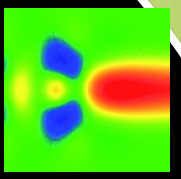
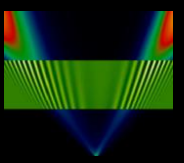
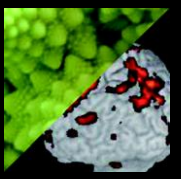
Connecting Science,
Understanding Complexity

IFISC ANNUAL REPORT 2010




Universitat de les Illes Balears

CSIC
Consejo Superior de Investigaciones Científicas

IFISC

INDEX

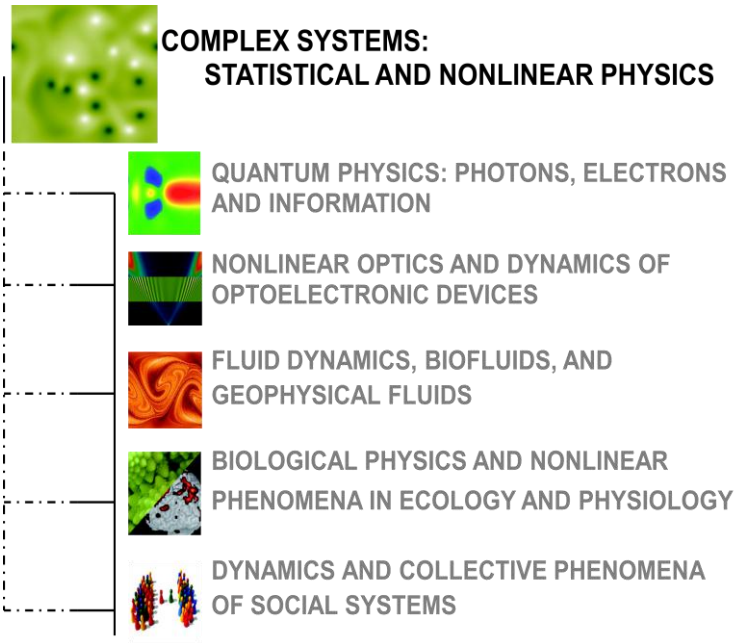
1. PRESENTATION AND RESEARCH LINES

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 IFISC´S research that unifies, percolates, and is the basis of the rest of 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.

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 identified five lines with a subject defined by the system under study and representing cross-disciplinary interfaces of Physics with other established discipline.

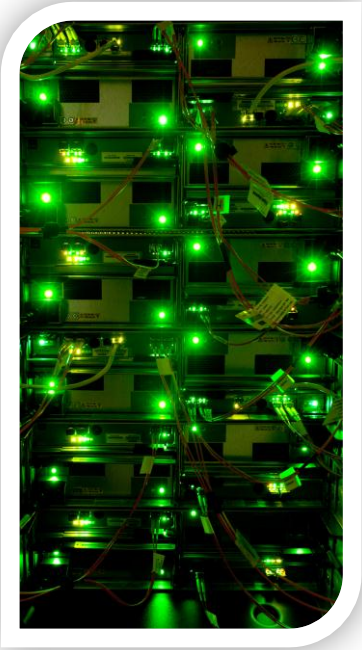


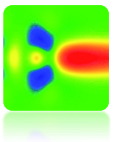
COMPLEX SYSTEMS. NONLINEAR AND STATISTICAL PHYSICS

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 Thoughput 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.





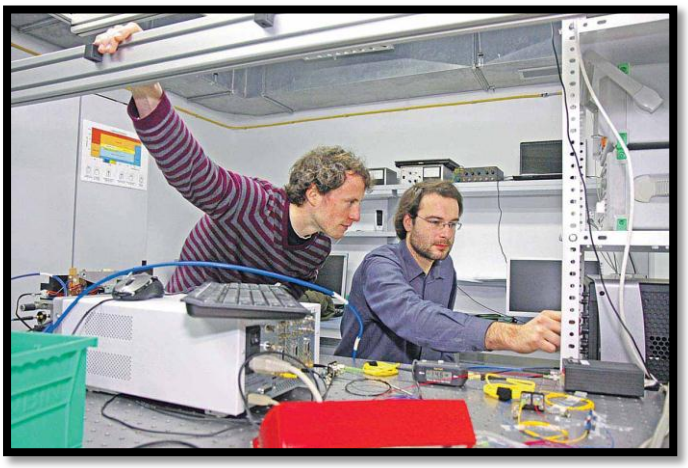
QUANTUM PHYSICS: PHOTONS, ELECTRONS AND INFORMATION

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.

NONLINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES

The general topic of this line is the study of the light-matter nonlinear 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.



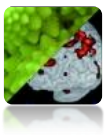
Photonics lab

Since 2009 a Photonics Laboratory of high standards has been established. The lab is equipped with a Faraday cage for electromagnetic shielding and houses several experiments of delay-coupled lasers using the latest technology to characterize the laser emission with multi-Gigahertz bandwidth: in the temporal domain via fast detectors and 16 GHz real-time oscilloscope, and in the spectral domain via a 14 GHz real-time spectrum analyzer. In addition, high-resolution optical characterization can be performed via different spectrometers, and laser modulation can be implemented with arbitrary waveforms up to 9.6 GHz bandwidth.

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, and Lyapunov methods are thoroughly used. On the other hand, we apply these concepts and methods to geophysical settings, mostly in ocean dynamics: transport modelling, plankton patchiness, Lagrangian coherent structures, etc. Numerical simulation as well as the output from satellite sensors are the main sources of data used here.



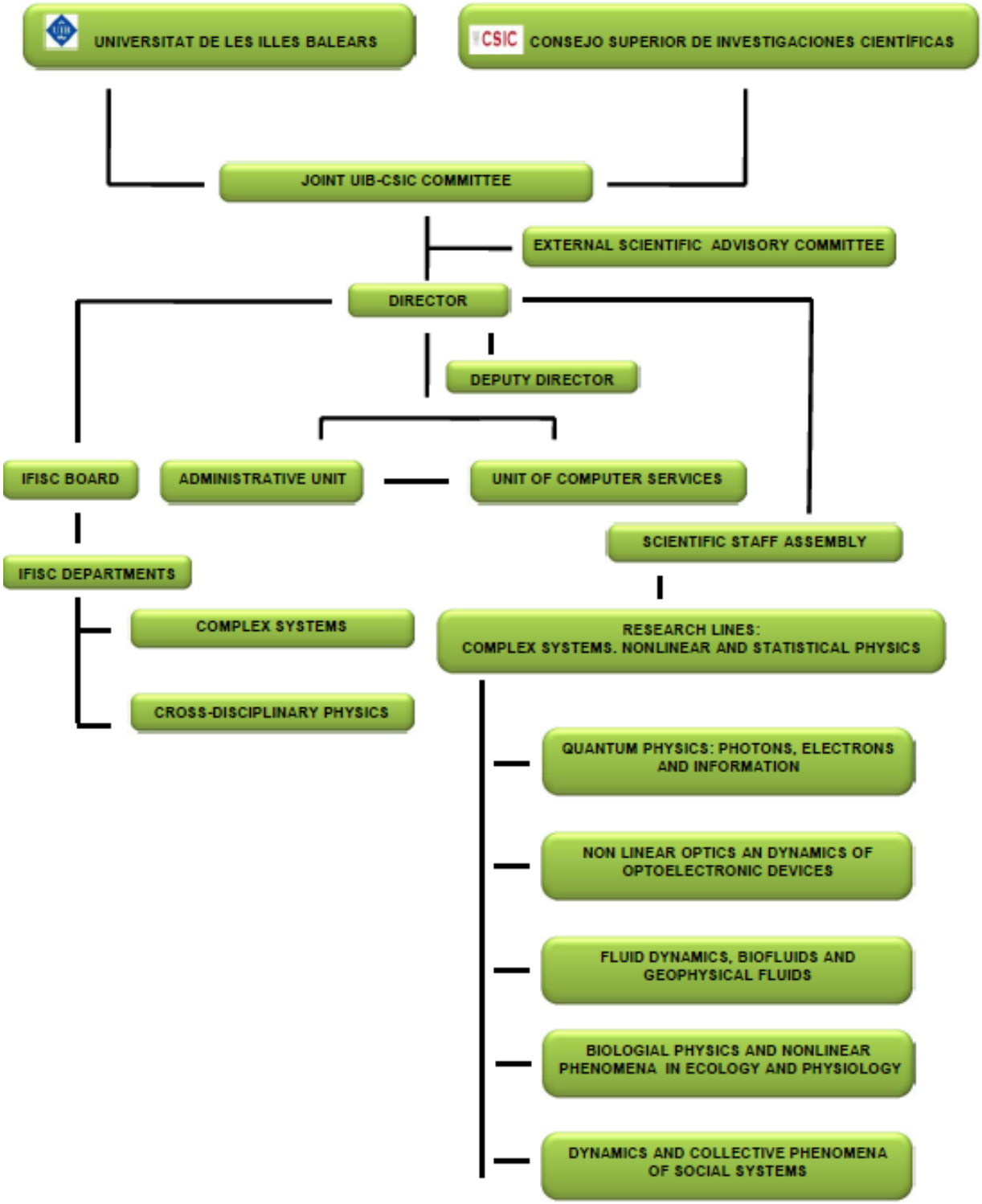
BIOLOGICAL PHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY

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 addres

1.2 STRUCTURE CHART



1.3 SOME REPRESENTATIVE RESEARCH RESULTS OF 2010

NONLOCALITY-INDUCED FRONT-INTERACTION ENHANCEMENT

Physical Review Letters 104, 154101 (2010)

Spatial interaction in physical systems is usually local (first neighbors), but sometimes this description is not enough. Non-local interactions (long range) appear in physics and other field of science such as biology or ecology, and they can have important effects on the propagation of the information in the system.

Classical equations describing the time evolution in space and time are Partial Differential Equations, e.g. the heat equation. In these equations spatial interaction depends on some derivative of the relevant field, a local quantity. More recently, considerable effort has been devoted to the study of evolution equations in which spatial interaction is *nonlocal*, in the form of an integral over a spatial domain. Nonlocal interaction terms can appear in Physics and other fields when long-range interaction terms are considered, also as the result of using approximations in reaction-diffusion descriptions (e.g. adiabatic eliminations of averaging approximations) and also due to density-dependent effects in biological and ecological systems. This work studies the effect of such nonlocality on the propagation of fronts in systems with two equivalent states and shows that these interactions change the dynamics of the systems substantially. In particular it can give rise to the formation of structures with two stable fronts, like a flat-top mountain, an example of a localized structure.

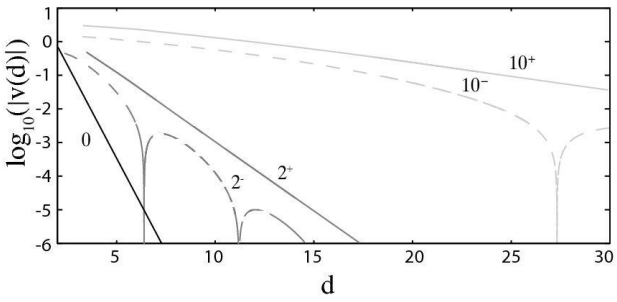


Figure 2: Relative velocity of two fronts as a function of the distance between them for different ranges and sign of the non-local interaction (labels by the lines).

The interaction of two fronts separated by a distance *d* can be characterized by their relative velocity *v* which typically decreases exponentially with the distance at a rate γ. When non-local couplings are considered this behavior is affected substantially. In the Ginzburg-Landau equation with non-local interactions in the form of an integral term, we have observed that attractive or activatory (+) interactions strongly reduce the coefficient γ, and even for moderate values of the range of the non-local interactions (σ) fronts move several orders of magnitude faster than in the case with local interactions only (Figures 1 and 2). For repulsive or inhibitory (-) interaction the exponential law no longer holds. Nevertheless, the magnitude of the envelope of the front velocity decreases exponentially, as shown in Figure 1. In this case, the velocity becomes zero at regular intervals of the distance d between two fronts. At these positions the fronts are locked leading to the formation of localized structures that may not be present with local interactions only. Nonlocal interactions are common in nonlinear optics, biology, chemistry, and other fields of science, and they can have a constructive role by enhancing the propagation of information between distant parts of the system, and also allowing the system to exhibit new dynamical regimes.

