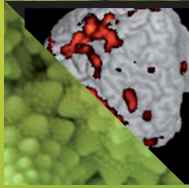
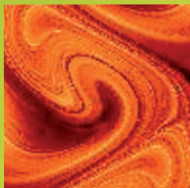
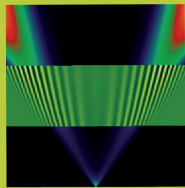
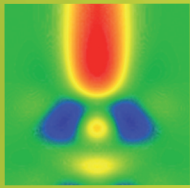




Connecting Science,  
Understanding Complexity



# IFISC ANNUAL REPORT 2008



Universitat de les  
Illes Balears



**CSIC**  
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



Institut de Física Interdisciplinària i Sistemes Complexos



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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.

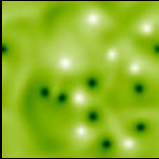
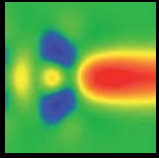
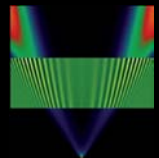
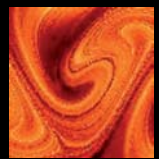


By **interdisciplinary** research we mean the general attitude of willing to transfer knowledge, concepts and methods across the borders between well established disciplines. By **strategic** research we mean focusing in advanced studies in fields with strong future potential, avoiding incremental research 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

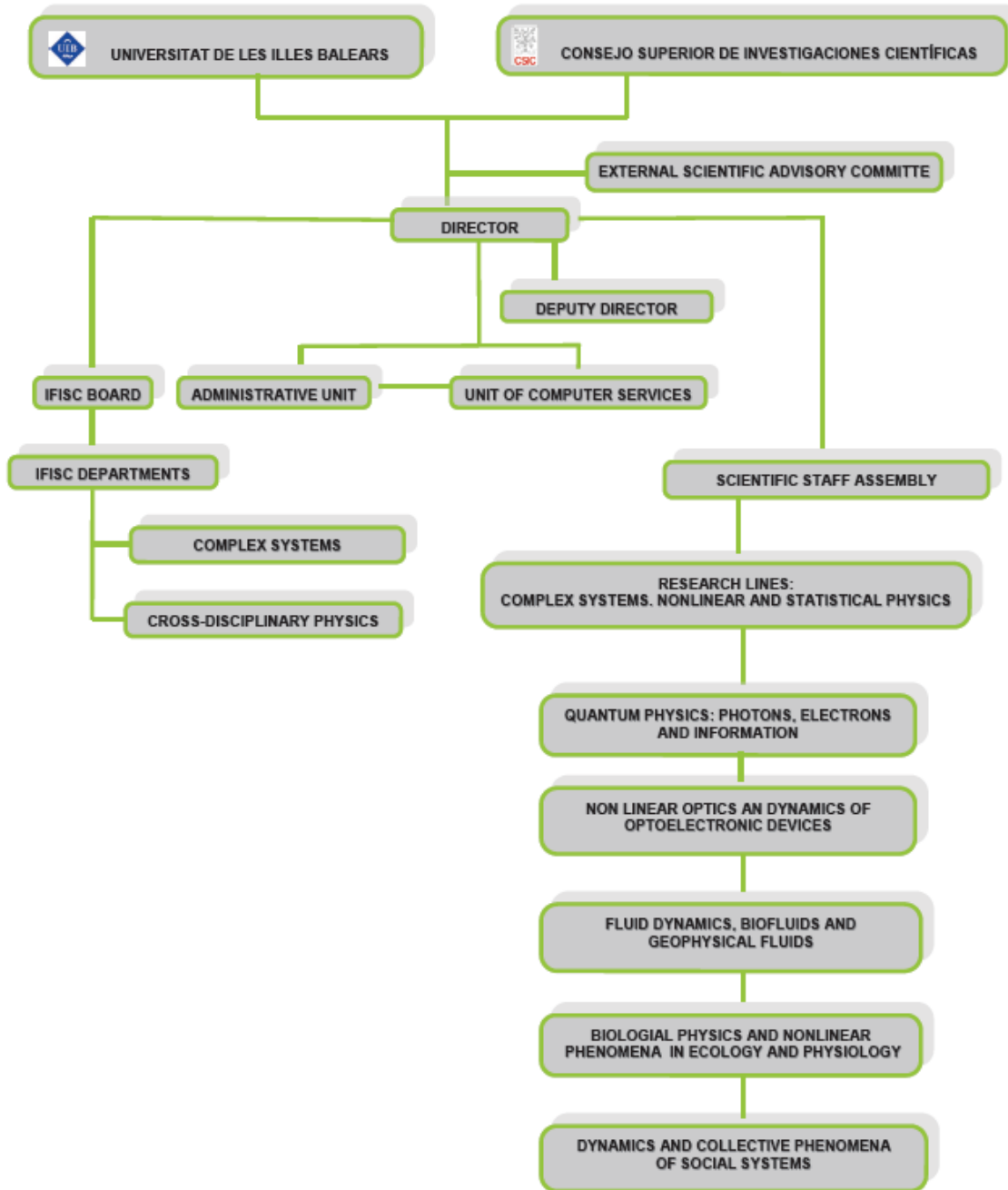
## RESEARCH LINES

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 2008 of the staff members and Senior postdoctoral associates is summarized in the following scheme.

RESEARCH LINES

		MONTserrat CASAS	PERE COLET	DAMIÀ GOMILA	EMILIO HERNÁNDEZ-GARCÍA	CRISTÓBAL LÓPEZ	VÍCTOR M. EGUILUZ	MANUEL MATÍAS	CLAUDIO MIRASSO	ORESTE PIRO	MAXI SAN MIGUEL	LLORENÇ SERRA	ALESSANDRO SCIRE	M. ÀNGELES SERRANO	TOMÁS SINTES	RAÚL TORAL	ROBERTA ZAMBRINI
<b>1) COMPLEX SYSTEMS, NONLINEAR AND STATISTICAL PHYSICS</b>		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>2) QUANTUM PHYSICS: PHOTONS, ELECTRONS AND INFORMATION</b>		X		X								X					X
<b>3) NON LINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES</b>			X	X					X				X				X
<b>4) FLUID DYNAMICS, BIOFLUIDS AND GEOPHYSICAL FLUIDS.</b>					X	X				X					X		
<b>5) BIOLOGICAL PHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY</b>					X	X	X	X	X	X					X	X	
<b>6) DYNAMICS AND COLLECTIVE PHENOMENA OF SOCIAL SYSTEMS</b>							X				X			X		X	

1.1 STRUCTURE CHART



## 1.2 SOME REPRESENTATIVE RESEARCH RESULTS OF 2008

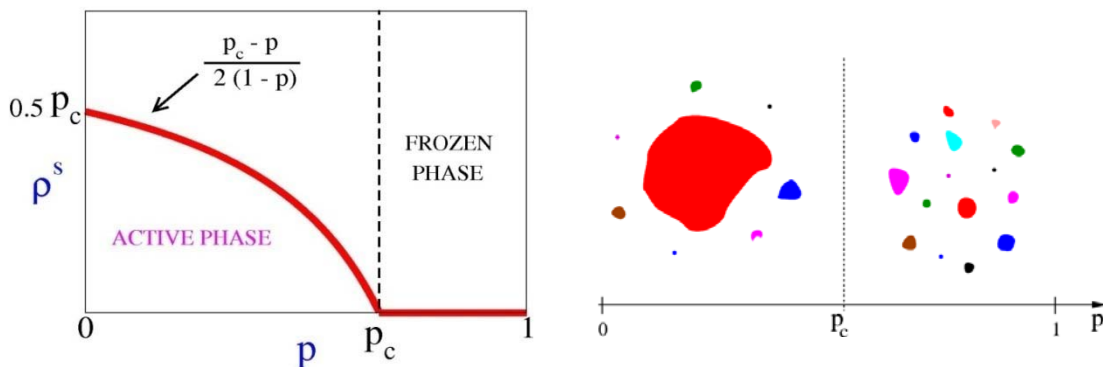
### FRAGMENTATION IN COEVOLVING NETWORKS

Physical Review Letters 100, 108702

Several models of adaptive networks studied during the last years present similar phenomena, for example an absorbing phase transition. In these models, the nodes of the network update their states after interacting with their neighbors, and at the same time, links may be rewired according to the state of the nodes with whom it interacts. In this way, the dynamics of nodes and network topology are not independent, but they coevolve. It is found that, if the topology changes at a high enough rate respect to the rate at which nodes update their states, the networks breaks in a set of disconnected components. The fragmentation transition appears between two frozen phases, one in which the size of the largest component is of the order of the system size, and one composed by many small components, much smaller than the system size.

In order to gain an insight of the fragmentation transition on generic coevolving models, we proposed and analyzed a simple coevolution model that hold all the features of related models, and has the advantage of being analytically tractable. Nodes can have one of two possible states (+ or -) and they interact only with their first neighbors. In a single event, a node and a neighbor are chosen at random. If they have the same state, nothing happens. But if they have opposite states, then with probability  $p$  the chosen node breaks the link with its neighbor, and it forms a new link with another same-state node chosen at random, or with probability  $(1 - p)$ , the node takes its neighbor's state. This model can be thought as the adaptive version of the voter model, where now, nodes can chose their neighbors according to their states. A mean-field approximation predicts, in an infinite large network, a transition at a critical value  $p_c$ , between an active phase where links are permanently rewired, and a frozen phase composed by two disconnected components of approximately half of the system size, and holding opposite states.

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The Figure shows that the stationary value of the density of active links (+ - links), becomes zero when the rewiring probability is larger than  $p_c$ . Also, in finite networks the system gets frozen in a single connected component for values of  $p$  smaller than  $p_c$ , or in two disconnected components for  $p$  larger than  $p_c$ . Therefore, we conclude that the fragmentation appears when the rewiring process is faster than the state spreading process, in such a way that the network breaks before the system reaches global consensus.

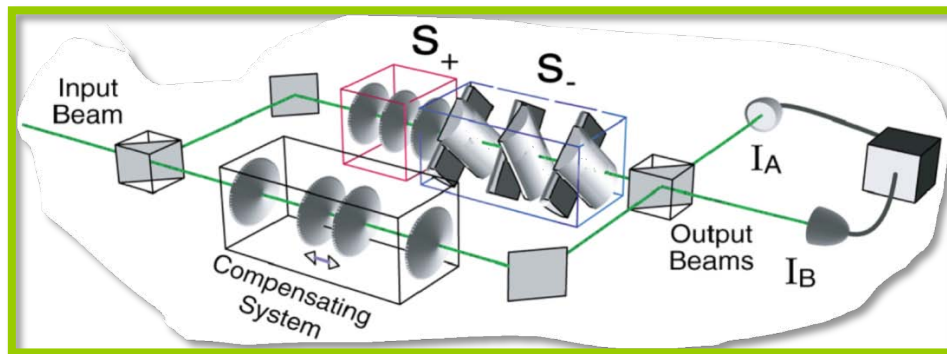
## HOW TO MEASURE THE SPATIAL SPECTRUM OF A GENERIC LIGHT BEAM?

Physical Review Letters 100, 173902

The temporal, vectorial, and spatial degrees of freedom of electromagnetic fields with increasing complexity are exploited in applications ranging from communications to medicine. Recently, an intense research activity on *spatially* multimode light has burgeoned in quantum information, communication, and imaging, with successful demonstrations spanning from nano-displacement measurements, to parallel information, high-dimensional entanglement or coherent transfer of suitably prepared superpositions of vortices in Bose-Einstein. The use of multimode beams thus demands the development of techniques allowing to characterize their spatial spectrum and to retrieve the information encoded in different components.

The basic question answered is: *How to measure the spatial spectrum of a generic light beam?* If we are interested in the Fourier spectrum it is well known that a simple lens provides the answer. In this paper the authors propose a method that allows the experimental determination of the entire spatial mode spectrum of Gaussian beams. In particular, we detail an efficient setup for measuring in the Hermite-Gaussian mode basis, as these are the most common in laser physics and appear naturally in devices where astigmatism, strain, or slight misalignment drive the system toward rectangular symmetry. However, because of the generality of the approach, different experimental setups can be implemented to extract the full spatial spectrum of multimode transverse beams in many bases, including Laguerre-Gaussian modes.

The method used in this paper was based on a symplectic invariant approach and on the possibility to associate to this mathematical construction a feasible optical set-up. The result was a spatial spectrum analyzer, which can be implemented with a small number of benchtop refractive elements, as shown in the picture. The proposed interferometer needs only spherical and cylindrical lenses, mirrors and beam splitters to provide the full Hermite-Gaussian spectrum of any monochromatic coherent input beam. This scheme, inspired by a previous paper (R. Zambrini and S. M. Barnett, Physical Review Letters **96**, 113901 (2006)), should also be feasible in the context of atom optics for analyzing the spatial profiles of macroscopic matter waves.



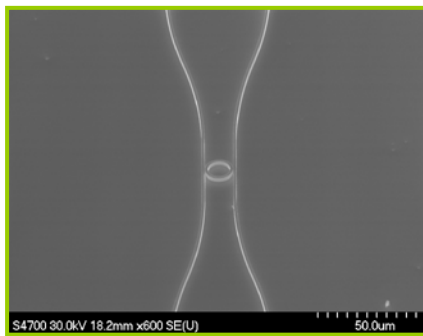


**SWITCHING COUNTERPROPAGATING MODES IN SEMICONDUCTOR RING LASERS**

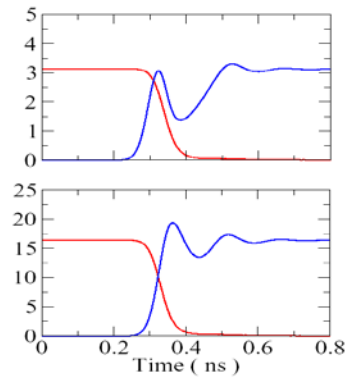
Physical Review Letters 101, 093903

In the current research on optoelectronic devices, one of the most interesting devices for future applications in all-optical circuits are Semiconductor Ring Lasers (SRLs). The peculiar geometry of SRLs allows the existence of two counterpropagating modes operating in different kinds of behaviours. One of this behaviours is the unidirectional emission allowing the switching between the directions of emission. This feature opens up a new scenario in the production of optical logic gates and memories.

At IFISC we are modelling SRLs from different perspectives including rate equations models and travelling wave models. We have studied the modal structure, the directional switching and the wavelength jumps that occur as a function of the pump current. We have found that the residual reflectivities in the light extraction sections determine the modal structure, and together with the redshift of the material gain explains the amount of wavelength jumps displayed by the SRL as the pump current increases.

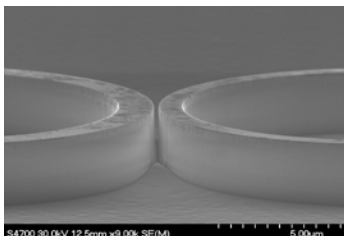


Optical micrograph of a SRL with light extraction sections.

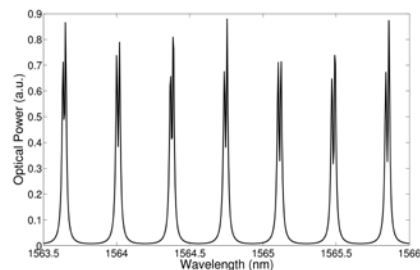


Switching simulations.

We have simulated the switching dynamics obtaining switching times of 0.2 ns for a 300 nm radius SRL. In our simulations we have obtained the emission spectrum, showing multimode behaviour when the SRL is switched-on going to single mode operation after a transient. We have found peculiar spectrum features when studying the noise properties of a SRL that we explain as a consequence of the energy exchange between the two counterpropagating modes, which is well confirmed with measurements. Moreover, we have investigated new laser geometries that are related with SRL geometry.



