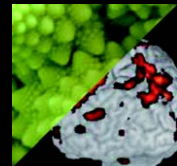
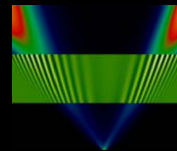
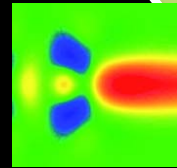
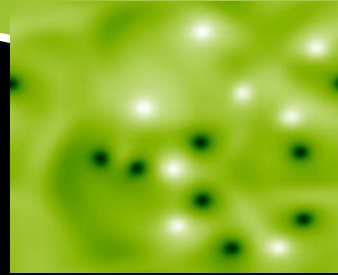




Connecting Science,  
Understanding Complexity

# IFISC ANNUAL REPORT 2009





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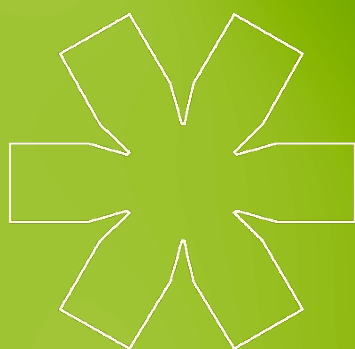
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# 1. PRESENTATION AND RESEARCH LINES

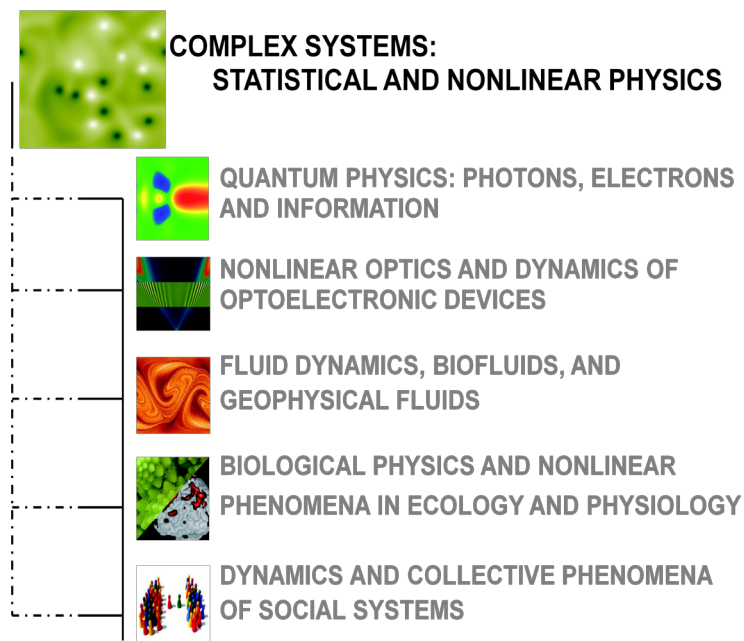
**IFISC** (Institute for Cross-Disciplinary Physics and Complex Systems) is a joint research Institute of the [University of the Balearic Islands \(UIB\)](#) and the [Spanish National Research Council \(CSIC\)](#) created in 2007 building upon the former Cross-Disciplinary Physics Department of IMEDEA (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.

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## 1.1 IFISC RESEARCH LINES

In the evolving scheme associated with the programmatic orientation of IFISC there is a unifying transverse line of exploratory research on Complex Systems: Statistical and Nonlinear Physics. In addition for the strategic plan 2010-13 IFISC has defined five lines with a subject defined by the system under study and representing cross-disciplinary interfaces of Physics with other established discipline.





## COMPLEX SYSTEMS. NONLINEAR AND STATISTICAL PHYSICS

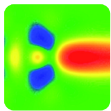
Complex systems, a central paradigm at IFISC, are characterized by emergent and collective phenomena of many interacting units. Fundamental understanding of these systems comes from Statistical Physics together with the Theory of Dynamical Systems, which includes the study of chaos and the effect of fluctuations and random events on systems evolution. Generic phenomena under consideration include synchronization, phase transitions, nonequilibrium instabilities, spatiotemporal pattern formation, or dynamics and evolution of complex networks.

### Computing lab

The main tool for intensive calculations is the Nuredduna system intended for High Throughput Computing. Nuredduna includes a cluster designed and build at IFISC using out-of-the-shelf components from the personal computer market which at the present has 250 computational cores. The nuredduna system also includes an IBM iDataplex cluster with 540 computational cores within the Grid-CSIC initiative to promote e-science. Other computational tools at IFISC include several servers and a fully integrated network consisting on about 50 desktops and a similar number of laptops.



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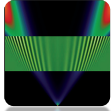


## QUANTUM PHYSICS: PHOTONS, ELECTRONS AND INFORMATION

Very small systems (nanoscience) and light-matter interaction (quantum optics) share a common background in Quantum Physics. These are subjects of interest in fundamental research and also in view of new technologies, such as quantum devices and quantum computers. In particular, the possibility to overcome the limitations imposed by classical physics leads to new ways to manage the information (quantum information).

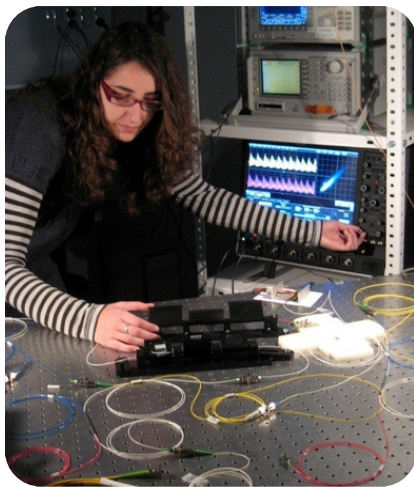
The research at IFISC focuses on the theoretical study of specific topics within these timely lines. Charge and spin transport (nanoelectronics and spintronics) are studied in semiconductor nanostructures, including quantum dots and wires.

The possibility to control photonic properties, such as quantum correlations and entanglement in light beams, are studied in nonlinear optical devices, cold atoms and lasers. General properties shared by these systems are studied in the context of quantum information, focusing on the identification of entangled states, the characterisation of their degree of entanglement and its creation and dynamical evolution.



## NONLINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES

The general topic of this line is the study of the light-matter non-linear interaction and its consequences and potential for applications in emerging photonics technologies. We study the complex dynamics and the generation of non homogeneous spatial light distributions (pattern formation) in photonic sources such as semiconductor lasers and in optical cavities filled with nonlinear media. Experimental studies include the utilization of complex laser dynamics for encrypted communication, key exchange, generation of random bit sequences and information processing.



### Photonics lab

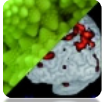
During 2009 a Photonics Laboratory of high standards has been established. The lab is equipped with a Faraday cage for electromagnetic shielding and has implemented already latest technology to characterize the laser emission with multi-Gigahertz bandwidth in temporal domain via fast detectors and 16 GHz real-time oscilloscope and in spectral domain via a 14 GHz real-time spectrum analyzer. In addition, high-resolution optical characterization can be performed via different spectrometers.

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## FLUID DYNAMICS, BIOFLUIDS, AND GEOPHYSICAL FLUIDS

Fluid flow is a natural process occurring in a huge range of scales, from blood capillaries to atmospheric weather systems. It is also widely spread in technological settings, being its understanding crucial to aircraft design or materials production, for example. We concentrate in two research directions: on the one hand we study basic processes in fluid flow such as stirring, mixing, chemical or biological reactivity, instabilities, pattern formation, motion of non-ideal tracers, etc. The point of view of chaotic advection is a convenient starting point. On the other hand, we apply these concepts and methods to geophysical settings, mostly in ocean dynamics: transport modelling, plankton patchiness, ocean forecasting, stochastic forcing effects, etc. More recent topics include studies of biofluids, such as embryonic nodal flow, or plankton and bacterial swimming, and topics in microfluidics.



### **BIOLOGICAL PHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY**

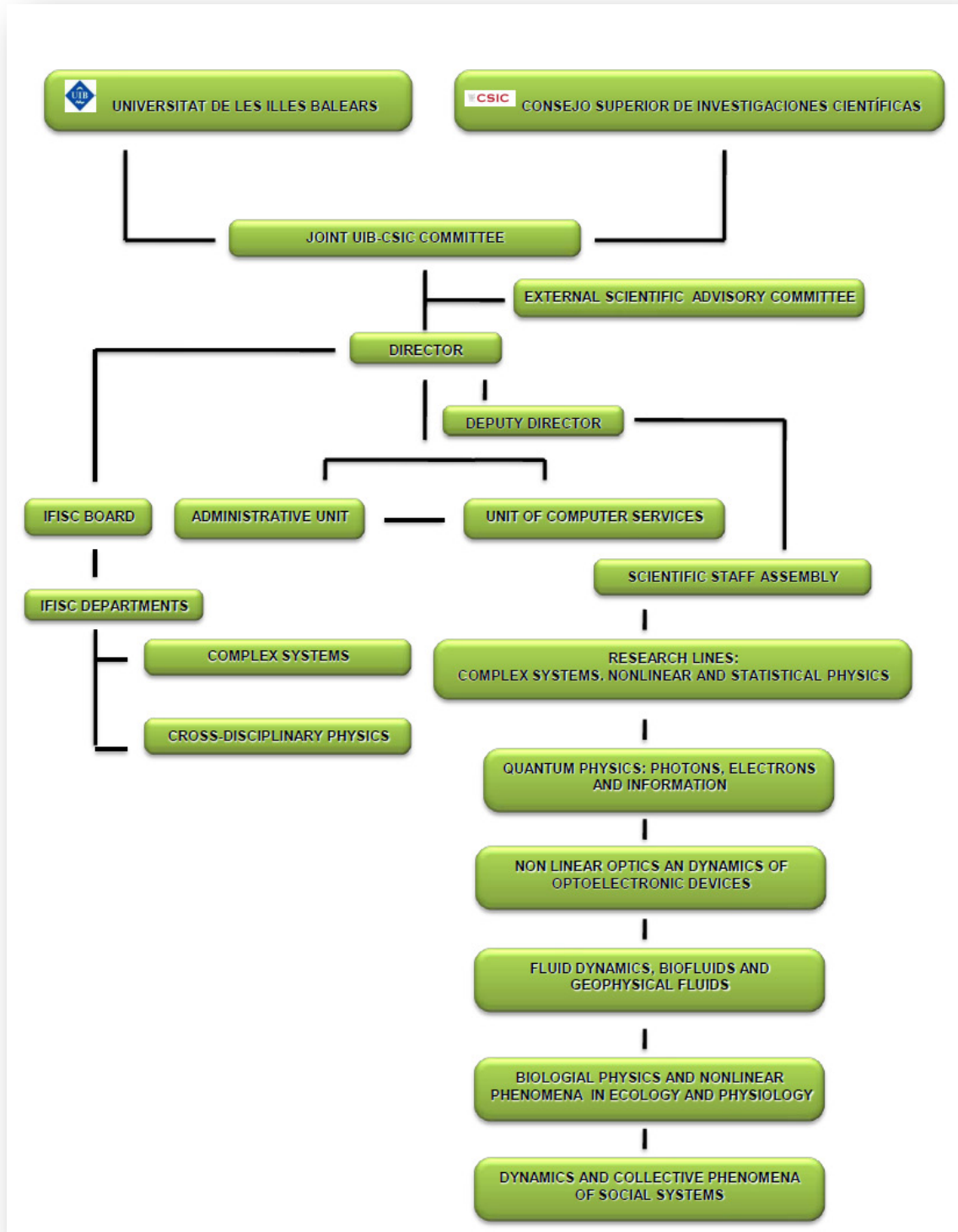
The general topic of this line is the study of some biological systems, mostly under the prism of modern Systems Biology, i.e. from the tenet that most observed behaviors in living systems stem from complex, emergent interactions among its constituents. Present research topics include modeling and simulation of neuronal systems, with special emphasis in stochastic effects and synchronization properties, drug transport and absorption, population dynamics, phylogenetic networks and ecological structure and dynamics, including growth, aggregation processes and spatial effects, with special focus on clonal plants and savannahs. Methods of complex network analysis, stochastic simulations, and the theory of nonlinear dynamical systems, such as delayed coupled systems, are used thoroughly.



### **DYNAMICS AND COLLECTIVE PHENOMENA OF SOCIAL SYSTEMS**

Social systems are prominent examples of complex systems. Concepts, tools and models aiming at identifying generic mechanisms underlying collective phenomena in these systems are developed with the use of Game Theory, Statistical Physics, Agent Based Models and Complex Networks Theory. Cooperation, cultural conflicts and problems of social consensus are examples of phenomena being addressed.

### 1.1.2 STRUCTURE CHART





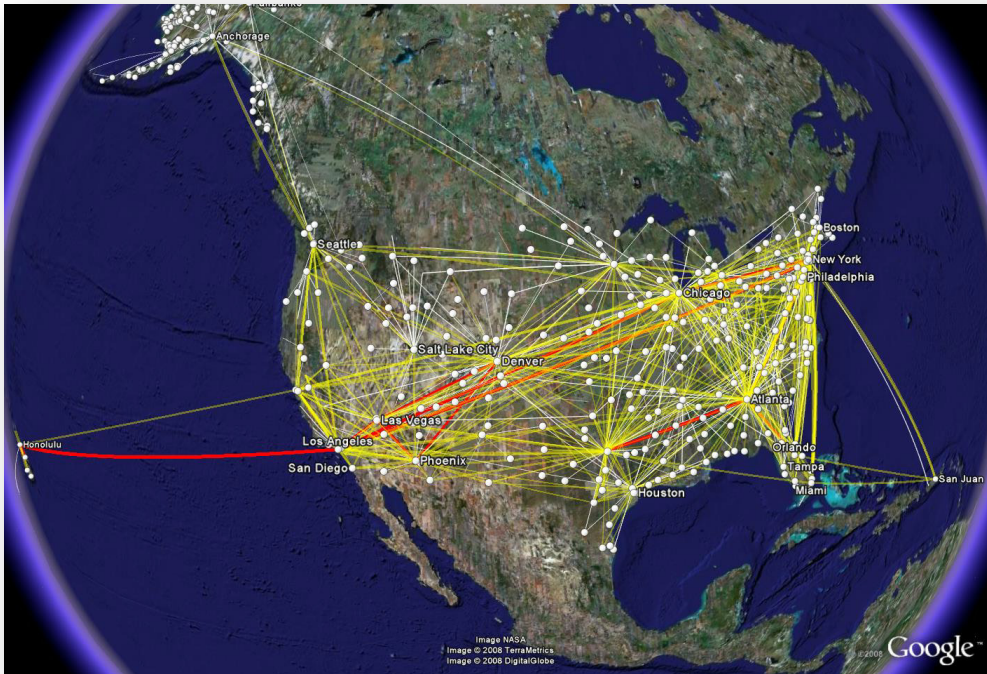
## 1.2 SOME REPRESENTATIVE RESEARCH RESULTS OF 2009

### EXTRACTING THE MULTISCALE BACKBONE OF COMPLEX WEIGHTED NETWORKS

**Proceedings National Academy of Sciences USA (PNAS) 106, 6483-6488**

A large number of complex systems find a natural abstraction in the form of weighted networks whose nodes represent the elements of the system and the weighted edges identify the presence of an interaction and its relative strength. In recent years, the study of an increasing number of large-scale networks has highlighted the statistical heterogeneity of their interaction pattern, with degree and weight distributions that vary over many orders of magnitude. These features, along with the large number of elements and links, make the extraction of the truly relevant connections forming the network's backbone a very challenging problem. More specifically, coarse-graining approaches and filtering techniques come into conflict with the multiscale nature of large-scale systems. Here, we define a filtering method, the disparity filter, that offers a practical procedure that exploits local heterogeneity and local correlations among weights to extract the relevant connection backbone in complex multiscale networks, preserving the edges that represent statistically significant deviations with respect to a null model for the local assignment of weights to edges. As a result, the disparity filter reduces the number of edges in the original network significantly, keeping, at the same time, almost all of the weight and a large fraction of nodes. An important aspect of the method is that it does not belittle small-scale interactions and operates at all scales defined by the weight distribution, preserving structural properties of the network such as the scale free character of the degree distribution, degree-degree correlations and clustering.

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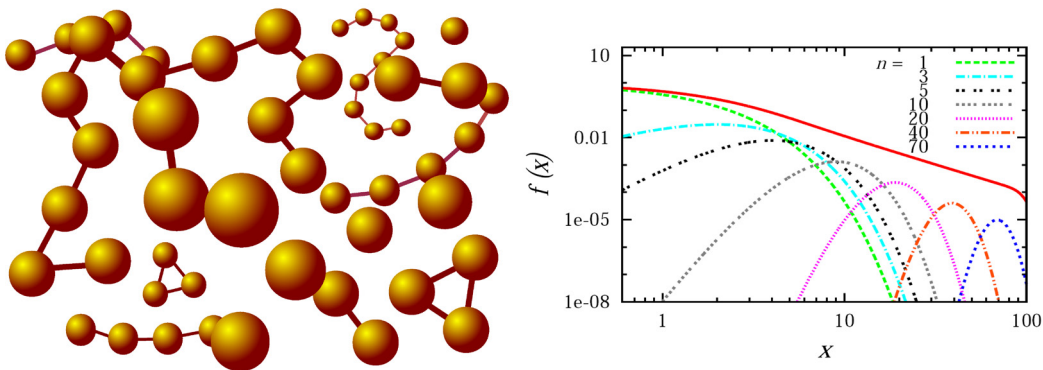


**Figure:** As an illustration of the efficacy of our method we apply the disparity filter to real world network instances, the U.S. airport network and the Florida Bay food web, and compare the obtained results with alternative backbone extraction techniques.

**POWER LAW TAILS FROM THE OVERLAP OF CANONICAL DISTRIBUTIONS****Physical Review Letters 103, 228701**

Complex systems are made of relatively simple units, from which a highly organized behavior of the system emerges. The introduction of an intrinsic diversity of the units, e.g. of their coupling strengths to an external field, is now recognized as an important element which can lead to self-organization and counter-intuitive phenomena, e.g. noise-induced resonance, i.e. the existence of an optimal level of heterogeneity for the system response to the external signal.

In this work intrinsic diversity related to the number of degrees of freedom of the units - i.e. their "dimension" – has been considered. We have shown that introducing a dimensional heterogeneity in an otherwise canonical system can produce a power law distribution, such as those observed e.g. in economics (Pareto law) and linguistics (Zipf law).



**Left:** a simple mechanical model of dimensionally heterogeneous system.

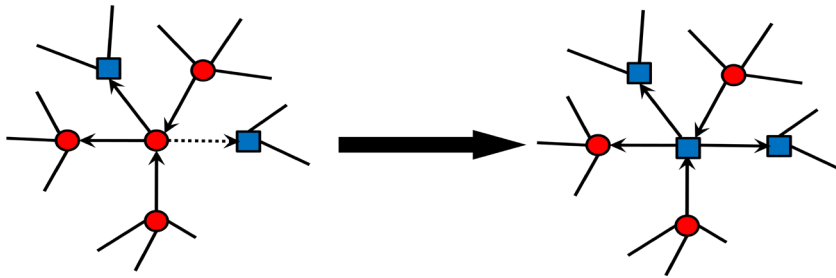
**Right:** A power law distribution  $f(x)$  (continuous line, red) appears from the overlap of canonical distributions of subsystems with different dimensions  $n$  (dotted and dashed lines, various colors). A simple yet representative model of dimensionally heterogeneous system is a mixture of polymers of different sizes (different numbers of monomers). For a homogeneous set of polymers of size  $N$ , at thermal equilibrium the polymer velocity modulus  $v$  is distributed according to the Maxwell-Boltzmann probability density  $f_N(v)$ . However, the aggregate distribution  $f(v)$  – i.e. the probability that a polymer has a velocity  $v$  independently of its size  $N$  – presents a robust power law if the polymer size distribution is in turn broad. *This simple mechanism is described by canonical statistical mechanics and can be formulated through a variational principle based on the Boltzmann entropy.*

Besides the mentioned examples in the fields of Economics and Linguistics, such a mechanism describes the degree distribution of some gene-regulation networks models.

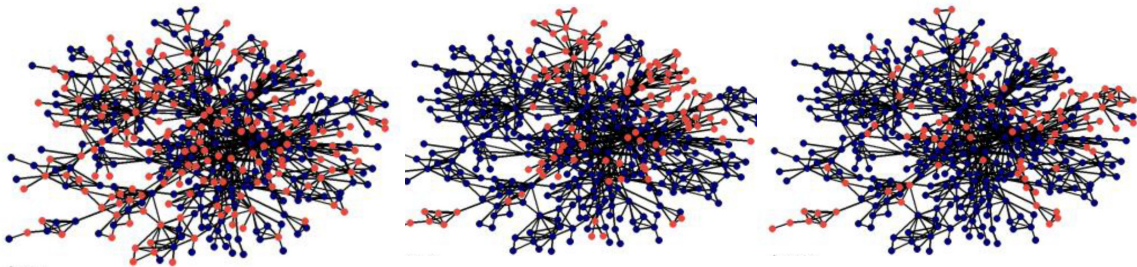
## CONSERVATION LAWS IN STOCHASTIC PROCESSES IN DIRECTED NETWORKS

Journal of Statistical Mechanics: Theory and Experiments P10024

Conservation laws condensate in simple mathematical expressions the properties of a system. For instance, the energy conservation law relates the kinetic and potential energy of a particle in a potential field, relating the height and the speed in any point of the trajectory. In a stochastic process where the trajectory of the state of the system is non-potential, is, in general, difficult to find non-trivial conservation laws. In the Kinetic Ising model with Kawasaki dynamics of spin exchange, the magnetization is conserved at each step, while for Glauber dynamics, the magnetization is conserved only averaging over realizations and initial conditions.



The voter model is one of the simplest non-equilibrium models defined on a complex network. Each element can have state +1 or -1 and the interactions might be, in general, asymmetric –represented by a directed network-, that is, if element  $i$  interacts with  $j$ , not necessarily  $j$  interacts with  $i$ . At each time step, a random element  $i$  changes its state copying the state of one of its neighbors randomly chosen (see Figure). In a two-dimensional lattice, due to the fact that the probability that  $i$  copies  $j$  is the same as the probability of  $j$  copying  $i$ , the magnetization is conserved. But at difference with the kinetic Ising model, the magnetization is conserved at each step, that is, starting with the same initial condition the initial magnetization is conserved. We have found conservation laws for voter-like dynamics in directed networks and the time evolution of the total magnetization. In a directed network, the conservation law of the voter model says that the out-degree weighted magnetization is conserved, that is,  $m = \frac{1}{\langle k \rangle} \sum k_i^{out} s_i$  is time-independent over realizations keeping the same initial condition. For the invasion process, the conserved magnitude is  $m = \frac{1}{\langle 1/k^{in} \rangle} \sum \frac{s_i}{k_i^{in}}$ . This work helps in the understanding of how the rich structure of real systems affects the dynamical processes that run on top.