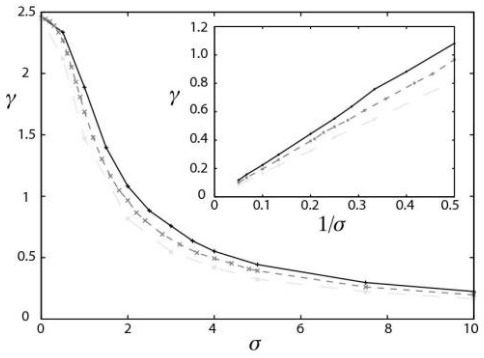


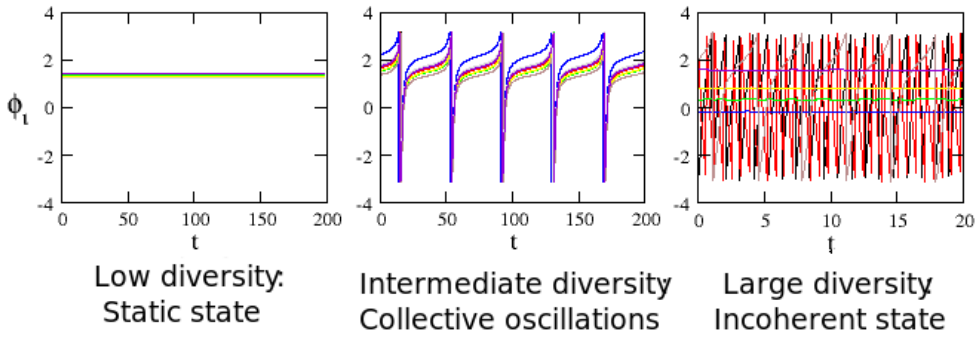
Figure 1: Coefficient γ as a function of the range σ of the non-local interaction.

NON-UNIVERSAL RESULTS INDUCED BY DIVERSITY DISTRIBUTION IN COUPLED EXCITABLE SYSTEMS

Physical Review Letters 105, 084101

In this work, a general model that shows how synchronized behavior can appear when a set of many non-identical units interact among themselves is studied. Special attention is paid to the role of the diversity in the system.

Synchronization phenomena are ubiquitous processes in nature. They appear in systems as diverse as chemical reactions, peacemaker cells in the heart, Josephson Junction arrays or population of flashing fireflies, among many other examples. In this kind of systems, the elements are never identical to each other and this type of disorder can give rise to interesting and some times unexpected effects. During the past years, physicists have been trying to understand this phenomena by building simple models that are amenable to analytical study, yet retain the essence of the phenomenon and give qualitatively (and to some extent also quantitatively) similar results than those of more complicated systems appearing in nature. In this context, the Kuramoto model has been established as a paradigmatic model for the study of synchronization. The diversity of the different elements is usually considered in the model by taking the parameters of the individual units from some prescribed probability distribution. Typically, the specific form of the distribution does not affect the results qualitatively (as long as it is symmetric and unimodal). In this work we show that an extension of the Kuramoto model, which describes coupled excitable units, can generically exhibit a regime of collective firing induced by the disorder. This interesting constructive effect is observed for practically all the distributions of the disorder, except for the Lorentzian, usually considered in the literature since it allows an easier analytical treatment. Our results prove the ubiquity of disorder induced collective firing and warn about the use of some recently proposed methods that rely on Lorentzian-type distributions to understand generic properties of Kuramoto-like systems and synchronization in general.



Phases of eight representative oscillations as a function of time for the three different dynamical regimes, for Gaussian distribution of natural frequencies with average 0.97 and standard deviation 0.5 (left), 1.5 (middle), and 3 (right).

BRINGING ENTANGLEMENT TO THE HIGH TEMPERATURE LIMIT

Physical Review Letters 105, 180501

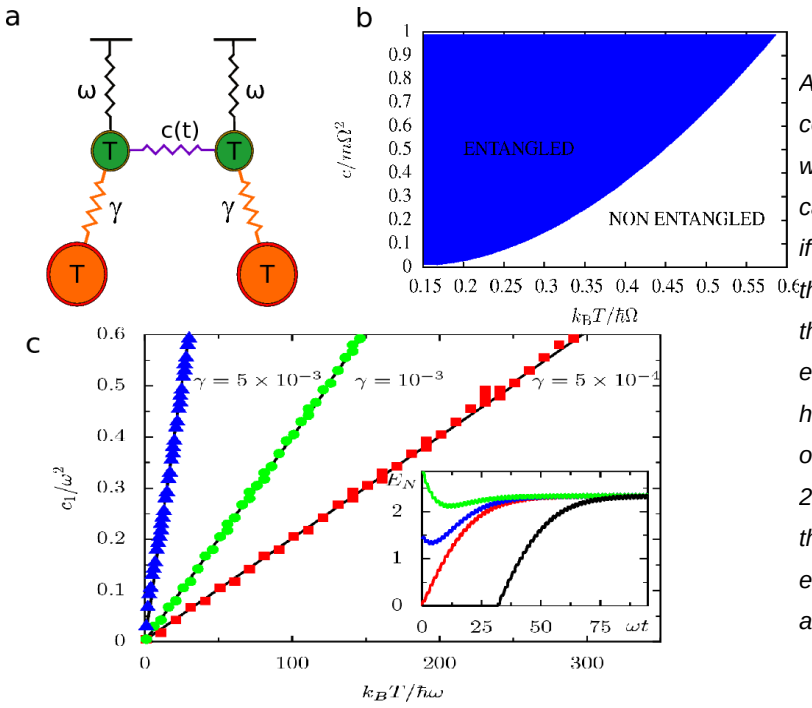
Highlighted in Phys. Rev. Focus 22 October 2010

Commented by Vedral, V. «Hot entanglement». *Nature*, 468, 769

We show that, contrary to common intuition, we can observe quantum entanglement (an extreme form of quantum behaviour) at high temperatures if a system is strongly driven by an external forcing. This is exemplified via two coupled harmonic oscillators in contact with hot environments.

From the beginnings of quantum theory, the concept of what is quantum and what is not, has substantially evolved. From the initial, and arbitrary, separation between quantum microscopic objects and classical macroscopic objects, our picture of this subject has become more accurate. This advance was the result of experimental observation of purely quantum phenomena in many body systems with a huge amount of degrees of freedom, such as e.g. superconductivity, intereference of massive molecules and coherent superposition of Bose-Einstein condensates.

The last bastion in the quantum/classical border seemed to be temperature: it was commonly accepted that an object could only exhibit quantum features when its temperature is below the resolution of the minimum characteristic energetic levels of the system. In our work we show that this criterion is not valid. We find that equilibrium sates exist (due to parametric forcing) for dissipative coupled harmonic oscillators in which very high temperatures can be reached and yet entanglement, one of the most extreme phenomena predicted by quantum mechanics, can be observed. Thus, in principle, quantum phenomena could be observed even at room temperature.



A system composed by two coupled harmonic oscillators which dissipate to heat baths (a) can only possess entanglement if the temperature is low (b). In the case of parametric driving, the system can reach entanglement at hundred times higher temperatures (c). For an oscillator with frequency in the 20 GHz range, it would mean that room temperature entanglement could be achieved.

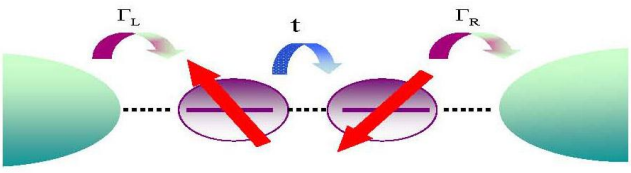
JOSEPHSON CURRENT IN STRONGLY CORRELATED DOUBLE QUANTUM DOTS

Physical Review Letters 105, 116803

We have investigated the sign of the supercurrent through a nanostructure. Our results could shed light in the understanding of high temperature superconductors (heavy fermions). Besides, our findings on the Cooper pair transport in the presence of many-body effects could have a great impact for the design of the future quantum computers.

In a metal containing a dilute concentration of magnetic impurities the competititon between Kondo physics, which favours screening of the localized spins by the itinerant conduction-band electrons, and antiferromagnetic exchange interactions between impurities leads to a quantum phase transition. Even more interesting properties emerge when the metal turns superconducting below the critical temperature. For s-wave superconductors, Cooper pairs formed by itinerant electrons are yet another possible singlet state which competes with the above. The intriguing interplay of these phenomena, which might actually coexist in complex materials such as heavy-fermion superconductors, governs the low temperature physics of these systems. Nanoscale systems allow to tune the ratio between the relevant parameters (the Kondo temperature T_K, the antiferromagnetic exchange interaction J, and the superconducting gap Δ, respectively) and, therefore, enable thorough investigations of such competition in a controlled setting. In the simplest case of single quantum dots attached to superconducting reservoirs, where only Kondo physics and superconductivity are relevant, a sign change of the Josephson current, from positive *0-junction* to *negative π-junction* behavior, signals a quantum phase transition between a singlet and a doublet ground state as T_K/Δ decreases. A double quantum dot coupled to normal metals constitutes a physical realization of the two- impurity Kondo model, as demonstrated experimentally. When the reservoirs become superconducting, this system is *a minimal artificial realization of the described competition among three different spin-singlet ground states*. In this Letter we focus on a detailed analysis of the Josephson current which, as a ground state property, shows signatures of this subtle competition.

We examine the competition between the superconductivity and the Kondo physics by tuning the relative strength Δ/T_K of the superconducting gap Δ and the Kondo temperature T_K, for different strengths of the superexchange coupling determined by the interdot tunneling t relative to the dot level broadening Γ. We find strong renormalization of t (interdot tunneling amplitude), a significant role of the superexchange coupling J, and a rich phase diagram of the 0 and π-junction regimes. In particular, when both the superconductivity and the exchange interaction are in close competion with the Kondo physics ($\Delta \sim J \sim T_K$), there appears an island of π′-phase at large values of the superconducting phase difference.



Schematics of the double quantum dot system coupled to superconducting leads. In the deep Kondo limit, this system is an artificial realization of the two-impurity Kondo problem in the presence of superconducting correlations.

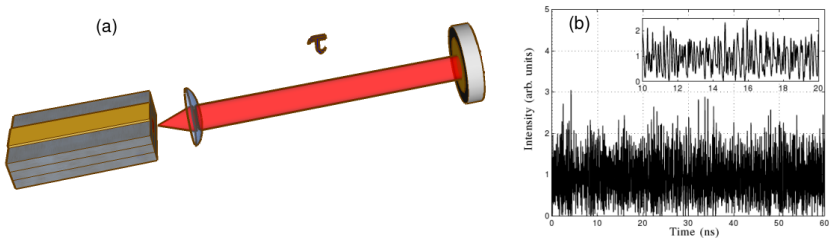
IFISC

TIME SCALES OF A CHAOTIC SEMICONDUCTOR LASER WITH OPTICAL FEEDBACK UNDER THE LENS OF A PERMUTATION INFORMATION ANALYSIS

Journal of Quantum Electronics, IEEE 47, p. 252-261

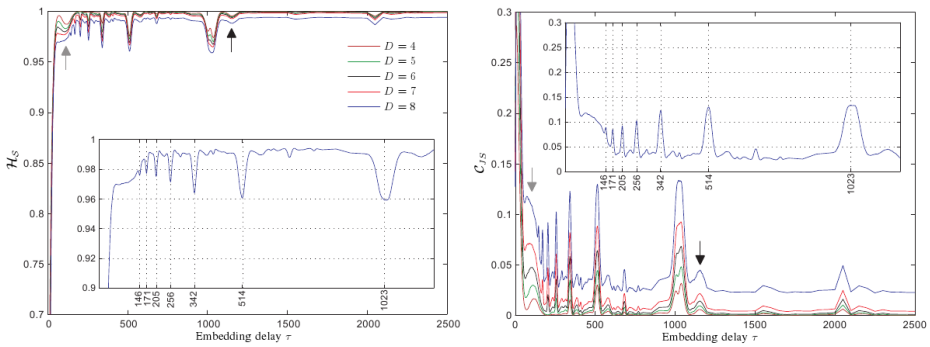
By using permutation statistical quantifiers we characterized the relevant time scales in a single mode semiconductor laser subject to optical feedback. Our results highlight that this kind of identification is escencial for a proper analysis of time series, especially when delay interactions are relevant.

The identification of essential physical time scales from complex laser dynamics is a nontrivial task, which is, however, important for their general characterization and application. In this work we perform a detailed study of the time scales present in a chaotic a semiconductor laser subject to coherent optical feedback. We address this critical issue by estimating permutation entropy, H_S, and permutation statistical complexity, C_{JS}, of experimental and numerical time series of the laser output power as functions of the embedding delay τ of a Bandt and Pompe symbolic reconstruction.



Scheme of laser with feedback (left) and and the corresponding time evolution of the light intensity (right).

By analyzing the behavior of the permutation entropy and statistical complexity it is possible to identify the feedback time delay, the relaxation oscillation period and a picosecond pulsing time scale of the system. We find that the feedback time delay and the relaxation oscillation period are associated with embedding delay values that minimize the permutation entropy and maximize the permutation statistical complexity, simultaneously. The presence of additional peaks at harmonics and subharmonics of the feedback time allow us to distinguish between these two intrinsic time scales. The fastest time scale defines the minimal required sampling time. It can be interpreted as the shortest embedding delay value where the permutation statistical complexity is also maximized. The permutation entropy has, however, a monotonous increasing behavior around this point. Therefore, estimations of both quantifiers are necessary to identify all the relevant time scales.