Light extraction sections induce residual reflectivities that determines the modal structure of the device



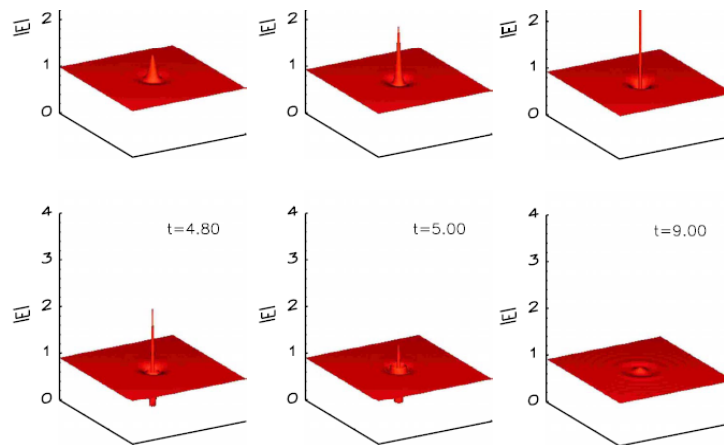
Transfer function of a SRL showing the modal structure

## EFFECTS OF A LOCALIZED BEAM OF LIGHT ON THE DYNAMICS OF EXCITABLE CAVITY SOLITONS

Physical Review A 78, 053821

Localized structures appearing in the transverse plane of nonlinear optical cavities, known as Cavity Solitons (CS), have been advocated for their use in fast and compact optical information storage. Localized structures may develop a number of instabilities like start moving, breathing, or oscillating. In the latter case, they would oscillate in time while remaining stationary in space. The Lugiato-Lefever model for an optical cavity filled with a self-focusing Kerr medium shows a route in which autonomous oscillating cavity solitons are destroyed leading to an excitability regime. Excitability is a concept arising originally from biology (e.g., neuroscience), and it has been found in a variety of contexts, including optical systems. Typically a system is said to be excitable if while it sits at a stable fixed point, perturbations beyond a certain threshold induce a large response before coming back to the rest state. This phenomenon can provided CS with information processing capabilities beyond their use as bits in optical memories.

In views of the possible implementation of devices such as all-optical logical gates, controlling the properties of the excitability is very important. In this work we show how this can be done using an addressing Gaussian beam. The presence of this perturbation introduces changes in the dynamics of CS leading to a new route to excitability with a tunable threshold. We analyze and discuss the whole scenario and show how it is organized by three codimension-2 points. Our results open new possibilities to observe excitable CS experimentally by using an addressing beam.

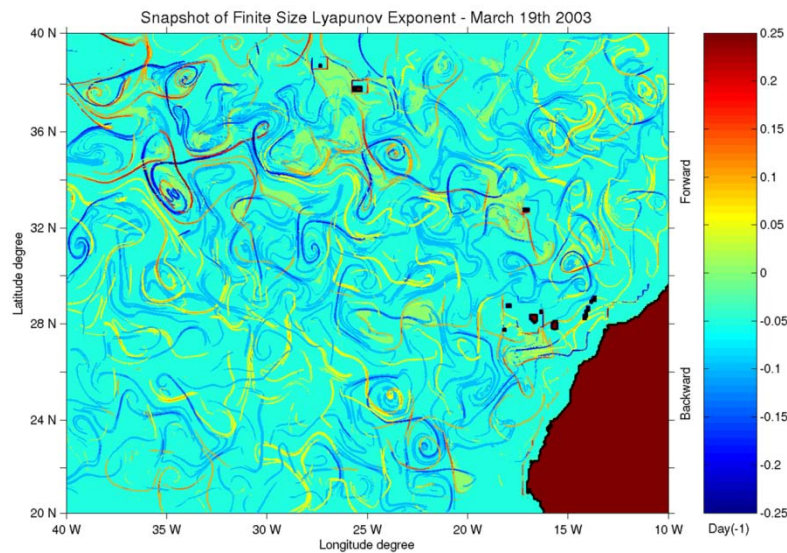


Transverse profile of the electric field intensity  $|E|$  during an excitable excursion caused by a small perturbation in the intensity of the addressing beam.

## TURBULENCE AND BIOLOGY IN UPWELLING OCEAN ZONES

Geophysical Research Letters 35, L11602

The sea currents are not gentle water avenues, but they twist on themselves, produce eddies and fluctuate continuously, dragging and mixing substances brought from diverse origins. This turbulent activity can contribute nutrients to poor zones of the ocean, activating in this way the growth of the small marine organisms that live suspended in the water and which are collectively called plankton. But a question not much studied is the effect of turbulence in marine regions which are already rich in nutritious substances. The so called *upwelling zones* in the Eastern coasts of the oceans are major representatives of these. They are characterized by the existence of ascending currents that transport waters rich in phosphorus, nitrogen and other nutrients from the depths to the surface, where they are used by plankton and by the organisms that feed on it, increasing the population of practically all the types of marine life including the ones relevant for fishing.



Stretching map in the Atlantic

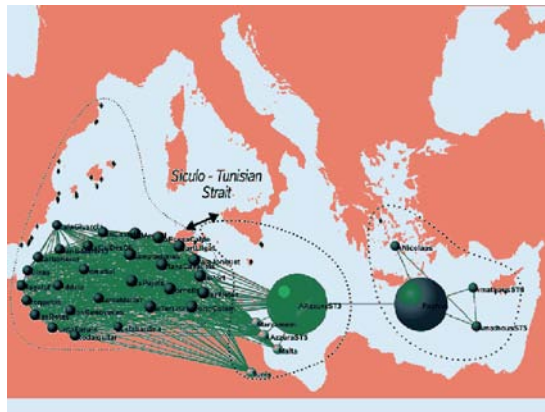
In this work we have analyzed the correlations between degree of turbulence and mixing on the one hand, and biological activity on the other, in two important upwelling zones: the zone of the Canary Islands in the North Atlantic and the one of Benguela in the South Atlantic African coast. The turbulent activity has been characterized by means of maps of Lyapunov exponents, like the one shown in the figure, that indicate the places of maximum distortion of the oceanic surface, where close starting points disperse quickly. They have been obtained by means of data analysis of the state of the water surface gathered by sensors on board satellites. The biological richness has been quantified by means of the amount of chlorophyll present in the water, also measured from satellites. The chlorophyll reveals presence of phytoplankton, the first step in the marine food chain. The main result obtained is that, in contrast to what happens in poorer zones, in the two studied areas the regions of maximum turbulent mixing contain smaller chlorophyll concentrations than the less turbulent ones. We have identified possible mechanisms to explain this observation, based on the consideration of the vertical speeds and the nonturbulent components of the flow.

## WEAK AND STRONG GENETIC LINKS IN POPULATIONS OF MARINE PLANTS

**Proceedings of the National Academy of Sciences of the USA (PNAS) 105, 18824-18829**

Network theory is a powerful mathematical tool able to represent and analyze relationships among elements of very diverse type. In this work, IFISC physicists in collaboration with biologists from Faro (Portugal), Brest (France) and from IMEDEA in Mallorca have developed methodologies based on network theory to investigate genetic relations between biological species population. The technique has been applied to genetic data collected in a large-scale sampling of an endemic Mediterranean marine plant, *Posidonia oceanica*, a species of great importance in the ecology of this sea.

The genetic relationships between the different populations where the plant lives have been represented as a network in which populations appear connected if they have high genetic similarity. From that representation, techniques have been developed that identify the populations more relevant to maintain the flow of genes from one place to another, which of them act as active exporters of genes and which simply receive them from several origins. This information identifies the populations that sustain the biodiversity in the system and that, in case of being eliminated or very degraded, would give rise to serious interruptions in the genetic connection between distant places, which would limit the capacity of recovery in damaged populations.



Network of Mediterranean *Posidonia* Populations.  
Symbol size gives the centrality of populations.

Besides confirming the already well-known separation between populations of the western Mediterranean and the Eastern one, it has been found that the majority of the populations that act as net exporters of genetic material are concentrated in the Balearic archipelago. In addition, the populations of *Posidonia* in the peninsular Mediterranean coast do not interchange genes directly but rather through the Balearics. This identifies the submarine prairies of the islands like authentic motors that feed the diversity on the *Posidonia* in the western Mediterranean.

The techniques developed to analyze networks of populations obtained from genetic data are in principle applicable to other problems in ecology, and also to situations in epidemiology where it would be relevant to determine the suitable transport routes of a pathogen and the right places to interrupt its propagation.

ZERO-LAG SYNCHRONIZATION AMONG BRAIN CORTICAL AREAS

Proceedings of the National Academy of Sciences of the USA (PNAS) 105, 17157

Multi-electrode recordings have revealed zero time-lag synchronization among remote cerebral cortical areas although conduction delays among such distant regions can amount to several tens of milliseconds. In our work we investigated the synchronization properties of a simple network motif and found that, even in the presence of large axonal conduction delays, distant neuronal populations self-organize into lag-free oscillations. This occurs when two populations relay their dynamics through a third one, as represented in the upper panel of the left figure. In the figure we show two populations connected by the relay element (left side) and two populations directly coupled (right side). Both in the raster plots and cross-correlograms, isochronous synchronization (achronal synchronization) is observed when a relay element (no-relay) participates in the dynamics.

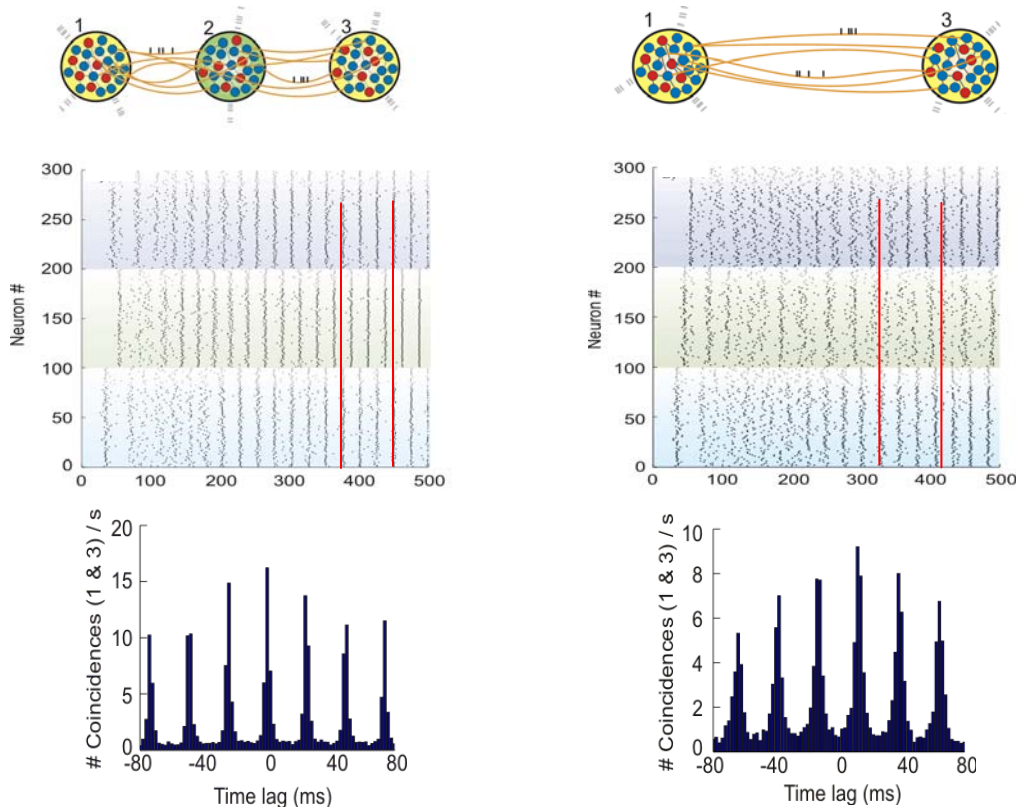
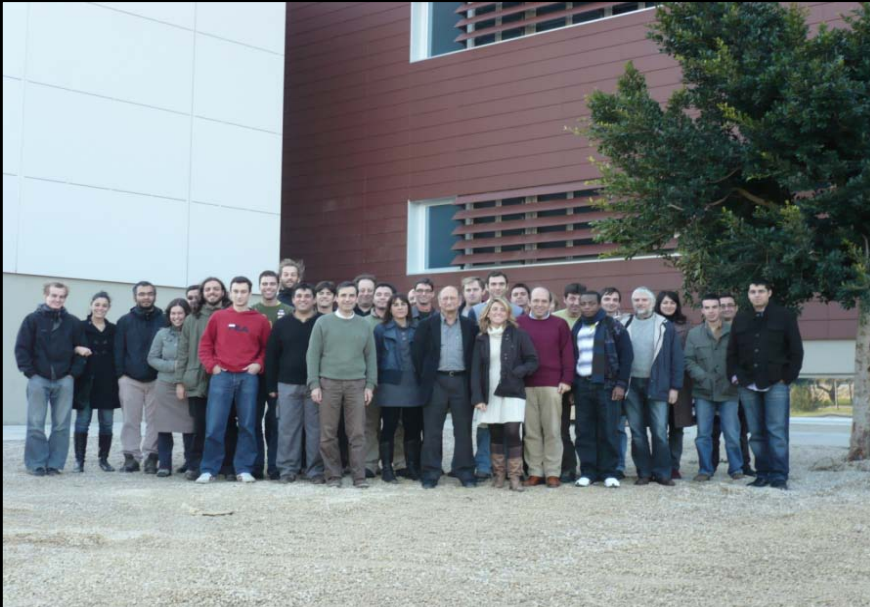


Figure: Dynamics of three large-scale networks. Middle panel, raster plot of 300 neurons randomly selected. Lower panel: averaged cross-correlogram between neurons of red vertical lines help to see the degree of synchronization between the population activities.

According to our results cortico-cortical association fibers as well as certain cortico-thalamo-cortical loops represent ideal circuits to circumvent the phase-shifts and time-lags associated with conduction delays.