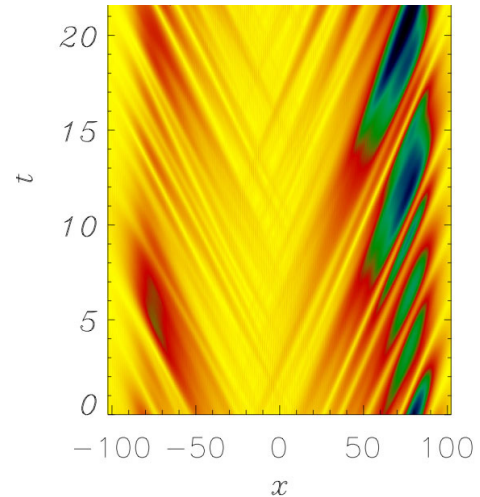


**Figures.** (Top) Dynamics of the voter model. Element  $i$  copies the state of one of its neighbors  $j$  (chosen at random). (Bottom) Time evolution of the voter model in a complex network at three different time steps.

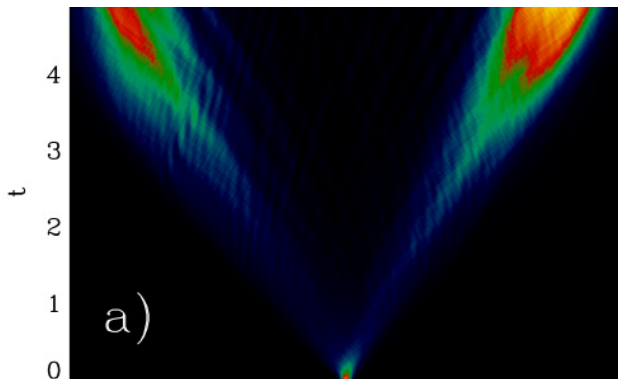
**LASERS WITH NONLOCAL FEEDBACK, DIFFRACTION, AND DIFFUSION**

Physical Review A 79, 033811

An off-axis or misaligned feedback loop gives rise to a two-point nonlocality that is the spatial analogue of a temporal delay: each point is coupled to a shifted one in a given direction. We considered this nonlocality in a broad class of optical devices including class A and B lasers, first in [R.Zambrini, F.Papoff, *Phys. Rev. Lett.* 99, 063907 (2007)]. Previously two-point nonlocality was studied both theoretically and experimentally in liquid crystals light valves, Kerr-type media, and generic nonlinear systems with diffusive couplings. A major effect of a two-point nonlocality is that it changes the instabilities of lasers: after crossing a first threshold these devices amplify localized perturbations while they lase above a second one. Moreover phase and group velocities can be tuned to have the same or opposite sign. A peculiar effect is that when the feedback is out-of-phase the two-point nonlocality make operate the laser as a signal splitter. The picture above shows a “counterpropagating” noise sustained pattern, obtained by numerical simulation of stochastic laser equations.



**Figures:** Perturbations with opposite wave-numbers travel apart, even if the shift breaks the reflection symmetry.



Misaligned feedback also allows controlling, steering, amplifying, and splitting localized light signals. Small signals can be strongly amplified while the background radiation in the rest of the system remains very low. In the picture we show the robustness of these features in presence of noise, in spite of the back-ground noise amplification.

From the standpoint of applications, we showed not only the robustness of these

properties with respect to noise but also for feedback delay time comparable to the time scales of the system dynamics. Finally, the formal analogy between the variables *space and time* considered here and *propagation length and pulse time* of pulsed lasers, suggests that the effects described in this paper can be observed in a completely different context, where the tunability and chirping of spatial pulses becomes tunability and chirping of temporal pulses, provided that a two-point nonlocality can be produced by an appropriate feedback.

## SECURITY IMPLICATIONS OF OPEN-AND CLOSED-LOOP RECEIVERS IN ALL-OPTICAL CHAOS-BASED COMMUNICATIONS

IEE Photonics Technology Letters, 21, 426-428

Chaos-based communications have emerged as an alternative technique to improve privacy and security in communication services, especially after the field demonstration in the optical link of the metropolitan area of Athens, Greece. In all-optical chaos-based systems, the emitter usually includes a semiconductor laser subject to optical feedback which generates a chaotic carrier on top of which a message is encoded.

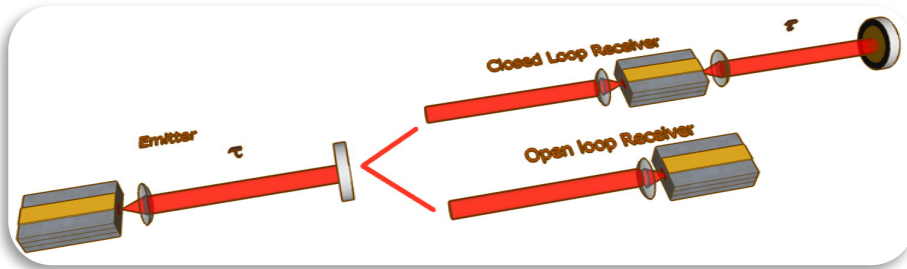


Figure: Receiver schemes.

The receiver can operate subject to the same feedback architecture (closed loop scheme) or without optical feedback (open loop scheme). The performance of each scheme can be understood from the mutual information ( $J$ ), a non-linear measure of the similarities between two quantities. A successful message recovery relies on the receiver's capability to synchronize with the carrier rather than with the transmitted signal (carrier + message). The former can be measured by the mutual information between the carrier and the receiver's output ( $J_{ms}$ ) and the latter by the mutual information between the transmitted signal and the receiver's output ( $J_{ts}$ ).

We find that closed-loop receivers follow the chaotic carrier better than open-loop ones. In fact, open-loop receivers need a much larger coupling strength to achieve a minimal synchronization quality. Furthermore, the difference between  $J_{ms}$  and  $J_{ts}$  indicates that closed-loop receivers discriminate much better the encoded message than open-loop ones.

Mutual information predictions are confirmed by measuring the Quality factor (Q-factor) of the recovered messages. In those situations in which the coupling strengths maximize synchronization, our results clearly indicate that the closed-loop outperforms the open one, reaching very large Q-factors (above 10) even for relatively small message amplitudes. The open loop performance is very poor and even for 7.5% message's amplitude displays a very limited recovery.

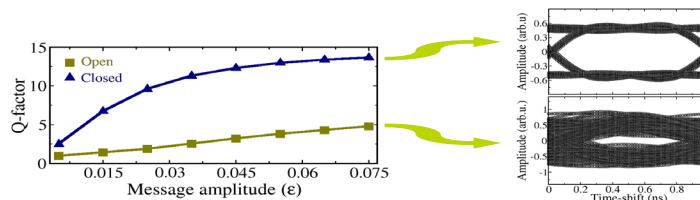


Figure: Recovered message quality factor (left) and eye diagram for  $\epsilon=0.075$  (right).

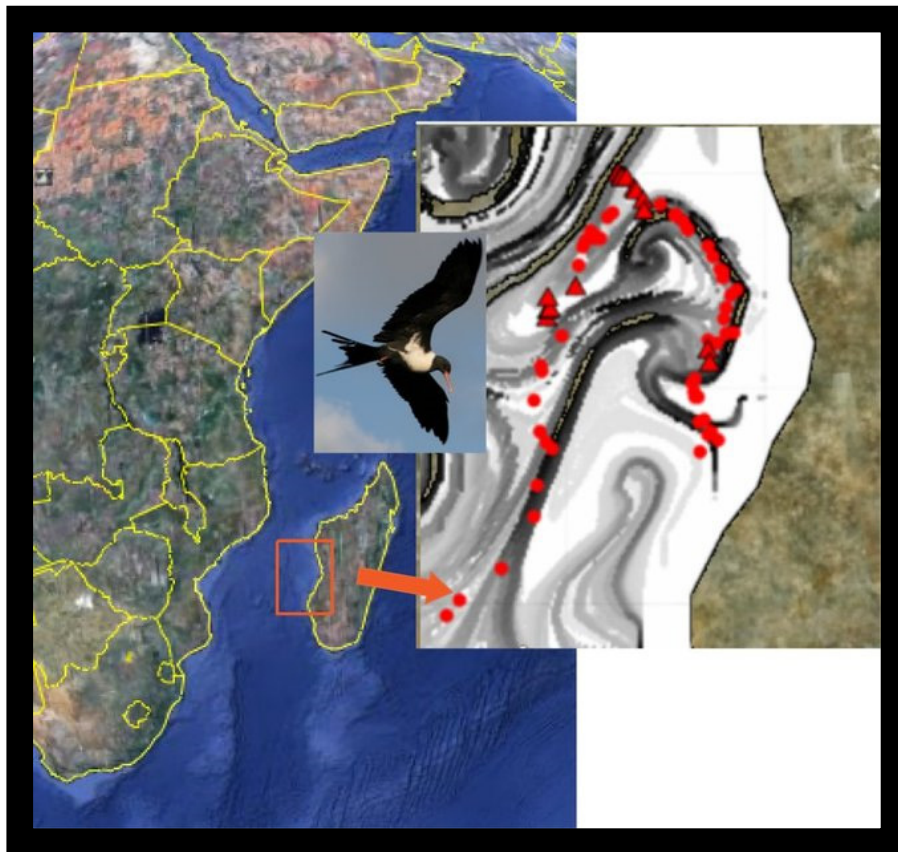
In summary, closed-loop receivers outperform significantly open-loop ones, providing better synchronization and message recovery. They allow for smaller message amplitudes thereby increasing privacy and security.

## FRIGATEBIRDS FOLLOW LYAPUNOV AVENUES IN THE SEA

**Proceedings of the National Academy of Sciences of the USA (PNAS) 106, 8245-8250**

The motion of the ocean waters is one of the important forces shaping, among others, global patterns of climate, geographical distribution of chemical substances on the seas, and also marine ecosystem composition and dynamics. It is well known that ocean turbulence at all scales affects plankton in many ways: from the global productivity patterns linked to the large-scale circulation structure, to the local enhancement, trapping, and mixing provided by mesoscale eddies and filaments. Less understood is the way in which this influence at the base of the food chain scales up through plankton consumption and consequent predation towards higher trophic levels until arriving to the higher predators.

In this study we have analyzed, in collaboration with French biologists and oceanographers, 50 trajectories of eight frigatebirds, which are top predators, equipped with transmitters and altimeters in the Mozambique Channel, southeast of Africa. Simultaneously, we have obtained from satellite images of the sea surface the ocean velocity fields, so that we can locate, by means of the so-called Lyapunov exponents technique from chaotic dynamics, the regions and lines of maximum compression, stretching, and deformation. The outcome was quite surprising: frigatebirds literally fly on top of the structures identified by the Lyapunov analysis, so that they should be using these physical structures for their navigation and fishing. These Lyapunov structures, with convoluted filamental shapes, appear as the analogous to 'ecological corridors' of terrestrial ecology.

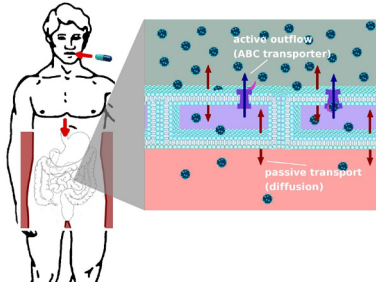


**Figure:** Flying Trajectory (red points) of a frigate-bird in the Mozambique Channel compared with filaments and lines that signal vortices and maximum deformation areas of the marine surface. (Ridges of FSLES)

## DRUG ABSORPTION THROUGH A CELL MONOLAYER: A THEORETICAL WORK ON A NON-LINEAR THREE-COMPARTMENT MODEL

European Journal of Pharmaceutical Sciences 37, 106-114

Orally administered drugs are mainly absorbed in the small intestine. Its wall is covered by a monolayer of epithelial cells which have a strong directional asymmetry: the cell wall towards the intestinal lumen has a largely increased surface area due to the microvilli and the cells are connected by tight junctions among each other. Different processes govern, and limit, the amount of the substance and the time it needs to pass from the lumen into the blood stream.



The speed at which molecules diffuse through the cell membranes is mainly determined by the lipophilicity and the concentration difference. However, in many cases this passive mechanism is accompanied by an energy consuming one: transmembrane proteins (such as P-gp) transport a broad

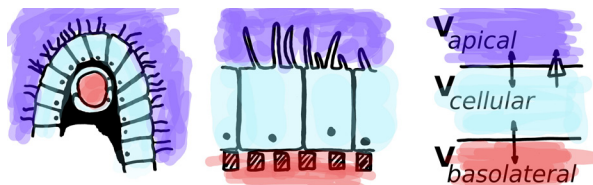
range of substances against the local gradient out of the cell. A way to study the overall absorption capabilities of a new drug is to set up a culture of epithelial cells on a permeable filter and measure the concentration evolution in the solutions above and below the filter for different drug amounts.

One possibility to study this and other processes of relevance for the Pharmaceutical Sciences is to use the so-called three-compartment-model. One assumes interconnected volumes (in this case three) and defines linear and non-linear transport in between them. The parameters (permeabilities, transporter values) should be set in accordance with the experiment. Our work performs a thorough mathematical analysis of the transport equations and it aims at facilitating the experimentalists with more precise predictions before going into the laboratory. Furthermore, with our approximate, but accurate, analytical solution we have a tool at hand to find out on how differences in the samples propagate into the statistics of the experiment. This might give a crucial insight for tackling individual differences in the responses to pharmaceutical therapies.

### **Drug Absorption Through a Cell Monolayer.**

A three-compartment model consists of three interconnected cavities. Some flux (linear or non-linear) is defined for each of the connections. The model can account for different situations, for example the measurement of absorption profiles for medical drugs in cell cultures. A volume is assigned to the liquid above the cells and one below. The third volume is the layer of cells.

Our mathematical analysis of the transport equations allows us to write them as a relaxational dynamics in a monostable potential. We are able then to obtain approximate, yet accurate, analytical

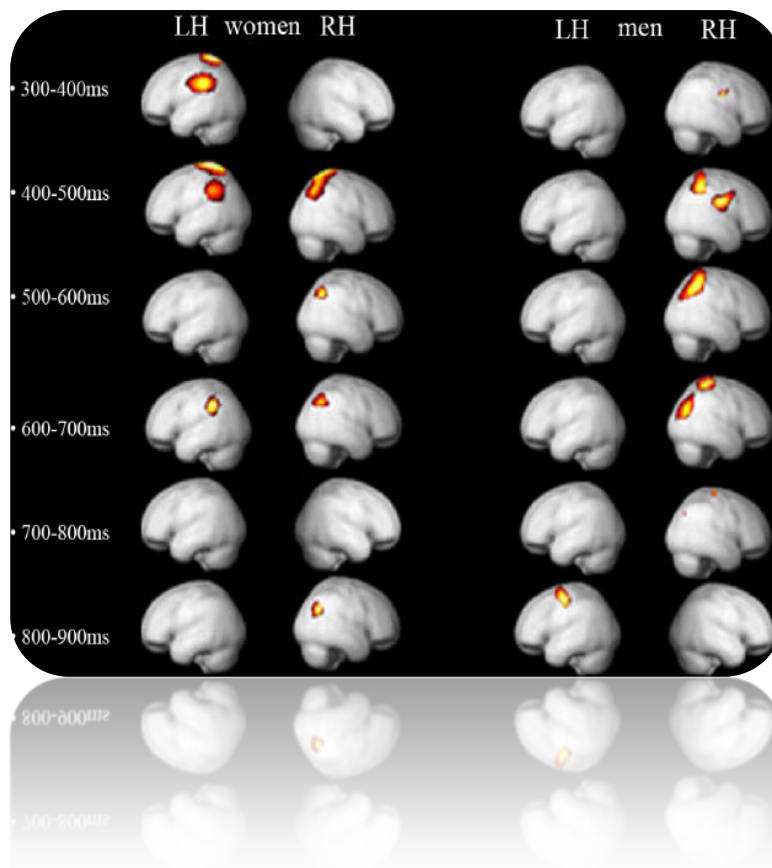


solutions which allow an easy determination of the time scale for the absorption process as well as to compute variations in the outcomes depending on the variability on the system parameters, to differentiate between oscillating or asymptotic behavior, etc. In a tight collaboration with the "Research Group on Intestinal Absorption" from the Department of Pharmaceutics, University Valencia, we have applied our results to the absorption experiments of an antibiotic (CNV97100) done by Gonzalez-Alvarez et al. (Xenobiotica, 2005) and described how sensitive to the parameters this model is for their given experimental setup.

## SEX-RELATED SIMILARITIES AND DIFFERENCES IN THE NEURAL CORRELATES OF BEAUTY

**Proceedings of the National Academy of Sciences of the USA (PNAS) 106, 3847-3852**

The capacity to appreciate beauty is one of our species' most remarkable traits. Although knowledge about its neural correlates is growing, little is known about any gender-related differences. We have explored possible differences between men and women's neural correlates of aesthetic preference. We have used magnetoencephalography to record the brain activity of 10 male and 10 female participants while they decided whether or not they considered examples of artistic and natural visual stimuli to be beautiful. Our results reveal significantly different activity between sexes in parietal regions when participants judged the stimuli as beautiful. Activity in this region was bilateral in women, whereas it was lateralized to the right hemisphere in men. It is known that the dorsal visual processing stream, which encompasses the superior parietal areas, has been significantly modified throughout human evolution. We posit that the observed gender-related differences are the result of evolutionary processes that occurred after the splitting of the human and chimpanzee lineages. In view of previous results on gender differences with respect to the neural correlates of coordinate and categorical spatial strategies, we infer that the different strategies used by men and women in assessing aesthetic preference may reflect differences in the strategies associated with the division of labour between our male and female hunter-gatherer hominin ancestors.



**Figure:** Brain areas in which activity is significantly greater for stimuli rated as beautiful rather than not beautiful by women and men during different time intervals. Bilaterally activity dominates in women and right hemisphere in men.



## MODELING APPROACH TO REGIME SHIFTS OF PRIMARY PRODUCTION IN SHALLOW COASTAL ECOSYSTEMS

**Ecological Modelling 220, 3100-3110**

Pristine coastal shallow ecosystems have usually a bottom dominated by meadows of seagrasses which trap nutrients in the water and protect the sediments, so that water quality and clarity remains high. When, by natural causes or by pollution, nutrients increase in the water column, a regime transition which could be abrupt in time may lead to a ecosystem state dominated by floating vegetation or phytoplankton, in which water turbidity is high and important amounts of organic suspended matter may decompose leading to severe ecosystem degradation. The reason for the transition is in the nonlinear feedbacks linking among others the shadowing by the suspended organisms, sediment retention by the plants, and the differential growth of the different species. Whereas the main driving force for the regime transition is the amount of nutrients, temperature and solar radiation are known to play a role.

In this work we have modeled the joint population dynamics of a seagrass (*Zostera*), macroalgae (*Ulva*) and phytoplankton, taking into account the annual cycle of temperature and light, as well as the concentrations of limiting nutrients such as ammonium and nitrates. The results show that small increases in mean temperature, illumination or in their fluctuations favor the shift towards floating vegetation and plankton dominance. Great sensitivity of the final ecosystem composition to initial conditions and perturbations is also found.

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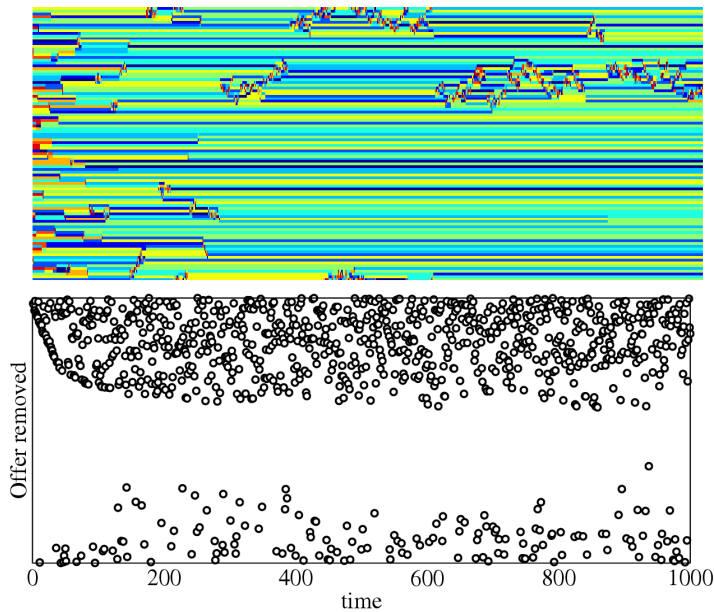


**Figure:** Left: Image of a lake of clear and blue water, close to another one in a turbid state with a large amount of suspended organic matter. Right: floating macroalgae in the Sacca di Goro lagoon, Italy.

## THE INFLUENCE OF SOCIAL STRUCTURE IN THE EVOLUTION OF ALTRUISTIC BEHAVIOR

*Advances in Complex Systems* 12, 221–232

One of the features that puzzled Darwin when writing *The origin of species* (1859) is how cooperation could survive natural selection. That is, in the presence of cooperators defectors always get a larger payoff, thus the population of cooperators should decrease until extinction. However, the empirical and experimental evidence shows systematically cooperative behavior from small societies around the world to students in developed countries. Since Darwin, the emergence of cooperation has been a topic of intense debate and many explanations have been proposed to explain it, from *kin selection* to co-evolution with the social structure [1]. To explore human behavior in this context, several games have been designed, among them, one of the simplest is the Ultimatum Game.