Permutation entropy (left) and statistical complexity (right) vs. the embedding delay for the light intensity.

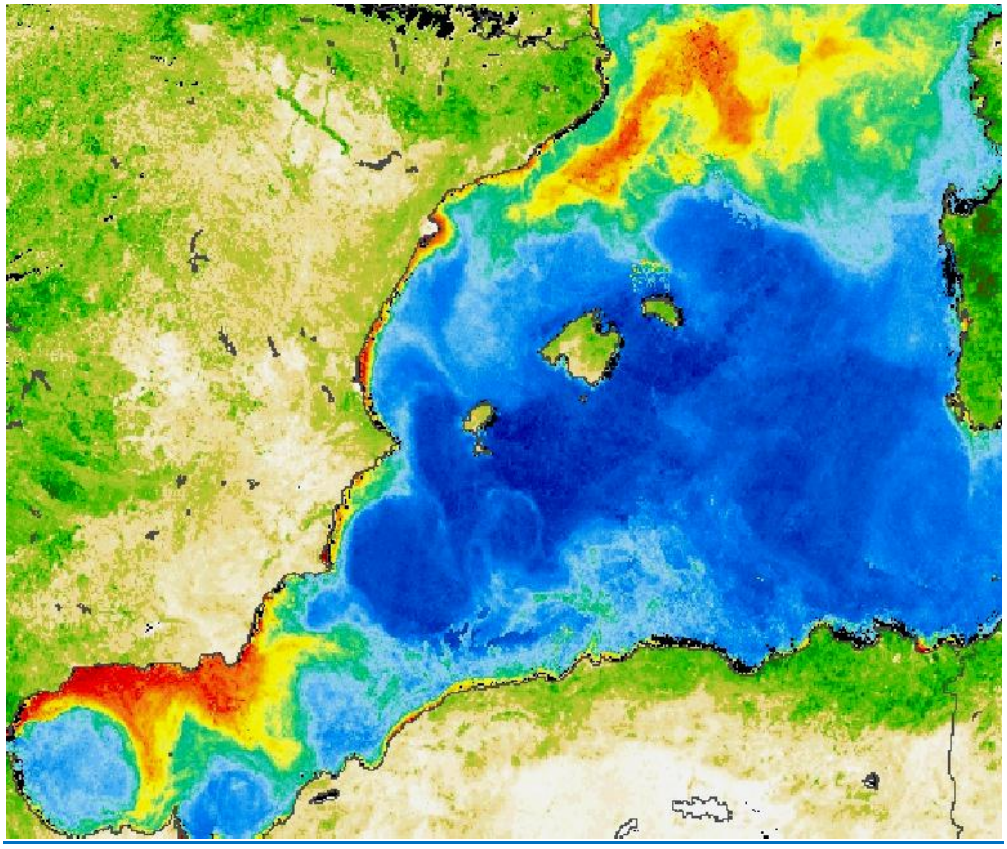
PREFACE "NONLINEAR PROCESSES IN OCEANIC AND ATMOSPHERIC FLOWS"

Nonlinear Processes in Geophysics 17, 283-285

The publication of a special issue, coedited by IFSIC members, in the Journal 'Nonlinear Processes in Geophysics' was completed in 2010. The subject was "Nonlinear processes in oceanic and atmospheric flows", and contained refereed original contributions from the participants in the workshop with the same name held in Castro Urdiales (Cantabria) in July 2008.

Nonlinear phenomena are essential ingredients in many oceanic and atmospheric processes, and successful understanding of them benefits from multidisciplinary collaboration between oceanographers, meteorologists, physicists and mathematicians. In this Preface the Editors summarize the contributions to the Special Issue, which include papers on generation and variability of geophysical jets (such as the Gulf Stream) and waves, on the characterization of transport (i.e. the motion of water, air, dissolved substances, particles, …) in fluids, interactions of fluid flow with biology, such as in the discussion of plankton dynamics, statistical properties in meteorological fields, and variability in the El Niño phenomenon.

It is expected that this Special Issue will contribute to the visibility of novel approaches, based on nonlinear methodologies, to oceanography and meteorology, and become a useful reference for researchers in the field.



Plankton distributions in the western Mediterranean, observed from satellite (SeaWiFS sensor).

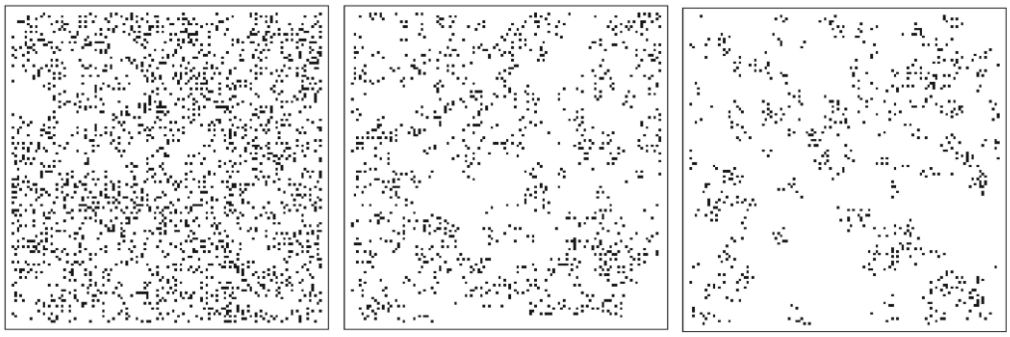
TREE PATTERNS IN SAVANNAS

The American Naturalist 175, E44-E65

A long standing question is what is special about savanna ecosystems that allows the coexistence of trees and grasses, as opposed to the general pattern in other areas of the world where either one or the other is dominant. We try to answer this question using the techniques and concepts of Statistical Physics.

Savanna ecosystems are widespread and economically important and harbor considerable biodiversity. Despite extensive study, the mechanisms regulating savanna tree populations are not yet well understood. Recent empirical work suggests that both *tree-tree competition* and *fire* are key factors. However, the potential for competition to structure savannas, particularly in interaction with fire, has received little theoretical attention. We develop a minimalistic and analytically tractable stochastic cellular automaton to study the individual and combined effects of competition and fire on savannas. We find that while competition often strongly depresses tree density, fire generally has little impact, but can drive tree extinction in extreme scenarios. When combined, competition and fire interact nonlinearly, magnifying each others negative effects on tree density. This is a novel result that may help explain several observed phenomena in savannas in response to fire. In addition, a key strength of our approach is that we can establish analytically the conditions under which the model's important qualitative features (regular spacing of trees, clustering, etc..) occur.

Different spatial distributions of trees from the model:



CAN THE THALAMUS CONTROL THE SYNCHRONIZATION OF CORTICAL AREAS?

Neuroimage, 52, 947

We show by extensive numerical simulations that the dynamics of a simple thalamo-cortical circuit model can be responsible for the observed synchronization between cortical areas during the process of coherent perception.

How our brain binds features and information that are processed at different cortical areas is still an open question. One of the most accepted hypotheses is that the binding can be achieved by synchrony, despite the non-negligible delays that can take place between areas. We propose and study the dynamics and synchronization properties of a simplified model of two cortical areas whose dynamics is mediated by the thalamus. The thalamus and cortical areas are interconnected via excitatory synapses with a certain delay, longer than the internal time scale of the neurons. Using this simple model (depicted in the figure 1) we find that the thalamus could serve as a central subcortical area that is able to stablish zero-lag synchrony between distant cortical areas.

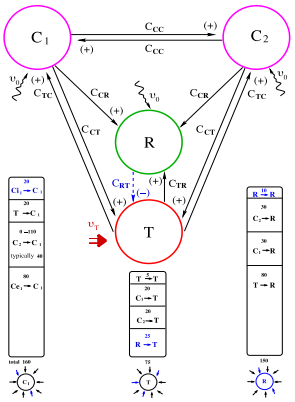


Figure 1: Thalamocortical connectivity. The two cortical populations (C1 and C2) are balanced with both excitatory (80%) and inhibitory (20%) neurons. The thalamus is composed by the perigeniculate nuclei region (R) and the thalamocortical relay neurons (T). Dashed blue arrow stands for inhibition while black arrows stand for excitatory connections. The background noise and the external driving consist of independent Poisson trains impinging in each neuron. Neurons in T are externally driven at rate ν_T while the other ones receive background activity at rate ν_0. The external inputs are uncorrelated. A scheme of all the synaptic inputs innervated in the neurons of each population is presented at the bottom panels.

Our results (figure 2) show that the model circuit is able to generate oscillations in frequency ranges of the beta and gamma bands, as well as to stablish zero-lag synchronization between cortical areas.

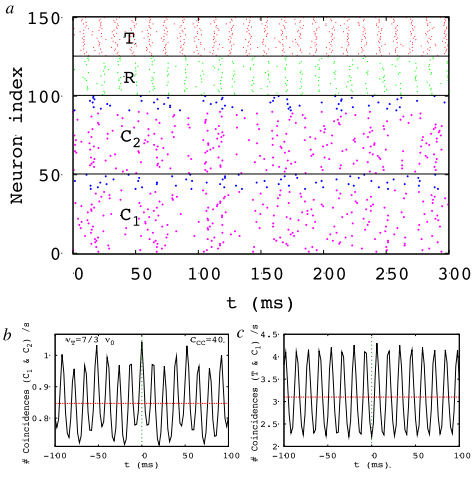


Figure 2: Thalamocortical dynamics. Panel (a): raster plots. Spikes in magenta (blue) stand for excitatory (inhibitory) neurons. The spikes of neurons in R (T) are plotted in green (red). The rate in T is ν_T =7/3 ν_0. The average cross-correlogram of 3,000 randomly chosen neuron pairs of different populations are presented in panels (b) for C_1 and C_2 and (c) for T and C_1. The maximun of C_1-C_2 cross correlation occurs at zero-lag while that of T-C_1 occurs at 6 ms.

We have also proposed a control mechanism to turn “On” and “Off” the synchronization between cortical areas as a function of the relative rate of the external input fed into the thalamic neuronal populations. Our results emphasize the hypothesis that the thalamus could control the dynamics of thalamo-cortical functional networks enabling two separated cortical areas to be either synchronized (at zero-lag) or unsynchronized. This control may happen at a fast time scale in agreement with experimental data, and without any need of plasticity or adaptation mechanisms that typically require longer time scales.

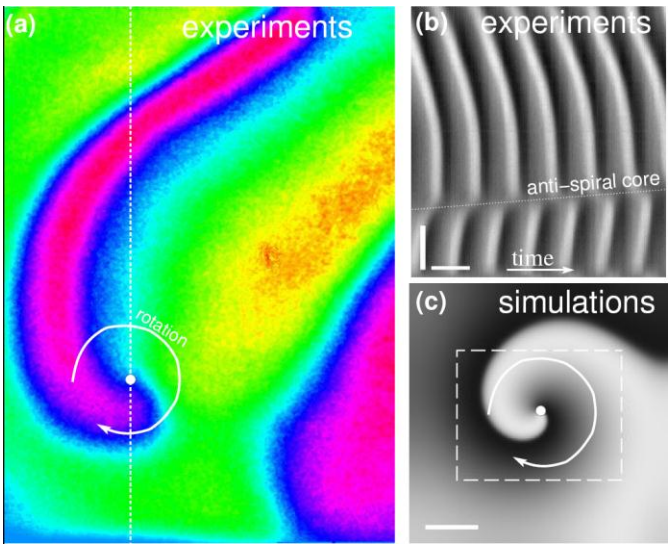
INWARD ROTATING SPIRAL WAVES IN GLYCOLYSIS

Biophysical Journal 99, L04-L06

This paper reports on the experimental finding of a novel sort of spatial structure arising in a biochemical reaction called glycolysis. We also show that this structure, called anti-spiral and consisting of a inward rotating spiral wave, naturally emerge in a standard model of glycolysis. The study of the formation of patterns in glycolysis is very important since this reaction is the main part of metabolic pathway through which every cell extracts usable energy from glucose.

Glycolysis forms part of the main metabolic pathway in every cell and is probably one of the most ancient pathways. It has attracted the attention of scientists since a long time and represents one of the main biological model systems for the energy metabolism. The glycolitic pathway consumes glucose and produces ATP, the main unit of energy inside the cell. In this publication we analyze pattern-forming properties of glycolysis experimentally, numerically and theoretically.

Spiral waves are probably the most common structure arising in pattern forming systems. Much less common are the so called anti-spirals where, in contrast to normal spirals, the wave fronts propagate inwardly, i.e. towards the spiral core [Nicola, Brusch and Baer, J. Phys. Chem. (2004)]. Till recently anti-spirals have been only found experimentally in chemical systems (in [Vanag and Epstein, Science (2001)] and [Shao et.al., Phys. Rev. Lett. (2008)]). In this publication we report on experimental finding of anti-spirals in the biological system comprised by glycolysis (see panel (a) in figure). The experiments were performed by the group of T. Mair in Magdeburg (Germany) with a open spatial reactor containing glycolytic enzymes extracted from yeast cells. In those experiments glycolysis displays oscillatory behavior. In the paper we also show that anti-spirals emerge naturally in a standard reaction-diffusion model of glycolysis for experimentally realistic parameter values (see (c) in figure). We further explore theoretically the conditions for the occurrence of anti-spirals in this model using methods coming from the field of pattern-formation.