## 2. PERSONNEL



13

### 2.1 PERMANENT SCIENTIFIC STAFF

- **Montserrat Casas**, University Full Professor UIB
- **Pere Colet**, CSIC Research Professor
- **Víctor M. Eguíluz**, CSIC Tenured Scientist
- **Emilio Hernández-García**, CSIC Research Professor , IFISC Deputy Director
- **Cristóbal López**, University Professor UIB
- **Manuel Matías**, CSIC Senior Researcher
- **Claudio Mirasso**, University Professor UIB
- **Oreste Piro**, University Professor UIB
- **Maxi San Miguel**, University Full Professor UIB, IFISC Director
- **Llorenç Serra**, University Professor UIB
- **Tomàs Sintès**, University Professor UIB

- **Raúl Toral**, University Full Professor UIB
- **Roberta Zambrini**, CSIC Tenured Scientist

## 2.2 POSTDOCTORAL RESEARCH ASSOCIATES

- **Miguel Cornelles**, Juan de la Cierva Contract
- **Damià Gomila**, JAE-CSIC Postdoctoral Contract
- **Els Heinsalu**, Postdoctoral Contract Project FISICOS
- **Adrián C. Murza**, Postdoctoral Contract Project BIOSIM
- **Miguel Pineda**, Postdoctoral Contract Project FISICOS
- **Alessandro Scirè**, Ramón y Cajal Postdoctoral Contract
- **M. Ángeles Serrano Moral**, JAE-CSIC Postdoctoral Contract
- **Vasile Z. Tronciu**, Postdoctoral Contract Project PICASSO
- **Guy Van der Sande**, Contract FWO Belgium
- **Federico Vázquez**, Postdoctoral Contract Project PATRES. Juan de la Cierva Contract since December 14th, 2008

## 2.3 PhD STUDENTS

14

- **José María Aparicio**, FPI Fellowship Project FISICOS
- **Xavier Castelló**, Balear Government Fellowship.
- **Ilya Ermakov**, Russian Ministry of Education Fellowship, Russia
- **Luis Fernández Lafuerza**, JAE-CSIC Fellowship
- **Guadalupe García**, Fellowship Project PICASSO
- **Juan Carlos González Avella**, FPI Fellowship, Project CONOCE2
- **Przemek Grabowicz**, Fellowship PIE CSIC Project PIEredes
- **Ismael Hernández**, FPI Fellowship Project FISICOS
- **Alejandro Herrada**, Balear Government Fellowship.
- **Adrian Jacobo**, Fellowship MCINN-FPU
- **Niko Komin**, Balear Government Fellowship
- **Leonardo Lyra Gollo**, FPI Fellowship Project FISICOS
- **María Moreno**, Contract Project QULMI, University Teaching Assistant (since Oct. 08)
- **Teresa Martins**, Fellowship FCT, Portugal
- **R. Modeste Nguimdo**, FPI Fellowship, Project PhoDeC
- **Toni Pérez López**, Balear Government Fellowship, Spain

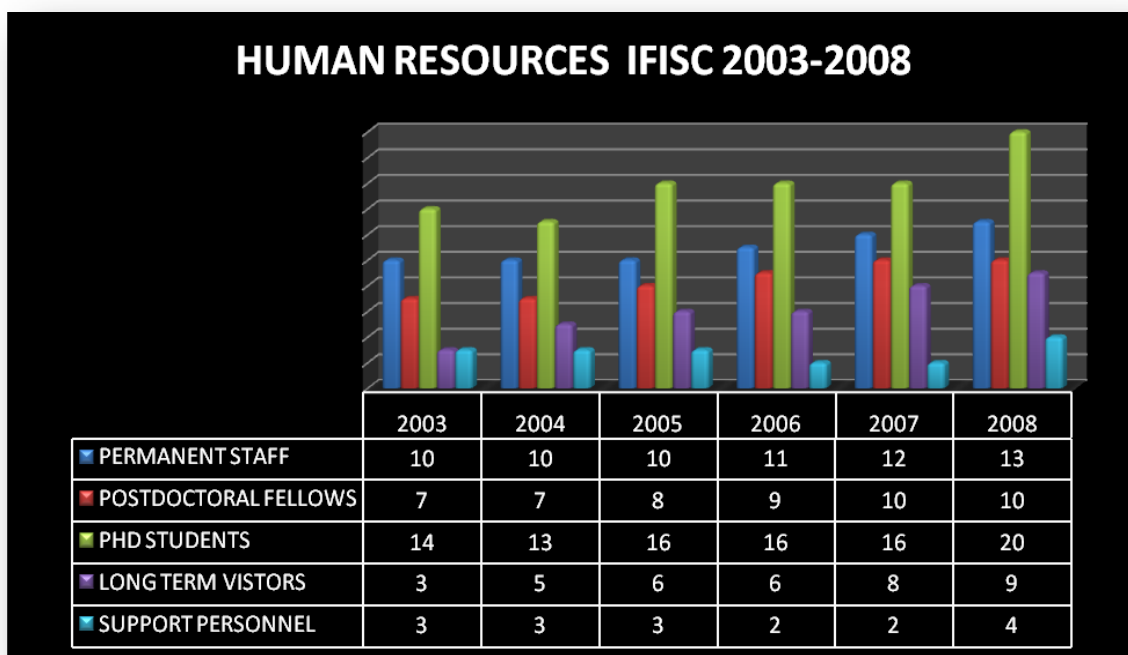
- **Antonio Pérez Serrano**, Fellowship Project IOLOS
- **Pedro A. Sánchez**, University Teaching Assistant
- **Flora Souza Bacelar**, Balear Government Fellowship
- **Murat Tugrul**, Fellowship Project EDEN





## 2.4 TECHNICAL AND ADMINISTRATIVE SUPPORT

- **Eduardo Herraiz**, Computing Lab Technician
- **Rubén Tolosa**, Computing Lab Technician
- **Marta Ozonas**, Secretary
- **Rosa María Rodríguez**, Outreach and Workshops



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## 2.5 VISITORS

### a) Long Term Visitors ( >1 month)

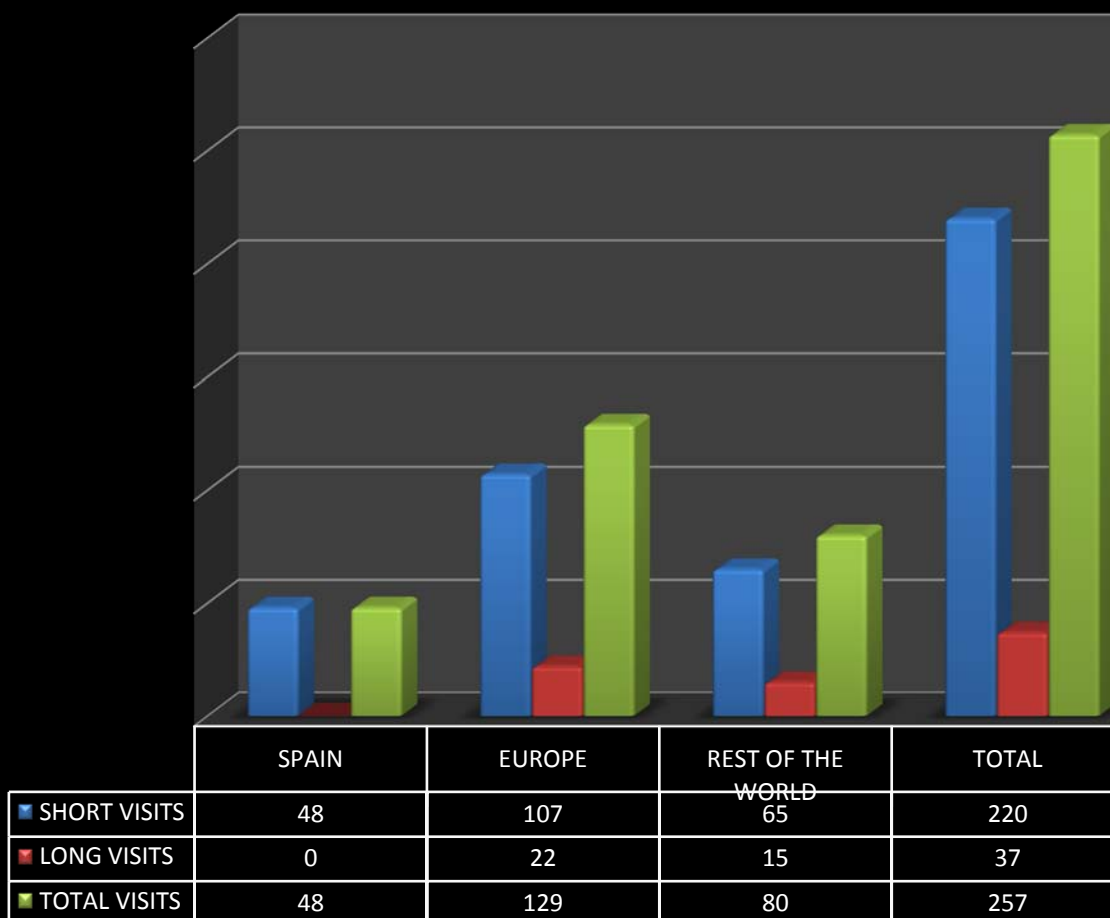
- **Lendert Gelens**, *Department of Applied Physics and Photonics - IR/TONA, Vrije Universiteit Brussel, Belgium*, January and June
- **Umberto Marini**, *Universita di Camerino, Italy*. January
- **Jesús A. Tapia**, *Benemérita Universidad de Puebla, Mexico*. February
- **Margit Pattantyús-Ábrahám**, *Budapest University of Technology and Economics, Hungary*, June
- **Gholamreza Jafari**, *Shahid Beheshti University, Iran*. June
- **Edgar Knobloch**, *University of California at Berkeley, USA*. July

- **Byrke Brüser**, *University of Bremen, Germany*. August-September
  - **Konstantin Klemm**, *Bioinformatics University of Leipzig, Germany*. September to November
  - **Marco Patriarca**, *National Institute of Chemical Physics and Biophysics, Tallinn, Estonia*. October and November
- b) **Short Term Visitors (< 1 month)**
- **Justin Calabrese**, *Dept. of Ecological Modelling, Centre for Environmental Research Leipzig, Germany*. January
  - **Antonio Turiel**, *Instituto de Ciencias del Mar, Barcelona, Spain*. January
  - **Gianluca Giorgi**, *La Sapienza, Rome, Italy*. March
  - **Matthias Kuhnt**, *Institute for Sociology, Dresden University of Technology, Germany*, March
  - **Mahn-Soo Choi**, *Korea University, Korea*. March
  - **Borja Ibarz**, *Departamento de Física, Universidad Rey Juan Carlos, Móstoles, Madrid, Spain*. March
  - **Kimmo Kaski**, *Centre of Excellence in Computational Complex Systems Research, Helsinki University of Technology, Finland*. April
  - **Rafael Barrio**, *Instituto de Física, Universidad Nacional Autónoma de México, México*. April
  - **Jorge Wagensberg**, *Director del Área de Medio Ambiente y Ciencia de la Fundación La Caixa, Spain*. April
  - **José Cuesta**, *Grupo Interdisciplinar de Sistemas Complejos (GISC), Dpto. de Matemáticas, Universidad Carlos III de Madrid, Spain*. April
  - **Mario Floria**, *Física de la Materia Condensada, BIFI, Zaragoza, Spain*. April
  - **Augusta Santos**, *Universidade de Oporto, Portugal*. May
  - **Simone Pigolotti**, *The Niels Bohr Institute, Denmark*, May
  - **Alberto Robledo**, *Instituto de Física, Universidad Nacional Autónoma de México, México*. May

- **Óscar Vilarroya**, *Catedra Cervell Social, Universitat Autònoma de Barcelona, Spain*. May
- **Gloria Platero**, *Instituto de Ciencia de Materiales de Madrid (CSIC), Spain*. May
- **J.J. Cerdà**, *Frankfurt Institute for Advanced Studies, J.W. Goethe-Universitat, Frankfurt, Germany*. June
- **Pavel Paulau**, *B.I. Stepanov Institute of physics, NASB, Minsk, Belarus*. June
- **Juan Pérez Mercader**, *Centro de Astrobiología (CSIC-INTA), Spain*. May
- **Dimitri Krioukov**, *CAIDA, USA*. June
- **Luis Santos**, *Institut für Theoretische Physik, Universitaet Hannover, Germany*. June
- **Diego Porras**, *Max-Planck-Institut für Quantenoptik, Munich, Germany*. June
- **Zoltan Neufeld**, *UCD School of Mathematical Sciences University College Dublin, Ireland*. June
- **Juan Jose Ripoll**, *Universidad Complutense, Madrid, Spain*. June
- **Salikoko Mufwene**, *University of Chicago, USA*. June
- **Peter Samuelsson**, *University of Lund, Sweden*. June
- **Olga Chibirova**, *Laboratory of Preclinical Neuroscience, Université Joseph Fourier, Grenoble, France*. July
- **Dario Taraborelli**, *Surrey University, UK*. July
- **Jan Danckaert**, *Vrije Universiteit, Brussel, Belgium*. July
- **Fernando Vega**, *European University Institute, Florence, Italy*. July.
- **Florentino Borondo**, *Departamento de Química e Instituto Mixto de Ciencias Matematicas CSIC-UAM-UC3M-UCM, Universidad Autónoma de Madrid, Spain*. September
- **Miguel Ángel Muñoz**, *Departamento de Electromagnetismo y Física de la Materia Condensada, e Instituto de Física Teórica y Computacional Carlos I, Universidad de Granada, Spain*. September

- **Fernando Galve Conde**, *University of Augsburg, Germany*. October
- **Yehuda Braiman**, *Center for Engineering Science Advanced Research, Computer Science and Mathematics Division, Oak Ridge National Laboratory, USA*. October
- **Miguel Ángel García March**, *Universidad Politécnica de Valencia, Spain*. October
- **Francesco Piazza**, *Ecole Polytechnique Fédérale de Lausanne (EPFL), SB-ITP-LBS, Switzerland*. December
- **Rafael Sánchez**, *Départament de Physique Théorique, Université de Genève, Italy*. December
- **Lorenzo Bongini**, *Dipartimento di Fisica, Università di Firenze, Italy*. December
- **Ernesto Nicola**, *Max Planck Institute for the Physics of Complex Systems, Dresden, Germany*. December

### VISITING SCIENTISTS AT IFISC 2003-2008





## 3 RESEARCH PROJECTS

### 3.1 RESEARCH PROJECTS FUNDED BY THE EUROPEAN COMMISSION

**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: 305.726 €.

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

**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 (UPC) Universitat Politècnica de Catalunya. Principal Investigator: Claudio R. Mirasso, Subcontract of the Universidad Politècnica de Cataluña. (2007-2009). Budget: 50.000 €.

**PICASSO: Photonic Integrated Components Applied to Secure Chaos Encoded Optical communication systems.** [IST-2005-34551] STREP within the program Information Society Technologies. European Coordinator: D. Syridis University of Athens (UA), Greece. Principal Investigator: Claudio R. Mirasso (2006-2009). Budget: 250.000 €.

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

**THRESHOLDS: Thresholds of Environmental Sustainability.** [003933 (GOCE)] Integrated Project of 6<sup>th</sup> EC Framework Programme at the priority "Global Change and Ecosystems". European Coordinator: C. Duarte (IMEDEA). Scientist in charge of work-package S2WP1 "regime modelling": Emilio Hernández-García. (2005-2008). IFISC Budget: 126.225 €.

**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. (2005-2009). Budget: 217.000€.

**EUR-OCEANS: European Network of Excellence for Ocean Ecosystems Analysis.** [Number 511106-2] 6<sup>th</sup> FP CE, Priority “Global Change and Ecosystems” Principal investigator: C.M. Duarte, (RRNN-IMEDEA). IFISC Participating Scientists: E. Hernández-García, C. López. (2005-2008). IFISC Budget: 5.238 €.

**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).

**PhysCoCo: Physics of Competition and Conflicts.** [MP0801] European COST ACTION Coordinator: P. Richmond (Trinity, Dublin, Ireland). Principal Investigator: Maxi San Miguel, Spanish representative in the Steering Committee (2008-2012).

### 3.2 RESEARCH PROJECTS OF THE SPANISH NATIONAL PLAN FOR SCIENCE

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

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

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

**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€.

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

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

**COSMICAE: Complex system modelling in chaotic advective environments.** [CGL2008-06245-C02-02/BTE] Principal Investigator: Oreste Piro. (2008-2009). Budget: 10.890 €.

### 3.3 OTHER IFISC RESEARCH PROJECTS

**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. (2007-2009). Budget: 50.000 €.

**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 €.

**ECuSCo: Efectos Cuánticos en Sistemas Complejos.** [PIE 200850I047] CSIC. Principal Investigator: Roberta Zambrini. (2008-2009). Budget 30.000 €.