Two anonymous players are faced in a one shot interaction and they are offered a given amount of money. *The proposer*, Player A, makes an offer on how to split the money. He can make only one offer, which *the responder*, player B, can accept or reject. If the offer is accepted, the money is shared accordingly; if rejected, both players receive nothing. The rational way of playing indicates that the responder will accept any offer and thus the proposer should offer the minimum amount. Surprisingly, offers below 25% are not accepted, while most offers are around 50%, being this result quite uniform

across cultures. However, it seems that social structure plays an important role. In this work we explore precisely how social structure influences the evolution of altruistic behavior in the Ultimatum Game.

**Figure:** Temporal evolution of (top) the proposals (blue: 0; red: 1) and (bottom) proposal of the player with lowest payoff for a one-dimensional ring of 100 players.

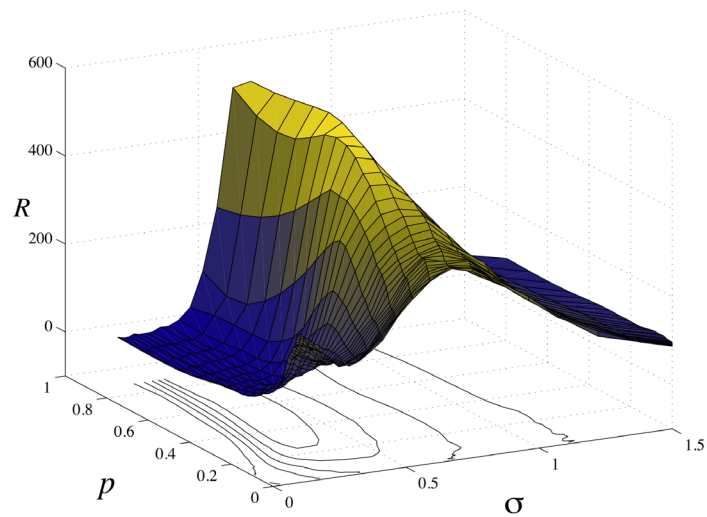
The model assigns to each player a number between 0 and 1 indicating the offer he makes and the minimum offer he accepts. After playing with his neighbors, they get a payoff. Natural selection then acts replacing the player with the lowest payoff (lowest fitness) and his neighbors with a new player with a new offer/acceptance. After several rounds, the system reaches a stationary state with a distribution of offers, and episodes of critical avalanches. Interestingly, this distribution depends on the topology of the social structure. While homogeneous topologies display distribution of offers below a critical value, broad distribution of neighbors display broad distributions of offers centered around 50%. Our simplistic approach hinders on the importance of social structure in evolutionary contexts, and in particular on the emergence of cooperation.

## DIVERSITY-INDUCED RESONANCE IN A MODEL FOR OPINION FORMATION

European Physical Journal B 71, 549-555

How do new ideas spread in a society? We argue that it is the diversity in the individual preferences that can trigger society changes induced by an external influence that would be completely inefficient for a homogenous society. Surprising at first, the fact that the right amount of diversity can enhance the response to an external forcing is not against our intuition. Think, for example, of a society that is very homogeneous in that all members of the population work on a particular economical field. If the economy tilts and that particular field becomes of less importance, it will have a big negative impact in the overall wealth of the population since individuals will not be able to follow the change. However, if there is some degree of heterogeneity and fractions of the populations work on different fields, there will be always a section that can adapt easily to the changing economy. The final ingredient that allows the whole society to follow the change is some degree of interaction by which the benefited agents can pull the others towards the new field.

In this work we consider a simple model for opinion formation in which the attitude of an individual towards a particular topic is a binary variable: against/in favor. Opinions evolve by a social pressure mechanism by which individuals adopt the opinion of the majority of their neighborhood only if (and this is the new ingredient of the model) the social pressure overcomes an internal preference threshold. Heterogeneity in the society is measured by the diversity parameter,  $s$ ,



which is nothing but the root mean standard deviation of the individual thresholds. On top of this effect, an external influence (modeling advertising, for instance) is added to the dynamical rules. Again, an individual follows the external influence only if it surpasses his preference threshold. We have considered that the network of interaction of individuals has a small-world structure with a rewiring probability  $p$ . Our results, summarized in the figure above, show that a conveniently defined resonance parameter  $R$  shows a clear maximum a function of the diversity parameter, and improves as the rewiring probability increases. This indicates that new ideas propagate better if there is some degree (neither too small not too large) of heterogeneity in the individual preferences. The microscopic mechanism is easy to understand: an external influence convinces first the individuals that were holding a contrary opinion but had an internal preference for the new idea. The mechanism of social pressure then allows this signal to propagate through a macroscopically significant proportion of the society.



## 2. PERSONNEL



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### 2.1 PERMANENT SCIENTIFIC STAFF

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

- \* **Llorenç Serra**, University Professor UIB
- \* **Tomàs Sintes**, University Professor UIB
- \* **Raúl Toral**, University Full Professor UIB
- \* **Roberta Zambrini**, CSIC Tenured Scientist



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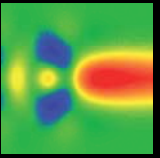
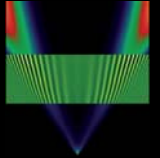

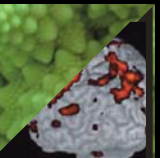

## 2.2 POSTDOCTORAL RESEARCH ASSOCIATES

- \* **Miguel C. Soriano**, Juan de la Cierva Contract
- \* **Fernando Galve Conde**, Postdoctoral Contract Project ECUSCO
- \* **Miguel Ángel García March**, Postdoctoral Contract Project ECUSCO
- \* **Gianluca Giorgi**, Juan de la Cierva Contract
- \* **Damià Gomila**, JAE-CSIC Postdoctoral Contract
- \* **Els Heinsalu**, Postdoctoral Contract Project FISICOS, Govern Balear Postdoctoral Contract since August

- \* **Adrian Jacobo**, Postdoctoral Contract Project FISICOS, UIB lecturer since October
- \* **Adolfo Paolo Masucci**, Postdoctoral Contract Project EDEN
- \* **Adrián C. Murza**, Postdoctoral Contract Project BIOSIM
- \* **Volker Nannen**, Postdoctoral Contract Project PATRES
- \* **Ernesto M. Nicola**, JAE-CSIC Postdoctoral Contract
- \* **Marco Patriarca**, Postdoctoral Contract Project BIOSIM
- \* **Pavel Paulau**, Postdoctoral Contract Project FISICOS
- \* **Miguel Pineda**, Postdoctoral Contract Project FISICOS
- \* **Alessandro Scirè**, Ramón y Cajal Postdoctoral Contract
- \* **María Ángeles Serrano**, JAE-CSIC Postdoctoral Contract
- \* **Federico Vázquez**, Juan de la Cierva Contract

## DISTRIBUTION OF SENIOR SCIENTISTS AMONG RESEARCH LINES

Participation in the lines of research during 2009 of the senior scientists is summarized in the following scheme. Every senior researcher participates in the transversal line on Complex Systems: Statistical and Nonlinear Physics. In addition, typically a senior researcher participates in one or two other focused lines. This collaborative organization provides coherence and integration as well as interaction and bridges. It is an alternative to static schemes with disjoint groups of researchers devoted exclusively to a line of research.

		MONTERRAT CASAS	PERE COLET	DAMIÀ GOMILA	INGO FISCHER	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 ZAMBIRINI
<b>COMPLEX SYSTEMS. NONLINEAR AND STATISTICAL PHYSICS</b>		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>QUANTUM PHYSICS: PHOTONS, ELECTRONS AND INFORMATION</b>		X		X									X					X
<b>NON LINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES</b>			X	X	X					X			X					X
<b>FLUID DYNAMICS, BIOFLUIDS AND GEOPHYSICAL FLUIDS.</b>						X	X				X					X		
<b>BIOLOGICAL PHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY</b>					X	X	X	X	X	X	X					X	X	
<b>DYNAMICS AND COLLECTIVE PHENOMENA OF SOCIAL SYSTEMS</b>								X				X			X		X	

## 2.3 PHD STUDENTS

- \* **José María Aparicio**, FPI Fellowship Project FISICOS
- \* **Xavier Castelló**, Govern Balear Fellowship
- \* **Ilya Ermakov**, Russian Ministry of Education Fellowship
- \* **Juan Fernández Gracia**, Govern Balear Fellowship
- \* **Luis Fernández Lafuerza**, JAE-CSIC Fellowship
- \* **Guadalupe C. García**, Fellowship Project PICASSO
- \* **Juan Carlos González Avella**, FPI Fellowship Project CONOCE2
- \* **Przemek Grabowicz**, JAE CSIC Fellowship.
- \* **Ismael Hernández**, FPI Fellowship Project FISICOS
- \* **Alejandro Herrada**, Govern Balear Fellowship
- \* **Niko Komin**, Govern Balear Fellowship
- \* **Leonardo Lyra Gollo**, FPI Fellowship Project FISICOS
- \* **María Moreno**, UIB University Teaching Assistant
- \* **Teresa Martins**, FCT Fellowship, Portugal
- \* **R. Modeste Nguimdo**, FPI Fellowship Project PhoDeCC
- \* **Toni Pérez López**, Govern Balear Fellowship
- \* **Antonio Pérez Serrano**, Govern Balear Fellowship
- \* **Vincent Rossi**, Predoctoral Contract Project OCEANTECH



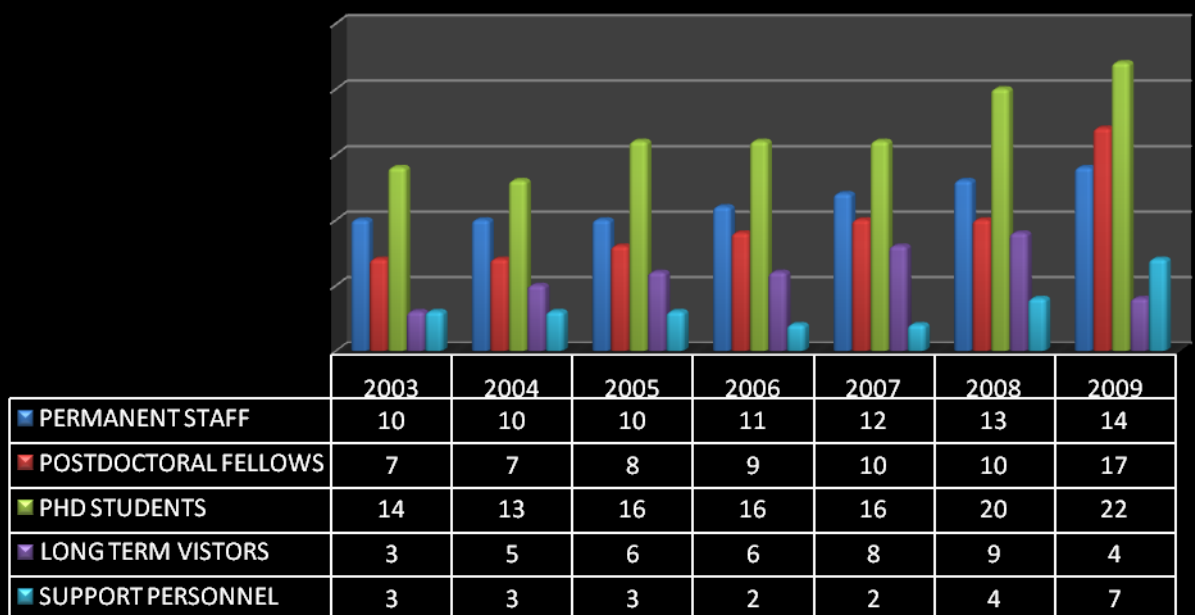
- \* **Flavio R. Ruíz Oliveras**, Fellowship Project PICASSO
- \* **Pedro A. Sánchez**, UIB University Teaching Assistant
- \* **Flora Souza Bacelar**, Govern Balear Fellowship
- \* **Murat Tugrul**, Fellowship Project EDEN

## 2.4 TECHNICAL AND ADMINISTRATIVE SUPPORT

- \* **Pep Canyelles Pericas**, Non Linear Lab Technician
- \* **Inma Carbonell**, Administration Unit Head (since December 2009)
- \* **Eduardo Herraiz**, Computing Lab Technician
- \* **Rubén Tolosa**, Computing Lab Technician
- \* **Marta Ozonas**, Secretary
- \* **Rosa María Rodríguez**, Outreach and Workshops
- \* **Neus Verdera**, Secretary (June – November)

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### HUMAN RESOURCES IFISC 2003-2009



## 2.5 STUDENT ASSISTANTS

- \* Daniel Conti
- \* Ricardo Martínez. CSIC - JAE INTRO. July and August
- \* Ana Montaner. CSIC - JAE INTRO. July and August
- \* Neus Oliver Andreu
- \* Xavier Porte Parera

## 2.6 VISITORS

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

- \* Ángel Plastino, *Universidad Nacional de La Plata, Argentina*. June and July
- \* Leonardo Molina, *Universidad de los Andes, Venezuela*. August and September
- \* Ferdinando de Pasquale, *Università degli Studi di Roma La Sapienza, Italy*. August and September
- \* Luciano Zunino, CONICET Fellowship. *Universidad de La Plata, Argentina*. November and December

### b) Short Term Visitors (< 1 month)

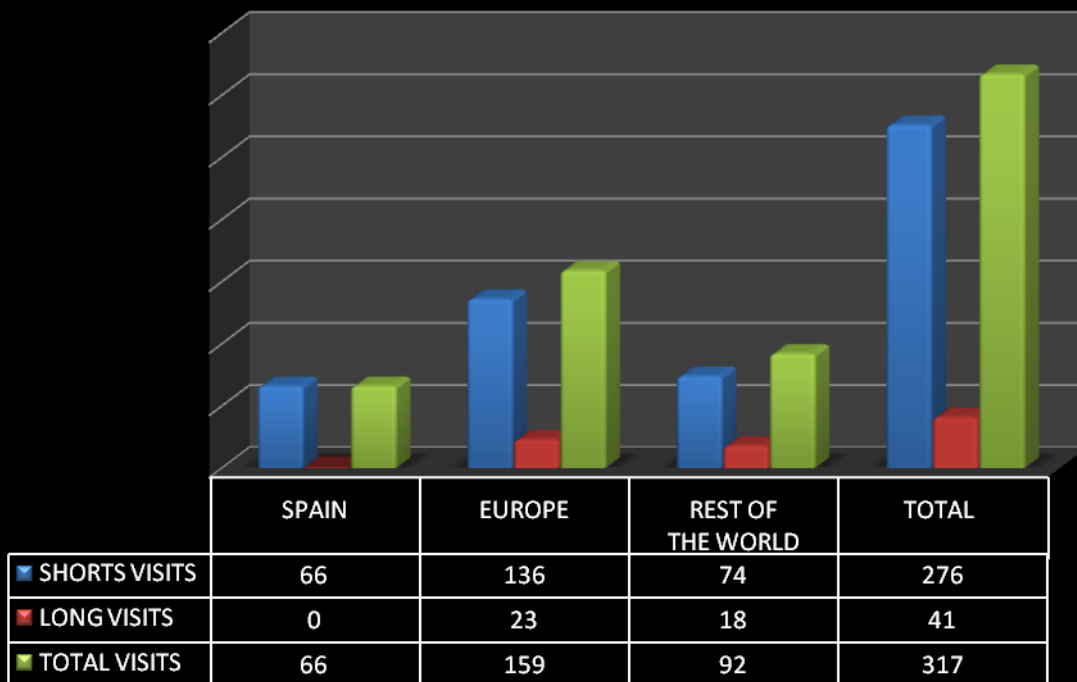
- \* Andrew Oates, *Max-Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany*. January
- \* Saúl Ares, *Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany*. January
- \* Yanne Chembo, *Université de Franche-Comté, Institut FEMTO-ST, France*. January
- \* Laurent Larger, *Université de Franche-Comté, Besançon, France*. January
- \* Maxime Jacquot, *Université de Franche-Comté, Besançon, France*. January
- \* Roman Larov, *Université de Franche-Comté, Besançon, France*. January
- \* Renaud Lambiotte, *Imperial Collage, London, England*. February

- \* **Susanna Manrubia**, *Centro de Astrobiología, INTA-CSIC, Madrid, Spain*. February
- \* **José Cuesta**, *Grupo Interdisciplinar de Sistemas Complejos, Dpto. de Matemáticas, Universidad Carlos III, Madrid, Spain*. February
- \* **Michele Catanzaro**, *Scientific Journalist, Barcelona, Spain*. February
- \* **Vincent Odent**, *Université de Lille, France*. March
- \* **Pedro Tarazona**, *Universidad Autónoma de Madrid, Spain*. March
- \* **Ulrike Feudel**, *University of Oldenburg, Germany*. March
- \* **David Bastine**, *University of Oldenburg, Germany*. April
- \* **Cornelia Denz**, *Institute für Angewandte Physik und Center for Nonlinear Science, Westfälische Wilhelms-Universität Münster, Germany*. April
- \* **Christian Holm**, *Institut für Computerphysik, Universität, Stuttgart, Germany*. April
- \* **Lennert Appeltant**, *Vrije Universiteit, Brussels, Belgium*. April
- \* **Luis Martínez**, *Instituto de Neurociencias de Alicante, Spain*. April
- \* **Satoshi Tojo**, *Japan Advanced Institute of Science and Technology, Japan*. April
- \* **Makoto Nakamura**, *Japan Advanced Institute of Science and Technology, Japan*. April
- \* **Ryuichi Matoba**, *Japan Advanced Institute of Science and Technology, Japan*. April
- \* **Michael Moskalets**, *Institute for Low temperature Physics and Engineering, Ukrainian Academy of Sciences, Ucraina*. May
- \* **Antonio Acín**, *ICFO-The Institute of Photonic Sciences, Barcelona, Spain*. May
- \* **Horacio Wio**, *Universidad de Cantabria, Spain*. June
- \* **Sheldon L. Glashow**, *Boston University, USA*. June
- \* **Henrik Jeldtoft Jensen**, *Department of Mathematics and Institute for Mathematical Sciences, Imperial Colleges London, UK*. June

- \* **Francesco Papoff**, *University of Strathclyde, Glasgow, UK*. June
- \* **Vasile Z. Tronciu**, *Technical University of Moldova, Moldavia*. June
- \* **Istvan Scheuring**, *Research Group of Ecology and Theoretical Biology, Eötvös University of Budapest, Hungary*. July
- \* **Lendert Gelens**, *Department of Applied Physics and Photonics IR/TONA, Vrije Universiteit Brussel, Belgium*. June
- \* **Damon Centola**, *Institute for Quantitative Social Science, Harvard University, USA*. July
- \* **Justin Calabrese**, *Dept. of Ecological Modelling, Centre for Environmental Research, Leipzig, Germany*. July
- \* **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*. July
- \* **Jan Danckaert**, *Université Libre de Bruxelles, Belgium*. July
- \* **Irene D'Amico**, *University of York, UK*. July
- \* **Kicheon Kang**, *Chonnam National University, South Korea*. July
- \* **Konstantin Klemm**, *Bioinformatics, University of Leipzig, Germany*. September
- \* **Lucas Lacasa**, *Centre de Recerca Matemàtica, Barcelona, y Dpto. Matemática Aplicada, ETSIA, Universidad Politécnica de Madrid, Spain*. September
- \* **Lorenzo Maccone**, *MIT - Research Laboratory of Electronics, Cambridge, USA*. October
- \* **Luca Rossi**, *Institute for Biocomputation and Physics of Complex Systems (BIFI), Zaragoza, Spain*. October
- \* **Ángel Plastino**, *Universidad de La Plata, Argentina*. October
- \* **Hans A. Braun**, *Neurodynamics Lab, Institute of Physiology, Philipps University of Marburg, Germany*. October
- \* **Daniele de Martino**, *International School for Advanced Studies SISSA and INFN, Trieste, Italy*. October
- \* **Svetlana Postnova**, *Marburg University, Germany*. October

- \* **Oxana Semyachkina-Glushkovskaya**, *Saratov State University, Russia*. October
- \* **Alberto Hernando**, *Departamento ECM, Universidad de Barcelona, Spain*. October
- \* **Jose Javier Ramasco**, *ISI Foundation, Turin, Italy*. October
- \* **Carme Torrent**, *Universitat Politècnica de Catalunya, Spain*. October
- \* **Ana María Mancho**, *IC3M, CSIC, Madrid, Spain*. October
- \* **Ramon Corbalan**, *UAB, Spain*. October
- \* **Isaac Pérez**, *Department of Mathematics, King's College London, UK*. November
- \* **Juan M.R. Parrondo**, *Universidad Complutense de Madrid, Spain*. November
- \* **Konstatin Hicke**, *TU Berlin, Germany*. November
- \* **Ángel Valle**, *Instituto de Física de Cantabria, CSIC- Univ. de Cantabria, Spain*. December
- \* **Julia Arias**, *Universidad Miguel Hernández, Elche, Alicante, Spain*. December

## VISITING SCIENTISTS AT IFISC 2003-2009





## 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”. Specific Targeted Research Projects (STREP). European Coordinator and Principal Investigator: Emilio Hernández-García. (2007-2009) Budget: 305.276 €

**PATRES: Pattern Resilience.** [FP6-2005-NEST-Path-043268] Specific Targeted Research Projects (STREP) of the Program “NEST: New Emerging Science and Technology. Call on Tackling Complexity”. European Coordinator: G. Deffuant (LISC-CEMAGREF, France). Principal Investigator: Maxi San Miguel. (2007-2010) 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”. Specific Targeted Research Projects (STREP). European Coordinator: J.García-Ojalvo (Universidad Politécnica de Cataluña). Principal Investigator: Claudio Mirasso. (2007-2009) Budget: 50.000 €.

**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”. Specific Targeted Research Projects (STREP). European Coordinator: J.García-Ojalvo (Universidad Politécnica de Cataluña). Principal Investigator: Ingo Fischer. (2009) Budget: 53.000 €.