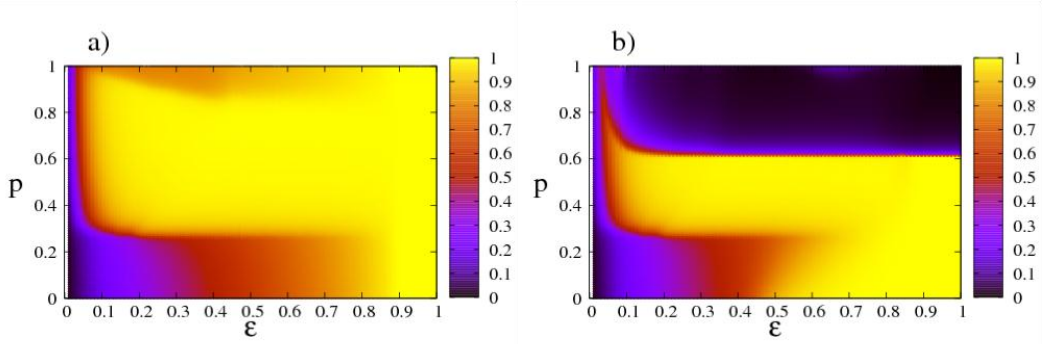
Anti-spirals in glycolysis. In (a) we show a snapshot of a typical anti-spiral as observed in yeast cells extracts. Different colors correspond to different concentrations of NADH. In (b) we show a space-time plot taken along the vertical dashed line in (a) and the dotted line indicates the position of the anti-spiral core. In (c) we show a snapshot of a anti-spiral in numerical simulations of a modification of the Goldbeter model. In (a) and (c), the white dot indicates the location of the anti-spiral core and the arrow the rotation direction.

MASS MEDIA AND REPULSIVE INTERACTIONS IN CONTINUOUS-OPINION DYNAMICS

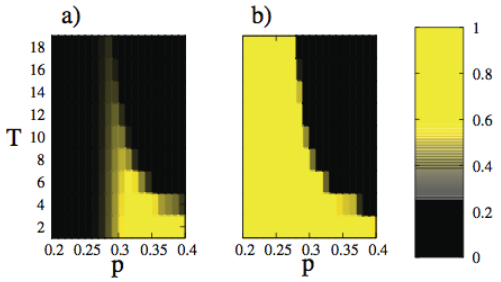
Europhysics Letters, 91, 48003

The main result is that the presence of repulsive links (pairs of people whose actions tend to diverge instead of to converge as a result of their direct social interaction) facilitates the building up on consensus around an external message, e.g. a commercial advertising. This result is reminiscent of studies in which the presence of some kind of disorder -like noise, diversity or competitive interactions- enhances the response to a weak time-dependent signal.

The modeling of the evolution of the opinion held by individuals in a society using techniques of statistical and non-linear physics has become a topic of interest in the last years. The celebrated Deffuant et al. model allows opinions to evolve by means of a negotiation rule. A distinctive parameter in this model is the interaction threshold, or bound of confidence: agents interact if their difference in opinions is smaller than some fixed value ε. As a result of their interaction, the opinions of the agents become closer by an amount proportional to their initial difference. The model also considers that individual opinions are affected by external factors, like political propaganda or advertising. Previous results indicated that propaganda only has local effects when the interaction threshold is small. In our work, we have shown that this is not the case if individuals prefer to have different opinions than some of their neighbors and, as a result, consensus can be built around an external message, even in close-minded societies. This counterintuitive result is reminiscent of studies in which the presence of some kind of disorder -like noise, diversity or competitive interactions- enhances the response to a weak time-dependent signal. In our model, we include a fraction *p* presence of repulsive links such that individuals tend to diverge in their opinions as a result of their mutual interaction and study the fraction of followers of the external message as a function of *p* and ε and the frequency T^{-1} with which the message acts.



Fraction of followers of an external message acting with (a) small or (b) large frequency as a function of the probability p of repulsive interactions and confidence bound □ ε



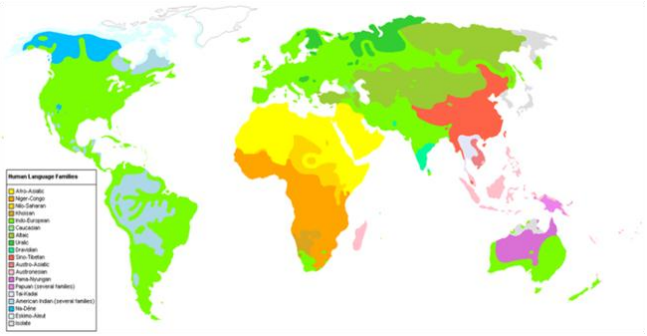
Fraction of followers as a function of the frequency T^{-1} of the message and the probability p of repulsive interactions in the cases (a) of small (ε =0.1) and (b) large (ε =0.7) confidence bound.

DYNAMICS OF LANGUAGE COMPETITION: VOLAVILITY, VIABILITY AND RESILIENCE

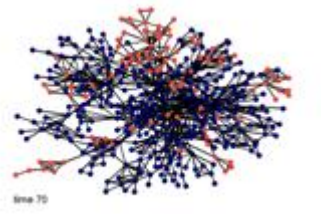
PLoS ONE, 5 (1), e8681

J. Statistical Mechanics P04007

Language Competition is concerned with the dynamics of language use due to social interactions, modeled in a network of social interactions. Language extinction or coexistence in a society with two competing languages depends on language prestige, social volatility, bilingual agents and topology of the social network.

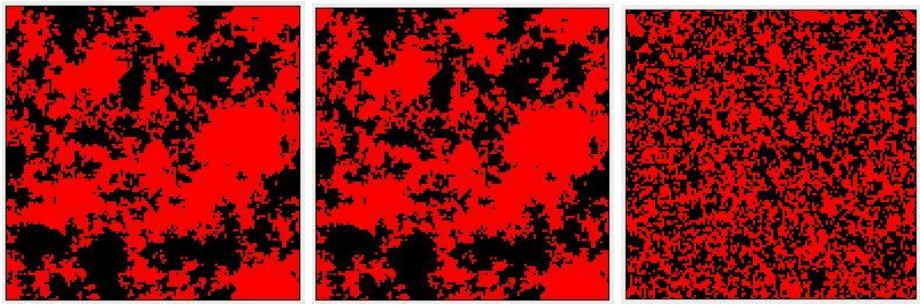


Map of families of languages in the world



Language competition in a social network

We highlight the role of social volatility, as compared with language prestige, as a relevant parameter in language dynamics. We describe a transition from one-language dominance to language coexistence controlled by the volatility parameter. We also find that the coexistence of languages is more difficult to maintain when bilingual agents are considered.. Language coexistence is also more unlikely to happen in poorly-connected than in fully connected social networks, and that the dominance of only one language is enhanced as the connectivity decreases.



Snapshots of the dynamics of growth of linguistic domains for different social volatilities. Left: High volatility leading to dynamical coexistence. Middle: Neutral volatility. Right: Low volatility leading to language dominance/extinction.

Viability theory provides concepts and tools to maintain a dynamical system inside a given set of a priori desired states. We study language resilience and determine the viability kernel for language coexistence using prestige and volatility as control parameters. Within our current framework the maintenance of a bilingual society is shown to be possible with policy actions to modify language prestige and social volatility.

2. PERSONNEL

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
- **Damià Gomila**, CSIC Tenured Scientist
- **Emilio Hernández-García**, CSIC Research Professor, IFISC Deputy Director
- **Cristóbal López**, University Professor UIB
- **Rosa López**, University Professor UIB
- **Manuel Matías**, CSIC Senior Researcher

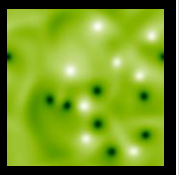
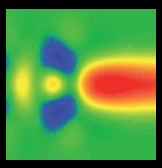
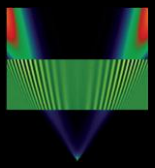
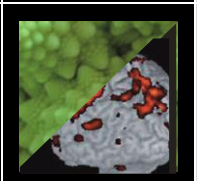
- **Claudio Mirasso**, University Full Professor UIB
- **Maxi San Miguel**, University Full Professor UIB, IFISC Director
- **David Sánchez**, University Professor UIB
- **Alessandro Scirè**, University Professor UIB
- **Llorenç Serra**, University Professor UIB
- **Tomàs Sintes**, University Professor UIB
- **Raúl Toral**, University Full Professor UIB
- **Roberta Zambrini**, CSIC Tenured Scientist

2.2 POSTDOCTORAL RESEARCH ASSOCIATES

- **Daniel Brunner,** Postdoctoral Contract Project PHOCUS
- **Juan José Cerdà**, UIB lecturer
- **Miguel C. Soriano**, Juan de la Cierva Contract
- **Fernando Galve Conde**, Postdoctoral Contract Project ECUSCO
- **Gianluca Giorgi**, Juan de la Cierva Contract
- **Els Heinsalu**, Govern Balear Postdoctoral Contract
- **Adrian Jacobo**, UIB lecturer
- **Lucas Lacasa**, Postdoctoral Contract Project FISICOS
- **Adolfo Paolo Masucci**, Postdoctoral Contract Project EDEN
- **Volker Nannen**, Postdoctoral Contract Project PATRES
- **Ernesto M. Nicola**, JAE-CSIC Postdoctoral Contract
- **Pavel Paulau**, Postdoctoral Contract Project FISICOS
- **José Javier Ramasco**, JAE-CSIC Postdoctoral Contract
- **Luciano Zunino**, Postdoctoral Fellowship CONICET (Argentina)

DISTRIBUTION OF SENIOR SCIENTISTS AMONG RESEARCH LINES

Participation in the lines of research during 2010 of the permanent scientific staff 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.

		Montserrat Casas	Pere Colet	Damià Gomila	Ingo Fischer	Emilio Hernández-García	Cristóbal López	Rosa López	Víctor M. Eguíluz	Manuel Matías	Claudio Mirasso	David Sánchez	Maxi San Miguel	Lorenç Serra	Alessandro Scire	Tomás Sintes	Raúl Toral	Roberta Zambrini
COMPLEX SYSTEMS. NONLINEAR AND STATISTICAL PHYSICS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
QUANTUM PHYSICS: PHOTONS, ELECTRONS AND INFORMATION		X		X				X				X		X				X
NON LINEAR OPTICS AND DYNAMICS OF OPTOELECTRONIC DEVICES			X	X	X						X				X			X
FLUID DYNAMICS, BIOFLUIDS AND GEOPHYSICAL FLUIDS.						X	X									X		
BIOLOGICAL PHYSICS AND NONLINEAR PHENOMENA IN ECOLOGY AND PHYSIOLOGY					X	X	X		X	X	X					X	X	
DYNAMICS AND COLLECTIVE PHENOMENA OF SOCIAL SYSTEMS						X			X				X				X	