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

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

### 3.4 RESEARCH PROJECTS WITH PARTICIPATION OF IFISC MEMBERS

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

**Información cuántica y dinámica electrónica en nanoestructuras** [FIS2005-02796] Ministerio de Educación y Ciencia. IFISC participatng Scientists: Montserrat Casas (IP), Llorenç Serra. (2005-2008)

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

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

**SOCIONET: Dinámica y fenómenos colectivos en sistemas socioeconómicos.** [FIS2008-01155-E/FIS].Complementary Action. Coordinator: A. Sánchez (Univ. Carlos III). IFISC Principal Investigator: Maxi San Miguel. (2008-2009)

**E-Ciencia: Organización y puesta en marcha de la red de E-Ciencia en España.** MEC Network IFISC Principal Investigator: Manuel Matías. (2008-2009)

**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).

**AECI-AR-08: Cooperación y emergencia en sistemas complejos extendidos.** [A/018685/08] International Cooperation with Argentina funded by Ministry of Foreign Affairs. Coordinator from IFCA: Horacio S. Wio (IFCA) Principal Investigator of IFISC: Raúl Toral. (2008-2009)

### 3.5 OTHER FUNDING

**Personal Tècnic de Suport.** Balear Government. Principal Investigator: Maxi San Miguel (2007-2009). Budget: 20.400 €

**IFISC-AE. Posada en marcha IFISC.** Balear Government. Principal Investigator: Maxi San Miguel. (2007-2008). Budget: 12.000 €

**NIOA2008-CSIC. Nonlinear dynamics in oceanic and atmospheric flows.** [mp-38-ar] Principal Investigator: Cristóbal López. (2008-2008) Budget: 2.000 €

**NIOA2008-UIB. Dinámica no lineal en flujos atmosféricos y oceánicos.** [FIS2007-30844-E]. Complementary Action. Spanish Government. Principal Investigator: Cristóbal López. (2008-2008) Budget: 4.000 €

**TCS: Trends in Complex Systems.** Workshop program with MPIPKS-Dresden. Balear Government. Principal Investigator: Maxi San Miguel. (2008-2010) Budget: 60.000 €

**IFISC Balear Government.** Convenio UIB-Balear Government. Principal Investigator: IFISC's Director. (2008-2008) Budget: 87.000 €

**IFISC technician,** Balear Government. Principal Investigator: Pere Colet. (2008-2010) Budget: 65.880 €

**FISICOS Project Technician.** Spanish Government. Principal Investigator: Maxi San Miguel. (2008-2012) Budget: MICINN 78.000 €, Balear Government: 29.400 €



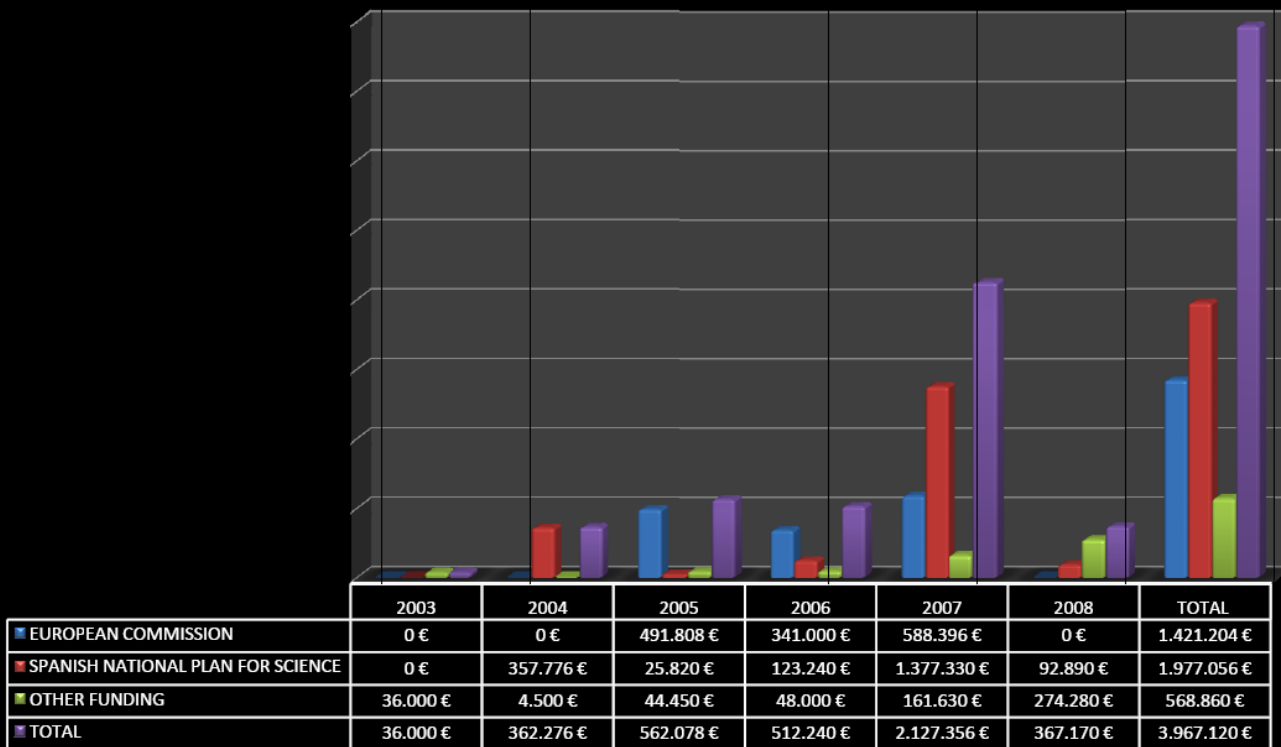
### 3.6 SUMMARY OF IFISC FUNDING 2003-2008

- **European Commission Framework Program projects:** 7 (EDEN, PATRES, GABA, PICASSO, IOLOS, THRESHOLDS, PHYSBIO)
- **European Networking:** 4 EC-FP networks (BIOSIM, EUR-OCEANS, ONCECS, MARBEF), 2 European COST Actions, 1 ESF Program
- **Spanish National Plan:**
  - 7 Research Projects
  - 5 International Bilateral Projects (Germany (3), Italy, Hungary)
  - 5 Thematic networks (Statistical and Nonlinear Physics, Quantum and Nonlinear Optics, E-science, Dynamics of collective phenomena in socioeconomic systems (2))
  - 7 Other complementary research action
- **Regional Balear Government:** 2 research projects, 3 “group of excellence”, and other funding

**BUDGETS:**

- Grand total budget of projects granted in 2003-08: 3,967.120 €
- Grand total budget of active projects in 2008: 3.304.489 €
- Budget of EC-funded active projects in 2008: 38,6 % of total

**IFISC'S RESEARCH PROJECTS FUNDING 2003-2008**





## 4. IFISC SEMINARS



25

Niko Komin (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Absorption of Drugs and Simplification of Large Systems.**

January 8

Lendert Gelens (Department of Applied Physics and Photonics - IR/TONA, Vrije Universiteit Brussels, Belgium).

**A reduced phase space description for deterministic and stochastic features in semiconductor ring lasers.**

January 17

Guy Van der Sande (IFISC, UIB-CSIC, Spain, and Department of Applied Physics and Photonics - IR/TONA, Vrije Universiteit Brussels, Belgium). **Rings of delay-coupled oscillators: Dynamics, correlation and synchronization.**

January 24

Antoni Gomila (Departamento de Psicología, UIB, Palma de Mallorca, Spain).

**Language evolution: the contribution of computational models.**

January 29

Adrián Jacobo (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

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

February 5

Adrián Jacobo IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Image processing using type II second harmonic generation.**

February 11

Jesús Tapia (BUAP, Mexico). **Central Pattern Generators in the Spinal Cord: Absences provides new clues of its organization.**

February 11

Miguel Cornelles (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Chaos-based communication schemes using semiconductor lasers subject to filtered optical feedback.**

February 12

Flora Souza Bacelar (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Regime shifts in shallow coastal ecosystems: Competition between Floating and Submerged plants.**

February 26

Matthias Kuhnt (Institute for Sociology, Dresden University of Technology, Germany)

**Structure building processes at the evolution of acquaintance networks.**

March 5.

Umberto Marini Bettolo Marconi (Universita di Camerino, Italia).

**Theory of Driven Granular Fluids.**

March 6

Mahn-Soo Choi (Korea University)

**Manipulation of the Phonon Squeezing in Molecular Devices.**

March 7

Borja Ibarz, (Departamento de Física, Universidad Rey Juan Carlos, Móstoles, Spain)

**Map-based models of spiking neurons.**

March 10.

Gianluca Giorgi, (La Sapienza, Rome, Italy).

**Quantum information processing in solid-state systems.**

March 11

Adrián Jacobo (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Quantum information processing in solid-state systems. Python for Scientists: theory and practical examples.**

March 18

Rafael A. Barrio (Instituto de Física, Universidad Nacional Autónoma de México, Mexico).

**Nonlinear systems, patterns and morphogenesis.**

April 8

Kimmo Kaski (Center of Excellence in Computational Complex Systems Research, Helsinki University of Technology, Finland).

**Modelling the Emergence of Communities in Weighted Social Networks.**

April 10

Pedro A. Sánchez (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Dynamical basis of the mesoscopic morphologies of thin solid films.**

April 17

José A. Cuesta (Grupo Interdisciplinar de Sistemas Complejos, CISC, Departamento de Matemáticas, Universidad Carlos III de Madrid, Spain).

**Statistical mechanics of ecosystems.**

April 22

Mario Floría (Física de la Materia Condensada, BIFI, Zaragoza, Spain).

**Social Temperature. Does it make any sense?**

April 29

Alberto Robledo (Instituto de Física, Universidad Nacional Autónoma de México, Mexico).

**Una mecánica estadística inusual en el borde del caos.**

May 6

Emilio Hernández-García (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**The INSTITUTE FOR CROSS-DISCIPLINARY PHYSICS AND COMPLEX SYSTEMS web and intraweb.**

May 13

Leonardo Lyra Gollo (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**A Statistical Physics approach to dendritic computation.**

May 20

Gloria Platero, (Instituto de Ciencia de Materiales de Madrid, CSIC, Madrid, Spain).

**Spin Transport in Double Quantum Dots.**

May 29

J.J. Cerdà, (Frankfurt Institute for Advanced Studies, J.W. Goethe-Universität, Frankfurt, Germany).  
**Microstructure analysis of monodisperse and bidisperse ferrofluid monolayers.**

June 3

Xavier Castelló (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Fenòmens col·lectius en dinàmica social: problemes de consens, dinàmiques d'ordenament i competició entre llengües.**

June 5

Vasile Tronciu (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Chaos based communication using multisection semiconductor laser.**

June 5

Pavel Paulau (B.I. Stepanov Institute of Physics, NASB, Minsk, Belarus).

**Localized states in VCSELs with Frequency Selective Feedback.**

June 6

Dmitri Krioukov (CAIDA, USA).

**Routing in the Internet and Navigability of Scale-Free Networks.** June 9

Luis Santos (Institut fuer Theoretische Physik, Universität Hannover, Germany).

**Ultra cold atomic gases: Bose-Einstein condensates and beyond.**

June 10

Diego Porras (Max-Planck-Institut für Quantenoptik, Munich, Germany).

**Quantum simulations with trapped ions.**

June 12

Juan José Ripoll (Universidad Complutense de Madrid, Spain)

**Strongly correlated states in optical lattices.**

June 13

Salikoko S. Mufwene (University of Chicago, USA).

**Ecology and Exaptation All the Way in Language Evolution.**

June 17

Peter Samuelsson (University of Lund, Sweden).

**Entanglement at finite temperatures in mesoscopic conductors.**

June 24

Claudio Mirasso (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Relaying in the brain: a novel approach for the feature binding problem.**

July 3

Edgar Knobloch (Department of Physics, University of California at Berkeley, USA).

**Convectons.**

July 8

Olga Chibirova (Laboratory of Preclinical Neuroscience, Université Joseph Fourier, Grenoble, France).

**Structure And Dynamics Of Precise Firing Sequences Detected In Coupled Neural Networks.**

July 24

Florentino Borondo (Departamento de Química e Instituto Mixto de Ciencias Matemáticas CSIC-UAM-UC3M-UCM, Universidad Autónoma de Madrid, Spain).

**Classical Motions in Quantum Mechanics.**

September 4

Konstantin Klemm (Bioinformatics University of Leipzig, Germany).

**Cooperation under pressure: a phase diagram for altruism.**

September 9

David Sánchez (UIB: Universitat de les Illes Balears).

**Breaking the Onsager symmetry: Rectification effects, nonequilibrium environments and shot noise.**

September 16

Miguel Ángel Muñoz (Departamento de Electromagnetismo y Física de la Materia Condensada, and Instituto de Física Teórica y Computacional Carlos I, Universidad de Granada, Spain).

**Self-organized criticality twenty years later.**

September 22.

Leonardo Lyra Gollo (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Master Thesis: Synchronization between populations of neurons.**

September 29

Yuri Braiman (Center for Engineering Science Advanced Research, Computer Science and Mathematics Division, Oak Ridge National Laboratory, USA).

**Dynamics and Control of Nonlinear Arrays of Coupled Oscillators.**

October 7

Fernando Galve Conde (University of Augsburg, Germany). **Optimal entanglement production in engineered quantum systems.**

October 15

Konstantin Klemm (Bioinformatics Leipzig, Germany and IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Networks and computational complexity.**

October 20

Marco Patriarca, (National Institute of Chemical Physics and Biophysics, Tallinn, Estonia).

**Influence of geography on language competition.**

October 21

Miguel Ángel García March, (Universidad Politécnica de Valencia, Spain).

**Singularities in optical extended systems.**

October 23

Niko Komin IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Stochastic and Non-linear effects in Biological Systems.**

October 27

Federico Vázquez IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**From microscopic to macroscopic dynamics in systems with two symmetric absorbing states.**

October 28

Gunnar Boldhau (Leipzig University, Germany).

**The Yeast cell cycle network and its neutral mutants.**

November 4

Els Heinsalu (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Subdiffusion in space-periodic force fields.**

November 18

Miguel Cornelles, (IFISC, UIB-CSIC, Palma de Mallorca, Spain).

**Synchronization without correlation.**

November 25

Adolfo Paolo Masucci, (CASA: Centre for Advanced Spatial Analysis at University College London)

**Differences between normal and shuffled texts: structural properties of weighted Networks.**

December 1

Francesco Piazza (EPFL: Ecole Polytechnique Fédérale de Lausanne, SB-ITP-LBS, Switzerland)

**Localization and energy transfer in nonlinear many-body systems with disorder: the case of coarse-grained network models of proteins.**

December 9

Rafael Sánchez (Départament de Physique Théorique, Université de Genève).

**Electron-phonon correlations in driven quantum dots.**

December 16

Ingo Fischer (Herriot Watt University, UK).

**Nonlinear dynamics of photonic and neuronal systems.**

December 16

Ernesto Nicola (Max Planck Institute for the Physics of Complex Systems, Dresden, Germany).