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

**IOLOS: Integrated Optical Logic and Memory using Ultra-fast Micro-ring Bistable Semiconductors Lasers.** [IST-2005-34743] Specific Targeted Research Projects (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: Carlos Duarte, IMEDEA. Scientist in charge of work-package S2WP1 “regime modelling”: Emilio Hernández-García. (2005-2009) IFISC Budget: 126.225 €

**BIOSIM: Biosimulation, a new tool in drug development.** [LSHB-CT-2004-005137] Network of Excellence (NoE) 6<sup>th</sup> EC Framework Programme, Priority “Genomics and Biotechnology of Health”. Coordinator: Erik Mosekilde (Technical University of Denmark). Principal Investigator: Raúl Toral. (2005-2010) Budget: 217.000 €

**PHOCUS: Towards a Photonic liquid state machine based on delay-CoUpled Systems.** [FP7-ICT-2009-C-240763] Specific Targeted Research Projects (STREP). European Coordinator: Claudio Mirasso. Principal Investigators: Claudio Mirasso (UIB) and Ingo Fischer (CSIC). (2010-2012). UIB Budget: 305.261 €. CSIC Budget: 330.228 €

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

**UAS: Unmanned Aerial Systems in atmospheric research.** [COST-ES802] European COST-ACTION. European Coordinator: Joachim Reuder (University of Bergen). Principal Investigator: Damià Gomila. (2008-2012)

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

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**DeCoDicA: Delay-Coupled Diode Lasers for Photonic Applications.** [TEC2009-14101] MICINN. Principal Investigator: Ingo Fischer. (2009-2012) Budget: 236.313 €

**FISICOS: 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 €

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

**EDEN-AC. Ecological Diversity and Evolutionary Networks** [FIS2007-29087-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 €

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

**EnvFlows: Transport in Chaotic Environmental Flows.** [HH2006-0031]. Accion Integrada Hispano-Húngara. Spanish Government. Principal Investigator: Cristóbal López. (2007-2009). Budget: 8.830 €

### 3.3 OTHER IFISC RESEARCH PROJECTS

**OCEANTECH: Herramientas avanzadas para el estudio de la dinámica oceánica y la gestión medio-ambiental.** [PIF06-059] Proyecto Intramural Frontera. CSIC. 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: Victor Eguíluz. (2007- 2009) Budget: 30.000 €

**ECuSCo: Efectos cuánticos en sistemas complejos.** [PIE200850I047] Proyecto Intramural Especial. CSIC. Principal Investigator: Roberta Zambrini. (2008-2009) Budget: 30.000 €

**Estudio experimental de la dinámica de láseres acoplados con retraso en configuraciones basadas en fibra.** [200950I190] Proyecto Intramural Especial. CSIC. Principal Investigator: Ingo Fischer. (2010) Budget: 50.000 €

**AECI-AR-08: Cooperación y emergencia en sistemas complejos extendidos.** [A/018685/08]. Cooperacion Internacional AECI. Ministerio Asuntos Exteriores. Principal Investigator: Raúl Toral. (2009) Budget: 3.000 €

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### 3.4 RESEARCH PROJECTS WITH PARTICIPATION OF IFISC MEMBERS

**T2CNI: Transporte cuantico en nanoestructuras e informacion cuantica.** [FIS2008-00781]. Plan Nacional de I+D+I. IFISC Participating Scientists: Llorens Serra and Montserrat Casas. (2009-2011).

**RiaFormosaFCT: Genetica paisagistica duma lagoa costeira; uma abordagem empirica e de modelaçao usando a erva marinha *Zostera noltii* in Ria Formosa.** [PTDC/MAR/099887/200] Proyecto de Investigaçao Cientifica e Desenvolvimento Tecnológico. Fundação para a Ciencia e a Tecnologia (FCT, Portugal). Coordinator: Filipe Alberto. IFISC Participating Scientists: Emilio Hernández García and Victor Eguíluz. (2010-2013)

**MARBEF: Marine Biodiversity and Ecosystem Functioning.** [GOCE-2003-505446] Network of Excellence (NoE). Principal Investigator: C. M. Duarte. IFISC Participating Scientist: Tomàs Sintès. (2004-2009)

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

**SOCIONET: Dinamica y fenomenos colectivos en sistemas socioeconomicos.** [FIS2008-01155-E/FIS] Complementary Action, Spanish Government. Coordinator: A. Sánchez (Universidad Carlos III). IFISC Principal Investigator: Maxi San Miguel. (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. (2006-2009)

### 3.5 OTHER FUNDING

**FISICOS Project Technician.** [PTAT2008-00895]. Spanish Government. Principal Investigator: Maxi San Miguel. (2008-2013) Budget: MICINN 78.000 € and Balear Government: 29.400 €

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

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

**EXPLORANT: Explorant les Fronteres entre els Sabers II.** [AAEE0070/08] Acciones Especiales. Balear Government. Principal Investigator: Claudio Mirasso. (2009-2009) Budget: 2.500 €

**TCS "09-10": Trends in Complex Systems** 2009-10. Workshop Program with MPIPKS Dresden. Balear Government. Principal Investigator: Maxi San Miguel. (2009-2011) Budget: 120.000 €

**GrupInterdisGovern2006: Grupo de investigación competitivo de Física Interdisciplinar.** [PCTIB-2005GC4-05]. Ajuda a la investigació. Balear Government. Principal Investigator: Maxi San Miguel. (2006-2009). Budget: 48.000 €

**CSIC Strategic Plan Equipment.** (2009). Budget: 90.000 **InfraUIB 09: Analizador de espectros en tiempo real.** [UNBB08-4E-009] Infraestructura MICINN-UIB. Principal Investigator: Claudio Mirasso. (2009) Budget: 69.639 €

**InfraCSIC 09: Osciloscopio de fósforo digital 16GHz, 4 canales independientes.** Infraestructura MICINN-CSIC. (2009) Budget: 45.000 €

**Ciudad Europea de la Ciencia y la Innovación 2010.** [FCT-09-1622] FECYT. Principal Investigator: Claudio Mirasso. (2009-2010) Budget: 20.000 €

**Grid CSIC.** Equipo de cálculo del Grid CSIC. Principal Investigator: Pere Colet. (2009) Budget: 283.125,21 €

### 3.6 SUMMARY OF IFISC FUNDING 2003-2009

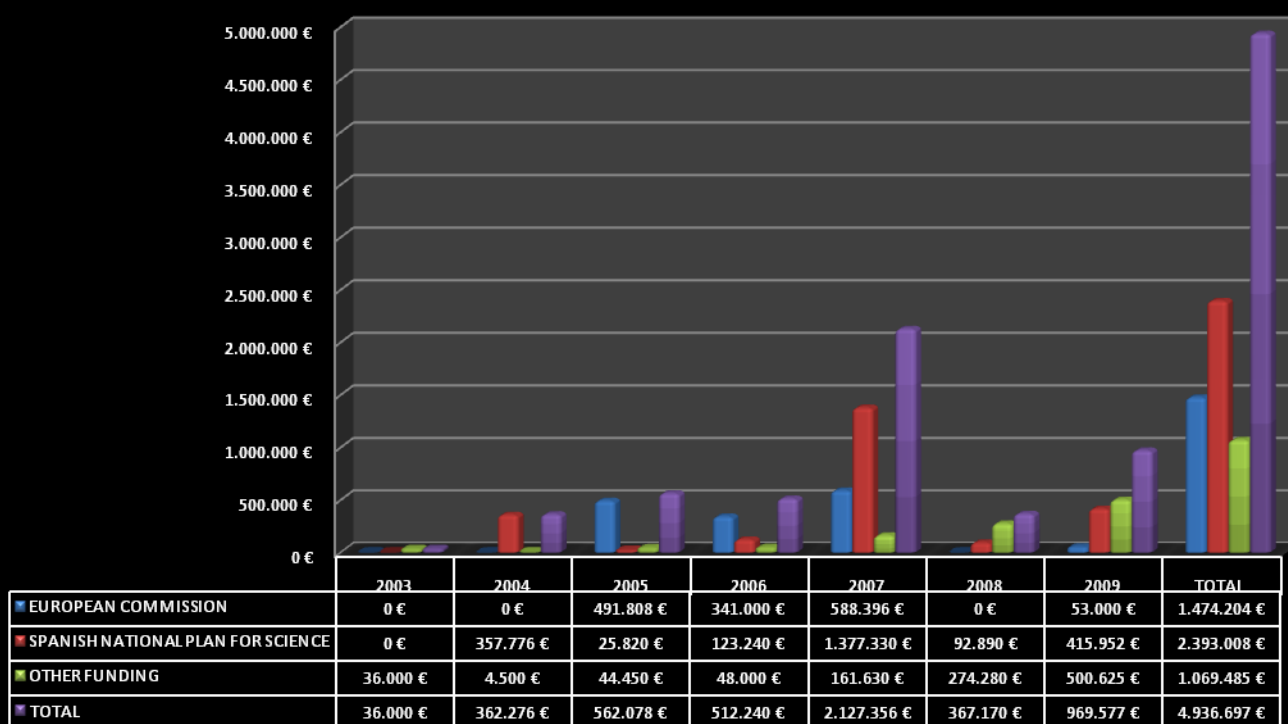
- \* **European Commission Framework Program projects:** 8 (EDEN, PATRES, GABA, PICASSO, IOLOS, THRESHOLDS, PHYSBIO, PHOCUS)
- \* **European Networking:** 4 EC-FP networks (BIOSIM, EUR-OCEANS, ONCECS, MARBEF), 3 European COST Actions, 1 ESF Program
- \* **Spanish National Plan:**
  - 8 Research Projects
  - 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 actions
- \* **Regional Balear Government:** 2 research projects, 3 “group of excellence”, and other funding

#### BUDGETS:

- Grand total budget of projects granted in 2003-09: **4.936.697 €.**
- Grand total budget of active projects in 2009: **4.130.720 €**
- Budget of EC-funded active projects in 2009: **32 % of total**

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#### BUDGET IFISC'S RESEARCH PROJECTS 2003-2009





## 4. IFISC SEMINARS

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



Pablo San José (University of Lancaster, UK)

**Pseudospintronics in bilayer graphene**

January 1

Miguel Pineda (IFISC, UIB-CSIC, Spain)

**External noise in surface reactions**

January 22

Xabier Barandiaran (Autonomous Systems Laboratory - U. Politécnica de Madrid, Spain)

**From Life to Cognition, the evolution of agency and the emergence of mental life**

January 27

Pere Colet (IFISC, UIB-CSIC, Spain)

**IFISC computer network**

January 30

Emilio Hernández-García (IFISC, UIB-CSIC, Spain)

**Clusters, exclusion and patterns in models of species competition**

February 4

Pere Colet (IFISC, UIB-CSIC, Spain)

**IFISC computer network 2**

February 6

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

**Delayed coupling theory of vertebrate segmentation**

February 9

Andrew C. Oates (Max-Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany)

**Communication between oscillating cells regulates the period of embryonic morphogenesis**

February 10

Laurent Larger (Université de Franche-Comté, Besançon, France)

**Electro-optic delay dynamics for fiber optics communications applications**

February 12

Renaud Lambiotte (Imperial College, London, UK)

**Dynamics and Modular Structure in Networks**

February 23

Michele Catanzaro (Scientific Journalist, Spain)

**Science & Science Journalism: a feedback loop**

February 25

Susanna C. Manrubia (Centro de Astrobiología, INTA-CSIC, Madrid, Spain)

**Stochastic extinction of viral infectivity through the action of defectors**

February 25

Cristóbal López (IFISC, UIB-CSIC, Spain)

**Oceanic mixing studies from satellite data**

March 4

Pedro Tarazona (Universidad Autónoma de Madrid, Spain)

**Self-organization of curved living-polymers: FtsZ protein filaments**

March 24

Cornelia Denz (Institut für Angewandte Physik und Center for Nonlinear Science, Westfälische Wilhelms-Universität Münster, Germany)

**Adaptive and reconfigurable nonlinear photonics - structuring and controlling light by light**

April 2

Adrian Jacobo (IFISC, UIB-CSIC, Spain)

**Spatial Structures and Information Processing in Nonlinear Optical Cavities**

April 3

Christian Holm (Institut für Computerphysik, Universität Stuttgart, Germany)

**Charged Soft Matter in Motion - How to Deal with Electrohydrodynamical Problems**

April 7

Elsa Prada (Universidad de Lancaster, UK)

**Pseudodiffusive magnetotransport in graphene**

April 8

Xavi Castelló (IFISC, UIB-CSIC, Spain)

**Ordering dynamics with two non-excluding options: the effects of community structure in language competition models**

April 22

Rok Zitko J. Stefan (Institute, Ljubljana, Slovenia)

**Magnetic properties of single atoms and nanostructures on metal surfaces**

23 de Abril

Luis Martínez Otero (Instituto de Neurociencias de Alicante, Spain)

**How the cat's thalamus changes what the cat's retina tells the cat's brain**

April 29

Toni Pérez (IFISC, UIB-CSIC, Spain)

**Effects of topology and delayed connections in a neuronal network**

May 6

Romain Modeste Nguimdo (IFISC, UIB-CSIC, Spain)

**Electro-optic delay oscillators: intensity and phase modulation dynamics and synchronization**

May 13

Michael Moskalets (Institute for Low temperature Physics and Engineering, Ukrainian Academy of Sciences, Ucraina)

**Dissipation to fluctuation relation for a dynamical single channel quantum capacitor**

May 18

Antonio Acín (ICFO-The Institute of Photonic Sciences, Barcelona, Spain)

**Quantum correlations and device-independent quantum information protocols**

May 20

Alejandro Herrada (IFISC, UIB-CSIC, Spain)

**Allometric scaling in phylogenies: from genes to species?**

May 27

Gian-Luca Giorgi (IFISC, UIB-CSIC, Spain)

**Ground-state factorization and quantum phase transition in spin chains**

June 3

Horacio Wio (Universidad de Cantabria, Spain)

**Efficient search by optimized intermittent random walks**

June 10

Sheldon. L. Glashow (Boston University, USA)

**Round table discussion on present and future challenges, opportunities and possible failures of Physics**

June 11

Henrik Jeldtoft Jensen (Department of Mathematics and Institute for Mathematical Sciences, Imperial Colleges London, UK)

**Evolution and dynamics of and on networks, and its relation to network structure**

June 16

Juan Carlos González (IFISC, UIB-CSIC, Spain)

**Spontaneous ordering against an external field in nonequilibrium systems**

June 17

Francesco Papoff (University of Strathclyde, Glasgow, UK)

**Light, entropy and nanoparticles**

June 24

Istvan Scheuring (Research Group of Ecology and Theoretical Biology, Eötvös University of Budapest, Hungary)

**Plankton bloom controlled by horizontal stirring**

July 2

Irene D'Amico (University of York, UK)

**LDA Entanglement in two-electron systems**

July 3

Alessandro Scire (IFISC, UIB-CSIC, Spain)

**Semiconductor Ring Laser dynamics**

July 8

Kicheon Kang (Chonnam National University, South Korea)

**Quantum mechanics helps efficient charge detection**

July 14

Angel Plastino (Universidad Nacional de La Plata, Argentina)

**Optical indicators of non-classicality**

July 22

Pere Colet and Gianluca Giorgi (IFISC, UIB-CSIC, Spain), Jose María Sancho (Univ. Barcelona, Spain)

**IFISC Seminar Session of devoted to. F. de Pasquale scientific contributions**

September 1

Murat Tugrul (IFISC, UIB-CSIC, Spain)

**Simple Branching Models for Macroevolution**

September 3

Toni Pérez (IFISC, UIB-CSIC, Spain)

**Dynamics and Synchronization in Neuronal Models**

September 7

Fernando Galve (IFISC, UIB-CSIC, Spain)

**How to entangle two objects at room temperature**

September 16

Lucas Lacasa (Centre de Recerca Matemàtica, Barcelona, and Dpto. Matemática Aplicada, ETSIA, Universidad Politécnica de Madrid, Spain)

**Mapping time series to complex networks: the visibility algorithm**

September 23

Lorenzo Maccone (MIT - Research Laboratory of Electronics, Cambridge, USA)

**How can you answer correctly without knowing what the question was? The quantum RAM and its use in the QPQ protocol**

October 1

Luigi Agnati (Department of BioMedical Sciences, University of Modena and Reggio Emilia, Italy)

**The neurobiological basis of the Ewig-Weibliche Theory (Plasticity and the Brain)**

October 6

Francisco Mora (Department of Molecular Physiology and Biophysics, University of Iowa, USA)

**Cerebro, plasticidad y envejecimiento (Plasticity and the Brain)**

October

Llorens Serra (IFISC and Departament de Física, UIB, Spain)

**Conductance of tubular nanowires with disorder**

October 7

Luca Rossi (BIFI, Zaragoza, Spain)

**Application of Poincaré recurrences to the study of mixed dynamical systems**

October 14

Hans A. Braun (Neurodynamics Lab, Institute of Physiology, Philipps University of Marburg, Germany)

**Oscillation, Chaos and Noise: From Shark Electroreceptors to Mental Disorders**

October 15

Daniele de Martino (International School for Advanced Studies SISSA and INFN, Trieste, Italy)

**Statistical mechanics of congestion**

October 21

Alberto Hernando (Departamento ECM, Universidad de Barcelona, Spain)

**Fisher-based thermodynamics applied to social systems**

October 28

Jose Javier Ramasco (ISI Foundation, Turin, Italy)

**Statistical significance of communities in networks**

October 29

María Moreno (IFISC, UIB-CSIC, Spain)

**Photonic Crystals acting on Instabilities and Squeezed states in OPOs**

November 4

Isaac Pérez (Department of Mathematics, King's College London, UK)

**Spectral density of random graphs with topological constraints**

November 11

Juan M.R. Parrondo (Universidad Complutense de Madrid, Spain)

**A (linear response) theory of everything**

November 12

Adrian Jacobo (IFISC, UIB-CSIC, Spain)

**Python for Scientist II - Graphical Interfaces**

November 17

Antonio Pérez (IFISC, UIB-CSIC, Spain)

**Multimode Dynamics in Ring Lasers**

November 18

Konstatin Hicke (TU Berlin, Germany)

**Stability of synchronized states in delay coupled lasers**

November 19

Federico Vázquez (IFISC, UIB-CSIC, Spain)

**The savanna problem from a Statistical Physics point of view**

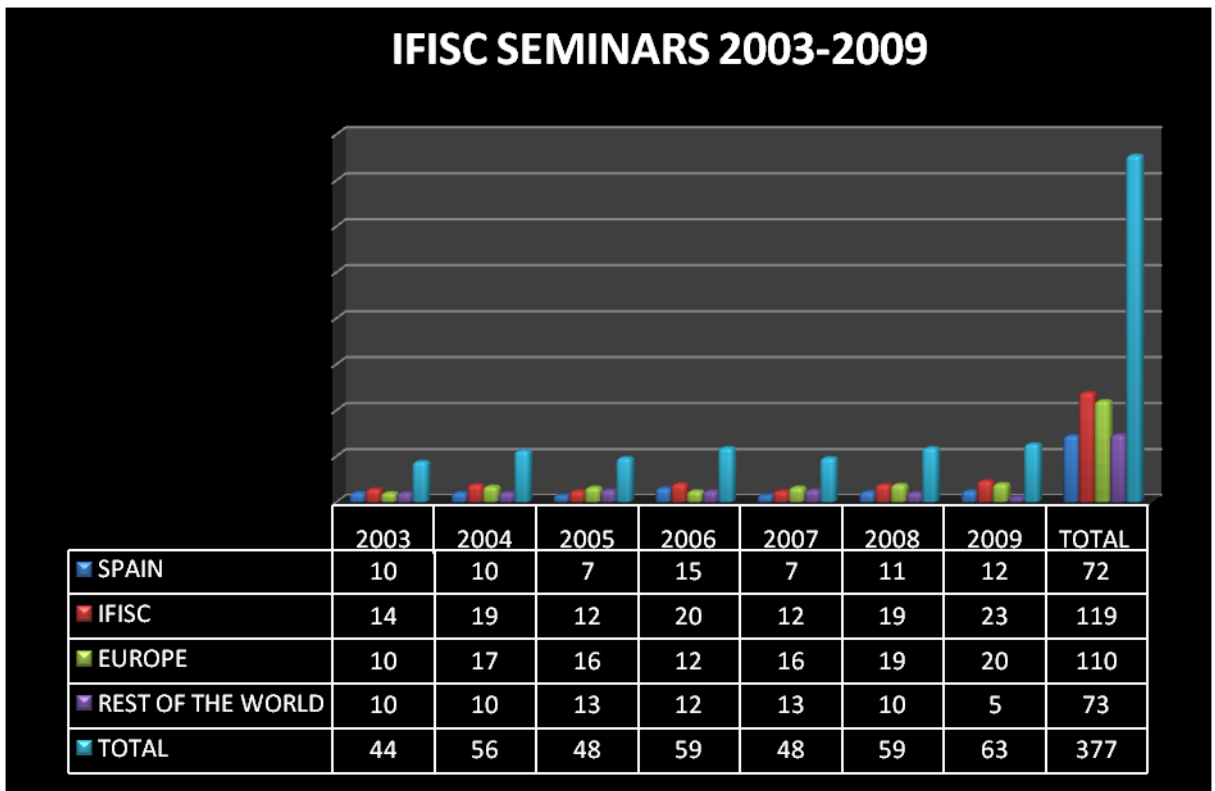
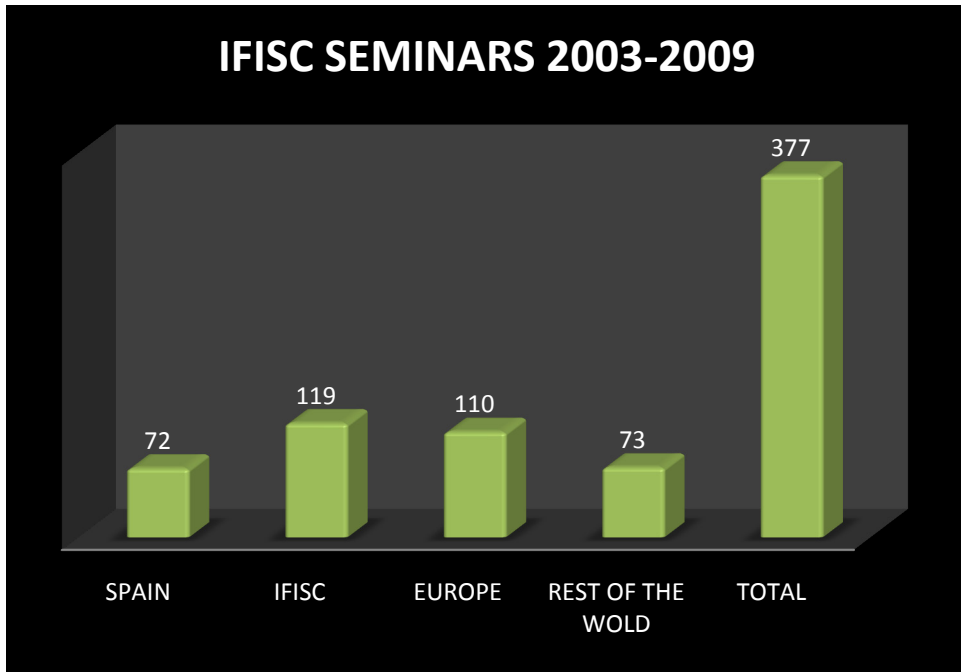
December 2

