain), July 16 to 20.

López, Cristóbal. Dipartimento de Física, Universita di Roma "La Sapienza" (Italy), January 24.

Matías, Manuel. Instituto de Física de Cantabria (IFCA) (Spain), June 12 to 17.

Matías, Manuel. Instituto Max-Planck de Física en Sistemas Complejos, Dresden (Germany) November 16 to 26.

Pérez, Toni; Lyra, Leonardo. FIAS Summer School: Teoretical Neuroscience & Complex Systems Frankfurt (Germany), August 06 to 25.

San Miguel, Maxi. Laboratory of Computational Engineering, Helsinki University of Technology (Finland), August 01 to 07.

Serra, Llorenç. Departament ECM, (Estructura y Constituyentes de la Material) Universitat de Barcelona, (Spain) January-February, 29 to 02.

Souza Bacelar, Flora. Institute for Environment and Sustainability, Joint Research Center of the European Commission, Ispra (Italy), July 25.

Zambrini, Roberta. Dipartimento de Fisica, Universita dell'Insubria ,Como (Italy),May 10-11.

Zambrini, Roberta. Departamento de Física, Universidad Autónoma de Barcelona, Barcelona, (Spain),May 15 to 19.

Zambrini, Roberta. Department of Physics, University of Strathclyde ,Glasgow, (United Kingdom),June 04 to 09.

7.3. - Organization and Scientific Committees of Conferences and Workshops.

Colet, Pere: Member of Scientific Committee CLEO EUROPE/IQEC 2007. Dynamics, Instabilities and Patterns.Munich (Germany) June 17 to 22

Gomila, Damià: Member of Scientific Committee IPSSO 2007. Instabilities, Patterns and Spatial Solitons (IPSSO 2007) Supélec, Campus de Metz (France).March 28 to 30.

López, Cristóbal: Session organizer: Transport, diffusion and mixing in Geophysical flows. European Geosciences Union, 2007.April 17.

Matías Manuel: Organizer of CoBeNN (Coherent Behavior of neural Networks) Mallorca, (Spain).October 17 to 20.

Mirasso, Claudio: Joint Symposium I, CRYPTOGRAPHIC TECHNIQUES IN PHOTONICS. Co-chairman. June 17 to 22.

Sintes, Tomás; Piro, Oreste; Sánchez, Pedro A: HIELOCRIS 2007. International Conference on Crystal Growth and Chemistry of Ice Thin Films under Extreme Conditions. April 26 to 28.

7.4. - Members of Editorial Board of scientific journals.

Eguíluz, Víctor M. Associate Editor of “*Advances in Complex Systems*”.

Toral Raúl. Associated Editor of “*Fluctuations and Noise Letters*”

San Miguel, Maxi. Associate Editor of “*The European Physical Journal B*” (New Section on Complex Systems).

7.5. - Outreach Activities.

Mirasso, Claudio. *Los láseres: cómo funcionan y para qué sirven.* Conference in Week of the science, La Salle School. November 13.

Mirasso, Claudio. *Los láseres: cómo funcionan y para qué sirven.* Conference in Week of the Science, Son Pacs, High School. November 15.

Ruíz, Flavio. *Exposure to optics for high school teachers and students.* Centro de Investigaciones en óptica A. C., León Gto. Mexico. September 01 to 15.

7.6. - Postgraduate Courses.

Fenómenos cooperativos y fenómenos críticos. Aplicaciones, Víctor M. Eguíluz, Maxi San Miguel, Tomàs Sintès, *Máster in Physics*, Universitat de les Illes Balears, January-December.

Introducción a los Sistemas cuánticos, Montserrat Casas, *Máster in Physics*, Universitat de les Illes Balears, January-December.

Sistemas dinámicos no lineales y complejidad espacio temporal, Pere Colet, Emilio Hernández-García, Claudio Mirasso, *Master in Physics*, Universitat de les Illes Balears, January-December.

Métodos estocásticos de simulación, Pere Colet, Raúl Toral, *Master in Physics*, Universitat de les Illes Balears, January-December.

Introducción a la Física Estadística y no lineal, Emilio Hernández-García, Claudio Mirasso, Maxi San Miguel, Tomàs Sintès, *Master in Physics*, Universitat de les Illes Balears, January-December.

Modelos Computacionales de la evolución Social, Víctor M. Eguíluz, *Máster en Cognición y Evolución Humana.* Universitat de les Illes Balears, January-December.

Fenómenos no lineales en biología, Victor M. Eguíluz, Claudio Mirasso, Tomàs Sintes, Raúl Toral, *Master in Physics*, Universitat de les Illes Balears, January-December.

Propiedades electrónicas de las nanoestructuras, Llorenç Serra Crespí, *Master in Physics*, Universitat de les Illes Balears, February-March.

Redes Sociales, Maxi San Miguel, PhD School, *Aplicaciones de la Física Estadística y no lineal a la Economía y las Ciencias Sociales*, Universidad de Barcelona, February.



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