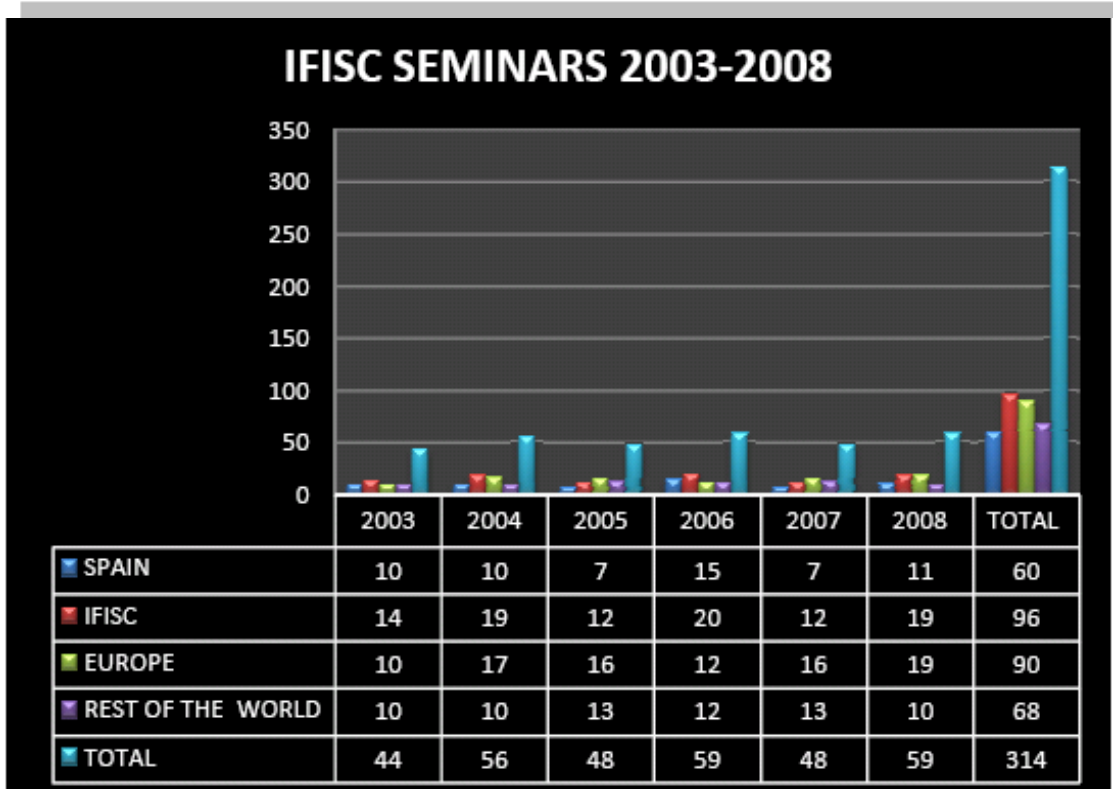
**How do cells break their symmetry? A reaction-diffusion model for cell polarization.**

December 17

Lorenzo Bongini ( Dipartimento di Fisica, Università di Firenze, Italy)

**A graph theoretical analysis of the energy landscape of model proteins.**

December 18





# \* 5. PUBLICATIONS

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

## 5.1 JCR JOURNALS

[Topological insight into the non-Arrhenius mode hopping of semiconductor ring lasers](#)

*Beri, S.; Gelens, L.; Mestre, M.; Van der Sande, G.; Verschaffelt, G.; Scirè, A.; Mezosi, G.; Sorel, M.; Danckaert, J.*

Physical Review Letters **101**, 093903 (1-4)

[Efficient generation of random multipartite entangled states using time optimal unitary operations.](#)

*Borras, A.; Majtey, A.P. and Casas, M.*

Physical Review A **78**, 022328 (1-5)

[Quantum brachistochrone evolution of systems of two identical particles: the role of entanglement.](#)

*Borras, A.; Plastino, A.R.; Casas, M.; Plastino, A.*

Physical Review A **78**, 052104 (1-7)

[Entanglement and the quantum brachistochrone problem.](#)

*Borras, A.; Zander, C. A.; Plastino, R.M.; Casas, M.; and Plastino. A*

Europhysics Letters **81**, 30007 (1-5)

[Some entanglement features of highly entangled multiqubit states](#)

*Borras, A.; Plastino, A. R.; Casas, M.; and Plastino, A.*

International Journal of Quantum Information (IJQI) **6**, (605-611)

[Measuring the Complete Transverse Spatial Mode Spectrum of a Wave Field](#)

*Calvo, G.F.; Picon, A.; Zambrini, R.*

Physical Review Letters **100**, 173902 (1-4)

[Fluid dynamics of nodal flow and left-right patterning in development](#)

*Cartwright, J. H. E.; Piro, N.; Piro, O.; Tuval, I.*

Developmental Dynamics **237** (3477-3490)

[Fluid Dynamics of Establishing Left-Right Patterning in Development](#)

*Cartwright, J. H. E.; Piro, N.; Piro, O.; Tuval, I.*

Birth Defects Research (Part C: Embryo Today) **84**, (95-101)

[Shear effects on crystal nucleation in colloidal suspensions](#)

Cerdà, J.J.; Sintes, T.; Holm, C.; Sorensen, C.; Chakrabarti, A.  
Physical Review E **78**, 031403 (1-16)

[Effects of gain and bandwidth on the multimode behavior of optoelectronic microwave oscillators](#)

Chembo K. Y.; Laurent, L.; Bendoula, R.; Colet, P.  
Optics Express **16**, (9067-9072)

[Nonlinear Dynamics and Spectral Stability of Optoelectronic Microwave Oscillators](#)

Chembo Kouomou, Y.; Larger, L.; Colet, P.  
IEEE Journal of Quantum Electronics **44**, (858-866)

[Dynamics of tidal synchronization and orbit circularization of celestial bodies](#)

Escribano, B.; Vanyo, J.; Tuval, I.; Cartwright, J. H. E.; González, D. L.; Piro, Oreste; Tél, T.  
Physical Review E **78**, 036216 (1-5)

[Modal Structure, Directional and Wavelength Jumps of Integrated Semiconductor Ring Lasers: Experiment and Theory](#)

Fürst, S.; Pérez-Serrano, A.; Scirè, A.; Sorel, M.; Balle, S.  
Applied Physics Letters **93**, 251109.

[Dynamical instabilities of dissipative solitons in nonlinear optical cavities with nonlocal materials](#)

Gelens, L.; Gomila, D.; Van der Sande, G.; Danckaert, J.; Colet, P.; Matías, M.  
Physical Review A **77**, 033841 (1-7)

[Experimental and modelling assessment of the effects of seagrass \(\*P. oceanica\*\) on flow and particle trapping](#)

Hendriks, I.; Sintes, T.; Bouma, T.; Duarte, C.  
Marine Ecology Progress Series **356**, (163-173)

[Universal Scaling in the Branching of the Tree of Life](#)

Herrada, E.A.; Tessone, C.J.; Klemm, K.; Eguíluz, V.M.; Hernández-García, E.; Duarte, C.M.  
PLoS ONE **3**, e2757 (1-6)

[Effects of a localized beam on the dynamics of excitable cavity solitons](#)

Jacobo, A.; Gomila, D.; Matías, Manuel A.; Colet, Pere  
Physical Review A **78**, 053821 (1-9)

[Metric character of the quantum Jensen-Shannon divergence.](#)

Lamberti, P.W.; Majtey, A.P.; Borrás, A.; Casas, M. and Plastino A.  
Physical Review A **77**, 05311

[Jensen-Shannon divergence as a measure of the degree of entanglement.](#)

*Majtey, A.P.; Borrás, A.; Casas, M.; Lamberti, P.W. and Plastino, A.*  
International Journal of Quantum Information (IJQI) **6**, (715 -720)

[Singlet-triplet transition of a two electron quantum ring in magnetic and electric fields](#)

*Malet, F.; Pi, M.; Serra, L., Lipparini, E.*  
Physica E **40**, (1492-1494)

[Lagrangian transport through an ocean front in the North-Western Mediterranean Sea](#)

*Mancho, A.M.; Hernández-García, E.; Small, D.; Wiggins, S.; Fernández, V.*  
Journal of Physical Oceanography **38**, (1222-1237)

[Self-localized structures in vertical-cavity surface-emitting lasers with external feedback](#)

*Paulau, P.V.; Gomila, D.; Ackemann, T.; Loiko, N.A.; Firth, W.J.*  
Physical Review E **78**, 016212 (1-7)

[Crystallization and melting of bacteria colonies and Brownian bugs](#)

*Ramos, F.; López, C.; Hernández-García, E.; Muñoz, M.A.*  
Physical Review E **77**, 021102(1-12)

[Comparative study of mixing and biological activity of the Benguela and Canary upwelling systems](#)

*Rossi, V.; López, C.; Sudre, J.; Hernández-García, E.; Garçon, V.*  
Geophysical Research Letters **35**, L11602 (1-5)

[Encryption test of pseudo-aleatory messages embedded on chaotic laser signals: An information theory approach](#)

*Rosso, O.; Vicente, R.; Mirasso, C.*  
Physics Letters A **372**, (1018-1023)

[Network analysis identifies weak and strong links in a metapopulation system](#)

*Rozenfeld, A.F.; Arnaud-Haond, S.; Hernández-García, E.; Eguíluz, V.M.; Serrão, E.A.; Duarte, C.M.*  
Proceedings of the National Academy of Sciences of the USA (PNAS) **105**, (18824-18829)

[Strongly modulated transmission of a spin-split quantum wire with local Rashba interaction](#)

*Sánchez, D.; Serra, L.; Choi, M.S.*  
Physical Review B **77**, 035315-11

[Biological activity in the wake of an island close to a coastal upwelling](#)

*Sandulescu, M.; López, C.; Hernández-García, E.; Feudel, U.*  
Ecological Complexity **5**, 228-237

[Local spin polarization in a quantum wire induced by the Rashba interaction](#)

Serra, L.; Sánchez, D.; López, R.

Physica E **40**, 1479-1480

[Rich-club vs rich-multipolarization phenomena in weighted networks](#)

Serrano, M. Ángeles

Physical Review E **78**, 026101,(1-5)

[Structural Efficiency of Percolated Landscapes in Flow Networks](#)

Serrano, M. Á.; De Los Rios, P.

PLoS ONE **3**(11), e3654

[Synchronization properties of coupled semiconductor lasers subject to filtered optical feedback](#)

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

Physical Review E **78**, 046218(1-8)

[Global firing induced by network disorder in ensembles of active rotators](#)

Tessone, C.J.; Zanette, D.H.; Toral, R.

European Physical Journal B **62**, (319-326)

[Chaotic dynamics of a semiconductor laser with double cavity feedback: applications to phase shift keying modulation](#)

Tronciu, V.; Ermakov, I.; Colet, P.; Mirasso, C.

Optics Communications **281**, (4747-4752)

[Chaos based communications using semiconductor lasers subject to feedback from an integrated double cavity](#)

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

Journal of Physics B: Atomic, Molecular & Optical Physics **41**, 155401,(1-8)

[Two-dimensional phase-space analysis and bifurcation study of the dynamical behavior of a semiconductor ring laser](#)

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

Journal of Physics B **41**, 095402 (1-8)

[Dynamics, correlation and synchronization behavior in rings of delay-coupled oscillators](#)

Van der Sande, G.; Soriano, M. C.; Fischer, I.; Mirasso, C.

Physical Review E **77**, 055202 (1-4)

[Systems with two symmetric absorbing states: relating the microscopic dynamics with the macroscopic behavior](#)

Vázquez, F. and López, C.

Physical Review E **78**, 061127 (1-5)

[Analytical Solution of the Voter Model on Uncorrelated Networks](#)

Vázquez, Federico and Eguíluz, Víctor M.

New Journal of Physics **10**, 063011, (1-19)

[Generic absorbing transition in coevolution dynamics](#)

Vázquez, Federico; Eguíluz, Víctor M.; San Miguel, Maxi.

Physical Review Letters **100**, 108702, (1-4)

[Synchronization properties of three delay-coupled semiconductor lasers](#)

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

Physical Review E **78**, 066202, (1-11)

[Dynamical relaying can yield zero time lag neuronal synchrony despite long conduction delays](#)

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

Proceedings of the National Academy of Sciences of USA (PNAS) **105**, (17157-17162)

## 5.2 BOOK CHAPTERS

[Modelling language competition: bilingualism and complex social networks](#)

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

The evolution of language; Proceedings of the 7th International Conference (EVOLANG7), Barcelona 2008. Eds. A.D.M. Smith, K. Smith, R. Ferrer-Cancho. , World Scientific Publishing Co. (59-66)

[Taking Wittgenstein seriously. Indicators of the evolution of language](#)

Cela-Conde, C.J.; Nadal, M.; Munar, E.; Gomila, A.; Eguíluz, V.M.

The evolution of language; Proceedings of the 7th International Conference (EVOLANG7), Barcelona 2008. Eds. A.D.M. Smith, K. Smith, R. Ferrer-Cancho. , World Scientific Publishing Co. (407-408)

[Excitability mediated by dissipative solitons in nonlinear optical cavities](#)

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

Dissipative Solitons: From Optics to Biology and Medicine (Nail Akhmediev & Adrian Ankiewicz, eds.), Springer-Verlag (113-136)

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

Serra, L.; Sánchez, D.

Progress In Industrial Mathematics At Ecmi 2006, Springer-Verlag Berlin, Germany, (449-453)

### 5.3 OTHER PUBLICATIONS

[Ice film morphologies and the Structure Zone Model](#)

Cartwright, J.H.E.; Escribano, B.; Piro, O.; Sainz-Díaz, C.I.; Sanchez, P.A.; Sintès, T.

AIP-Conference Proceedings **982**, (696-701)

[Nonlinear dynamics, the missing fundamental, and harmony](#)

Cartwright, J. H. E.; González, Diego L.; Piro, Oreste

Mathematics and Computation in Music 2007 Proceedings, 2008, Springer.

[On Cycles in AS Relationships](#)

Dimitropoulos, X.; Serrano, M. Ángeles; Krioukov, D.

ACM SIGCOMM Computer Communication Review **38**, (103-104)

[Universal functions and exactly solvable chaotic systems](#)

García-Nustes, M.A.; Hernández-García, E.; González, J.A.

Sao Paulo Journal of Mathematical Sciences **2**, (203-221)

[Experimental analysis of the optical spectra of directionally bistable semiconductor ring lasers](#)

Latorre, M. J.; Fürst, S.; Mezosi, G.; Sorel, M.; Pérez-Serrano, A.; Scirè, A.; Balle, S.; Giuliani, G.

Proceedings of SPIE 6997, 699725

[Control of spatial quantum fluctuations using photonic crystals](#)

Moreno, M.; Gomila, D.; Zambrini, R.

Proceedings of SPIE **7092**, 709205 (1-8)

[Modelling strategies for semiconductor ring lasers](#)

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

Proceedings of SPIE **6997**, 69971N

[Noise properties in semiconductor ring lasers](#)

Pérez-Serrano, A.; Zambrini, R.; Scirè, A.; Colet, P.

Proceedings of SPIE **6997**, 69971Q

[Excitability and coherence resonance of a DFB laser with passive dispersive reflector](#)

*Tronciu, Vasile*

Moldavian Journal of the Physical Sciences **7**, 516.

[The control of laser emission by feedback from a Fabry Perot resonator.](#)

*Tronciu, V.; Rusu, S.; Pirtac, C.*

Proceedings of the 2-nd International Conference "Telecommunications, Electronics and Informatics"  
(197-202)

## 5.4 SUMMARY OF PUBLICATIONS 2003-2008

1) Total number of publications in the period 2003-2008 with the IFISC affiliation (or DFI-IMEDEA previously) is 347 (284 of them in international SCI journals).

2) Publications in journals of high impact in 2003-2008 include:

- **Nature: 1**
- **Proc. Nat. Acad. Sci.: 5**
- **Physical Review Letters: 27**

3) Journals with the highest number of publications:

- **Physical Review E: 61**
- **Physical Review Letters: 27**
- **Physica A: 20**
- **Physical Review A: 19**
- **Physical Review B: 12**
- **IEEE journals: 12**
- **Europhysics Letters: 9**
- **Physica D: 8**

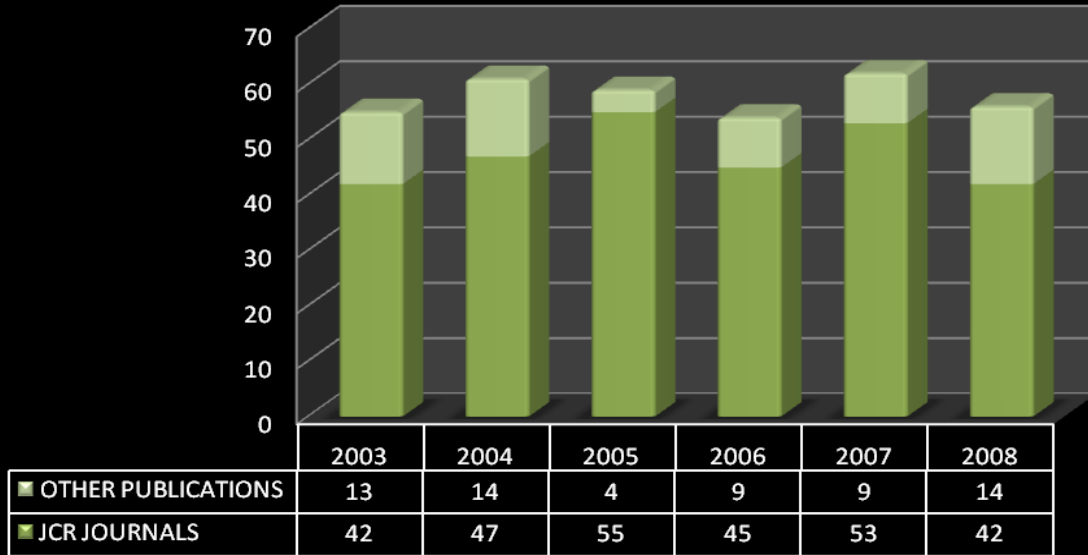
4) Total number of publications in SCI journals outside the domain of basic Physics: 46

In addition to 15 eleven publications in IEEE journals and Applied Physics, these publications are in the following journals:

- Geophysical Research Letters, TELLUS A, Nonlinear Processes in Geophysics, J. Marine Systems, Estuaries and Coasts
- Macromolecules, Biophysical Chemistry, Proc. Royal Soc. A, J. Theoretical Biology, Physical Biology, OIKOS, Ecological Complexity, Ecological Modelling, Neuroscience, Letters, Biosystems, J. Neurophysiology, J. Royal Society Interface, HFSP Journal, Developmental Dynamics, Marine Ecology Progress Series, PLoS ONE, Ecological Complexity, Birth Defects Research (Part C: Embryo Today)
- J. Economic Dynamics and Control, American Journal of Sociology, J. Artificial Societies and Social Simulation, J. of Conflict Resolution.