Ernesto Nicola (IFISC, UIB-CSIC, Spain)

**A simple mechanism for spontaneous and induced cell polarization during  
Asymmetric cell division**

December 16







## 5. PUBLICATIONS

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

### 5.1 ISI PUBLICATIONS

#### 5.1 A) JCR JOURNALS

##### [Top marine predators track Lagrangian coherent structures](#)

*Tew Kai, E.; Rossi, V.; Sudre, J.; Weimerskirch, H.; López, C.; Hernández-García, E.; Marsac, F.; Garçon, V.*  
 Proceedings of the National Academy of Sciences of the USA (PNAS) **106**, 8245-8250

##### [Extracting the multiscale backbone of complex weighted networks](#)

*Serrano, M. Ángeles; Boguñá, Marián; Vespignani, Alessandro*  
 Proceedings National Academy of Sciences USA **106**, 6483-6488

##### [Reply to Slater: Extracting the backbone of multiscale networks](#)

*Serrano, M. Ángeles; Boguñá, Marian; Vespignaini, Alessandro*  
 Proceedings National Academy Sciences USA **106 (26)**, E67

##### [Sex-related similarities and differences in the neural correlates of beauty](#)

*Cela-Conde, C. J.; Ayala, F. J.; Munar, E.; Maestú, F.; Nadal, M.; Capó, M. A.; del Río, D., Juan J. López-Ibor, J.; Ortiz, T.; Mirasso, C. R.; Marty, G.*  
 Proceedings of the National Academy of Sciences, USA (PNAS) **106**, 3847-3852

##### [A variational principle for the Pareto power law](#)

*Chakraborti, Anirban; Patriarca, Marco;*  
 Physical Review Letters, **103**, 228701 (1-4)

##### [Self-Tuned Critical Anti-Hebbian Networks](#)

*Magnasco, Marcelo O.; Piro, Oreste; Cecchi, GA*  
 Physical Review Letters, **102**, 258102

##### [An Intersegmental Neuronal Architecture for Spinal Wave Propagation under Deletions](#)

*Pérez, Toni; Tapia, Jesus; Mirasso, Claudio; García-Ojalvo, Jordi; Quevedo, Jorge; Cuellar, Carlos; Manjarrez, Elías*  
 Journal of Neuroscience **29**, 10254-10263

##### [Ecological Thresholds and Regime Shifts: from theory to operation](#)

*Andersen, Tom; Carstensen, Jacob; Hernández-García, Emilio; Duarte, Carlos*  
 Trends in Ecology and Evolution **24**, 49-57

[Active dendrites enhance neuronal dynamic range](#)

*Gollo, L. L.; Kinouchi, O.; Copelli, M.*

PLoS Computational Biology **5**(6): e1000402

[Modeling approach to regime shifts of primary production in shallow coastal ecosystems](#)

*Zaldívar, J.M.; Bacelar, F.S.; Dueri, S.; Marinov, D.; Viaroli, P.; Hernández-García, E.*

Ecological Modelling **220**, 3100-3110

[Drug absorption through a cell monolayer: A theoretical work on a non-linear three-compartment model](#)

*Komin, Niko; Toral, Raúl*

European Journal of Pharmaceutical Sciences **37**, 106-114

[Effects of microstructures on mesoscopic morphological transitions in deposition growth models](#)

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

Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science **465**, 3875-3884

[Spherical brushes within spherical cavities: A self-consistent field and Monte Carlo study.](#)

*Cerdà, J.J.; Sintès, T.; Toral, R.*

Journal of Chemical Physics **131**, 134901

[External noise-induced phenomena in CO oxidation on single crystal surfaces](#)

*M. Pineda and R. Toral*

Journal of Chemical Physics **130**, 124704 (1-7)

[Optimized electron propagation on a quantum chain by a topological phase](#)

*Paganelli, S; Giorgi, G. L., de Pasquale, F.*

Fortschritte der Physik **57**, 1094-1102

[Entanglement and symmetry effects in the transition to the Schrödinger cat regime](#)

*de Pasquale, Ferdinando; Giorgi, Gian Luca; Zannetti, Marco*

Fortschritte der Physik **57**, 1111-1120

[Noise Spectra of a semiconductor ring laser in the bidirectional regime](#)

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

Physical Review A **80**, 043843 (1-7)

[Drifting instabilities of cavity solitons in vertical-cavity surface-emitting lasers with frequency-selective feedback](#)

*Paulau, P.V.; Gomila, D.; Colet, P.; Matías, M.A.; Loiko, N.A.; Firth, W.J.*

Physical Review A **80**, 023808 (1-8)

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

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

Physical Review A **79**, 063618 (1-5)

**Lasers with nonlocal feedback, diffraction, and diffusion**

*Papoff, Francesco; Zambrini, Roberta*

Physical Review A **79**, 033811 (1-8)

**Typical features of the Mintert-Buchleitner lower bound for concurrence.**

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

Physical Review A **79**, 022112 (1-6)

**Robustness of highly entangled multiqubit systems under decoherence.**

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

Physical Review A **79**, 022108 (1-7)

**Controlling the emission properties of multimode vertical-cavity surface-emitting lasers via polarization- and frequency-selective feedback**

*Kouomou Chembo, Y.; Mandre, Shyram K; Fischer, Ingo; Elsässer, Wolfgang and Colet, P.*

Physical Review A **79**, 013817 (1-10)

**Ground state factorization and quantum phase transition in dimerized spin chains**

*Giorgi, Gian Luca*

Physical Review B **79**, 060405(R)(1-4)

**Localized magnetic states in Rashba dots**

*Crisan, M; Sánchez, D; López, R; Serra, L; Grosu, I*

Physical Review B, **79**, 125319 (1-7)

**Residential segregation and cultural dissemination: An Axelrod-Schelling model**

*Gracia-Lázaro, C.; Lafuerza, L.F.; Floría, L.M.; Moreno, Y.*

Physical Review E **80**, 046123 (1-5)

**Fractional Fokker-Planck subdiffusion in alternating force fields**

*Heinsalu, Els; Patriarca, Marco; Goychuk, Igor; Hänggi, Peter*

Physical Review E **79**, 041137

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

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

Physical Review E **79**, 016109 (1-8)

**Predict-prevent control method for perturbed excitable systems***Ciszak, Marzena; Mirasso, Claudio; Toral, Raúl; Calvo, Oscar*Physical Review E **79**, 046203 (1-5)**RED: A Set of Molecular Descriptors Based on Renyi Entropy***Delgado-Soler, Laura; Toral, Raúl; Santos Tomás, M.; Rubio-Martínez, Jaime*Journal of Chemical Information and Modeling **49**, 2457-2468**Performance of encryption schemes in chaotic optical communication: A multifractal approach***Zunino, Luciano; Soriano, Miguel C.; Figliola, Alejandra; Pérez, Dario G.; Garavaglia, Mario; Mirasso, Claudio R.; Rosso, Osvaldo A.*Optics Communications **282**, 4587-4594**Network effects in a human capital based economic growth model***Vaz Martins; T., Santos, M.A.; Araújo, T. and St. Aubyn, M.*Physica A **388**, 2207-2214**Conservation laws for voter-like models on random directed networks***Serrano, M. Ángeles; Klemm, Konstantin; Vázquez, Federico; Eguíluz, Victor M.; San Miguel, Maxi*Journal of Statistical Mechanics: Theory and Experiment, **P10024****Mapping stochastic processes onto complex networks***Shirazi, A. H. ; Reza Jafari, G.; Davoudi, J; Peinke, J.; Reza Rahimi Tabar M.; Sahimi Muhammad*Journal of Statistical Mechanics-Theory and Experiment, **P07046****Noisy continuous-opinion dynamics***M. Pineda, R. Toral and E. Hernández-García*Journal of Statistical Mechanics: Theory and Experiment, **P08001**, (1-18)**Surface mixing and biological activity in the four Eastern Boundary Upwelling Systems***Rossi, Vincent; López, Cristóbal; Hernández-García, Emilio; Sudre, Joel; Garçon, Veronique; Morel, Yves*Nonlinear Processes in Geophysics **16**, 557-568**Gradual learning and the evolution of cooperation in the spatial continuous prisoner's dilemma***Jiménez, Raúl; Lugo, Hayde; San Miguel, Maxi*European Physical Journal B **71**, 273-280**Stochastic resonance in bistable confining potentials***Heinsalu, Els; Patriarca, Marco; Marchesoni, Fabio*European Physical Journal B **69**, 19

[Consensus and ordering in language dynamics](#)

Xavier Castelló, Andrea Baronchelli, Vittorio Loreto  
European Physical Journal B **71**, 557-564

[Divide and conquer: resonance induced by competitive interactions](#)

Vaz Martins, Teresa; Toral, Raúl; Santos, M.A.  
European Physical Journal B **67**, 329-336

[Diversity-induced resonance in a model for opinion formation](#)

Tessone, Claudio Juan; Toral, Raúl  
European Physical Journal B, **71**, 549–555

[Conductance of tubular nanowires with disorder](#)

Serra, L.; Choi, M.S.  
European Physical Journal B, **71**, 97-103

[Multifractal detrended cross-correlation analysis of temporal and spatial seismic data](#)

Shadkhoo, S.; Jafari, G. R.  
European Physical Journal B **72**, 679-683

[Information Encoding and Decoding Using Unidirectionally Coupled Chaotic Semiconductor Lasers Subject to Filtered Optical Feedback](#)

Ruiz-Oliveras, F.; Soriano, M. C.; Colet, P.; Mirasso, C. R.  
IEEE Journal of Quantum Electronics **45**, 962-968

[Determination of Phase Noise Spectra in Optoelectronic Microwave Oscillators: a Langevin Approach](#)

Chembo Kouomou, Yanne; Volyanskiy, Kirill; Larger, Laurent; Rubiola, Enrico; Colet, Pere  
IEEE Journal of Quantum Electronics **45**, 178-186

[Theoretical Analysis of a New Technique for Inertial Rotation Sensing Using a Semiconductor Ring Laser](#)

Pérez-Serrano, A; Scirè, A;  
IEEE Photonics Technology Letters **21**, 917-919

[Security Implications of Open- and Closed-Loop Receivers in All-Optical Chaos-Based Communications](#)

Soriano, M. C.; Colet, P.; Mirasso, C. R.  
IEEE Photonics Technology Letters, **21**, 426-428

[Controlling the unstable emission of a semiconductor laser subject to conventional optical feedback with a filtered feedback branch](#)

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

Optics Express **17**, 8749-8755

[Universal fluctuations in subdiffusive transport](#)

*Sokolov, Igor M.; Heinsalu, Els; Hänggi, Peter; Goychuk, Igor*

Europhysics Letters **86**, 30009

[Critical behavior in an evolutionary Ultimatum Game with social structure](#)

*Eguíluz, Víctor M.; Tessone, Claudio J.*

Advances in complex systems **12**, 221-232

[Fluid Dynamics in Developmental Biology: Moving Fluids that Shape Ontogeny](#)

*Cartwright, Julyan H. E.; Piro, Oreste; Tuval, Idan*

HFSP Journal (Solicited Review) **3**, 77-93

[Species competition: coexistence, exclusion and clustering](#)

*Hernández-García, Emilio; López, Cristóbal; Pigolotti, Simone; Andersen, Ken H.*

Philosophical Transactions of the Royal Society A **367**, 3183-3195

[Beyond the nearest neighbor Zimm - Bragg model for helix - coil transition in peptides](#)

*Adrian Murza, Jan Kubelka*

Biopolymers **91 (2)**, 120-131

[Joint effects of nutrients and contaminants on the dynamics of a food chain in marine ecosystems](#)

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

Mathematical Biosciences **218**, 24-32

[Diversity-induced resonance in a system of globally coupled linear oscillators](#)

*Toral, Raúl; Hernández-García, Emilio; Gunton, James D.*

International Journal of Bifurcation and Chaos, **19**, 3499-3508

[Comparison between Eulerian diagnostics and Finite-Size Lyapunov Exponents computed from Altimetry in the Algerian basin](#)

*d'Ovidio, F; Isern-Fontanet, J; López, C; Hernández-García, E; García-Ladona, E*

Deep-Sea Research I **56**, 15-31

## 5.1 b) OTHER ISI PUBLICATIONS

### [Landauer's Principle and Divergenceless Dynamical Systems.](#)

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

Entropy, vol. 11, 586-597

### [Comment on 'Equiprobability, Entropy, Gamma Distributions and Other Geometrical Questions in Multi-Agent Systems'](#)

Toral, Raúl

Entropy, 11, 1121-1122

### [Information, Deformed kappa-Wehrl Entropies and Semiclassical Delocalization](#)

Pennini, F; Plastino, A; Ferri, GL; Olivares, F; Casas, M

Entropy, vol. 11, 32-42.

### [Generalized Complexity and Classical-Quantum Transition](#)

Kowalski, AM; Plastino, A; Casas, M

Entropy, vol. 11, 111-124

### [Collective Phenomena in Complex Social Networks](#)

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

Applications of Nonlinear Dynamics Model and Design of Complex Systems (In, Visarath; Longhini, Patrick; Palacios, Antonio, eds) **XII**, Springer Verlag, 189-200

47

### [Resonance Induced by Repulsive Links](#)

Vaz Martins, Teresa; Toral, Raúl

Applications of Nonlinear Dynamics - Model and Design of Complex Systems (In, Visarath; Longhini, Patrick; Palacios, Antonio, eds) **XII**, Springer Verlag, 439-444

### [Modal Structure of Integrated Semiconductor Ring Lasers with Output Waveguides](#)

Pérez-Serrano, A.; Furst, S.; Scire, A.

IEEE 21<sup>st</sup> International Semiconductor Laser Conference (129-130)

### [Control of spatial instabilities with intracavity photonic crystals](#)

Gomila, D; Moreno, M; Zambrini, R

2009 IEEE/LEOS WINTER TOPICALS MEETING SERIES (144-145) (WTM 2009)

## 5.2 BOOKS

### [Chemical and Biological Processes in Fluid Flows: A Dynamical Systems Approach](#)

Neufeld, Zoltan; Hernández-García, Emilio

Imperial College Press

ISBN/ISSN: 978-1-86094-699-8 / 1-86094-699-2





### Coherent Behavior in Neuronal Networks

*Josic, Kresimir; Rubin, Jonathan; Matías, Manuel A.; Romo, Ranulfo (editors)*

Springer Series in Computational Neuroscience. Vol. 3.

ISBN: 978-1-4419-0388-4 (Print) 978-1-4419-0389-1 (Online)

## 5.3 BOOK CHAPTERS

### Problems of Social Consensus: Voting , Language, Culture...

*Maxi San Miguel*

Cultures of Change. Social Atoms and Electronic Lives, Actar and Arts Santa Mònica, 60-61

### Far in space and yet in synchrony: neuronal mechanisms for zero-lag long-range synchronization

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

Coherent Behavior in Neuronal Networks, Springer, 143-168

## 5.4 OTHER PUBLICATIONS

### Can fMRI Alone Identify Functional Connectivity in the Brain?

*Cela-Conde, C.; Maestu, F.; Mirasso, C.; Munar, E.; Nadal, M.*

Science, e-letter Response. **Vol. 324**, 605. SSN 0036-8075

<http://www.sciencemag.org/cgi/eletters/324/5927/605#12259>

### Divergences in the 2-qubits space: Werner and thermal states

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

Applied Mathematical Physics, **Vol. 3**, no. 21-24, 1041-1059.

### Novel Integrated Tunable Laser using Filtered Feedback for simple and very fast tuning

*Docter, Boudewijn; Pozo, Jose; Karouta Fouad; Beri, Stefano; Ermakov, Ilya; Danckaert, Jan; Smit, Meint*

35th European Conference on Optical Communication (ECOC), Vienna, Austria, 214

### Deeply-etched DBR gratings for Photonic Integrated Circuits and Tunable Lasers

*Docter, Boudewijn; Pozo, Jose; Karouta Fouad; Beri, Stefano; Ermakov, Ilya; Danckaert, Jan; Smit, Meint*

2009 Annual symposium of the IEEE Photonics Benelux Chapter, 65-68

### Simulations of fast switching between longitudinal modes of semiconductor laser cavity induced by on-chip filtered optical feedback

*Ermakov, Ilya; Beri, Stefano; Docter, Boudewijn; Pozo, Jose; Smit, Meint; Danckaert, Jan*

2009 Annual symposium of the IEEE Photonics Benelux Chapter, 185-188

### Spin polarized current from localized Rashba interaction in a quantum wire

*Gelabert, M M; Sánchez, D; López, R; Serra, L*

Physica Status Solidi C, **6**, 2123-2127

## 5.5 SUMMARY OF PUBLICATIONS 2003-2009

1) Total number of publications in the period 2003-2009: 421 (340 of them in JCR journals).

2) Publications in journals of high impact in 2003-2009 include:

- \* Nature: 1
- \* Proc. Nat. Acad. Sci.: 9
- \* Physical Review Letters: 29
- \* Science 1

3) Journals with the highest number of publications:

- \* Physical Review E: 65
- \* Physical Review Letters: 29
- \* Physical Review A: 26
- \* Physica A: 21
- \* European Physical Journal: 18
- \* Physical Review B: 14
- \* IEEE journals: 16
- \* Europhysics Letters: 10

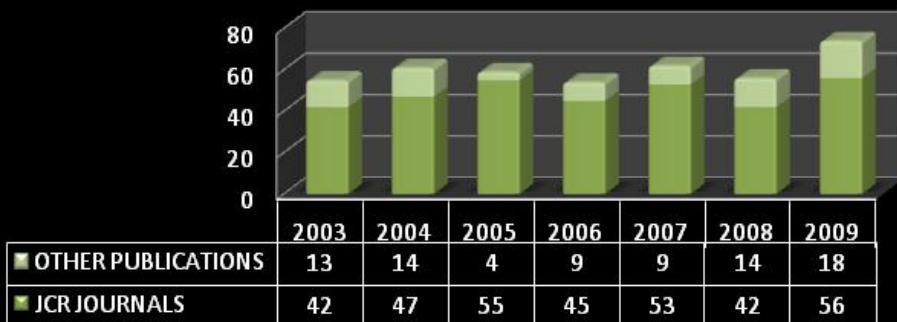
49

4) Total number of publications in JCR journals outside the domain of basic Physics: 59

In addition to 17 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, Deep Sea Research.
- \* Macromolecules, Biophysical Chemistry, Biopolymers, Biosystems, J. Theoretical Biology, Mathematical Biosciences, Physical Biology, Oikos, Trends in Ecology and Evolution, Ecological Complexity, Ecological Modelling, J. Royal Society Interface. HFSP Journal, Developmental Dynamics, Marine Ecology Progress Series, PLoS ONE, PLoS Computational Biology, Birth Defects Research, Neuroscience Letters, J. Neurophysiology, J. of Neuroscience, European J. of Pharmaceutical Sciences
- \* J. Economic Dynamics and Control, American Journal of Sociology, J. Artificial Societies and Social Simulation, J. of Conflict Resolution.

### IFISC PUBLICATIONS 2003-2009

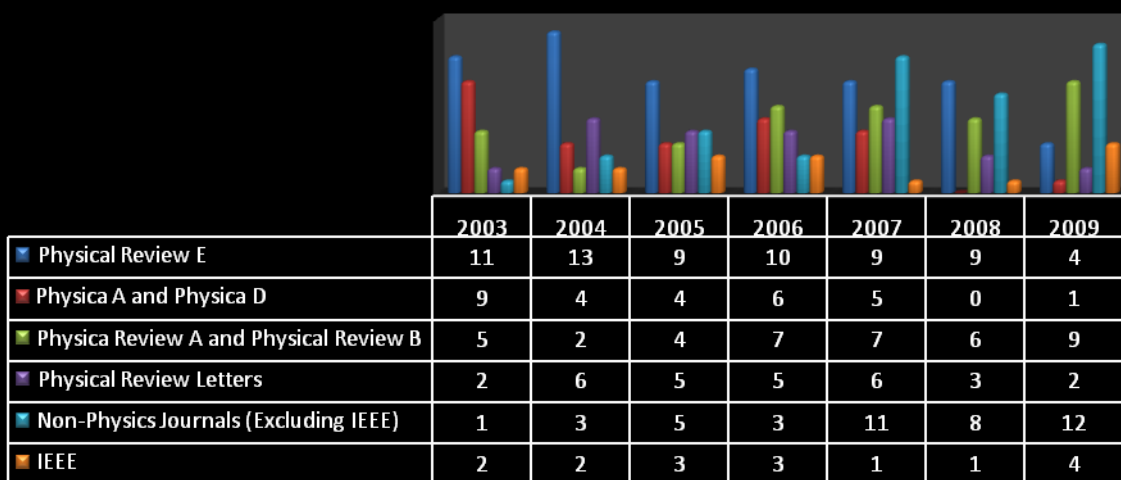


### JOURNALS WITH LARGEST NUMBER OF PUBLICATIONS

IFISC PUBLICATIONS	2003	2004	2005	2006	2007	2008	2009	TOTAL
Physical Review E	11	13	9	10	9	9	4	65
Physical Review Letters	2	6	5	5	6	3	2	29
Physical Review A	5	0	3	3	3	5	7	26
Physica A	8	3	3	2	4	0	1	21
European Physical Journal	3	2	2	0	3	1	7	18
Physical Review B	2	2	3	3	1	1	4	16
IEEE	0	2	1	4	4	1	2	14
Europhysics Letters	2	1	3	0	2	1	1	10
Non-Physics Journals (excluding IEEE Journals)	1	3	5	3	11	8	12	43

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### IFISC PUBLICATIONS 2003-2009





# 6. CONFERENCES AND WORKSHOPS

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

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

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

**Trends in Complex Systems**  
International Workshop on 150 Years after Darwin:  
From Molecular Evolution to Language  
Palma de Mallorca, November 23 - 27, 2009

Scientific coordination:  
José A. Cuesta, Universidad Carlos III, Madrid, Spain  
Susanna C. Manrubia, CAB (INTA-CSIC), Madrid, Spain  
Alan J. McKane, University of Manchester, UK

Two hundred years since the birth of Charles Darwin and a hundred and fifty years since the publication of "On the Origin of Species", the theory of evolution is now a conceptual cornerstone in a wide number of areas of research outside its original field of application. Evolutionary biologists, linguists, physicists, economists, and social scientists nowadays use the notions of evolution and adaptation in their research. In each of those areas, the mechanisms behind the relevant dynamics (stochastic appearance of mutants, cultural innovations or social strategies, inheritance or spread of a new variant, and selection through competition) take a specific form that, nonetheless, shapes the structure and organization of each system in a way that can be recognized as arising from "evolutionary dynamics" in its broadest sense. These anniversaries seem an ideal opportunity to bring together researchers from the variety of disciplines which now use the evolutionary paradigm, to review progress, learn from each other and initiate new collaborations.