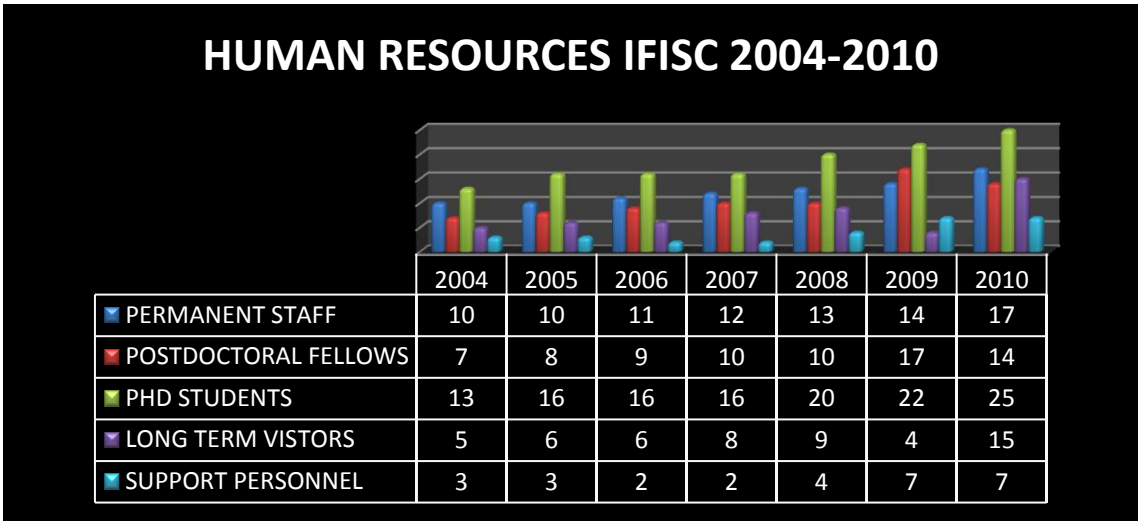
2.3 PHD STUDENTS

- **José María Aparicio**, FPI Fellowship Project FISICOS
- **Joao Bettencourt**, FCT Fellowship, Portugal
- **Xavier Castelló**, Govern Balear Fellowship
- **Ilya Ermakov**, Russian Ministery of Education Fellowship
- **Juan Fernández Gracia**, Govern Balear Fellowship
- **Luis Fernández Lafuerza**, JAE-CSIC Fellowship
- **Guadalupe C. García**, Fellowship Telefónica
- **Juan Carlos González Avella**, FPI Fellowship Project CONOCE2
- **Przemek Grabowicz**, JAE CSIC Fellowship.
- **Ismael Hernández**, FPI Fellowship Project FISICOS
- **Alejandro Herrada**, Govern Balear Fellowship
- **Konstantin Hicke**, Fellowship Project PHOCUS, Govern Balear Fellowship since October
- **Sigrid Jorgensen**, Fellowship EVOCOG Group
- **Niko Komin**, Govern Balear Fellowship
- **Leonardo Lyra Gollo**, FPI Fellowship Project FISICOS
- **Ricardo Martínez**, JAE CSIC Fellowship
- **Jade Martínez**, Govern Balear Fellowship
- **María Moreno**, UIB University Teaching Assistant
- **Teresa V. Martins**, FCT Fellowship, Portugal
- **R. Modeste Nguimdo**, FPI Fellowship Project PhoDeCC
- **Neus Oliver**, Fellowship Project PHOCUS

- **Antonio Pérez Serrano**, Govern Balear Fellowship
- **Xavier Porte Parera**, FPI Fellowship Project DeCoDicA
- **Pedro A. Sánchez**, UIB University Teaching Assistant
- **Flora Souza Bacelar**, Govern Balear Fellowship

2.4 TECHNICAL AND ADMINISTRATIVE SUPPORT

- **Pep Canyelles Pericas**, Lab Technician
- **Inma Carbonell**, Administration Unit Head
- **Eduardo Herraiz**, Computing Lab Technician
- **Rubén Tolosa**, Computing Lab Technician
- **Maria Antònia Tugores Pons**, GridCSIC Technician
- **Marta Ozonas**, Secretary
- **Rosa María Rodríguez**, Outreach and Workshops



	2004	2005	2006	2007	2008	2009	2010
PERMANENT STAFF	10	10	11	12	13	14	17
POSTDOCTORAL FELLOWS	7	8	9	10	10	17	14
PHD STUDENTS	13	16	16	16	20	22	25
LONG TERM VISTORS	5	6	6	8	9	4	15
SUPPORT PERSONNEL	3	3	2	2	4	7	7

2.5 VISITORS

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

- **Marco Patriarca**, *National Institute of Chemical Physics and Biophysics, Tallinn, Estonia*. January to December.
- **David Sukow**, *Department of Physics and Engineering, Washington and Lee University, USA*. June to December
- **Laurent Larger**, *Université de Franche-Comté, Besançon, France*. May to August
- **Konstantin Klemm**, *Bioinformatics, University of Leipzig, Germany*. March, September and October
- **Jordi Tiana**, *Universitat Politècnica de Catalunya, Spain*. February
- **Toni Pérez López**, *Lehigh University, Pennsylvania, USA*. June
- **Jim Gunton**, *Lehigh University, Pennsylvania, USA*. June
- **Damon Centola**, *Institute for Quantitative Social Science, Harvard University*. June
- **Angel Plastino**, *Universidad Nacional de La Plata (CONICET), La Plata, Argentina.* July
- **Peyman Zarrineh**, *Katholieke Universiteit Leuven, Belgium*. August
- **Mario Cosenza**, *Centro de Fisica Fundamental, Universidad de Los Andes, Merida, Venezuela.* September
- **Lendert Gelens**, *Vrije Universiteit, Brussels*. September
- **Johanna Senk**, *RWTH Aachen University, Germany.* September
- **Federico Vázquez**, *MPIPKS, Dresde, Germany*. September
- **Leonardo Molina**, *Universidad de Los Andes, Mérida, Venezuela*. September

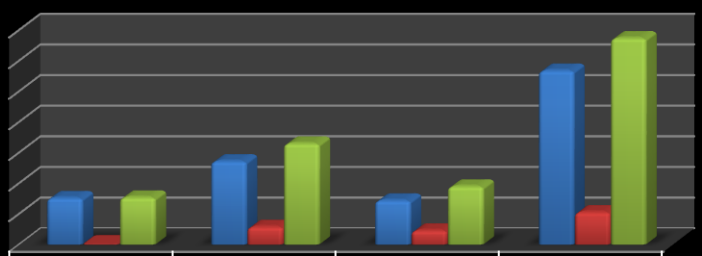
b) **Short Term Visitors (< 1month)**

- **Kent Choquette,** *University of Illinois, USA.* January
- **Cun-Zheng Ning**, *Arizona State University, USA*. January
- **Mahn-Soo Choi**, *Korea University*. January
- **Sigmund Kohler**, *Instituto de Ciencia de Materiales de Madrid, CSIC, Spain.* February
- **Gordon Pipa**, *Max-Planck Institute for Brain Research, Frankfurt, Germany*. February
- **Margarida Telo da Gama**, *CFTC Centro de Física Teórica e Computacional, Universidade de Lisboa, Portugal.* February
- **Cristina Masoller**, *Departament de Fisica i Enginyeria Nuclear, Universitat Politecnica de Catalunya, Terrassa, Spain.* February
- **Mari Ángeles Serrano**, *Universidad de Barcelona, Spain* . February
- **Bob van Dijk**, *VU University Medical Centre, Amsterdam***.** March
- **Tong-Boon Tang**, *Universitiy of Edinburgh*. March.
- **Jordi Soriano**, *Departament d'ECM. Facultat de Física, Universitat de Barcelona, Spain***.** March
- **Javier de Felipe**, *Instituto Cajal (CISC), Spain*. March
- **Penélope Hernández**, *Universidad de Valencia, Departamento de Análisis Económico, Spain*. March
- **Gonzalo Olcina**, *Universidad de Valencia, Departamento de Análisis Económico, Spain*. March
- **Otti d´Huys**, *Free University, Brussel, Belgium*. March
- **Miguel Maravall**, *Instituto de Neurociencias de Alicante, UMH-CSIC, Spain*. March
- **Albert Díaz Guilera**, *Departament d'ECM. Facultat de Física, Universitat de Barcelona, Spain*. April
- **Carlos Escudero**, *ICMAT, Madrid, Spain*. April
- **Javier Borge**, *University of Rovira i Virgili, Tarragona, Spain.* April

- **Jorge Viñals**, *Physics Department and CLUMEQ, McGill University, Montreal*. May
- **Marta Ibañez**, *Universitat de Barcelona, Departamento de estructura y constituyentes de la materia, Spain*. June
- **Miguel Angel García March**, *School of Mines, Colorado, USA*. June
- **Joan López Moliner**, *Departament de Psicologia Bàsica & Institute for Brain, Cognition and Behaviour (IR3C), Universitat de Barcelona, Spain*. June
- **Alberto Robledo**, *Instituto de Física, UNAM, Mexico*. June
- **Yanne Chembo**, *Université de Franche-Comté, Besançon, France*. July
- **Fernando Vega**, *European University Institute Florence, Italy*. July
- **Christian Flindt**, *University of Geneva, Switzerland*. July
- **Mariana Haragus**, *Université de Franche-Comté, Besançon, France*. July
- **Minchul Lee**, *Kyung Hee University, Korea*. July
- **Rubén Moreno-Bote**, *Dept. of Brain and Cognitive Sciences, University of Rochester, New York, USA*. July
- **Rok Zitko**, *Stefan Institute, Ljubljana, Slovenia*. September
- **Jan Martinek**, *Institute of Molecular Physics, Polish Academy of Sciences, Poznan, Poland*. September
- **Vasudev M. Kenkre**, *University of New Mexico*. October
- **Elias Vlieg**, *Institute for Molecules and Materials, University Nijmegen, Netherlands*. October
- **Fabio Benatti**, *Theoretical Physics Department, Trieste University, Italy*. October
- **Antonio Acín**, *Quantum Information Theory group, Institute of Photonic Sciences (ICFO), Barcelona, Spain*. October
- **Susana Huelga**, *Institute of Theoretical Physics, Ulm University, Germany*. October
- **Filippo Caruso**, *Ulm University, Germany*. October

- **Milena Grifoni**, *Regensburg University, Germany*. October
- **Giovanna Morigi**, Saarlandes University, Germany. October
- **John Lapeyre**, *ICFO-Instiut de Ciències Fotòniques, Barcelona, Spain*. October
- **Thomas Pohl**, *Max-Planck-Institute for the Physics of Complex Systems, Dresden, Germany*. October
- **Juan Diego Urbina**, *Regensburg University, Germany*. October
- **Thomas Wellens**, *Albert-Ludwigs- Universitat Freiburg, Germany*. October
- **Sandro Wimberger**, *Heidelberg University, Germany*. October
- **David Zueco**, *Universidad de Zaragoza, Spain*. October
- **Antonio Turiel**, *Institut Ciencies del Mar CSIC, Barcelona, Spain*. November
- **Gloria Platero**, Instituto de Ciencias de Materiales CSIC, Madrid, Spain. November
- **Paula Tuzón**, *Departament de Física Teorica, IFIC, CSIC-Univ. de Valencia, Spain*. November
- **Roberto F.S. Andrade**, *Instituto de Fisica, Universidade Federal da Bahia, Salvador, Brasil*. November
- **Valentin Flunkert**, *Technical University of Berlin, Germany*. November
- **Felix Müller**, *Institut für Physik, Humboldt Universität zu Berlin, Germany*. December

VISITING SICENTISTS AT IFISC 2004-2010



	SPAIN	EUROPE	REST OF THE WORLD	TOTAL
SHORTS VISITS	76	136	72	284
LONG VISITS	1	29	23	53
TOTAL VISITS	77	165	95	337

3. RESEARCH PROJECTS

3.1 RESEARCH PROJECTS FUNDED BY THE EUROPEAN COMMISSION

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 €.

BIOSIM: Biosimulation, a new tool in drug development. [LSHB-CT-2004-005137] Network of Excellence (NoE) 6th 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 atmosferic research**. [COST-ES802] European COST-ACTION. European Coordinator: Joachim Reuder (University of Bergen). Principal Investigator: Damià Gomila. (2008-2012)

NANOCTM: Nanoelectronics: Concepts, theory and modeling. [234970] Marie Curie Network for Initial Training (ITN). Principal Investigator: Colin Lambert from Lancaster University, UK. IFISC Participating Scientists: David Sánchez y Rosa López. (2010-2013)

3.2 RESEARCH PROJECTS OF THE SPANISH NATIONAL PLAN FOR SCIENCE

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 €

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 €

3.3 OTHER IFISC RESEARCH PROJECTS

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 €

DiSQuC 10: Dinámica de sistemas cuánticos complejos. [AAEE0113/09]. Acción especial. Balear Government. Principal Investigator: Roberta Zambrini (2010-2011) Budget: 8.000 €

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] Projecto de Investigaçao Cientifica e Desenvolvimento Tecnologico. Fundaçao para a Ciencia e a Tecnologia (FCT, Portugal). Coordinator: Filipe Alberto. IFISC Participating Scientists: Emilio Hernández García and Victor Eguíluz. (2010-2013)

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 €

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

CSIC Strategic Plan Equipment. (2010). Budget: 330.000 €

Infra UIB 09: **Analizador de espectros en tiempo real.** [UNBB08-4E-009] Infraestructura MICINN-UIB. Principal Investigator: Claudio Mirasso. (2009-2010) Budget: 69.639 €

Infra CSIC 09: **Osciloscopio de fósforo digital 16GHz, 4 canales independientes**. Infraestructura MICINN-CSIC. (2009-2010) 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. Técnico Grid. Principal Investigator: Pere Colet. (2010). Budget: 80.629 €

Programa de actividades de comunicación y cultura científica. Acción Especial Govern Balear. Principal Investigator: Maxi San Miguel (2010). Budget: 40.000 €

Adquisición fuente de laser sintonizable. Acción Especial Govern Balear. Principal Investigator: Ingo Fischer (2010). Budget: 11.650 €

3.6 SUMMARY OF IFISC FUNDING 2004-2010

- **European Commission Framework Program projects**: 8 (EDEN, PATRES, GABA, PICASSO, IOLOS, THRESHOLDS, PHYSBIO, PHOCUS)