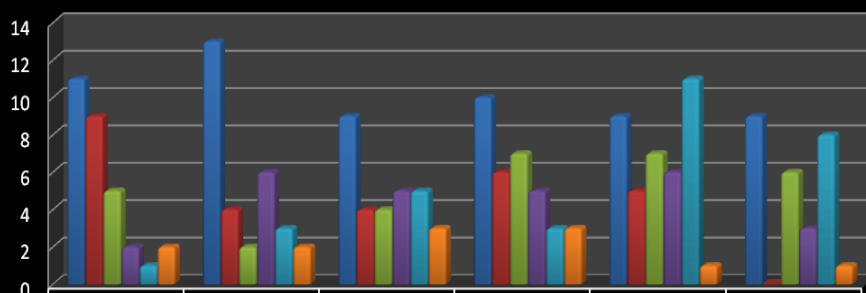
### IFISC PUBLICATIONS 2003-2008



## JOURNALS WITH LARGEST NUMBER OF PUBLICATIONS

IFISC PUBLICATIONS	2003	2004	2005	2006	2007	2008	TOTAL
Physical Review E	11	13	9	10	9	9	61
Physical Review Letters	2	6	5	5	6	3	27
Physica A	8	3	3	2	4	0	20
Physical Review A	5	0	3	3	3	5	19
Physical Review B	0	2	1	4	4	1	12
IEEE	2	2	3	3	1	1	12
Physica D	1	1	1	4	1	0	8
Europhysics Letters	2	1	3	0	2	1	9
<b>Non-Physics Journals (excluding IEEE Journals)</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>8</b>	<b>31</b>

## IFISC PUBLICATIONS 2003-2008



	2003	2004	2005	2006	2007	2008
Physical Review E	11	13	9	10	9	9
Physica A and Physica D	9	4	4	6	5	0
Physical Review A and Physical Review B	5	2	4	7	7	6
Physical Review Letters	2	6	5	5	6	3
Non-Physics Journals (Excluding IEEE)	1	3	5	3	11	8
IEEE	2	2	3	3	1	1



## 6. CONFERENCES AND WORKSHOPS

### 6.1 IFISC-MPIPKS WORKSHOP PROGRAM: TRENDS IN COMPLEX SYSTEMS. (TCS)

<http://ifisc.uib-csic.es/tcs/>

The Max Planck Institute for the Physics of Complex Systems, Dresden (MPIPKS) and the Institute for Cross-Disciplinary Physics and Complex Systems, Palma de Mallorca (IFISC) have launched a joint workshop program on "Trends in Complex Systems". The program consists of a series of IFISC-MPIPKS workshops, to be held in Mallorca and Dresden. The Program runs initially during the period 2008-2010. The events in Mallorca are supported by the Balear Government

PROPOSALS are invited for workshops in all research areas related to the physics of complex systems. Priority is given to frontier subjects which develop rapidly and to new interdisciplinary topics. Workshops extend over one week. Participation is limited to 60-80 persons. Each workshop consists of talks on advanced topics, discussions, and exploratory research for new scientific collaborations. Local costs of all accepted participants are covered by the local organizing institute.

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MPIPKS, Dresden, Germany  
IFISC, Palma de Mallorca, Spain

**Joint Workshop Program 2008 - 2010**  
**Trends in Complex Systems**  
**Second Call for Proposals**

The Max Planck Institute for the Physics of Complex Systems, Dresden (MPIPKS) and the Institute for Cross-Disciplinary Physics and Complex Systems, Palma de Mallorca (IFISC) announce the launch of a joint workshop program on "Trends in Complex Systems". The program consists of a series of IFISC-MPIPKS workshops, to be held in Mallorca and Dresden. The Program runs initially during the period 2008-2010.

PROPOSALS are invited for workshops in all research areas related to the physics of complex systems. Priority will be given to frontier subjects which develop rapidly and to new interdisciplinary topics. Workshops will extend over one week. Participation will be limited to 60-80 persons. Each workshop will consist of talks on advanced topics, discussions, and exploratory research for new scientific collaborations. Local costs of all accepted participants are covered by the local organizing institute.

DEADLINE for the submission of applications for workshops in 2010 is  
**May 31, 2009.**

CONTACT:  
<http://www.pks.mpg.de/~tcs>  
[tcs@pks.mpg.de](mailto:tcs@pks.mpg.de)  
<http://www.ifisc.uib-csic.es/tcs>  
[tcs@ifisc.uib-csic.es](mailto:tcs@ifisc.uib-csic.es)

CSIC Consejo Superior de Investigaciones Científicas  
Universidad de las Islas Baleares

## TCS2008: EXTREME EVENTS: THEORY, OBSERVATIONS, MODELING, AND PREDICTION.

<http://www.mpipks-dresden.mpg.de/~exe08/>

November 10 - 14

IFISC, Campus UIB, Palma de Mallorca, Spain

Scientific Organizers: Manuel Matías (IFISC), Holger Kantz (MPIPKS)

Invited Speakers: 17

- Alvaro Corral, Barcelona
- Katie Coughlin, London
- Chris Ferro, Exeter
- Michael Ghil, Paris
- Peter Grassberger, Calgary
- Jose M. Gutierrez, Santander
- Victor Homar, Mallorca
- Neil Johnson, Florida
- Jürgen Kurths, Potsdam
- Juan M. López, Santander
- Bruce Malamud, London
- Esteban Moro, Madrid
- Edward Ott, Maryland
- Joachim Peinke, Oldenburg
- Jean-François Pinton, Lyon
- Sidney Redner, Boston
- Lenny Smith, London
- Sorin Solomon, Jerusalem
- Didier Sornette, Zurich
- Raúl Toral, Mallorca

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## TCS WORKSHOPS SELECTED FOR 2009

### Darwin '09

#### **150 Years after Darwin: From Molecular Evolution to Language**

November 23 - 27, 2009

IFISC, Palma de Mallorca, Spain

Scientific Organizers: Jose A. Cuesta (U Carlos III, Madrid), Susanna C. Manrubia (INTA-CSIC), Alan J. McKane (U Manchester)

### Bsync '09

#### **Synchronization and Multiscale Complex Dynamics in the Brain**

November 02 - 06, 2009

Dresden, Germany

Scientific Organizers: Jordi Garcia Ojalvo (U Catalunya), Claudio Mirasso (IFISC), Gordon Pipa (MPI Frankfurt)

## 6.2 INVITED TALKS IN CONFERENCES AND WORKSHOPS

Colet, Pere.

**Excitability mediated by dissipative solitons.**

Lorentz Center Workshop on Network Synchronization: From dynamical systems to neuroscience.

Amsterdam (Holland)

May 19 - 30.

Colet, Pere.

**Sincronización de osciladores no lineales: De Huygens a la coherencia en láseres acoplados.**

(ETISC 2008) School and Interdisciplinary Workshop of Complex Systems, Isla Margarita (Venezuela).

October 27 - 30.

Colet, Pere.

**Sincronización de osciladores no lineales: Láseres caóticos y aplicaciones en comunicaciones ópticas y sincronización en sistemas espaciotemporales.**

(ETISC 2008) School and Interdisciplinary Workshop of Complex Systems, Isla Margarita (Venezuela).

October 27 - 30.

Colet, Pere.

**Sincronización de osciladores no lineales: Efectos de diversidad, ruido y topología en redes de osciladores acoplados.**

(ETISC 2008) School and Interdisciplinary Workshop of Complex Systems, Isla Margarita (Venezuela).

October 27 - 30

Gomila, Damià

**Excitability and dynamical instabilities of localized structures in a nonlinear optical cavity.**

Excitability and dynamical instabilities of localized structures in a nonlinear optical cavity, Santiago (Chile)

September 22 - 25.

Gomila, Damià

**Radial Snaking.**

SIAM Conference on Nonlinear Waves and Coherent Structures, Rome (Italy)

June 21 - 24.

Eguíluz, Víctor M.

**Absorbing transition in coevolution dynamics.**

BCNet Workshop, Barcelona (Spain).

December 10 - 12

Hernández-García, Emilio

**Characterizing ocean processes with finite-size Lyapunov exponents.**

Session NP3. 01, European Geosciences Union General Assembly 2008. Viena (Austria).

April 13 - 18.

Hernández-García, Emilio.

**Universal branching in phylogenetic trees.**

International Conference "Modelling and Computation on Complex Networks and Related Topics", Net-Works 2008. Pamplona (Spain).

June 9 - 11.

Hernández-García, Emilio.

**Species clustering in models of biological evolution.**

MEDYFINOL08: XVI Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics. Punta del Este (Uruguay).

December 1 - 5.

López, Cristóbal

**Oceanic mixing studies from satellites.**

Dynamics of Inertial Particles: From Ocean and Atmosphere to Planets, Max Planck Institute for Physics of Complex Systems, Dresden (Germany).

September 16.

Mirasso, Claudio.

**Chaos based communications; the concept becomes reality.**

Solvay Workshop on Bits, Quanta and Complex Systems, (Brussels).

April 30 - May 2.

Pineda, Miguel.

**Fluctuations in Surface Reactions.**

Invited Conference: (ETISC 2008) School and Interdisciplinary Workshop of Complex Systems, Isla Margarita (Venezuela).

October 27 - 30.

San Miguel, Maxi

**Discussion Panel Member: a) Modelling and simulation challenges, b) Challenge of interdisciplinary research**

"Workshop on Challenges and Visions in the Social Sciences", ETH, Zurich (Switzerland).

August 18 - 23.

San Miguel, Maxi.

**Fenómenos colectivos en dinámica social.**

FisEs08: XV Congreso de Física Estadística. Salamanca (Spain).

March 27 - 29.

Serra, Llorens.

**Spin-orbit coupling and the electronic properties of semiconductor quantum wires.**

Computational approaches to semiconductor, carbon and magnetic nanostructures. Lyon (France)

June 16 - 19.

Serra, Llorens

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

RTN Nano Meeting 2008-Fundamentals of Nanoelectronics. Bremen (Germany)

April 7-11

Serrano, M. Angeles.

**Self-similarity of complex networks and hidden metric spaces.**

Sigma Phi International Conference in Statistical Physics, Kolympari-Crete, (Greece)

July 14 - 18.

Toral, Raúl.

**Stability analysis of stochastic differential equations.**

Extreme Events: Theory, Observations, Modeling, and Prediction, Palma de Mallorca (Spain).

November 10 - 14.

Toral, Raúl.

**Collective effects induced by diversity in a model for opinion formation,.**

Physics Applied to Economics and Social Sciences PAESS'08, Porto Alegre (Brasil).

November 25 - 29.

Zambrini, Roberta.

**Control of spatial quantum fluctuations using photonic crystals.**

SPIE Optics+Photonics Quantum Communications and Quantum Imaging VI Conference, San Diego, California (USA).

August 10 - 14.

Zambrini, Roberta.

**Light angular momentum in action.**

Rank Prize Symposium, "The Push or Pull of Optical Momentum", Grasmere, Lake District (United Kingdom).

July 7 - 10.



### 6.3 SEMINAR TALKS IN OTHER RESEARCH CENTERS

López, Cristóbal.

**Competing species in niche space: the role of the competition kernel.**

Institute of Theoretical Physics, Eotvos University of Budapest (Hungary).

March 26.

Moreno, María.

**Control of spatial quantum fluctuations using photonic crystals.**

Düsseldorf Universität in the Theor. Physik III group.

September 3 - 4.

Pérez, Toni.

**Introduction to neuronal systems: basics concepts about modeling neurones.**

Department of Information and Computer Sciences Master Course Seminar. Saitama University (Japan).

October 17.

Toral, Raúl.

**Diversity induced effects in the dynamics of social systems.**

Physics Department , Geneve University (Switzerland).

February 28.

Serra, Llorens

**Spintronics in quantum wires**

Department of physics, korea University, Seoul (Korea)

October 7

Toral, Raúl.

**Diversity-induced resonance.**

Physics Department, Lehigh University, Bethelhem (USA).

July 9.

Tronciu, Vasile.

**Chaos based communication using multisection semiconductor laser.**

Mathematische Modelle der Photonik WIAS and Humboldt University Berlin (Germany).

April 24.

Vaz Martins, Teresa.

**Resonance induced by disorder.**

CFP: Centro de Física do Porto, Oporto (Portugal).

January 10.

## 6.4 TALKS IN CONFERENCES AND WORKSHOPS

Castelló, Xavier.

**The effects of community structure in the dynamics of language competition.**

International Conference on Economic Science with Heterogenous Interacting Agents. Warsaw (Poland).  
June 19 - 21.

Castelló, Xavier.

**The effects of complex social structure in the dynamics of language competition.**

Workshop on Dynamics and evolution of biological and social networks, Palma de Mallorca (Spain).  
February 18 - 20.

Castelló, Xavier; Toivonen, Riitta; Eguíluz, Víctor M.; Loureiro-Porto, Lucía; Saramaki, Jari; Kaski, Kimmo;  
San Miguel, Maxi.

**Modelling language competition: bilingualism and complex social networks.**

7th International Conference EVOLANG 2008, Barcelona (Spain).  
March 11 - 15.

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

**Homophily, Cultural Drift, and the Co-Evolution of Cultural Groups.**

The second World Congress on Social Simulation WCSS-08, George Mason University, Fairfax (USA).  
July 14 - 17.

Eguíluz, Víctor M.

**Scale-free brain functional networks.**

Dynamics and evolution of biological and social networks, Palma (Spain).  
February 18 - 20.

Eguíluz, Víctor M.

**Networks and Biology.**

Workshop on ecological networks and climate change, Seville (Spain).  
October 16 - 17.

Ermakov, I.V.; Van Der Sande, G.; Gelens, L.; Scirè, A.; Colet, P.; Mirasso, C.R.; Danckaert, J.

**Numerical investigation of semiconductor ring lasers with two external cavities.**

Thirteenth Annual Symposium of the IEEE/LEOS Benelux Chapter. Enschede (The Netherlands)  
November 27 - 28.

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

**Spontaneous vs. Imposed Organization in a Model of Social Dynamics.**

The Society for Computational Economics. 14th International Conference on Computing in Economics and Finance. Paris (France).  
June 26 - 28.

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

**Time scale competition leading to fragmentation and recombination transitions in the co-evolution of network and states.**

Annual Meeting of the the German Physical Society (DPG), Physics of Socio-economic Systems AKSOE 2008. Berlin (Germany).

February 25 - 29.

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

**Genetic Similarity Networks in Populations and in Metapopulations.**

Workshop on Dynamics and Evolution of Biological and Social Networks. Palma de Mallorca (Spain).

February 18 - 20.

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

**From genes to species: Universal Scaling?.**

Workshop on Dynamics and Evolution of Biological and Social Networks, Palma de Mallorca (Spain).

February 18 - 20.

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

**Excitability and Dynamical Instabilities of Localized Structures in a Nonlinear Cavity with a Spatially Inhomogeneous Pump.**

NOLINEAL 2008, Barcelona (Spain).