Invited speakers:  
W. Brian Arthur, Ulf Dieckmann, Sergey Gavrilov, Antonio Lacacco, Kai Sigmund, Luc Steels, Fernando Riquero, Barbara Drossel, Herbert Gintis, Andrés Moya, Gerald Silberberg, Alvin Traulsen, William Croft, Bruce Edmonds, Peter Hammerstein, Luca Piliati, Ricard V. Solé, Eric Weishoff, Bernard Derris, John Foster, Michael Lässig, Mari San Miguel, Peter F. Stadler, Ulrich Witt

Applications for participation and contributions are welcome and should be made by using the application form on the workshop web page (please see URL below). The number of attendees is limited. The applicants' registration fee for the workshop is 100 Euro. Costs for accommodation will be covered during the workshop. Limited funding is available on request to partially cover travel expenses.  
Deadline for applications is: July 5, 2009

CONTACT:  
Karin Lamack (MPIPKS), Rosa Rodríguez (IFISC) - Workshop Secretaries  
carlam@ifisc.uib-csic.es / rrodriguez@mpipks.de  
http://ifisc.uib-csic.es/tcs/09/

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) have recently 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.

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 2009 is: **May 11, 2009**

CONTACT:  
http://www.mpi-pps.de / www.ifisc.uib-csic.es  
mailto:ifisc@ifisc.de  
http://www.mpi-pps.de / www.ifisc.uib-csic.es

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

**Trends in Complex Systems**  
International Workshop on Synchronization and  
Multiscale Complex Dynamics in the Brain  
Dresden, November 02 - 06, 2009

Scientific coordination:  
Jordi Garcia-Ojalvo, Universitat Politècnica de Catalunya, Terrassa, Spain  
Claudio Mirasso, IFISC, Palma de Mallorca, Spain  
Gordon Pipa, MPI für Hirnforschung, Frankfurt/Main, Germany

Progress in understanding the global organization of brain functions has remained elusive up to now. Indeed, neural operations of the brain is characterized by complex dynamics at multiple temporal and spatial scales. Although different experimental techniques exist (neuroimagnetic recordings, EEG, MEG, and fMRI, among others), a simultaneous monitoring of the different scales is still scarce. Interpretation of the data resulting from such experiments requires a thorough understanding of low different scales integrated in a complex dynamical system. Within this context, the purpose of this workshop is to bring together experimental neuroscientists and physicists experienced in the study of multiscale processes, in order to help bridge the gap currently existing between theoretical and experimental approaches.

Invited Speakers:  
S. Boccaletti (Teramo), G. Giacomini (Tampere), B. Schuler (Frankfurt/Main), H. Breun (Marburg), L. Schimanski-Gier (Berlin), M. Breakpear (Sydney), B. Lindner (Dresden), T. Stöger (Frankfurt/Main), J. L. Casanova (Berlín), F. Maes (Madrid), W. Singer (Frankfurt/Main), M. Chavez (Paris), E. Pereda (La Laguna), F. T. Sommer (Berkeley), G. Deco (Barcelona), A. Pikovsky (Frankfurt), C.J. Stam (Amsterdam), V.M. Eguíluz (Palma de Mallorca), D. Patino (Dresden), M. Tsuda (Tokyo), R. Galán (Maastricht), M. Saaño-Vivo (Barcelona), A.E.P. Villa (Gronoble)

Applications for participation and contributions are welcome and should be made by using the form on the workshop webpage. The number of attendees is limited. The applicants' registration fee for the workshop is 100 Euro. Costs for accommodation will be covered during the workshop. Limited funding is available on request to partially cover travel expenses. Please note that childcare is available upon request.

Deadline for applications is: **June 30, 2009**

CONTACT:  
Mandy Luchter - Workshop Secretary  
luchter@ifisc.uib-csic.es  
http://www.mpi-pps.de / ifisc09  
Tel: +49 351 471 2109 / Fax: +49 351 471 2109

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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. IFISC Scientific coordinator: Manuel Matías.

PROPOSALS were 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.



## DARWIN09: INTERNATIONAL WORKSHOP ON 150 YEARS AFTER DARWIN: FROM MOLECULAR EVOLUTION TO LANGUAGE

<http://ifisc.uib.es/darwin09/>

Palma de Mallorca, November 23 - 27, 2009

IFISC, Campus UIB, Palma de Mallorca, Spain

### Scientific coordinators:

- José A. Cuesta, *Universidad Carlos III, Madrid, Spain.*
- Susanna C. Manrubia, *Centro de Astrobiología (INTA-CSIC), Madrid, Spain.*
- Alan J. McKane, *University of Manchester, UK.*



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Two hundred years since the birth of Charles Darwin and a hundred and fifty years since the publication of “On the Origin of Species”, the theory of evolution is now a conceptual cornerstone in a wide number of areas of research outside its original field of application. Evolutionary biologists, linguists, physicists, economists, and social scientists nowadays use the notions of evolution and adaptation in their research. In each of those areas, the mechanisms behind the relevant dynamics (stochastic appearance of mutants, cultural innovations or social strategies, inheritance or spread of a new variant, and selection through competition) take a specific form that, nonetheless, shapes the structure and organization of each system in a way that can be recognized as arising from “evolutionary dynamics” in its broadest sense. These anniversaries are an ideal opportunity to bring together researchers from the variety of disciplines which now use the evolutionary paradigm, to review progress, learn from each other and initiate new collaborations.

**Invited Speakers:**

- \* F. Baquero, (Spain)
- \* W. Croft, (Albuquerque)
- \* B. Derrida, (Paris)
- \* U. Dieckmann, (Vienna)
- \* B. Drossel, (Darmstadt)
- \* B. Edmonds, (Manchester)
- \* J. Foster, (Queensland)
- \* S. Gavrilets, (Knoxville)
- \* H. Gintis, (Massachusetts)
- \* P. Hammerstein, (Berlin)
- \* M. Lässig, (Köln)
- \* R. Moya, (València)
- \* J. Peretó, (Barcelona)
- \* M. San Miguel, (Palma de Mallorca)
- \* K. Sigmund, (Vienna)
- \* G. Silverberg, (Maastricht)
- \* P. F. Stadler, (Leipzig)
- \* L. Steels, (Brussel)
- \* A. Traulsen, (Plön)
- \* E. Westhof, (Strasbourg)

**BSYNC09. SYNCHRONIZATION AND MULTISCALE COMPLEX DYNAMICS IN THE BRAIN**

<http://www.mpipks-dresden.mpg.de/~bsync09/>

Dresden, November 02 - 06, 2009

**Scientific Coordinators:**

- Jordi García Ojalvo, *Universitat Politècnica de Catalunya, Terrassa, Spain.*
- Claudio Mirasso, *Instituto de Física Interdisciplinar y Sistemas Complejos, IFISC (CSIC-UIB) Palma, Spain.*
- Gordon Pipa, *Max-Planck-Institut für Hirnforschung, Frankfurt/Main, Germany.*

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Progress in understanding the global organization of brain functions has remained elusive up to now. Indeed, normal operation of the brain is characterized by complex dynamics at multiple temporal and spatial scales. Although different experimental techniques exist (microelectrode recordings, EEG, MEG, and fMRI, among others), a simultaneous monitoring of the different scales is still scarce. Interpretation of the data coming from such experiments requires a thorough understanding of how different scales integrate in a complex dynamical system. Within this context, the purpose of this workshop was to bring together experimental neuroscientists and physicists experienced in the study of multiscale processes, in order to help bridge the gap currently existing between theoretical and experimental approaches.

**Invited speakers:**

- \* S. Boccaletti, (Firenze)
- \* H. Braun, (Marburg)
- \* M. Breakspear, (Sydney)
- \* J. L. Cantero, (Sevilla)
- \* M. Chavez, (Paris)
- \* G. Deco, (Barcelona)
- \* V.M. Eguíluz, (Palma)
- \* R. Goebel, (Maastricht)
- \* G. Gómez-Herrero, (Tampere)
- \* G. Laurent, (Pasadena)
- \* B. Lindner, (Dresden)
- \* F. Maestu, (Madrid)
- \* E. Pereda, (La Laguna)
- \* Pikovsky, (Potsdam)
- \* D. Postnov, (Saratov)
- \* B. Scheller, (Frankfurt/Main)
- \* L. Schimansky-Geier, (Berlin)
- \* T. Siapas, (Pasadena)
- \* W. Singer, (Frankfurt/Main)
- \* F.T. Sommer, (Berkeley)
- \* C.J. Stam, (Amsterdam)
- \* A.E.P. Villa, (Grenoble)
- \* M. Tsukada, (Tokyo)

## **TCS WORKSHOPS SELECTED FOR 2010**

### **ORFLOW10. LIVING ORGANISMS IN FLOWS: FROM SMALL-SCALE TURBULENCE TO GEOPHYSICAL FLOWS**

<http://ifisc.uib-csic.es/orflow10/>

IFISC, Palma de Mallorca, June 7 - 11, 2010.

#### **Scientific Coordinators:**

- Ulrike Feudel, *University of Oldenburg, Germany.*
- Raymond E. Goldstein, *University of Cambridge, UK.*
- Emilio Hernández-García, *Instituto de Física Interdisciplinar y sistemas Complejos IFISC (CSIC-UIB), Palma, Spain.*
- Cristóbal López, *Instituto de Física Interdisciplinar y Sistemas Complejos, IFISC (CSIC-UIB), Palma, Spain.*

### **KRONOS10 .TIMING AND DYNAMICS IN BIOLOGICAL SYSTEMS**

<http://www.mpipks-dresden.mpg.de/~kronos10/>

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Dresden , September 27 - October 01, 2010

#### **Scientific Coordinators:**

- Felix Naef, *EPFL SV ISREC UPNAE, Lausanne, Switzerland.*
- Andrew Oates, *MPI of Molecular Cell Biology and Genetics Dresden, Germany.*
- Jörg Stelling, *ETH Zürich, Basel, Switzerland.*





## 6.2 INVITED TALKS IN CONFERENCES AND WORKSHOPS

Gomila, Damià

**Control of spatial instabilities with intracavity photonic crystals.**

*LEOS Winter Topicals 2009, Innsbruck (Austria).*

January 12 - 14

Mirasso, Claudio.

**Synchronization Without Correlations.**

*Workshop of the NEST project GABA, Global Approach to Brain Activity, Paris (France)*

March 25 - 27

Mirasso, Claudio.

**Dynamics of mutually delay-coupled systems: From Lasers to Neurons.**

*Chaos Applications in Telecommunications and Sensing, CATS Workshop, Crete (Greece).*

June 2 - 5

Hernández-García, Emilio.

**Stretching fields and lines in ocean transport dynamics.**

*EPSRC Symposium Capstone Conference. Minisymposium on Lagrangian structure, Lagrangian data.*

*University of Warwick (UK).*

July 1

Fischer, Ingo

**Synchronization without Correlation.**

*PhysCon 2009, Catania (Italy).*

September 1 - 4

Fischer, Ingo

**Zero-lag synchronization in delay-coupled lasers and its stability.**

*PhysCon 2009, Catania (Italy).*

September 1 - 4

Fischer, Ingo.

**Nonlinear Photonics with Semiconductor Sources and Systems: Challenges and Chances.**

*IEEE Photonics Benelux Annual Workshop 2009, Eindhoven (Netherlands).*

September 11

Serra, L.

**Linear response in the spin channel of metal clusters and quantum dots.**

*International Workshop "Spin dynamics in metallic nanoparticles", Universidad de Barcelona (Spain).*

September 30 - October 2

Toral, Raúl.

**Noisy continuous-opinion dynamics.**

*Latinoamerican workshop on Nonlinear Physics*

*LAWNP-09, Buzios (Brasil).*

October 5 - 9

Fischer, Ingo.

**Zero-lag and generalized synchronization properties of delay-coupled oscillators: Lasers as model systems with future potential.**

*Delayed Complex Systems Workshop, Dresden (Germany).*

October 5 - 9

Zambrini, Roberta.

**Multimode Light in Action.**

*Frontiers in Optics 2009: 93rd OSA Annual Meeting and Laser Science XXV, San Jose, California (USA).*

October 11 - 15

López, Cristóbal

**The continuum PATRES tutorial Workshop. of agent-based models (part I).**

*PATRES tutorial Workshop, Madeira (Portugal).*

October 21

Vázquez, Federico.

**The continuum PATRES tutorial Workshop. of agent-based models (part II).**

*PATRES tutorial Workshop, Madeira (Portugal).*

October 21

Eguíluz, Víctor

**Functional networks: Theory and experiments.**

*Trends in Complex Systems: Synchronization and Multiscale Complex Dynamics in the Brain, Dresden (Germany).*

November 2 - 6

Fischer, Ingo.

**Mechanisms and robustness of synchronization in the presence of long conduction delays.**

*Trends in Complex Systems: Synchronization and Multiscale Complex Dynamics in the Brain, Dresden (Germany).*

November 2 - 6

Maxi San Miguel.

**Dynamics of language competition.**

*Trends in Complex Systems: 150 years after Darwin: From molecular evolution to language, Palma de Mallorca (Spain).*

November 23 - 27

Colet, Pere

**Interaction of Dissipative Solitons in Oscillatory and Excitable Regimes.**

*International Workshop on Dissipative Solitons 2009, Adelaida (Australia).*

November 29 - December 3

Zambrini, Roberta

**Nonlocality and off-axis feedback in transversally multimode optical devices.**

*4th Workshop on Laser Dynamics and Nonlinear Photonics, Piriapolis (Uruguay).*

December 8 - 11

Toral, Raúl.

**Stochastic effects in social systems.**

*12th International Workshop on Instabilities and Non-equilibrium Structures, Valparaiso (Chile).*

December 14 -19

## 6.3 SEMINAR TALKS IN OTHER RESEARCH CENTERS

González Avella, Juan Carlos.

**Fenómenos colectivos y dinámica social.**

*Centro de Física Fundamental. Univ. de los Andes, Mérida (Venezuela).*

February 13

Giorgi, Gian Luca.

**Ground-state factorization and quantum phase transition in dimerized spin chains.**

*Universitat Autònoma, Barcelona (Spain).*

March 20

Colet, Pere.

**Efectos de diversidad y fluctuaciones en la sincronización de osciladores no lineales.**

*Department of Mathematics of the Universidad de Puerto Rico at Mayagüez, Puerto Rico (USA).*

April 16

Giorgi, Gian Luca.

**Ground-state factorization and quantum phase transition in dimerized spin chains.**

*Università La Sapienza, Roma (Italy).*

June 23

Colet, Pere.

**Tailoring semiconductor laser dynamics with double cavity feedback.**

*Oak Ridge National Laboratory, Oak Ridge, TN (USA).*

August 8

Castello, X.

**Dynamics of language competition: bilingualism and social structure effects.**

*Economic sociology working group. SLOAN School of Management, MIT (USA).*

August 24

Patriarca, Marco; Heinsalu, Els.

**Influence of geography on language competition.**

*Institute of Cybernetics, Tallin University of Technology (Tallinn).*

September 28

Hernández-García, Emilio.

**Sobre el uso de algoritmos evolutivos para encontrar leyes a partir de datos: Éxitos y límites.**

*Instituto de Investigaciones Biomédicas Alberto Sols, CSIC-UAM, Madrid (Spain).*

October 23

Ermakov, Ilya.

**Nonlinear dynamics of semiconductor FP and ring lasers with external optical feedback.**

*Weierstrass Institute for Applied Analysis and Stochastics, Berlin (Germany)*

October 29

Fischer, Ingo.

**Nonlinear Photonics of Semiconductor Lasers.**

*Technical University Lodz (Poland).*

December 9 - 12

Fischer, Ingo.

**Dynamical Emission Properties of Semiconductor Lasers: What is the Effect of Nonlinearities?**

*Lecture Series, Technical University Lodz (Poland).*

December 9 - 12

## 6.4 TALKS IN CONFERENCES AND WORKSHOPS

Ermakov, Ilya; Van der Sande, Guy; Gelens, Lendert; Scirè, Alessandro; Colet, Pere; Mirasso, Claudio; Tronciu, Vasile; Danckaert, Jan

**Numerical investigation of nonlinear dynamics of semiconductor ring lasers with two external cavities**

*Young Optical Scientists Conference, Moscow (Russia)*

February 2 - 7

Moreno, María; Gomila, Damià; Zambrini, Roberta.

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

*IONS-5 meeting at ICFO, Barcelona (Spain).*

February 19 - 21

Heinsalu, Els (presented By Hektor, Andi).

**Normal and anomalously slow diffusion under external fields.**

*XXXIX Estonian Physics Days and XXXI Days of Physics Teachers, Tartu (Estonia).*

March 17 - 18

Komin, Niko; Toral, Raúl.

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

*DPG spring meeting 2009, Dresden (Germany).*

March 23 - 27

Federico Vázquez, Cristóbal López, Justin Calabrese, Miguel Angel Muñoz.

**Progres report: Dynamical coexistence of trees and grasses. An extension of the savanna model.**

*Patres meeting in Paris (France).*

March 25 - 27

Grabowicz, Przemyslaw Adam; Eguíluz Martínez, Victor.

**Flickr modeling.**

*Patres meeting in Paris (France).*

March 25 -27

Pérez, Toni; Eguíluz, Victor; García, Guadalupe; Vicente, Raúl; Mirasso, Claudio.

**Effects of the topology and delay in a neuronal network.**

*GABA 2nd Scientific Workshop, Paris (France).*

March 25 - 27

Souza Bacelar, Flora; M. Calabrese, Justin; Grimm, Volker; Zinc, Richard; Hernández-García, Emilio.

**Savanna-Fire Model: Combined effects of tree-tree establishment competition and spatially explicit fire on the spatial pattern of trees in savannas.**

*Patres meeting, Paris (France).*

March 25 - 27

Hernández-García, Emilio; Komin, Niko; Murza, Adrian; Toral, Raúl.

**Synchronization and stochasticity in circadian oscillators ensembles.**

*BioSim workshop on Methodological Challenges for Systems Biology: linking networks, crossing scales, Venice (Italy).*

March 31

Marco Patriarca, Emilio Hernández-García, Raúl Toral.

**Effect of diversity in a neuronal model for the wake-sleep cycle.**

*BioSim workshop on Methodological Challenges for Systems Biology: linking networks, crossing scales, Venice (Italy).*

April 2

Murza, Adrian; Komin, Niko; Hernández García, Emilio; Toral, Raúl.

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

*Workshop on Mathematical Modelling in Biology and Medicine, Dubrovnik (Croatia).*

April 27 - May 2

Hernández-García, Emilio.

**Ocean transport dynamics characterized by stretching fields and lines.**

*RTRA-STAE Workshop on Geometrical and multiscale approaches for predictability and analysis of complex data in astrophysics and geophysics, Montaignut-Sur-Save (France).*

May 18 - 19

Giorgi, Gian Luca.

**Ground state factorization and quantum phase transition in dimerized spin chains.**

*16th Central European Workshop on Quantum Optics CEWQO2009, Turku (Finland).*

May 23 - 27

Zambrini, Roberta; Gomila, Damià; Moreno, María.

**Control of quantum fluctuations in spontaneous pattern formation.**

*16th Central European Workshop on Quantum Optic, Turku (Finland)*

May 23 - 27

Nguimdo, Romain Modeste; Colet, Pere; Chembo Kouomou, Yanne; Larger, Laurent;

**Dynamics of electro-optic delay oscillators pumped with two lasers.**

*Chaos Applications in Telecommunications and Sensing, CATS2000, Chania, Crete (Greece)*

June 1 - 4

Nguimdo, Romain Modeste; Colet, Pere; Mirasso, Claudio R.

**Opto-electronic devices with double feedback loop.**

*Chaos Applications in Telecommunications and Sensing, CATS2009, Chania, Crete (Greece)*

June 1 - 4

Ermakov, Ilya; Van der Sande, Guy; Gelens, Lendert; Scirè, Alessandro; Colet, Pere; Mirasso, Claudio; Tronciu, Vasile; Danckaert, Jan

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

*2nd Chaotic Modeling and Simulation International Conference, Chania (Greece)*

June 1 - 5

Jacobo, Adrian; Soriano, Miguel C.; Nguimdo, Romain Modeste; Colet, P.; Mirasso, Claudio R.

**Breaking Chaotic Encryption using PDEs.**

*Chaos Applications in Telecommunications and Sensing, CATS 2009, Chania, Crete (Greece).*

June 1 - 4

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

**Synchronization and Message Transmission Using Coupled Semiconductor Lasers with Filtered Optical Feedback.**

*Chaos Applications in Telecommunications and Sensing, CATS2009, Chania, Crete (Greece).*

June 1 - 4

Tronciu, Vasile Z. ; Mirasso, Claudio R. ; Colet, Pere; Hamacher, Michael; Benedetti, Mauro; Annovazzi-lodi, Valerio.

**Chaos generation and communications using integrated sources with an air gap.**

*Chaos Applications in Telecommunications and Sensing, CATS2009, Chania, Crete (Greece).*

June 1 - 4

Soriano, Miguel C.; Colet, Pere; Mirasso, Claudio R.