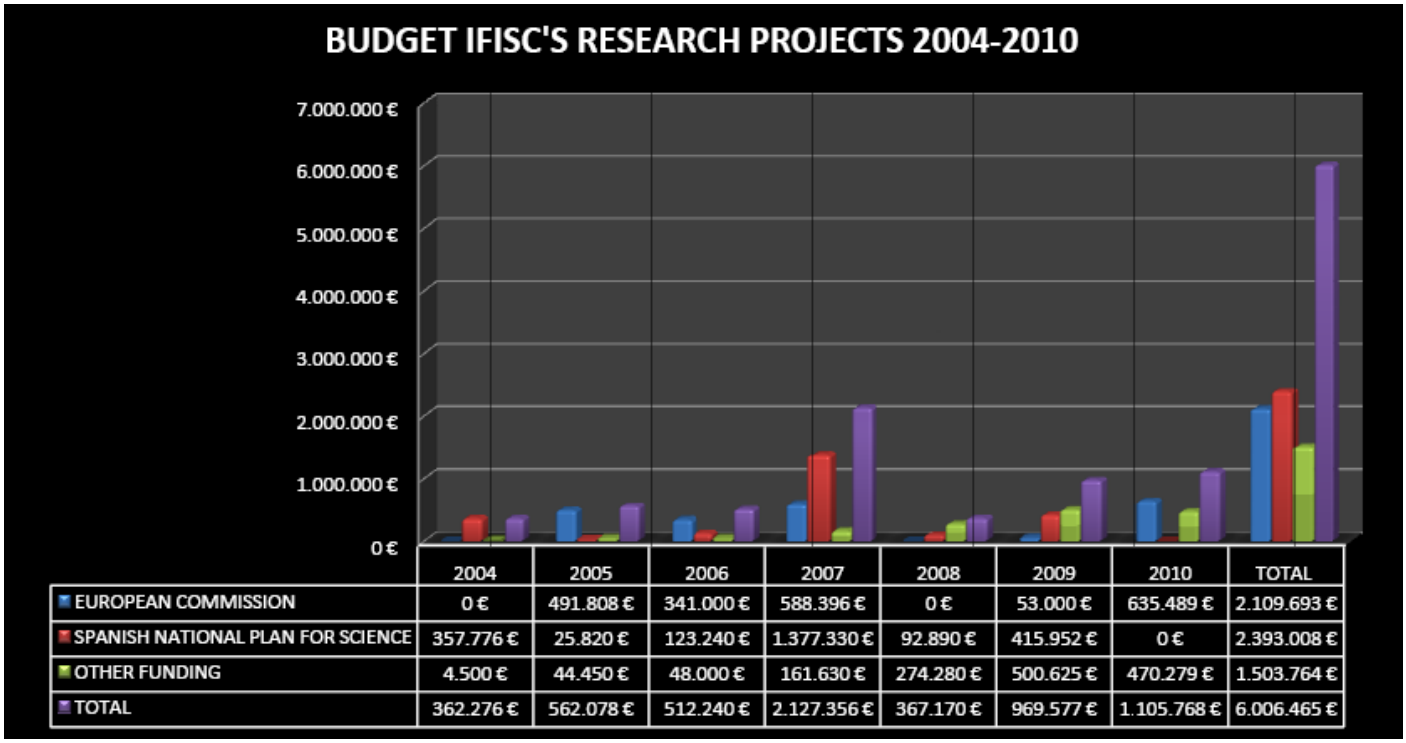
- **European Networking**: 4 EC-FP networks (BIOSIM, EUR-OCEANS, ONCECS, MARBEF), 3 European COST Actions, 1 ESF Program

- **Spanish National Plan:**
  - 9 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**: 17 Research actions.

BUDGETS:

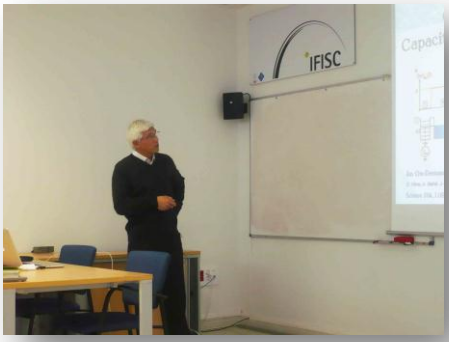
- Grand total budget of projects granted in 2004-10: **6.006.465 €.**
- Grand total budget of active projects in 2010: **3.647.170 €**
- Budget of EC-funded active projects in 2010: **29,7 % of total**

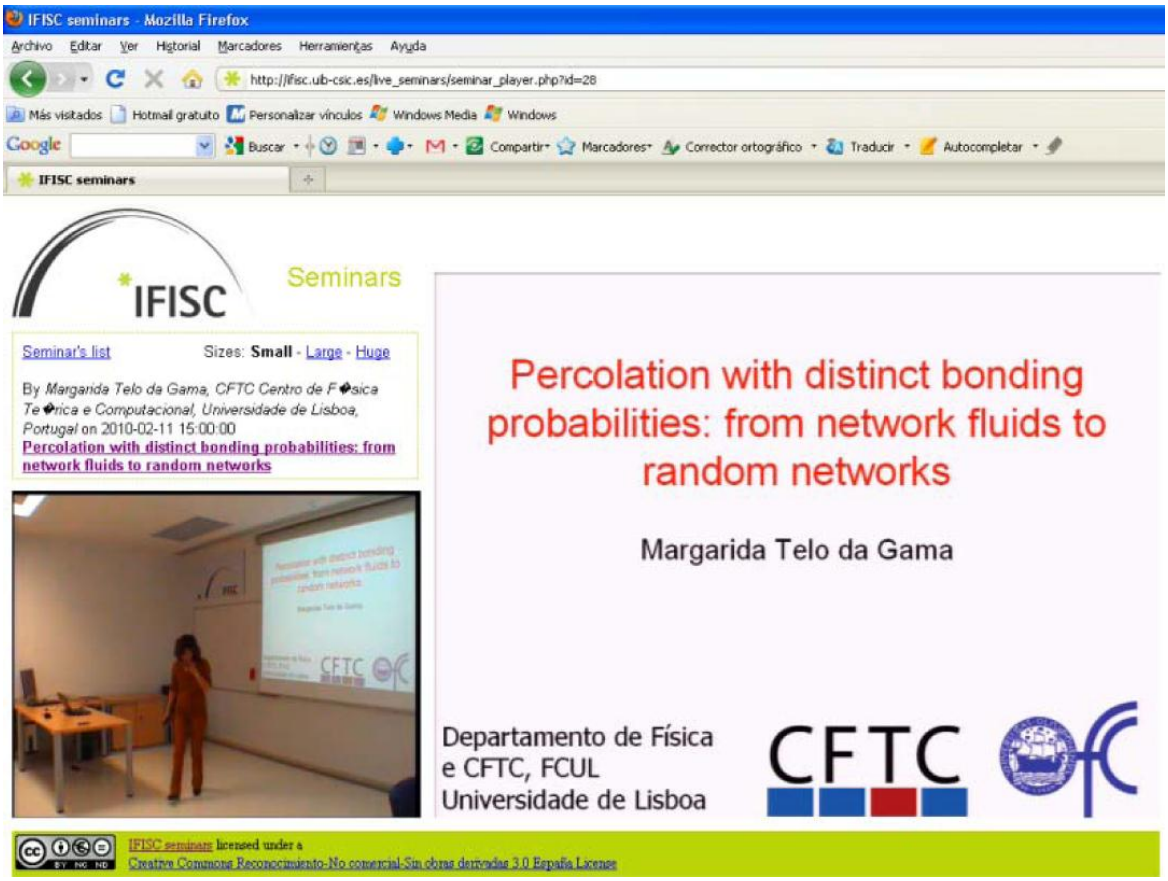


	2004	2005	2006	2007	2008	2009	2010	TOTAL
EUROPEAN COMMISSION	0 €	491.808 €	341.000 €	588.396 €	0 €	53.000 €	635.489 €	2.109.693 €
SPANISH NATIONAL PLAN FOR SCIENCE	357.776 €	25.820 €	123.240 €	1.377.330 €	92.890 €	415.952 €	0 €	2.393.008 €
OTHER FUNDING	4.500 €	44.450 €	48.000 €	161.630 €	274.280 €	500.625 €	470.279 €	1.503.764 €
TOTAL	362.276 €	562.078 €	512.240 €	2.127.356 €	367.170 €	969.577 €	1.105.768 €	6.006.465 €

4. IFISC SEMINARS

Seminars are broadcasted live and recorded.You can watch and retrieve them at:
http://ifisc.uib-csic.es/seminars/





Ernesto Nicola, IFISC, Palma de Mallorca, Spain
A simple mechanism for spontaneous and induced cell polarization during asymmetric cell division
January 13

Cun-Zheng Ning, Arizona State University, USA
Nanolasers: Is there a size limit?
January 14

Kent Choquette, University of Illinois, USA
Green Photonic Laser Sources
January 14

Pavel Paulau, IFISC, Palma de Mallorca, Spain
Self-localized vortices in lasers
January 19

Mahn-Soo Choi, Korea University, Korea
Hanbury Brown and Twiss Correlation of Cooper Pairs
January 27

Sigmund Kohler, Instituto de Ciencia de Materiales de Madrid, CSIC, Spain
Ratchet Currents in Driven Nanoscale Conductors
February 4

Gordon Pipa, Max-Planck Institute for Brain Research, Frankfurt, Germany
Our brain plays Jazz: Information processing in a self-organized and multi-scale system
February 8

Margarida Telo da Gama, CFTC Centro de Física Teórica e Computacional, Universidade de Lisboa, Portugal
Percolation with distinct bonding probabilities: from network fluids to random networks
February 11

Cristina Masoller, Departament de Fisica i Enginyeria Nuclear, Universitat Politecnica de Catalunya, Terrassa, Spain
Quantifying complexity and noise induced order via information theory measures and ordinal patterns symbolic analysis
February 17

Josep Lluís Rosselló, Departament de Física, UIB, Palma de Mallorca, Spain
Hardware Implementation of Neural Networks
February 24

Flora S. Bacelar, IFISC, Palma de Mallorca, Spain
Savanna-Fire Model: Combined effects of tree-tree establishment competition and spatially explicit fire on the spatial pattern of trees in Savannas
March 3

Bob van Dijk, VU University Medical Centre, Amsterdam
Random networks in MEG from Alzheimer's disease patients
March 9

Tong-Boon Tang, University of Edinburgh, UK
Multisensor Fusion for Low-Power Wireless Microsystems: A Neural Approach
March 9

Javier de Felipe, Instituto Cajal (CISC), Spain
Circuitos corticales y cognición: El proyecto Cajal Blue Brain
March 17

Jordi Soriano, Departament d\'ECM. Facultat de Física, Universitat de Barcelona, Spain
Connectivity in Living Neural Networks. Can we build a brain?
March 18

Miguel Maravall, Instituto de Neurociencias de Alicante, UMH-CSIC, Valencia, Spain
Context dependence of sensory responses in the rodent tactile whisker system
March 24

EvoCog, IFISC Associated Unit, Palma de Mallorca, Spain
The psychological approach to beauty and art
March 31

Albert Díaz Guilera, Universitat de Barcelona, Spain
Synchronization in networks of mobile oscillators
April 15

Xavier Castelló Llobet, IFISC, Palma de Mallorca, Spain
Collective phenomena in social dynamics: consensus problems, ordering dynamics and language competition
April 16

Carlos Escudero, ICMAT, Madrid, Spain
United by noise: randomness helps swarms stay together
April 21

Javier Borge, University of Rovira i Virgili, Tarragona, Spain
Navigation and Cognition in Semantic Networks
April 22

Luciano Zunino, IFISC, Palma de Mallorca, Spain
Time series analysis by using permutation entropy and statistical complexity
April 28

Emilio Hernández García, IFISC, Palma de Mallorca, Spain
On the use of evolutionary algorithms to find laws from data: Successes and limits
May 19

Laurent Larger, Université de Franche-Comté, Besançon, France
Electro-optic phase delay oscillator: nonlocal character, dynamics, and field experiment of 10Gb/s chaos communications
May 26

Jorge Viñals, Physics Department and CLUMEQ, McGill University, Montreal, Canada
Pitchfork and Hopf bifurcation thresholds in stochastic equations with delayed feedback
May 27

Maria Antonia Tugores, IFISC, Palma de Mallorca, Spain
Grid Computing
May 31

Marta Ibañes, Universitat de Barcelona, Spain
Systems Biology for the hormonal control of vascular patterning in plant shoots
June 2

Miguel-Angel García-March, Colorado School of Mines, USA
Macroscopic superposition states of cold bosons in double well with Orbital Degrees of freedom
June 15

Jim Gunton, Lehigh University, Bethlehem, Pennsylvania, USA
Aggregation of aqueous solutions of proteins
June 17

Joan López Moliner, Departament de Psicologia Bàsica & Institute for Brain, Cognition and Behaviour (IR3C), Universitat de Barcelona, Spain
Do actions need an interpreted world?
June 18