June 16 - 19.

Jacobo, Adrián; Gomila, Damià; Matías, Manuel A.; Colet, Pere.

**Control and Interaction of Excitable Localized Structures in Kerr Media.**

SIAM Conference on Nonlinear Waves and Coherent Structures. Università di Roma, Rome (Italy)

July 21 - 24.

Jiménez, R.; Lugo, H.; San Miguel, M.

**Resistance to Learn and the origin of cooperation.**

14th International Conference on Computing in Economics and Finance, Université de la Sorbonne, Paris (France).

June 26 - 28.

Komin, Niko; Toral, Raúl.

**Drug absorption in a three-compartment model.**

4th BIOSIM conference, Budapest (Hungary).

September 24 - 27.

López Cristóbal

**Competing species in niche space: the role of the competition Kernel**

Talk in the meeting of project Patres, Montuiri, Mallorca (Spain)

April 3

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

**Dynamical Instabilities of Localized Structures in Nonlinear Optical Cavities with Metamaterials.**

SIAM Conference on Nonlinear Waves and Coherent Structures. Università di Roma, Rome (Italy)

July 21 - 24.

Mirasso, Claudio.

**Chaos-based optical communications in Europe.**

Workshop NTT Corporation, Nara (Japan).

September 8.

Mirasso, Claudio.

**Dynamics and synchronization of delay-coupled oscillators: From Lasers to Neurons.**

Dynamics Days, Asia, Pacific 5, Nara (Japan).

September 10.

Mirasso, Claudio.

**Delayed but still in time: a neuronal mechanism for zero-lag long-range synchronization in the brain.**

MEDYFINOL 2008, Mecánica Estadística del Desequilibrio y Física No Lineal, Punta del Este (Uruguay).

December 3.

Murray, Douglas R.; Barnett, Stephen M.; Ohberg, Patrik; Gomila, Damià.

**Vortex nucleation in Bose-Einstein Condensates due to Effective Magnetic Fields.**

FisEs08, Salamanca (Spain).

March 27 - 29.

San Miguel, Maxi.

**Group formation: Fragmentation transitions in network coevolution dynamics.**

Workshop on Challenges and Visions in the Social Sciences, ETH, Zurich (Switzerland)

August 18 - 23.

Serrano, M. Ángeles; Flammini, Alessandro; Menczer, Filippo.

**A generative model of text documents capturing bursts and similarity.**

Extreme Events: Theory, Observations, Modeling, and Prediction, Trends in Complex Systems IFISC –

MPIPKS. Palma de Mallorca (Spain)

November 10 - 14.

Sintes, Tomàs.

**Clonal plant growth and genetic diversity.**

Trobades Científiques de la Mediterrània. Maó, Menorca (Spain).

October 6 - 8.

Toral, Raúl.

**Diversity-induced resonance.**

Stochastic Resonance 1998-2008, Perugia (Italy).

August 17 - 21.

Toral, Raúl.

**Diversity can improve the response to a changing environment.**

XXIV Trobades científiques de la Mediterrània, Maó, Menoría (Spain).

October 6 - 8.

Toral, Raúl.

**Diversity induced effects in the dynamics of social systems.**

Dynamics and evolution of biological and social networks, Palma de Mallorca (Spain).

February 18 - 20.

Tugrul, Murat.

**Boolean Dynamics of Gene Regulation Network of *Saccharomyces Cerevisiae* (yeast).**

15th Istanbul Statistical Physics Days, Istanbul (Turkey).

June 19 - 21.

Van Der Sande, Guy; Gelens, Lendert; Tassin, Philippe; Scirè, Alessandro; Danckaert, Jan.

**The dynamical behaviour of a semiconductor ring laser.**

SPIE Photonics Europe, Strasbourg (France)

April 7 - 10

Vázquez, F; Eguíluz, Víctor M.; San Miguel, M.

**Absorbing transitions in coevolution dynamics.**

International Conference on Economic Science with Heterogeneous Interacting Agents ESHIA/WEHIA 2008, Warsaw (Poland).

June 19 - 21.

Vázquez, Federico; Eguíluz, Víctor M.; González, Juan C.; San Miguel, M.

**Absorbing Phase Transition in Coevolving Networks.**

Workshop on Dynamics and Evolution of Biological and Social Networks. Palma de Mallorca (Spain).

February 18 - 20.

Vázquez, Federico; López, Cristóbal; Castelló, Xavi; Eguíluz, Víctor; San Miguel, Maxi.

**Language dynamics at the macroscopic scale.**

Talk in the meeting of Project PATRES, Bad Schandau (Germany).

October 13 - 15.

Vázquez, Federico; Eguíluz, Víctor; González-Avella, Juan Carlos; San Miguel, Maxi.

**Absorbing Phase Transition in Coevolving Networks.**

International Conference in Statistical Physics, Crete (Greece).

July 14 - 18.

Vázquez, Federico; Castelló, Xavi; Eguíluz, Víctor; San Miguel, Maxi.

**Macroscopic modelling of language dynamics.**

Talk in the meeting of project PATRES en Montuiri, Mallorca (Spain).

April 2 - 4.

## 6.5 POSTER PRESENTATIONS

Bacelar, F. S.; Zaldívar-comenges, J. M.; Dueri, S.; Hernández-García, E.

**Regime changes in competing floating-submerged plant ecosystems.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Bacelar, Flora S.; Dueri, Sibylle; Hernández-García, Emilio; Zaldívar, José Manuel.

**Join effects of nutrients and contaminants on the dynamics of a food chain in marine ecosystems.**

FisEs08 Salamanca (Spain).

March 27 - 29.

Castelló, Xavier.

**Language competition as an example of the consensus problem.**

FisEs08: XV Congreso de Física Estadística, Salamanca (Spain).

March 27 - 29.

Castelló, Xavier; Toivonen, Ritta; Eguíluz, Víctor M.; Saramaki, Jari; Kaski, Kimmo; San Miguel, Maxi.

**Broad lifetime distributions for ordering dynamics in complex networks.**

BCNetWORKSHOP, trends and perspectives in complex networks, Barcelona (Spain).

December 10 - 12.

Cerdá, J. J. ; Sintés, T. ; Sorensen, C. ; Chakrabarti, A.

**Shear effects in the induction of kinetic phase transformation in depletion driven colloids.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Cornelles Soriano, Miguel; Colet, Pere; Mirasso, Claudio.

**Sincronización de dos láseres de semiconductor sometidos a retroalimentación óptica  $\lambda$  ltrada y acoplados unidireccionalmente.**

FisEs08 Salamanca (Spain).

March 27 - 29.

Gomila, Damià ; Jacobo, Adrian; Colet, Pere; Matías, Manuel A.

**Coherence resonance of excitable localized structures in nonlinear optical cavities.**

FisEs08, Salamanca (Spain).

March 27 - 29.

González-Avella, Juan Carlos; Eguíluz, Victor M.; San Miguel, M.

**Modelo de Ising en una red co-evolutiva.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Hernández Carrasco, I; López, C.; Hernández-García, E.; Turiel, A.

**Statistical properties and robustness of dispersion from surface velocity data.**

Nonlinear Processes in Oceanic and Atmospheric Flows, NLOA2008, Castro Urdiales, Cantabria (Spain).

July 2 - 4.

Hernández Carrasco, I; López, C.; Hernández-García, E.; Turiel, A.

**Extremes of stretching in ocean flow: Intermittency and its impact in transport and mixing.**

Extreme Events: Theory, Observations, Modeling and Prediction, Palma de Mallorca (Spain).

November 10 - 14.

Hernández-Carrasco, I; López, C.; Hernández-García, E.; Turiel, A.

**Statistical properties and robustness of dispersion from surface velocity data.**

Dynamics of Inertial Particles: From Ocean and Atmosphere to Planets. Dresden (Germany).

September 15 - 19.

Hernández-García, E.; Rossi, V.; López, C.; Sudre, J.; Garçon, V.

**Mixing, Lyapunov exponents, and biological activity in the Benguela and the Canary upwelling systems.**

Nonlinear Processes in Oceanic and Atmospheric Flows, NLOA2008. Castro Urdiales, Cantabria (Spain).

July 2 - 4.

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

**Networks of Genetic Similarity in Populations and in Metapopulations.**

International Conference "Modelling and Computation on Complex Networks and Related Topics", Net-Works 2008, Pamplona (Spain).

June 9 - 11.

Herrada, E. Alejandro; Tessone, Claudio J.; Eguíluz, Víctor M.; Hernández-García, Emilio; Duarte, Carlos M.

**Scaling properties in protein evolution.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Jacobo, Adrián; D' Alessandro, Gianpaolo; Gomila, Damià; Colet, Pere.

**Hysteresis in planar liquid crystal cells illuminated by polarized light.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Jacobo, Adrian; Gomila, Damià; Matías, A. Manuel; Colet, Pere.

**Interaction of oscillating dissipative solitons in nonlinear optical cavities.**

FisEs08, Salamanca (Spain).

March 27 - 29.

Komin, Niko; Murza, Adrian; Toral Raúl.

**Diversity in Large and Coupled Systems - (Gompertz Equation of Tumoral Growth).**

Fises08, Salamanca (Spain).

March 27 - 29.

Latorre, María J.; Fürst, Sandor; Mezosi, Gabor; Sorel, Marc; Pérez-Serrano, Antonio; Scirè, Alessandro; Balle, Salvador; Giuliani, Guido.

**Experimental and theoretical analysis of the optical spectra of directionally bistable semiconductor ring laser.**

SPIE Photonics Europe, Strasbourg (France)

April 7 - 10.

Murza, Adrián; Bernard, Samuel; Komin, Niko; Pérez, Toni; Mirasso, Claudio; Hernández-García, Emilio; Toral, Raúl.

**The role of light-dark cycle, constructive diversity and coupling symmetries in synchronizing circadian oscillators.**

4th BioSim Conference, Budapest (Hungary)

September 24 - 27.

Pattantyus-Abraham, M; López, C; Tel, Tamas.

**Dispersion rates for inertial particles dynamics.**

Dynamics of inertial particles in turbulence: From Ocean and Atmosphere to Planets, Max Planck Institute for Physics of Complex Systems, Dresden (Germany).

September 16.

Pérez-Serrano, Antonio; Fürst, Sandor; Scirè, Alessandro; Javaloyes, Julien; Balle, Salvador; Sorel, Marc.

**Modal structure of Semiconductor Ring Lasers.**

SPIE Europe, Strasbourg (France)

April 7 - 10.



Pérez -Serrano, Antonio; Furst, Sandor; Scirè, Alessandro; Javaloyes, Julien; Sorel, Marc; Balle, Salvador.

**Modal structure of Semiconductor Ring Lasers.**

IEEE/LEOS ISLC 2008 Sorrento (Italy)

September 16.

Pérez -Serrano, Antonio; Scirè, Alessandro; Zambrini, Roberta; Colet, Pere.

**Noise properties of semiconductor ring lasers.**

SPIE Europe, Strasbourg (France)

April 7 - 10.

Pérez -Serrano, Antonio; Zambrini, Roberta; Scirè, Alessandro; Colet, Pere.

**Noise spectra and correlations in semiconductor ring laser in the bidirectional regime.**

FisEs 2008, Salamanca (Spain).

March 28.

Pérez, Toni; Mirasso, Claudio; Toral, Raúl.

**Diversity-induced Resonance in a FitzHugh-Nagumo Neural Network.**

Dynamics Days Asia-Pacific 05 Nara (Japan).

September 9 - 12.

Rossi, V.; Lopez, C; Sudre, J.; Hernández-García, E; Garçon, V.

**A comparative study of the Benguela and the Canary upwelling systems.**

4th IGBP Congress, Sustainable Livelihoods in a Changing Earth System, Capetown (South-Africa).

May 5 - 9.

Rossi, V.; López, C.; Sudre, J.; Hernández-García, E.; Garçon, V.

**Mixing, Lyapunov exponents, and biological activity in the Benguela and the Canary upwelling systems.**

European Geosciences Union 2008 Viena (Austria).

April 13 - 18.

Sánchez, Pedro A.; Sintés, Tomás; Piro, Oreste; Cartwright, Julyan H. E.

**Non-equilibrium phase transition-like behavior between bulk structures in ballistic-diffusive stochastic models of thin film growth.**

FisEs08, Salamanca (Spain)

March 27 - 29.

Soriano, Miguel C.; Ruiz-Oliveras, Flavio; Colet, Pere; Mirasso, Claudio.

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

Solvay Workshop on Bits, Quanta and Complex Systems (Brussels).

April 30 - May 2.

Toral, Raúl.

**Diversity-induced resonance in a model for opinion formation.**

FISES 2008, Salamanca (Spain).

March 27 - 29.

Tronciu, Vasile; Ermakov, Ilya; Colet, Pere; Mirasso, Claudio.

**Chaotic dynamics of a semiconductor laser with double cavity feedback.**

Solvay Workshop on Bits, Quanta and Complex Systems (Brussels).

April 30 - May 2.

Tronciu, Vasile; Mirasso, Claudio; Colet, Pere.

**Chaos based communications using integrated semiconductor lasers.**

Solvay Workshop on Bits, Quanta and Complex Systems (Brussels).

April 30 - May 2.

Tugrul, Murat.

**Boolean Dynamics of Gene Regulation Network of *Saccharomyces Cerevisiae* (yeast).**

International Conference "Modelling and Computation on Complex Networks and Related Topics", Net-Works 2008, Pamplona (Spain).

June 7 - 9.

Vaz Martins, Teresa; Toral, Raúl.

**Divide and conquer.**

Stochastic Resonance 1998-2008, Perugia (Italy).

August 17 - 21.

Vázquez, Federico; López, Cristóbal; San Miguel, Maxi.

**From microscopic to macroscopic dynamics in systems with two symmetric absorbing states.**

MEDYFINOL08: XVI Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics. Punta del Este (Uruguay).

December 1 - 5.

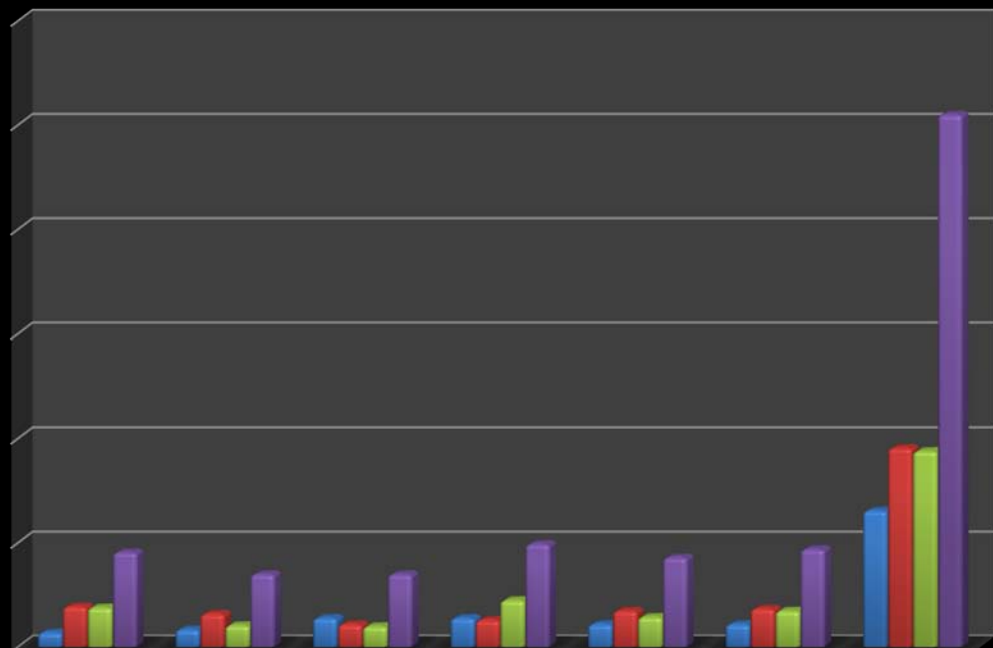
Vázquez, Federico; Eguíluz, Víctor; González-Avella, Juan Carlos; San Miguel, Maxi.