**Open vs closed loop receivers in all-optical chaos-based communication systems: the final round.**

*CATS Workshop, Crete (Greece).*

June 4

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

**Logical Operations Using Excitable Cavity Solitons.**

*CLEO-EQEC, Munich (Germany).*

June 14 - 19

Strain, Michael; Mezosi, Gabor; Pérez Serrano, Antonio; Scirè, Alessandro; Balle, Salvador; Verschaffelt, Guy; Danckaer, Jan; Sorel, Marc.

**Semiconductor Snail Laser.**

*CLEO Europe 2009, Munich (Germany).*

June 16

Pérez-Serrano, Antonio; Furst, Sandor; Scire, Alessandro; Javaloyes, Julien; Sorel, Marc; Balle, Salvador  
**Modal Structure of Integrated Semiconductor Ring Laser with Output Waveguides.**

*CLEO Europe 2009, Munich (Germany).*

June 16

Soriano, Miguel C.; Colet, Pere; Mirasso, Claudio R.

**Open vs closed loop receivers in all-optical chaos-based communication systems: the final round.**

*CLEO Europe 2009, Munich (Germany).*

June 18

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

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

*Localized Excitations in Nonlinear Complex Systems, LENCOS'09, Sevilla (Spain).*

July 14 - 17

Pérez-Serrano, Antonio; Javaloyes, Julien; Scire, Alessandro; Balle, Salvador;

**Travelling Wave Model for Ring Lasers.**

*The annual international Laser Physics Workshop, LPHYS09, Barcelona (Spain).*

July 17

Patriarca, Marco; Hernández-García, Emilio; Toral, Raúl.

**Effect of diversity in a neuronal model for the wake-sleep cycle.**

*5-th Biosim Conference, Copenhagen (Germany).*

August 25 - 29

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

**Reliability of Lagrangian diagnosis from finite-size Lyapunov exponents.**

*Lagrangian Analysis and Prediction of Coastal and Ocean Dynamics, LAPCOD2009, La Londe les Maures (France).*

September 7 - 11

Hernández-García, E.; López, C.; Tew Kai, E.; Marsac, F.; Rossi, V.; Garçon, V.; Sudre, J.; Weimerskirch, H.

**Frigatebirds follow Lagrangian Coherent Structures.**

*Lagrangian Analysis and Prediction of Coastal and Ocean Dynamics (LAPCOD) 2009. La Londe-des-Maures (France).*

September 7 - 11

López, Cristóbal; Rossi, Vincent; Hernández-García, Emilio; Tew Kai, Emilie; Sudre, Joel; Weimerskirch, Henri And Garçon Veronique.

**Oceanic turbulence, coherent structures, and the behavior of marine ecosystems.**

*XVI Congreso de Física Estadística, FISES'09, Huelva (Spain).*

September 10 - 12





Loureiro, Lucía; Castello, Xavi; San Miguel, Maxi.

**Local effects of global languages: evidence from language modelling.**

*SLE, Societas Linguistica Europae, 42nd Annual Meeting, Lisbon (Portugal).*

September 9 - 12

Federico Vázquez, Cristóbal López, Maxi San Miguel, Miguel Angel Munoz, Justin Calabrese And Volker Grimm.

**The savanna problem from a statistical physics point of view.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Sintes, Tomás.

**Clonal plant growth and genetic diversity.**

*XVI Congreso de Física Estadística, FISES'09, Huelva (Spain).*

September 10 - 19

B. Docter, J. Pozo, F. Karouta, I. Ermakov, J. Danckaert, M.K. Smit

**Novel Integrated Tunable Laser using Filtered Feedback for simple and very fast tuning**

*35th European Conference on Optical Communication, ECOC, Viena (Austria)*

September 20 - 24

Castello, X.; Vázquez, F. ; Loureiro-porto, L. ; Eguíluz, V. M. ; San Miguel, M.

**Viability and resilience in the dynamics of language competition.**

*European Conference on Complex Systems; ECCS '09, University of Warwick (UK).*

September 21 - 25

Cerda, J. J. ; Sánchez, P. A. ; Webber, R. ; Kantorovich, S. ; Krutikova, E. ; Ballenegger, V. ; Sintes, T. ; Ivanov, A. ; Holm, C.

**Theory and simulations applied to the understanding of magnetic systems: bulky ferrofluids, shifted ferrofluids and magnetic filaments.**

*IX Ferrofluid Workshop, Benediktbeuern (Germany).*

September 22 - 25

Federico Vázquez, Cristóbal López and Maxi San Miguel.

**The macroscopic description of agent-based models.**

*European Conference on Complex Systems; ECCS '09, University of Warwick (UK).*

September 21 - 2

Moreno, María.

**Photonic Crystals acting on Instabilities and Squeezed states in OPOs.**

*Frontiers in Optics 2009/the 93rd OSA Annual Meeting and Laser Science XXV, San Jose, California (USA).*

October 15

Hernández-García, Emilio.

**Stretching structures from finite-size Lyapunov exponents: their impact across all biological scales.**

*Thematic Institute on Lyapunov analysis: from theory to geophysical applications. Institut des Systemes Complexes, ISC-PIF, Paris (France).*

October 27

B. Docter, J. Pozo, F. Karouta, I. Ermakov, J. Danckaert, M.K. Smit

**Deeply-etched DBR grating for Photonic Integrated Circuits and Tunable Lasers**

*Annual Symposium of the IEEE Photonics Benelux Chapter, Brussels (Belgium)*

November 5 - 6

Herrada, E. A., Eguíluz, V. M., Hernández-García, E. And Duarte, C. M.

**The shape of phylogenetic trees: From taxonomic trees to the Tree of Life.**

*150 Years after Darwin: From Molecular Evolution to Language, Palma de Mallorca (Spain).*

November 23 - 27

Juan Carlos González-Avella, Mario G. Cosenza, Victor M. Eguíluz, Maxi San Miguel.

**Spontaneous vs. imposed globalization in a model of cultural dynamics.**

*A topological approach to cultural dynamics: Changing Cultures, Culture of Change, Barcelona (Spain).*

December 10 – 12

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## 6.5 POSTER PRESENTATIONS

Grabowicz, Przemyslaw Adam; Eguíluz Martínez, Victor; San Miguel, Maxi.

**Model of group formation for Flickr online community.**

*COST action MP0801: Physics of Competition and Conflicts; Net 2009: evolution and complexity, Rome (Italy).*

May 27 - 30

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

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

*European Geosciences Union, EGU (Vienna).*

April 19 - 24

Galve, Fernando.

**Entangled oscillators at room temperature.**

*2nd Vienna Symposium on the Foundations of Modern Physics (Austria).*

June 11 - 14



Jacobo A. Soriano M. C. Colet P. Mirasso C.

**Breaking Chaotic Encryption using PDEs.**

*CLEO-EQEC. Munich (Germany).*

June 14 - 19

Moreno, María; Gomila, Damià; Zambrini, Roberta.

**Control of spatial instabilities with intracavity photonic crystals.**

*CLEO/EQEC, European Conference on Lasers and Electro-Optics/European Quantum electronics Conference, Munich (Denmark).*

June 14 - 19

Zambrini, Roberta; Papoff, Francesco.

**Signal Splitter by Nonlocal Coupling.**

*CLEO Europe-EQEC Conference, Munich (Germany).*

June 14 - 19

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

**Controlling the unstable emission of a semiconductor laser subject to conventional optical feedback with a filtered feedback branch.**

*CLEO/Europe-EQEC 2009, Munich (Germany)*

June 14 – 19

Pérez-serrano, Antonio; Scire, Alessandro; Zambrini, Roberta; Colet, Pere;

**Noise spectra of semiconductor ring lasers in the bidirectional regime.**

*CLEO Europe 2009, Munich (Germany).*

June 16

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

**Logical Operations Using Excitable Cavity Solitons.**

*LPHYS09, Barcelona (Spain).*

July 13 -17

Murza, Adrian; Komin, Niko; Hernández-García, Emilio; Toral, Raúl.

**Synchronization of coupled circadian oscillators.**

*Workshop on network dynamics, Exeter (UK).*

July 15

Hernández-García, Emilio; Komin, Niko; Murza, Adrian; Toral, Raúl.

**Synchronization of coupled circadian oscillators.**

*5th Biosim Conference, Copenhagen (Denmark).*

August 25 - 29

Komin, Niko; Toral, Raúl.

**Diversity induced bifurcations.**

*5th BioSim Conference, Copenhagen (Denmark).*

August 25 - 29

Nguimdo, Romain Modeste; Colet Pere And Mirasso, Claudio R.

**Opto-electronic delay device with double feedback loops.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Nguimdo, Romain Modeste; Colet, Pere; Larger, Laurent.

**Dynamics of electro-optic delay oscillators pumped with two lasers.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Sánchez, P. A.; Cerda, J. J. ; Sintés, T. ; Ballenegger, V. ; Holm, C. ; Piro, O.

**Adsorption of semiflexible magnetic filaments on flat surfaces.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10-12

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

**Spontaneous ordering against an external field in nonequilibrium systems.**

*FISES2009: XVI Congreso de Física Estadística FisEs 09, Huelva (Spain).*

September 10 - 12

E. Heinsalu, E. Hernández-García, C. López.

**Nonlocally interacting particle systems: Lévy flights versus Gaussian jumps.**

*FISES2009. XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Federico Vázquez, Cristóbal López and Maxi San Miguel.

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

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Fernandez Lafuerza, Luis; Toral Garces, Raúl.

**Aproximacion gaussiana para la resolucion de ecuaciones maestras.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Hernández-carrasco, Ismael; Hernández-García, Emilio; López, Cristóbal; Turiel, Antonio.

**Scaling and robustness of finite-size Lyapunov exponents in surface marine flows.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

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

**Interaction of localized structures in the oscillatory and excitable regimes.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Komin, Niko; Murza, Adrian; Toral, Raúl; Hernández-García, Emilio.

**Constructive effects of diversity in the synchronisation of a model for the circadian clock in mammals.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Marco Patriarca, Emilio Hernández-García, Raúl Toral.

**Role of diversity in a neuronal model of wake-sleep cycle.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Sánchez, P. A.; Ilyin, V.; Sintès, T.; Piro, O. ; Procaccia, I. ; Cartwright, J. H. E.

**Two dimensional glassy water: searching for minimal models of LDA-HDA transitions.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Soriano, Miguel C.; Colet, Pere; Mirasso, Claudio R.

**Open vs closed loop receivers in all-optical chaos-based communication systems.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 -12

Soriano, Miguel C.; Van Der Sande, Guy; Fischer, Ingo; Mirasso, Claudio R. ; Colet, Pere.

**Lyapunov analysis of the chaotic dynamics of rings of delay-coupled oscillators.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Souza Bacelar, Flora; Calabrese, Justin; Grimm, Volker; Hernández-García, Emilio.

**Savanna-Fire Model: Combined effects of tree-tree establishment competition and spatially explicit fire on the spatial pattern of trees in savannas.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Toral, Raúl; Pineda, Miguel, Hernández-García, Emilio.

**Role of noise in a continuous opinion model.**

*FISES2009: XVI Congreso de Física Estadística, Huelva (Spain).*

September 10 - 12

Sánchez, P. A.; Cerda, J. J. ; Sintés, T.; Ballenegger, V.; Holm, C.; Piro, O.

**Adsorption and self-organization properties of semi-flexible magnetic filaments.**

*IX Ferrofluid Workshop, Benediktbeuern (Germany).*

September 22 - 25

S. Bacelar, Flora; White, Andrew; Boots, Mike; Hernández-García, Emilio.

**The evolution of male-biased parasitism.**

*XI Latin American Workshop on Nonlinear Phenomena, LAWNP09, Búzios, Rio de Janeiro (Brazil).*

October 5 - 9

F. S. Andrade, Roberto; B. S. Marinho, Euler; S. Bacelar, Flora.

**A model of partial differential equations for the propagation of HIV in TCD4+ cells.**

*XI Latin American Workshop on Nonlinear Phenomena, LAWNP09, Búzios, Rio de Janeiro (Brazil).*

October 5 - 10

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

**Far in space and yet in synchrony: A neuronal mechanism for zero-lag long-range synchronization in the brain**

*Neuroscience 2009. Conference of the Neuroscience Society of America, Chicago (USA).*

October 17 - 21

Patriarca, Marco; Hernández-García, Emilio; Raúl Toral, Raúl.

**Role of diversity in a neuronal model of wake-sleep cycle.**

*Synchronization and Multiscale Complex Dynamics in the Brain, Dresden (Germany).*

November 2 - 6

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

**Mesoscale structure effects in language competition: topological traps and broad lifetime distributions.**

*International Workshop On 150 Years After Darwin: From Molecular Evolution To Language. Trends In Complex Systems Series, Palma De Mallorca (Spain).*

November 23

Keller-schmidt, Stephanie; Tugrul, Murat; Eguíluz, Víctor M.; Hernández-garcía; Emilio; Klemm, Konstantin.

**Shapes of Phylogenetic Trees: Age Model and Likelihoods.**

*International Workshop on 150 Years after Darwin: From Molecular Evolution to Language. Trends in Complex Systems series, Palma de Mallorca (Spain).*

November 23 - 27

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

**Bilingualism, language death and language birth in language contact situations.**

*International Workshop on 150 Years after Darwin: From Molecular Evolution to Language. Trends in*

*Complex Systems series, Palma de Mallorca (Spain).*

November 23

Sánchez, P. A.; Cerda, J. J.; Sintés, T.; Ballenegger, V.; Holm, C.; Piro, O.

**Adsorption and self-organization properties of stiff magnetic filaments.**

*Julich Soft Matter Days 2009, Bonn (Germany).*

November 10 - 13

Tugrul, Murat; Keller-schmidt, Stephanie; Eguíluz, Víctor M.; Hernández-garcía; Emilio; Klemm, Konstantin.

**Can age explain macroevolution?.**

*International Workshop on 150 Years after Darwin: From Molecular Evolution to Language. Trends in Complex Systems series, Palma de Mallorca (Spain).*

November 23 - 27

Vaz Martins, Teresa; Toral, Raúl.

**Enhancement of response induced by competitive interactions.**

*International Workshop: 150 Years after Darwin: From Molecular Evolution to Language. Trends in Complex Systems series, Palma de Mallorca (Spain).*

November 23 - 27

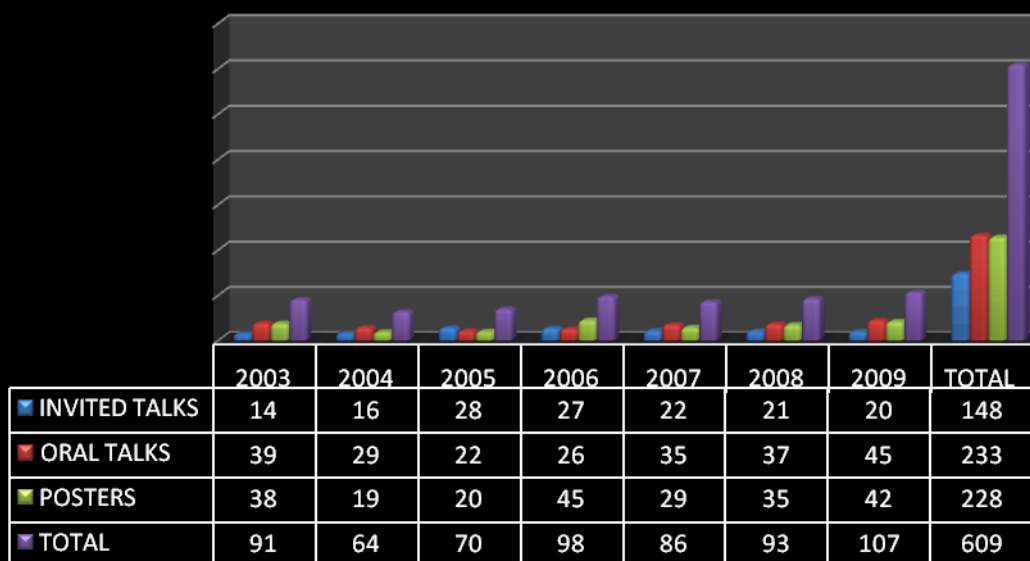
I. Ermakov, S. Beri, B. Docter, J. Pozo, M. K. Smit and Jan Danckaert

**Simulations of fast switching between longitudinal modes of semiconductor laser cavity induced by on-chip filtered optical feedback.**

*2009 Annual Symposium of the IEEE Photonics Benelux Chapter, Brussels (Belgium) November 5 - 6*

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## CONFERENCES AND WORKSHOPS 2003-2009



## 6.6 SCIENTIFIC COMMITTEES AND ORGANIZATION OF CONFERENCES AND WORKSHOPS

Mirasso Claudio

European Conference on lasers and Electro-optics and the XIth European Quantum electronics Conference

Member of the programme Committee "semiconductor lasers", Munich, Germany

May 22-26

Mirasso Claudio

Chaos Applications in Telecommunicatios and Sensing

Member of the Organizing Committee, Creta, Greece

June 1-5

Colet, Pere

Member of the Scientific Committee FISES'09.

XVI Congreso de Física Estadística, FISES'09 (Huelva).

June 15 -19

Fischer, Ingo

Topical Chair of Semiconductor Laser Conference.

Cleo / Europe 2009, Munich.

June 15 -19

San Miguel, Maxi

Member of the International Advisory Committee.

Statphys 2010, Cairns Australia.

July 19 - 23

Colet, Pere

Member of the Scientific Committee FISES'09.

XVI Congreso de Física Estadística, FISES'09 (Huelva).

September 10 -12

Mirasso Claudio

SYNCHRONIZATION AND MULTISCALE COMPLEX DYNAMICS IN THE BRAIN,

Member of the Organizing Committee, Dresden, Germany.

November 02 - 06

Colet, pere

Member of the Pysica Area Commission of CSIC

Consejos Superior de Investigaciones Cientificas

December 1-3





# 7. OTHER ACTIVITIES

## 7.1 MASTER THESIS

### **Simple Branching Models for Macroevolution**

*Tugrul, Murat (Supervisors: Emilio Hernández-García and Victor M. Eguíluz)*

August , 28

### **Control of light emission in Parametric Oscillators with Photonic Crystals**

*Moreno, M. (Supervisor: Zambrini, R.)*

September, 29

### **Gaussian approximation to the resolution of master equations**

*Fernández Lafuerza, Luis (Supervisor Raúl Toral)*

September, 29

### **Scaling properties and robustness of finite-size Lyapunov exponents in surface marine flows**

*Hernández-Carrasco, Ismael (Supervisors: López, Cristóbal; Hernández-García, Emilio)*

September, 29

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## 7.2 PhD THESIS

### **Spatial Structures And Information Processing in Nonlinear Optical Cavities**

*Jacobo, Adrian (Supervisors. P.Colet and D. Gomila)*

### **Dynamics and Synchronization in Neuronal Models**

*Pérez, Toni (Supervisor: Claudio Mirasso)*

## 7.3 RESEARCH STAYS IN OTHER CENTERS

Serra, Llorenç

Korea University, Seoul (República de Corea).

September 1, 2008 - August 31, 2009

Pérez-Serrano, Antonio.

Dept. of Electronics and Electrical Engineering, University of Glasgow (UK).

February 2 - March 12

González Avella, Juan Carlos.

Centro de Física Fundametal, Universidad de Los Andes, Merida (Venezuela).

February 12 - March 6

Federico Vázquez.

Instituto "Carlos I" de Física Teórica y Computacional, Universidad de Granada (Spain)

February 23 - March 6

Federico Vázquez.

Cemagref, Clermont-Ferrand (France).

March 30 - April 1

Colet, Pere.

Department of Mathematics of the Universidad de Puerto Rico at Mayagüez, Puerto Rico (USA).

April 16

González Avella, Juan Carlos.

Institute for Mathematical Sciences Imperial College London (UK).

April 1 - May 31

Souza Bacelar; Flora.

Under supervision of Professor Andrew White. Heriot Watt university, Edinburgh (UK).

April 23 - July 5

Sánchez, P. A.

Institut für Computerphysik, Stuttgart (Germany).

June 17 - July 17

Colet, Pere.

Oak Ridge National Laboratory, Oak Ridge, Tennessee (USA).

July 6 - August 9

Castello, X.

MIT, Massachusetts Institute of Technology, Boston, Cambridge (USA)

August 1 - 31

Heinsalu, Els; Patriarca, Marco.

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

September 21 - 30

Matías, Manuel A.

Max Planck Institutes for Molecular Cell Biology and Genetics and of Physics of Complex Systems,

Dresden (Germany).

April 1 - September 30

Heinsalu, Els; Patriarca, Marco.

Helsinki University, Department of Physics (Helsinki).

October 1 - 2

Heinsalu, Els; Patriarca, Marco.

Humboldt-Universitaet zu Berlin, Institut fuer Physik (Berlin)

October 5 - 6

Hernández-García, Emilio; Toral, Raúl.

Instituto de Investigaciones Biomédicas Alberto Sols (CSIC-UAM), Madrid (Spain).

October 22 - 23

Eguíluz, Víctor M.

European University Institute, Florence (Italy)

December 1 - 15

## 7.4 MEMBERS OF EDITORIAL BOARD OF SCIENTIFIC JOURNALS

Eguíluz, Victor M. Associate Editor of *Advances in Complex Systems*.

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

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## 7.5 POSTGRADUATE COURSES

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

***Nonlinear dynamical systems and spatio temporal complexity***, Pere Colet, Emilio Hernández-García, Claudio Mirasso, Oreste Piro, *Master in Physics*, Universitat de les Illes Balears.

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

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

***Computational Models of Social Evolution***, Víctor M. Eguíluz, *Master in Cognition and Human Evolution*, Universitat de les Illes Balears.

***Nonlinear phenomena in biology***, Claudio Mirasso, Cristóbal López, Tomàs Sintes, Raúl Toral, *Master in Physics*, Universitat de les Illes Balears.



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

### 7.5.1 POSTGRADUATE COURSES IN OTHER CENTERS

#### **Master en Ingeniería Biomédica.**

Participation in the Master Programme of the *Universidad Politécnica de Madrid*  
(2 créditos).

Mirasso, Claudio.