Alberto Robledo, Instituto de Física, UNAM, Mexico
Manifestations of the intermittency route to chaos in the physics of condensed matter and of complex systems
June 21

Ismael Hernández, IFISC, Palma de Mallorca, Spain
On the reliability of finite-size Lyapunov exponents (FSLEs) diagnosis in surface marine flows
June 23

Maria Antonia Tugores, IFISC, Palma de Mallorca, Spain
Use of Grid Computing Resources
June 23

Marco Patriarca, IFISC, Palma de Mallorca, Spain
Noise and diversity effects in a homeostatic model of wake-sleep cycle
June 30

Daniel Brunner, IFISC, Palma de Mallorca, Spain
Coherent spectroscopy on single QDs
July 7

Angel Plastino, Universidad Nacional de La Plata and Instituto de Física La Plata, Consejo Nacional de Investigaciones Científicas (CONICET), La Plata, Argentina
Fundamenting Statistical Mechanics on Macroscopic principles
July 9

Christian Flindt, University of Geneva, Switzerland
Counting statistics of electron transport in nanostructures
July 14

Mariana Haragus, Université de Franche-Comté, Besançon, France
Looking for nice solutions of partial differential equations
July 15

Minchul Lee, Kyung Hee University, Korea
Josephson Effect through Molecule with Spin Interactions
July 21

Rubén Moreno-Bote, Dept. of Brain and Cognitive Sciences, University of Rochester, New York, USA.
Spatiotemporal correlations in spiking neural networks
July 22

Romain Modeste Nguimdo, IFISC, Palma de Mallorca, Spain
Effect of Fiber Dispersion on Broadband Chaos Communications Implemented by Electro-Optic Nonlinear Delay Phase Dynamics
July 28

Claudio Conti, Rome and Vladimir Konotop, Lisbon, Portugal
Complexity in structured systems: is the theory complete?
August 30

Mario Cosenza, Centro de Fisica Fundamental, Universidad de Los Andes, Merida, Venezuela
Equivalent synchronization of chaos in driven and in autonomous systems
September 7

Guadalupe Garcia, IFISC, Palma de Mallorca, Spain
Effects of the topology and delayed connections in the synchronization properties of a neuronal network
September 13

Rok Zitko, Stefan Institute, Ljubljana, Slovenia
Surfaces of 3D topological insulators and impurity effects
September 15

Juan Carlos Gonzalez-Avella, IFISC, Palma de Mallorca, Spain
Coevolution and local versus global interactions in collective dynamics of opinion formation, cultural dissemination and social learning
September 20

Jan Martinek, Institute of Molecular Physics, Polish Academy of Sciences, Poznan, Poland
Single spin manipulation in quantum-dot spin valves
September 22

Miguel Cornelles Soriano, IFISC, Palma de Mallorca, Spain
The Experimental IFISC
September 28

Lendert Gelens, Vrije Universiteit Brussel, Belgium
Multistability and excitability in semiconductor ring lasers
September 30

V.M. Kenkre, Distinguished Professor of Physics, University of New Mexico, Mexico
Population Extinction of Bacteria and Mice: Abrupt Transitions from Interplay of Nonlinearity and Inhomogeneity
October 5

Elias Vlieg, Institute for Molecules and Materials, University Nijmegen, Netherlands
Chiral purification using crystal growth and grinding
October 7

Fabio Benatti, Theoretical Physics Department, Trieste University, Italy
Quantum Algorithmic Complexities and Entropies
October 14

Antonio Acín, Quantum Information Theory group, Institute of Photonic Sciences (ICFO), Barcelona, Spain
Entanglement and Quantum Networks
October 14

Susana Huelga, Institute of Theoretical Physics, Ulm University, Germany
Quantum dynamics of bio-molecular systems in noisy environments
October 15

Konstantin Klemm, Bioinformatics, University of Leipzig, Germany
Stability in Boolean networks and cellular automata
October 20

Els Heinsalu, IFISC, Palma de Mallorca, Spain
Stochastic resonance in a surface dipole
October 27

David Sukow, Department of Physics and Engineering, Washington and Lee University, USA
Semiconductor laser dynamics with orthogonal optical feedback and injection
November 3

Antonio Turiel, Institut Ciencies del Mar, Barcelona, Spain
The Oil Crash
November 4

Paula Tuzón, Departament de Física Teòrica, IFIC, Universitat de València, Spain
Physics beyond the Standard Model: adding one more Higgs to the puzzle.
November 9

Ingo Fischer, IFISC, Palma de Mallorca, Spain
Towards Photonic Reservoir Computing: Can a single dynamical node replace a complex network?
November 16

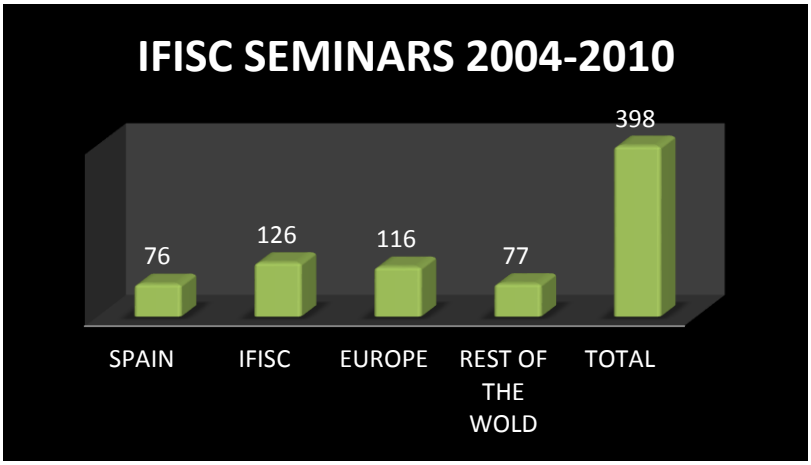
Roberto F.S. Andrade, Instituto de Fisica, Universidade Federal da Bahia, Salvador, Brasil
A Complex Network Approach to Phylogenetic Analysis using Protein Sequence Databases
November 23

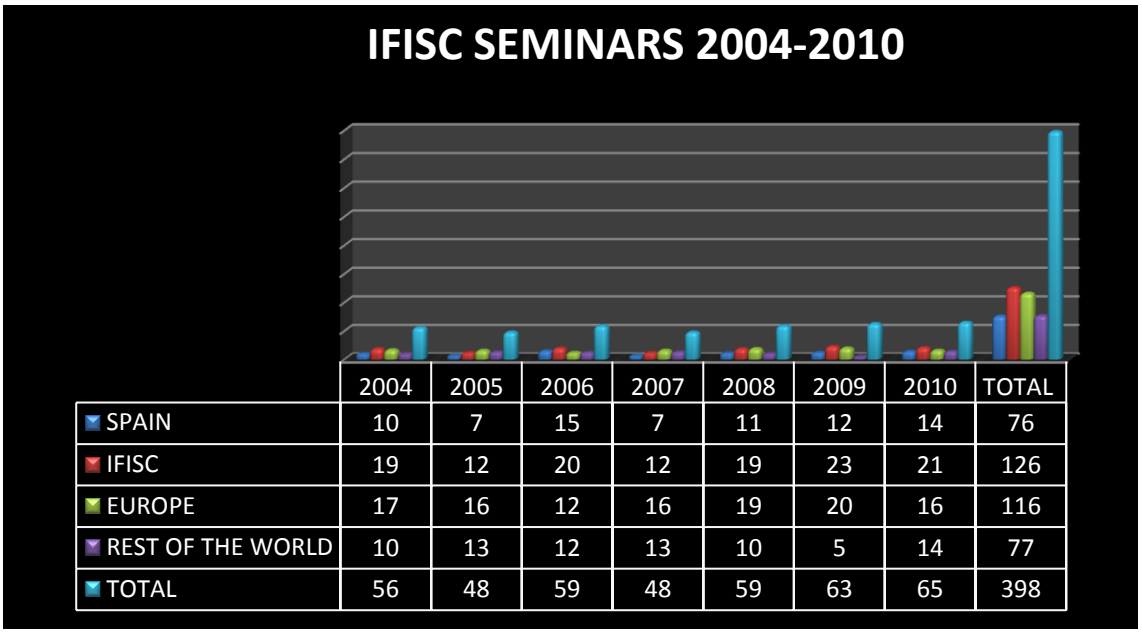
Flora Souza Bacelar, IFISC, Palma de Mallorca, Spain
Nonlinear Dynamics and Regime Shifts in Ecosystems
November 24

Victor Eguiluz, IFISC, Palma de Mallorca, Spain
The voter model: conservation laws, co-evolution and persistence
November 30

Felix Müller, Institut für Physik, Humboldt Universität zu Berlin, Germany
Patterns in Potassium-driven Neuronal Media
December 10

José J. Ramasco, IFISC, Palma de Mallorca, Spain
Web traffic: analysis of navigation data and modeling at single user level
December 15





	2004	2005	2006	2007	2008	2009	2010	TOTAL
SPAIN	10	7	15	7	11	12	14	76
IFISC	19	12	20	12	19	23	21	126
EUROPE	17	16	12	16	19	20	16	116
REST OF THE WORLD	10	13	12	13	10	5	14	77
TOTAL	56	48	59	48	59	63	65	398

5. PUBLICATIONS

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

5.1 ISI PUBLICATIONS

5.1 A) JCR JOURNALS

Nonlocality-induced front interaction enhancement
Gelens, L.; Gomila, D.; Van der Sande, G.; Matías, M.A.; Colet, P.
Physical Review Letters **104**, 154151 (1-4)

Non-universal results induced by diversity distribution in coupled excitable systems
F. Lafuerza, Luis; Colet, Pere; Toral, Raul
Physical Review Letters **105**, 084101 (1-4)

Josephson Current in Strongly Correlated Double Quantum Dots
Zitko,Rok; Lee, Minchul; López, Rosa; Aguado, Ramón;Choi,Mahn-Soo;
Physical Review Letters **105**, 116803

Bringing entanglement to the high temperature limit
Galve, Fernando; Pachón, Leonardo A.; Zueco, David
Physical Review Letters **105**, 180501 (1-4)

The individual and interactive effects of tree-tree establishment competition and fire on savanna structure and dynamics
Calabrese, Justin; Vazquez, Federico; López, Cristóbal; San Miguel, Maxi; Grimm, Volker
The American Naturalist **175**, E44-E65

Dynamic control for synchronization of separated cortical areas through thalamic relay
Gollo, L. L.; Mirasso, C. R.; Villa, A. E. P.
Neuroimage **52**, 947-955

Viability and Resilience of Languages in Competition
Chapel, L.; Castelló, X.; Bernard, C.; Deffuant, G.; Eguíluz, V.M.; Martin, S.; San Miguel, M.
PlosOne **5 (1)**, e8681

Inward Rotating Spiral Waves in Glycolysis
Straube, R; Vermeer, S; Nicola, Ernesto M., Mair T.
Biophysical Journal **99**, L01

Vortex solitons in lasers with feedback
Paulau, P.V.; Gomila, D.; Colet, P.; Loiko, N.A.; Rosanov, N.N.; Ackemann, T.; Firth, W.J.
Optics Express **18**, 8859-8866

Mass media and repulsive interactions in continuous-opinion dynamics
T. Vaz Martins, M. Pineda, and R. Toral
Europhysics Letters **91**, 48003

Spatial clustering of interacting bugs: Levy flights versus Gaussian jumps
Heinsalu, Els; Hernandez-Garcia, Emilio; Lopez, Cristobal
Europhysics Letters **92**, 40011 (1-6)

The constructive role of diversity on the global response of coupled neuron systems
Perez, Toni; Mirasso, Claudio R.; Toral, Raul; Gunton, James
Philosophical Transactions of the Royal Society A **368**, 5619

Spontaneous ordering against an external field in nonequilibrium systems
J. C. González-Avella, M.G. Cosenza, V.M. Eguíluz and M. San Miguel
New Journal of Physics **12**, 013010

Mobility induces global synchronization of oscillators in periodic extended systems
Peruani, Fernando; Nicola, Ernesto M.; Morelli, Luis G.
New Journal of Physics **12**, 093029

Ion-trap simulation of the quantum phase transition in an exactly solvable model of spins coupled to bosons
Giorgi, G. L., Paganelli, S; Galve, F.
Physical Review A **81**, 052118 (1-6)

Bichromatic emission and multimode dynamics in bidirectional ring lasers
Pérez-Serrano, Antonio; Javaloyes, Julien; Balle, Salvador
Physical Review A **81**, 043817 (1-13)

Entanglement dynamics of nonidentical oscillators under decohering environments
Galve, Fernando; Giorgi, Gian Luca; Zambrini, Roberta
Physical Review A **81**, 062117 (1-10)