**Transiciones de fase absorventes en redes coevolutivas.**

FisEs08,, Salamanca (Spain).

March 27 - 29.

## CONFERENCES AND WORKSHOPS 2003-2008



	2003	2004	2005	2006	2007	2008	TOTAL
■ INVITED TALKS	14	17	28	28	22	22	131
■ ORAL TALKS	39	32	22	26	35	37	191
■ POSTERS	38	21	20	45	29	35	188
■ TOTAL	91	70	70	99	86	94	510

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## 6.6 SCIENTIFIC COMMITTEES AND ORGANIZATION OF CONFERENCES AND WORKSHOPS

Colet, Pere.

Member of the Steering Committee FisEs08: XV congreso de Física Estadística, Salamanca (Spain).

March 27 - 29.

Hernández-García, E.

Convener of sesión NP6. 01 Mixing, Transport and Diffusion in the Environment.

European Geosciences Union General Assembly 2008, Viena (Austria)

April 13 - 18.

Hernández-García, Emilio; Toral, Raúl.

Organizing Committee.

Workshop on Dynamics and Evolution of Biological and Social Networks, Palma de Mallorca (Spain).

<http://ifisc.uib.es/public/biosocnets>.

February 18 - 20.

Scirè, A.

Organizer.

IOLOS review meeting.

Cas Jai, Campus UIB, Palma de Mallorca (Spain)

October 16 - 19.

Serrano, M. Ángeles.

Organizing Committee and scientific committee.

BCNetWORKSHOP, trends and perspectives in complex networks, Barcelona (Spain).

December 10 - 12.

López, Cristóbal; Hernández Carrasco, Ismael; Hernández-García, Emilio.

Organizing Committee.

Nonlinear processes in oceanic and atmospheric flows, Castro Urdiales, Cantabria (Spain).

<http://ifisc.uib-csic.es/public/nloa2008>.

July 2 - 4.

San Miguel, Maxi.

Organizer.

PATRES project plenary meeting. Montuïri, Mallorca (Spain)

April 2 - August 4.

San Miguel, Maxi.

Member of Scientific Committee.

BCNetWorkshop: Trends and perspectives in complex networks. Barcelona (Spain)

December 10 - 12.

San Miguel, Maxi.

International Committee of International Conference in Statistical Physics, Crete (Greece).

July 1 - 31.

San Miguel, Maxi.

Member of Scientific Committee

International Conference on Economic Science with Heterogenous Interacting Agents., ESHIA 08  
(Warsaw)

June 19 - 21.

San Miguel, Maxi.

Member of Scientific Committee. 8th German Workshop on Artificial Life (GWAL-8)

Leipzig (Germany)

July 30 - August 1.



## 7. OUTREACHING ACTIVITIES

<http://ifisc.uib.es/outreaching/>

### CONFERENCE SERIES

Conference Series organized by IFISC and Caixa-Fòrum: "Explorant les Fronteres entre els Sabers". Edifici Caixa Fòrum, Palma (Spain)

The science of the twentieth century has been characterized by a progressive specialization that has enabled major advances in specific areas. The great challenge of the XXI century science is to explore the boundaries between different areas of knowledge and interdisciplinary development, thus enabling the understanding of complex phenomena.

**CONFERÈNCIES**

**1**  
Dimarts, 15 d'abril de 2008  
**Individuo versus individualidad en una teoría de complejidad.**  
Dr. Jorge Wagensberg  
Director de l'Àrea de Medi Ambient i Ciència de la Fundació "La Caixa"

**2**  
Dimecres, 7 maig de 2008  
**¿Cómo puede el cerebro explicarse a si mismo?**  
Dr. Oscar Vilarroya  
"El Cerebel Social", Càtedra Universitat Autònoma de Barcelona de Neurociències i Societat

**3**  
Dimecres, 14 de maig de 2008  
**La vida y la evolución del universo**  
Dr. Juan Pérez Mercader  
Centro de Astrobiología, Instituto Nacional de Técnica Aeroespacial - CSIC

**EXPLORANT LES FRONTERES ENTRE ELS SABERS**

Edifici CaixaForum Palma. (Plaça de Marça 3)  
Organitzat per IFISC (Institut de Física Interdisciplinària i Sistemes Complexos)  
Telèfon: 971 17 32 90 ifisc@ifisc.uib.es www.ifisc.uib.es  
Totes les conferències són a les 19:30 hores

IFISC UIB  
CaixaForum

The aim of this series of conferences is to present various examples, models of complex systems, such as: the structure and evolution of the universe, life and functioning of the brain, all treated from a cross-disciplinary perspective.

- Jorge Wagensberg (Director del Àrea de Medio Ambiente y Ciencia de la Fundación La Caixa) **Individuo versus individualidad en una Teoría de la Complejidad**. April 15.

- Óscar Vilarroya (Càtedra el Cerebel Social, Universitat Autònoma de Barcelona) **Cómo puede el cerebro explicarse a si mismo**. May 7.

- Juan Pérez Mercader (Centro de Astrobiología, CSIC-INTA, Spain) **La vida y la evolución del Universo**. May 14.

## OUTREACHING CONFERENCES



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Maxi San Miguel

Outreach Conference organized by Club Diario de Mallorca

***“La complejidad, ¿qué es y para qué sirve?”***. Centre Cultural Sa Nostra. Club Diario de Mallorca, Palma de Mallorca, Balearic Islands (Spain)

October 2.

Eguíluz, Víctor M

***“¿Qué tienen en común una AL21 y el efecto mariposa?”***

7 Jornada de Agendas Locales 21 en Municipios Vascos, GEO2 Feria del Desarrollo Sostenible, Barakaldo (Spain).

November 4.

Colet, Pere

***“Caos y sincronización: ingredientes para comunicaciones seguras”***

Conferencia divulgativa dentro del ciclo Semana de la Ciencia organizado por la delegación del CSIC en Valencia. Jardín Botánico de Valencia (Spain)

November 25

## **PARTICIPATION IN BALEARIC SCIENCE AND TECHNOLOGY WEEK. SCT08. TALKS IN HIGH SCHOOLS**

Colet, Pere

***Usos del caos: Comunicaciones Secretas.***

Outreaching Conference. Instituto de Educación Secundaria San Alfonso María de Lignorio, Palma de Mallorca (Spain)

November 6.

Eguíluz, Víctor M

***La complejidad y la Interdisciplinariedad ¿qué es y para qué sirve?***

Aula Multiusos del Edificio Científico-técnico, Campus Universitario de la UIB, Palma de Mallorca (Spain)

November 14

Mirasso, Claudio

***Los Láseres: cómo funcionan y para qué sirven.***

Outreaching Conference at I. E. S Joan Alcover, Palma de Mallorca (Spain)

November 6.



**SCIENCE FAIR 2008**

The Balearic Science Fair is an activity targetting all audiences, which aims to stimulate the development of the creative and scientific capacity, promote research, and disseminate scientific and technological knowledge. IFISC had its own stand in the Science Fair 2008. The central theme of the contribution from IFISC was the laser light, and optical properties and applications. IFISC also presented another line of investigation based on nanoscience and the laws of quantum mechanics.

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Coordination: Mirasso, Claudio; Perez, Toni; Cornelles, Miguel; López, Rosa  
Palma de Mallorca, April 17 to 19 and Ibiza, May 8. Balearic Islands (Spain)



## PRESS AND MEDIA

- **News:** "Optical Fibre: Secure in all the chaos".IST Results. January 15.
- **News:** "Para mejorar el planeta hay que educar sobre su evolución". Juan Pérez Mercader (Conferences series: Explorant les Fronteres entre els sabers), Diario de Mallorca.Juny 15.
- **News:** "IOLOS project featured in Future Labs magazine", University of Bristol, Electrical & Electronic Engineering, News. July 2.
- **News:** "L'IFISC acosta la ciència a la cultura". Claudio Mirasso, L'Hiperbòlic. July 2.
- **News:** "La UIB, a un pas de convertir-se en centre referencial en al camp de la Física Interdisciplinària i de sistemes complexos". Manuel Matías, L'Hiperbòlic. July 2.
- **News:** "Vilarroya dice que el cerebro no copia la realidad, la construye a partir del entorno". Óscar Vilarroya, (Conferences Series: Explorant les Fronteres entre els sabers), Diario de Mallorca. May 7.
- **News:** "Científicos de la UIB aplican un modelo matemático al cerebro". Claudio Mirasso, Diario de Mallorca. October 21.
- **Press release:** "Físics de l'IFISC (UIB-CSIC) aconseguen modelitzar la possible connexió anatòmica al cervell que explicaria la percepció coherent". Claudio Mirasso, UIB Press, October 21.
- **News:** "La UIB participa en una investigación puntera". Claudio Mirasso, Diario de Mallorca. October 21.
- **Radio program:** Interview to Claudio Mirasso." La posible conexión anatómica del cerebro explicaría la percepción coherente" Cadena SER Mallorca. October 21
- **News** "La ciencia se ha preocupado mucho de las partes y poco de cómo interactúan". Maxi San Miguel, Diario de Mallorca. October 24.
- **News** "An optical computer could be only light years away".optics-news.com <http://www.optics-news.com/Optics-News/Optical.php?id=1516>
- **Radio Program:** Interview to Maximino San Miguel ¿Complejidad qué es y para qué sirve?. Ona Mallorca, November 8
- **Press Release:** "L'IFISC, Institut Mixt entre el CSIC i la UIB, i l'Institut Max-Planck de Sistemas Complejos de Dresden llancen un programa científic conjunt". Manuel Matías, November 11.
- **News:** "Ens situam al capdavant de la ciència mundial". Interview to Manuel Matías, Suplemento Universitat, Diario de Mallorca. November 20.

- **News:** Interview to Manuel Matías: *“Ens situam al capdavant de la Ciència Mundial”* Suplemento Universitat, Diario de Mallorca. November 20.
- **Press Release:** *“Descubren que las praderas submarinas de posidonia en Baleares son imprescindibles para la diversidad de la especie”*. Emilio Hernández-García, CSIC Press, November 20.
- **News:** *“In jedem Chaos ist auch System”*. Manuel Matias, Mallorca Zeigtun, November 20.
- **News:** *“La Posidonia de Balears inyecta su DNI en el resto de población mediterráneas”*. Emilio Hernández-García, El Mundo-Baleares. November 20.
- **News:** *“La posidonia de Balears es vital para la diversidad de toda la especie”*. Emilio Hernández-García, Diario de Mallorca. November 21.
- **News:** *“Las praderas submarinas de posidonia en Balears son imprescindibles para la diversidad de las especies”*. Emilio Hernández-García, Última Hora Ibiza. November 21.
- **Radio Program:** Interview to Emilio Hernández-García in Radio Nacional. November 21.





## 8. OTHER ACTIVITIES

### 8.1 MASTER THESIS

Adrián Jacobo

**Image processing using type II second harmonic generation**

Supervisor : Pere Colet

February 11<sup>th</sup>

Juan Carlos González Avella

**Competition of local and non-local interactions: Mass media effect in social dynamics.**

Supervisors: Maxi San Miguel and Víctor Eguíluz

September 19

Flora Souza Bacelar

**Bifurcations Análisis of a Marine Food Chain**

Supervisors: Emilio Hernández-García

September 19

Romain Modeste Nguimdo

**Optical communications using semiconductor laser with electro-optical feedback devices**

Supervisors: Pere Colet

September 19

Leonardo Lyra Gollo

**Synchronization between populations of neurons**

Supervisor: Claudio Mirasso

October 21

Niko Komin

**Stochastic and Non-linear effects in Biological Systems**

Supervisor: Raúl Toral

October 22

## 8.2 RESEARCH STAYS IN OTHER CENTERS

Castelló, Xavier.

Universita di Roma "La Sapienza", Roma (Italy).

Estada de treball. Universita di Roma "La Sapienza", Roma (Italy).

November 24 to 28.

Colet, Pere.

Lorentz Center Workshop on Network Synchronization: From dynamical systems to neuroscience. Leiden, Amsterdam (Holland)

May 19 to 30.

González Avella, Juan Carlos

The Abdus Salam International Centre for Theoretical Physics (ICTP).

Scientific Visit to the group "Statistical Mechanics and Interdisciplinary Applications Research Group of the Condensed Matter and Statistical Section" Trieste (Italy)

April 1 to May 31.

Hernández Carrasco, Ismael.

Institut de Ciències del Mar -CMIMA (CSIC). Barcelona (Spain).

June 9 to 10.

Hernández Carrasco, Ismael.

Max Plank Institute for the Physics of Complex Systems, Dresden (Germany).

September 1 to 26.

Hernández Carrasco, Ismael.

Institut de Ciències del Mar - CMIMA (CSIC). Barcelona (Spain).

April 23 to 25

Jacobo, Adrián.

University of Southampton. Southampton (USA)

June 2 to July 31.

Serra, Llorens.

Department of Physics, Korea University, Seoul (Korea)

September 1 to December 31

Lyra Gollo, Leonardo.

Universidad Pablo de Olavide. Sevilla (Spain)

October 6 to November 7.

López, Cristóbal.

Institute of Theoretical Physics, Eotvos University, Budapest (Hungary).

March 24 to 28.

Matías, Manuel A.

Max Planck Institute for the Physics of Complex Systems, Dresden (Germany)

December 2 to 10.

Pérez López, Toni.

Max Planck Institute for Brain Research, Frankfurt (Germany).

May 18 to 23.

Pérez López, Toni.

Saitama University (Japan).

August 21 to November 14.

Souza Bacelar, Flora.

Department of Ecological Modelling (OESA), Helmholtz Centre for Environmental Research (UFZ), Leipzig (Germany).

September 29 to October 31.

Toral, Raúl.

Departamento de Física University of Geneva (Switzerland).

February 21 to March 4.

Toral, Raúl.

Physics Department, Lehigh University, Bethlehem (USA).

June 30 to August 22.

### 8.3 MEMBERS OF EDITORIAL BOARD OF SCIENTIFIC JOURNALS

Víctor M. Eguíluz. Associate Editor of "Advances in Complex Systems"

Raúl Toral. Associate Editor of "Fluctuations and Noise Letters"

Maxi San Miguel. Associate Editor of The "European Physical Journal B (New Section on Complex Systems")

## 8.4 POSTGRADUATE COURSES

**Cooperative phenomena and critical phenomena. Applications**, Victor M. Eguíluz, Maxi San Miguel, Tomàs Sintes, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Introduction to Quantum Systems**, Montserrat Casas, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Nonlinear dynamic systems and complexity espacial temporal**, Pere Colet, Emilio Hernández-García, Claudio Mirasso, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Stochastic simulation methods**, Pere Colet, Raúl Toral, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Introduction to statistical and nonlinear Phisycs**, Emilio Hernández-García, Claudio Mirasso, Maxi San Miguel, Tomàs Sintes, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Computational Models of Social Evolution**, Víctor M. Eguíluz, *Máster en Cognición y Evolución Humana*. Universitat de les Illes Balears, January-December.

**Nonlinear phenomena in biology**, Victor M. Eguíluz, Claudio Mirasso, Tomàs Sintes, Raúl Toral, *Master in Physics*, Universitat de les Illes Balears, January-December.

**Electronic properties of nanostructures**, Llorenç Serra Crespí, *Master in Physics*, Universitat de les Illes Balears, February-March.

## 8.5 PATENTS

**Procedimiento y aparato para el control de un sistema dinámico maestro.**

R. Toral, C. Mirasso, M. Ciszak, O. Calvo

Spanish Patent **200800727** (UIB, March 12, 2008)

## 8.6 AWARDS

**González Avella, J.C**

Winner of the Regional Award for Science and Technology to the Best Scientific Paper, “Nonequilibrium transition induced by mass media in a model for social influence”. FUNDACITE-Mérida-Venezuela. February 3



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