July 12 - 15



## 8. 2009 MISCELLANEOUS EVENTS

### 8.1 MEETING OF CSIC'S PHYSICS INSTITUTES. MAY, 22.

IFISC hosted a meeting, chaired by Prof. Juan Jose Damborenea, vicepresident of CSIC, and attended by the directors of the 28 institutes and centres of CSIC in the area of Physical Sciences and Technologies, together with CSIC's Physics commission chaired by Prof. Jesús Marco. The meeting was devoted to the analysis and discussion of the Strategic Plan for Physical Sciences and Technologies within CSIC strategic plan 2010-2013



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### 8.2 ROUND TABLE DISCUSSION WITH PROF. SHELDON L. GLASHOW. JUNE, 1

Prof. Sheldon L. Glashow, from Boston University and Nobel Laureate in Physics (1979) visited IFISC in June 1. IFISC researchers and students participated in a round table discussion on the "Present and Past in Physics: challenges, oportunities and failures"



### 8.3 OFFICIAL OPENING OF IFISC BUILDING. JULY, 16



The official opening of IFISC building (shared with other UIB research institute) took place on July 16. The president of the Government of the Balearic Islands, the President of CSIC and the Rector of the University attended the event.



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#### FACILITIES

##### \* LEVEL 0

- 4 shared offices (two researchers)
- Ph D students lounge (150 m2)
- Seminar room
- Computing Services Laboratory and
- Computer clusters room
- Nonlinear Physics Laboratory I
- Nonlinear Physics Laboratory II
- Photonics Laboratory
- Electromechanical workshop

##### \* LEVEL 1

- 5 shared offices (two researchers)

##### \* LEVEL 2

- 15 individual offices
- Meeting room (50 m2)
- Administration lounge



## 9. OUTREACH ACTIVITIES

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

Scientific coordinator: Claudio Mirasso

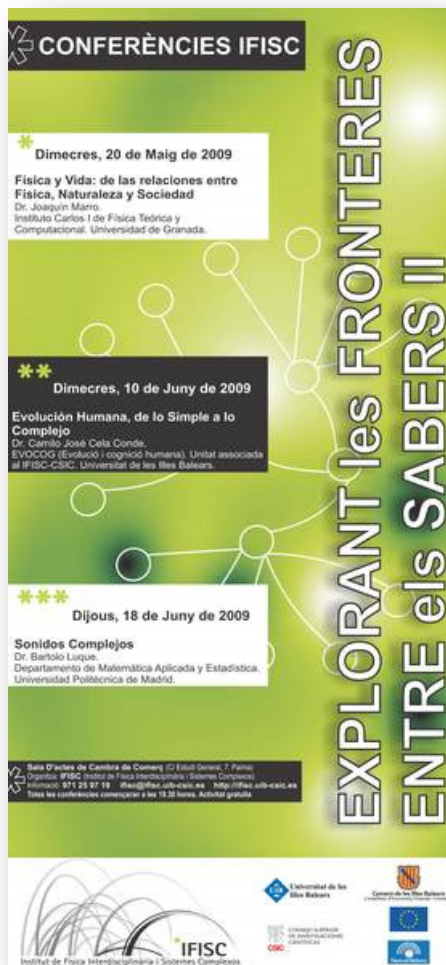
### 9.1 CONFERENCE SERIES

#### Conference Series “Exploring boundaries between disciplines”

Conference Series organized by the IFISC with the collaboration of “Club Diario de Mallorca” and the *Conselleria d'Economia, Hisenda i Innovació* of the Government of the Balearic Islands.

Conference series covering different aspects of complex systems and cross-disciplinary studies.

The science of the twentieth century's 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.



Conference Series “Explorant les Fronteres entre els Sabers” took place in the Càmera de Comerç.

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May, 20

**“Physics and Life: Relationships between Physics, Nature and Society”**

Dr. Joaquín Marro. *Instituto Carlos I de Física Teórica y Computacional* of the *Universidad de Granada*.

June, 10

**“Human Evolution, from the Simple to the Complex”.**

Dr. Camilo José Cela Conde, EVOCOG (Evolution and Human Cognition), Associated Unit to IFISC-CSIC of the *Universitat de les Illes Balears*.”

June, 18

**“Complex Sounds”.**

Dr. Bartolo Luque, Departamento de Matemática Aplicada y Estadística of the *Universidad Politécnica de Madrid*.

### Conference Series “Our everyday Science”

Our Everyday Science is a series of informative lectures organized by the *Universitat de les Illes Balears* with the aim of bringing different fields of knowledge to the general public. IFISC has collaborated on two editions of this series of conferences.



Raúl Toral

February, 24.

*Game Theory: lose to win*

Víctor M. Eguiluz

March, 3.

Complex networks: Architecture of life and society

Pere Colet

March, 10.

*Chaos and synchronization: a cocktail for a secure communication*

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Tomás Sintés

November, 4.

*Ecology: structure and dynamics of clonal plants*

Enric Munar.EVOCOG, IFISC associated unit (UIB-CSIC)

November, 11.

*Is aesthetic perception a sex question?*

Emilio Hernández-García.

November, 18

*A look around forms and forces of nature.*





## 9.2 PARTICIPATION IN BALEARIC SCIENCE AND TECHNOLOGY WEEK.

### (SCT09)

The Balearic Science and Technology week is organized yearly by the Government of the Balearic Islands.

Contributions of IFISC in 2009 include:

### 9.2a) Talks in High Schools

Pere Colet

*Chaos and synchronization: a cocktail for secure communications*

Instituto de Educación Secundaria Marc Ferrer, Formentera, November 4.

Claudio Mirasso

*Lasers: How do they work? What can they be used for?*

Instituto de Educación Secundaria San José, Menorca, November 10

Claudio Mirasso

*Lasers: How do they work? What can they be used for?*

Instituto de Educación Secundaria, Gullem Colom Casasnovas, Sóller, November 13

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### 9.2b) IFISC Open Days. November, 9- 13



IFISC organized an open days event within the Balearic Science and Technology Week. The aim of this event is to open its workspace to the public and to disseminate the results of its research activity. More than 200 selected students visited IFISC coming from various high schools in Mallorca, including: IES Lluçmajor, Sant Josep Obrer School, Verge del Carme School, IES Son Pacs, Aixà School and Àgora School.

The programme included a welcome presentation by Prof. Emilio Hernández-García, Deputy Director of IFISC and a tour of the laboratory and computing facilities. In addition there were three demonstration workshops on the following topics:

- \* Dynamics of semiconductor lasers
- \* Photonics and optical communication technologies
- \* Complex systems: Chaotic pendulum. Synchronization phenomena.



**Outreach flyer**

In the context of IFISC Open Days an outreach flyer was produced in Spanish and Catalan explaining the main research fields and activities at IFISC. The flyer has been widely distributed since then.



The flyer was distributed to the participants in IFISC Open Days and other IFISC outreach events

### 9.3 2009 SCIENCE FAIR OF THE BALEARIC ISLANDS

The Science Fair is an event organized by the Government of the Balearic Islands to promote scientific and technological awareness in the society. IFISC participated with its own stand in the event in Mallorca in Menorca. (March 26-28)



Impressions from the IFISC stand. Several IFISC PhD students were involved in the demonstrations and linking with the public. The central theme selected for the 2009 edition was photonics. A dozen different activities on laser light and applications, optical illusions and image formation were presented. The wide spectrum of scientific demonstrations were at the same time entertaining and educational to both, young and adult visitors

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## 9.4 OSA-IFISC ACTIVITIES



The OSA (Optical Society of America) promotes the Student Chapters with the aim to establish collaboration networks with other students, participate in outreach activities, and encourage the interest in optics of undergraduate students and the general public.

The "OSA - IFISC Student Chapter" is a group of Ph.D. students of IFISC and the Physics Department of the UIB (University of the Balearic Islands) with a broad spectrum of ongoing research for their Thesis but with a common interest in Optics.

These activities have been coordinated by Roberta Zambrini

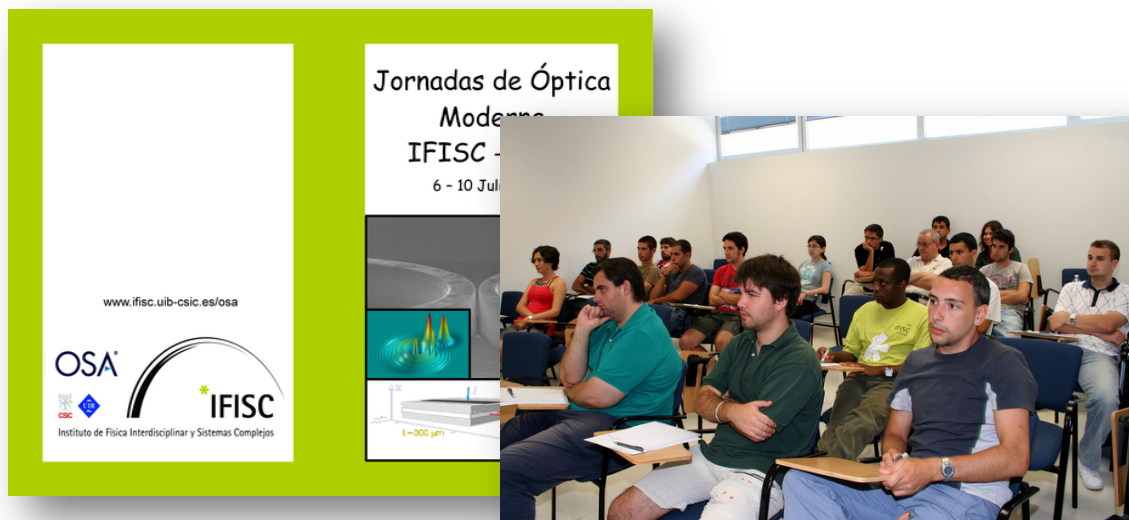
### Science Fair

The members of the chapter joined enthusiastically their efforts to the organization of the "Fira de la Ciencia" and documented this experience in a short video available, with other informations about the group activities, at their webpage: <http://www.ifisc.uib-csic.es/osa/>

### Modern Optics Days

One of the initiatives of the OSA-IFISC Student Chapter has been the organization of the Modern Optics Days at the beginning of July 2009. A group of 20 undergraduate Physics and Engineering students of the UIB participated to a one week program including seminars given by PhD students of the chapter, visits to the lab as well as informative discussions about research possibilities before and after graduation. These days provided an overview on hot research topics covering a broad spectrum of subjects like lasers dynamics, quantum optics, nonlinear optics and chaotic communications.

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## 9.5 PRESS AND MEDIA

### PRESS NEWS

#### News related to the publication: "Sex-related similarities and differences in the neural correlates of beauty"

*Proceedings of the National Academy of Sciences of the USA (PNAS) 106, 3847-3852.*



- \* Schönheit entsteht im Kopf - bei Männern nur etwas weniger. Ärzte Zeitung online, February 22, 2009.
- \* La UIB lidera una investigació sobre percepció diferent de la bellesa per part d'homes i dones. EuropaPress. February 23, 2009.
- \* Muestran que hombres y mujeres perciben la belleza de forma diferente. CSIC Press release. February 23, 2009.
- \* Hombres y mujeres ven diferente la belleza. Público, February 23, 2009.
- \* Mujeres y hombres procesan la belleza de forma diferente. E!espectador.com. February 23, 2009.
- \* Investigadores españoles desvelan cómo hombres y mujeres procesan de forma diferente la percepción de la belleza. El Economista.es. February 23, 2009.
- \* Afirman que mujeres y hombres procesan la belleza de forma diferente. Peru21, February 23, 2009.
- \* Frauen finden anders schön als Männer. Spektrumdirekt. February 23, 2009.
- \* Frauen bewerten Schönheit anders als Männer. T-Online. February 23, 2009.
- \* Frauen bewerten Schönheit anders als Männer. welt online. February 23, 2009.
- \* Hombres y mujeres perciben la belleza de forma distinta. Yahoo noticias. February 23, 2009.
- \* Homes i dones perceben la bellesa de manera different. UIB Press Release, February 24, 2009.
- \* Los varones solo usan la mitad del cerebro para apreciar la belleza. Elperiodico.com. February 24, 2009.
- \* Hombres y mujeres perciben la belleza de manera distinta, según un estudio de la UIB. Diario de Mallorca. February 24, 2009.
- \* Hombres y mujeres perciben la belleza de manera distinta. El Mundo. February 24, 2009.
- \* Hombres y mujeres perciben la belleza de manera distinta. El Mundo.es, February 24, 2009.
- \* El cerebro de hombres y mujeres reacciona de forma diferente manera ante la belleza. Expansion, February 24, 2009.
- \* La belleza artística, cuestión de sexo. La razón. February 24, 2009.
- \* Los varones sólo usan la mitad del cerebro para apreciar la belleza. El periodico. February 24, 2009.
- \* El cerebro de hombres y mujeres percibe la belleza de forma diferente. El mundo.es. February 24, 2009.
- \* UIB-Studie: Frauen bewerten Schönheit anders als Männer. Mallorca Zeitung. February 24, 2009.
- \* Von Männern, Frauen und dem Blick für Kunst. NEWS Wissenschaft.de. February 24, 2009.
- \* Männer- und Frauenhirne verarbeiten Schönheit unterschiedlich Spiegel online, February 24, 2009.

- \* Frauen betrachten Kunst mit dem ganzen Gehirn. News Wissen. February 24, 2009.
- \* Apprécier la beauté: le cerveau féminin plus actif que le masculin. Yahoo Quebec. February 24, 2009.
- \* Apprécier la beauté: le cerveau féminin plus actif que le masculin. Santé ChezNous. February 24, 2009.
- \* Apprécier la beauté: le cerveau féminin plus actif que le masculin. Cyberpresse.ca. February 24, 2009.
- \* Mujeres y hombres procesan belleza de forma diferente, iesaña.es. February 24, 2009.
- \* El cerebro de hombres y mujeres percibe la belleza de forma diferente. Opcion. February 24, 2009.
- \* Hombres y Mujeres perciben la belleza de forma diferente. Época. March 4, 2009.
- \* Apprécier la beauté: Le cerveau féminin plus actif que le masculin. ELMOUDJAHID.com March 16, 2009.
- \* Cerveau des femmes. Blogmyarts. 16 March, 2009.
- \* Les femmes utilisent tout leur cerveau. Actualités Santé. 16 March, 2009.

**News Related to the publication: "Marine birds follow Lyapunov avenues on the sea  
Proceedings of the National Academy of Sciences of the USA (PNAS) 106, 8245-8250.**



- \* Investigadors de l'IFISC (UIB-CSIC) han participat en un estudi internacional de recerca que ha detectat les autopistes sobre l'oceà que segueixen les aus marines [UIB](#) Press Release, May 5 2009. [\[PDF\]](#)
- \* Las aves detectan 'carreteras' en el mar con el olfato. El Mundo, May, 5 2009. [\[PDF\]](#)
- \* Las aves marinas podrían guiarse por el olfato. Europa Press, May 5 2009. [\[PDF\]](#)
- \* Las aves detectan 'carreteras' en el mar que conducen hasta sus presas. ABC, May 5 2009. [\[PDF\]](#)
- \* Científicos descubren que las aves detectan 'carreteras' en el mar gracias a su olfato. 20 Minutos, May 5, 2009. [\[PDF\]](#)
- \* Descubren que las aves marinas detectan las rutas de caza mediante el olfato. Diario de Ibiza, May 5, 2009. [\[PDF\]](#)

- \* Descubren que las aves marinas detectan las rutas de caza mediante el olfato. La Opinión, Tenerife, May 5, 2009. [\[PDF\]](#)
- \* Descubren que las aves detectan carreteras en el mar que conducen hasta sus presas. CSIC Press Release, May 6, 2009. [\[PDF\]](#)
- \* Las autopistas del océano. Diario de Mallorca, May 6, 2009. [\[PDF\]](#)
- \* Descubren que las aves marinas detectan las rutas de caza mediante el olfato. La Opinion, Murcia, May 6, 2009 [\[PDF\]](#)
- \* Científicos descubren que aves detectan carreteras en el mar. La Crónica, Mexicali, Mexico, May 6, 2009 [\[PDF\]](#)
- \* Las aves detectan 'carreteras' en el mar con el olfato. Revista Opción, Mexico, May 6, 2009 [\[PDF\]](#)
- \* Detectan aves carreteras marinas. Diario 21, Guerrero, Mexico, May 6, 2009 [\[PDF\]](#)
- \* Aves siguen carreteras de olores para dar con sus presas en el mar. Panamá América, May 9, 2009. [\[PDF\]](#)

- \* Las aves detectan 'carreteras' en el mar para llegar a su presa. ABC (suplemento Natural), May 12, 2009. [\[PDF\]](#)
- \* La UIB participa en un estudio destinado a identificar las rutas que siguen las aves marinas. Periódico Salut i Força, n 152 (11-31 May 2009). [\[PDF\]](#)
- \* Leyendo las aguas, por C.J. Cela Conde. Diario de Mallorca, May 16, 2009. [\[PDF\]](#)
- \* Investigadors de la UIB i del CSIC estudien des de Mallorca les 'autopistes' sobre l'oceà que segueixen les aus marines. Última Hora (suplemento Entorn), May 28, 2009 [\[PDF\]](#)
- \* Featured in several blogs, such as the [MIT Technology review](#)

**News related to the Conference Series “Explorant les Fronteres entre els Sabers”**

- \* "Aún con todas las leyes fundamentales, el mundo seguirá siendo misterioso" Diario de Mallorca, May 21, 2009. [\[PDF\]](#)
- \* "Está por demostrar que la especie humana sea inteligente" Diario de Mallorca, June 11, 2009. [\[PDF\]](#)
- \* "No Somos Conscientes de todo lo que escuchamos cada día" Diario de Mallorca, June 20, 2009 [\[PDF\]](#)



**News related to the “Official Opening of IFISC Building”**

- \* Inauguració de l'edifici dels instituts Universitaris de Recerca de la UIB. UIB Press Release, 2009. July 17, 2009. [\[PDF\]](#)
- \* La UIB inaugura un flamant centre de recerca avançada. Diari de Balears. July 17, 2009. [\[PDF\]](#)
- \* La UIB inaugura el Nuevo edificio de los Institutos Universitaris de recerca. Última Hora, July 17, 2009 [\[PDF\]](#)
- \* La UIB centraliza en un Nuevo edificio todos los institutos de investigación. Diario de Mallorca, July 17, 2009. [\[PDF\]](#)

- \* La Guerra Freda millora la Ciència. Diari de Balears, July 19, 2009 [\[PDF\]](#)
- \* A la investigació li queda un llarg camí. Diari de Balears, July 19, 2009. [\[PDF\]](#)
- \* El CSIC invertirà setze milions en les illes para contractar a investigadors, Diario de Mallorca, July 19, 2009. [\[PDF\]](#)
- \* El CSIC centrará sus proyectos en energía y Medicina. Diario de Mallorca, May 23, 2009 [\[PDF\]](#)



### News related to IFISC Open Days

- \* L'IFISC obre les portes als alumnes de les Illes, UIB Press Release. November 12, 2009 [PDF]
- \* Més de 200 alumnes visiten l'IFISC. Diario de Mallorca, November 12, 2009. [PDF]

### News related to the International Workshop on 150 Years after Darwin: From Molecular Evolution to Language

- \* Congrés Internacional 150 Anys després de Darwin: De l'evolució molecular al llenguatge, UIB, Press Release, November 19, 2009.
- \* Experts de disciplines dispares paricipan en la Universidad en un Congreso sobre Darwin. Diario de Mallorca, November 24, 2009.
- \* L'IFISC cita a 20 dels millors experts mundials. Diario de Mallorca, November 26, 2009.



### OTHER NEWS

- \* Excel.lent en Física. L'hiperbòlic, January ,2009.
- \* L'IFISC (UIB-CSIC) rep els directors de vint centres d'investigació de tot l'Estat per analitzar l'Àrea de Física del Pla estratègic del CSIC 2010-2013. UIB press release. May 22, 2009 [PDF]
- \* El premi Nobel Sheldon L. Glashow es reuní amb l'IFISC. Diario de Mallorca, June 6, 2009. [PDF]
- \* Óptica cuántica, una luz que ilumina la ciencia del siglo XXI. El Mundo, suplemento B@léopolis, September 22, 2009 [PDF]
- \* Cicle de Conferències: La nostra ciència de cada dia. UIB Press Release. November 11, 2009 [PDF]
- \* El día de los pequeños investigadores. Diario de Menorca, March 27, 2009.
- \* El software, la cobaya virtual. El Mundo, suplemento B@léopolis, November 24, 2009. [PDF]

### RADIO

- \* Interview with Maxi San Miguel, Aurora Viçens and Roberta Zambrini, Cadena Ser-Menorca, March 28, 2009.
- \* Interview with Roberta Zambrini, Punto Ràdio-Menorca, March 27, 2009.
- \* Interview with Emilio Hernández-García, "Españoles en la mar", Radio Nacional (Radio Exterior de España). May 7, 2009 [MP3]
- \* Interview with Emilio Hernández-García, "Bon Dia Balears", IB3 TV. May 13, 2009 [AVI]





- \* Interview with Enric Munar. "Això no és Sicília", Ona Mallorca Ràdio. November 10, 2009.
- \* Interview with Emilio Hernández-García;"Això no és Sicília" de Ona Mallorca Radio. November 17, 2009.
- \* Interview with Emilio Hernández García, "Tassa i mitja" de IB3 Ràdio. November 18, 2009.
- \* Interview with Susanna C.Manrubia and Manuel Matias." Balears fa Ciència" IB3 Ràdio. November 28 ,2009
- \* Round table discussion with Maxi San Miguel, *la biología, la física y la química*, "Balears fa Ciència" IB3 Ràdio. December 19, 2009.
- \* Interview with Emilio Hernández-García en el programa "Al Día de Hoy", de Punto Radio. May 7, 2009 [\[MP3\]](#)

## TV

- \* Presentation of the Plan for Science, Technology and Innovation of the Balearic Islands. Interview with Professor Claudio Mirasso, IFISC Researcher. News IB3 TV, May 26, 2009 [watch the video](#)
- \* "Science in action" BBC TV-show. February 27, 2009. Interview with Camilo Cela-Conde
- \* Inauguració dels edificis de l'Institut Universitari de Recerca de la UIB. Declaracions R.Rodrigo IB3 TV. July 19, 2009. [watch the video](#)
- \* La UIB ja disposa d'un edifici específic per a la investigació i la recerca científica. Declaracions M.Casas. TVM. [watch the video](#). July 19, 2009
- \* Inauguració d'un centre de recerca científica a la UIB. Declaracions F.Antich Canal 4 TV, July 19, 2009.





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