Reply to comment on "Connection between entanglement and the speed of quantum evolution " and on " Entanglement and the lower bounds on the speed of quantum evolution"
Batle, J ; Borras, A.; Casas, M ; Plastino, A.R.; Plastino, A.
Physical Review A **82**

Magnetoasymmetric transport in a mesoscopic interferometer: From the weak to the strong coupling regime
Lim, Jong-Soo; Sánchez, David; López, Rosa;
Physical Review B **81**, 155323 (1-16)

Multichannel effects in Rashba quantum wires
Gelabert, M.M.; Serra, Ll.; Sanchez, D.; Lopez, R.
Physical Review B **81**, 165317 (1-8)

Spontaneous PT symmetry breaking and quantum phase transitions in dimerized spin chains
Giorgi, Gian Luca
Physical Review B **82**, 052404 (1-4)

Transport properties of a molecule embedded in an Aharonov-Bohm interferometer
Lim, Jong-Soo; López, Rosa; Platero, Gloria; Simon,Pascal
Physical Review B **81**, 165107

Kondo effect in spin-orbit mesoscopic interferometers
Lim, J.S.; Crisan, M.; Sanchez, D.; Lopez, R.; Grosu, I.
Physical Review B **81**, 235309 (1-8)

Resonance induced by repulsive interactions in a model of globally coupled bistable systems
Vaz Martins, Teresa; Livina, Valerie, N.; Majtey, Ana P.; Toral, Raúl
Physical Review E **81**, 041103 (1-7)

Influence of microstructure on the transitions between mesoscopic thin-film morphologies in ballistic-diffusive models
Sánchez, P. A.; Sintes, T.; Piro, O.; Cartwright, J. H. E.
Physical Review E **81**, 011140 (1-11)

Permutation information theory approach to unveil delay dynamics from time series analysis
Zunino, Luciano; Soriano, Miguel C.; Fischer, I.; Rosso, Osvaldo A.; Mirasso, Claudio R.
Physical Review E **82**, 046212 (1-9)

Description of stochastic and chaotic series using visibility graphs
Lacasa, Lucas; Toral, Raúl
Physical Review E **82**, 036120 (1-11)

Order parameter expansion study of synchronous firing induced by quenched noise in the active rotator model
Komin, Niko; Toral, Raúl
Physical Review E **82**, 051127 (1-8)

Amplitude and phase effects on symmetry-breaking of delay-coupled oscillators
D'Huys, Otti; Vicente, Raul; Danckaert, Jan; Fischer, Ingo
Chaos **20**, 043127 (1-10)

Electro-optic delay devices with double feedback
Nguimdo, Romain Modeste; Colet, Pere; Mirasso, Claudio R.
IEEE Journal of Quantum Electronics **46**, 1436-1443

Chaos generation and synchronization using an integrated source with an air gap
Tronciu, V.Z.; Mirasso, C.; Colet, P.; Hamacher, M,; Benedetti, M.; Vercesi, V.; Annovazzi-Lodi, V.
IEEE Journal of Quantum Electronics **46**, 1840-1846

Chaos-Based Optical Communications: Encryption Vs. Nonlinear Filtering
Jacobo, A.; C. Soriano, M.; Mirasso C. R.; Colet, P.
IEEE Journal of Quantum Electronics **46**, 499-505

Effect of fiber dispersion on broadband chaos communications implemented by electro-optic nonlinear delay phase dynamics
Nguimdo, Romain Modeste; Lavrov, Roman; Colet, Pere; Jacquot, Maxime; Kouomou Chembo, Yanne; Larger, Laurent
IEEE Journal of Lightwave Technology **28**, 2688-2696

Stochastic resonance in a surface dipole
Heinsalu, Els; Patriarca, Marco; Marchesoni, Fabio
Chemical Physics **375**, 410-415

Entanglement and disorder: a mean field approach
de Pasquale, Ferdinando; Giorgi, Gian Luca
Physica Scripta **T140**, 014019 (1-5)

Factorized ground state in dimerized spin chains
Giorgi, Gian Luca
Physica Scripta **T140**, 014022 (1-4)

A biophysical model for modulation frequency encoding in the cochlear nucleus
Eguía M. C., García G.C. and Romano S.A.
Journal of Physiology Paris **104**, 118-127

Creation and manipulation of entanglement in spin chains far from equilibrium
F. Galve; D. Zueco; G. M. Reuther; S. Kohler; and P. Hänggi
European Physical Journal: Special Topics, SpringerLink, **180**, 237-246

Basic kinetic wealth-exchange models: common features and open problems

Patriarca, Marco; Heinsalu, Els; Chakraborti, Anirban

European Physical Journal B **73**, 145-153

Soliton lasers stabilized by coupling to a resonant linear system

Firth W.J.; Paulau P.V.

European Physical Journal D (special issue) **59**, 13-21

Nonlocal feedback in nonlinear systems

Zambrini, Roberta; Papoff, Francesco

European Physical Journal D **58**, 235-242

Effects of noise on excitable dissipative solitons

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

European Physical Journal D **59**, 37-42

On the Gaussian approximation for master equations

F. Lafuerza, Luis; Toral, Raul

Journal of Statistical Physics **140**, 917-933

Effects of surface size on minimalistic stochastic models for the catalytic CO oxidation

M. Pineda, R. Imbihl, and L. Schimansky-Geier

Physica A. **389**, 1178-1188

Complexity-entropy causality plane: a useful approach to quantify the stock market inefficiency

Zunino, Luciano; Zanin, Massimiliano; Tabak, Benjamin M.; Pérez, Darío G.; Rosso, Osvaldo A.

Physica A **389**, 1891-1901

On co-evolution and the importance of initial conditions

Lambiotte R. and González-Avella J.C.

Phyica A, **390**, 392-397

Epidemics and chaotic synchronization in recombining monogamous populations

Vazquez, Federico; Zanette, Damian

Physica D **239**, 1922-1928

Phase transitions induced by microscopic disorder: a study based on the order parameter expansion

Komin, Niko; Toral, Raúl

Physica D **239**, 1827-1833

Preface ,,Nonlinear processes in oceanic and atmospheric flows,,

Mancho, A.M.; Wiggins, S.; Turiel, A.; Hernandez-Garcia, E.; Lopez, C.; Garcia-Ladona, E.

Nonlinear Processes in Geophysics **17**, 283-285

Life-history evolution; male-biased parasitism; adaptive dynamics; evolution of disease resistance

S. Bacelar, Flora; White, Andrew; Boots, Mike

Journal of Theoretical Biology **269**, 131 - 137

Anomalies in the transcriptional regulatory network of the yeast Saccharomyces cerevisiae

Tugrul, Murat; Kabakcioglu, Alkan

Journal of Theoretical Biology **263**, 328-336

Dynamical phase coexistence: a simple solution to the savanna problem

Vazquez, Federico; López, Cristobal; Calabrese, Justin and Muñoz, Miguel Angel

Journal of Theoretical Biology **264**, 360-366

Agent Based Models of Language Competition: Macroscopic descriptions and Order-Disorder transitions

Vazquez, Federico; Castello, Xavi; San Miguel, Maxi

Journal of Statistical Mechanics: Theory and Experiment **2010**, P04007

Critical behavior of a Ginzburg-Landau model with additive quenched noise

Niko Komin, Lucas Lacasa, Raul Toral

Journal of Statistical Mechanics: Theory and Experiment **2010**, P12008

How Gaussian competition leads to lumpy or uniform species distributions

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

Theoretical Ecology **3**, 89-96

Robustness of Transcriptional Regulation in Yeast-like Model Boolean Networks

Tugrul, Murat; Kabakcioglu, Alkan

International Journal of Bifurcation and Chaos **20**, 929-935

Simple models for scaling in phylogenetic trees

Hernandez-Garcia, Emilio; Tugrul, Murat; Herrada, E. Alejandro; Eguíluz, V.M.; Klemm, Konstantin

International Journal of Bifurcation and Chaos **20**, 805-811

Some features of the state-space trajectories followed by robust entangled four-qubit states during decoherence

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

International Journal of Quantum Information **8**, 505-515

Semiconductor Snail Lasers

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

Applied Physics Letters 96, 121105

Information flow during the quantum-classical transition

Kowalski, Andres M.; Martin, Maria T.; Plastino, Angelo; Zunino, Luciano

Physics Letters A **374**, 1819-1826

The roundtable: an agent-based model of conversation dynamics

Mastrangeli, Massimo; Schmidt, Martin; Lacasa, Lucas

Journal of Artificial Societies and Social Simulation **13** (4) 2

Global dynamics of a family of 3D Lotka-Volterra Systems

Murza, Adrian C.; Teruel, Antonio E.

Dynamical Systems: An International Journal **25**, 269-284

Linear conductance oscillations of quantum wires and stripes with Rashba interaction

Gelabert, M M; Serra, L

Journal of Physics: Conference Series, **248**, 012016 (1-8)

Diffusive coupling can discriminate between similar reaction mechanisms in an enzymatic feedback motif

Straube, Ronny; Nicola, Ernesto M.

BMC Systems Biology **4**, 165

5.1 B) OTHER ISI PUBLICATIONS

The Quantum-Classical Transition as an Information Flow

Kowalski, Andres M.; Martin, Maria T.; Zunino, Luciano; Plastino, Angelo; Casas, Montserrat

Entropy **12**, 148-160

All Optical Logical Operations Using Excitable Cavity Solitons

Jacobo, Adrian; Gomila, Damià; Colet, Pere; Matìas, Manuel

IEEE Photonics Society Winter Topicals Meeting Series, IEEE, 122-123

Space-time-dynamic model of passively-phased ring-geometry fiber laser array

Bochove, Erik J.; Aceves, Alejandro B.; Deiterding, Ralf; Crabtree, Lily; Braiman, Yehuda; Jacobo, Adrian; Colet, Pere

Fiber Lasers VII: Technology, Systems, and Applications, Proc. SPIE, **7580**, 758026

5.2 OTHER PUBLICATIONS

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

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

Young Optical Scientists Conference YOSC-2009. Technical Digest, Bauman Moscow State Technical University Press, 106-109

Difusioonist jõuväljades

Heinsalu, Els

Eesti Füüsika Seltsi Aastaraamat 2009, Eesti Füüsika Selts, 62-92

Private communication using chaotic light

MIrasso, C. R.

SPIE Newsroom

Econophysics studies in Estonia

Heinsalu, Els; Patriarca, Marco; Kitt, Robert; Kalda, Jaan

Science and Culture **76**, 374-379

5.3 SUMMARY OF PUBLICATIONS 2004-2010

1) Total number of publications in the period 2004-2010: 437 (362 of them in JCR journals).

2) Publications in journals of high impact in 2004-2010 include:

- **Nature: 1**
- **Proc. Nat. Acad. Sci.: 9**
- **Physical Review Letters: 31**
- **Science 1**

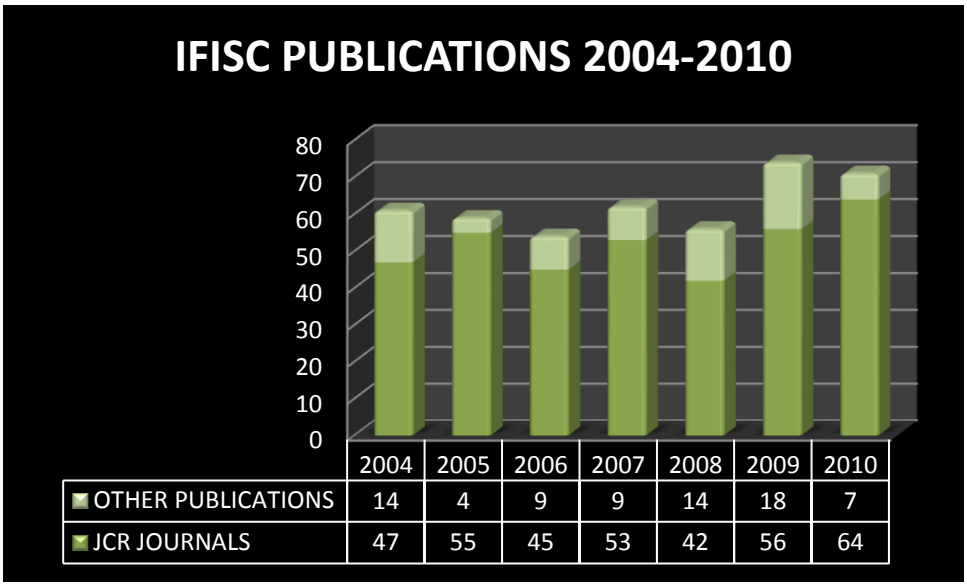
3) Journals with the highest number of publications:

- P**hysical Review E: 59**
- **Physical Review Letters: 31**
- **Physical Review A: 25**
- **European Physical Journal: 20**
- **Physical Review B: 19**
- **IEEE journals: 18**
- **Europhysics Letters: 10**
- **Physica A: 16**

4) Total number of publications in JCR journals outside the domain of basic Physics: 73

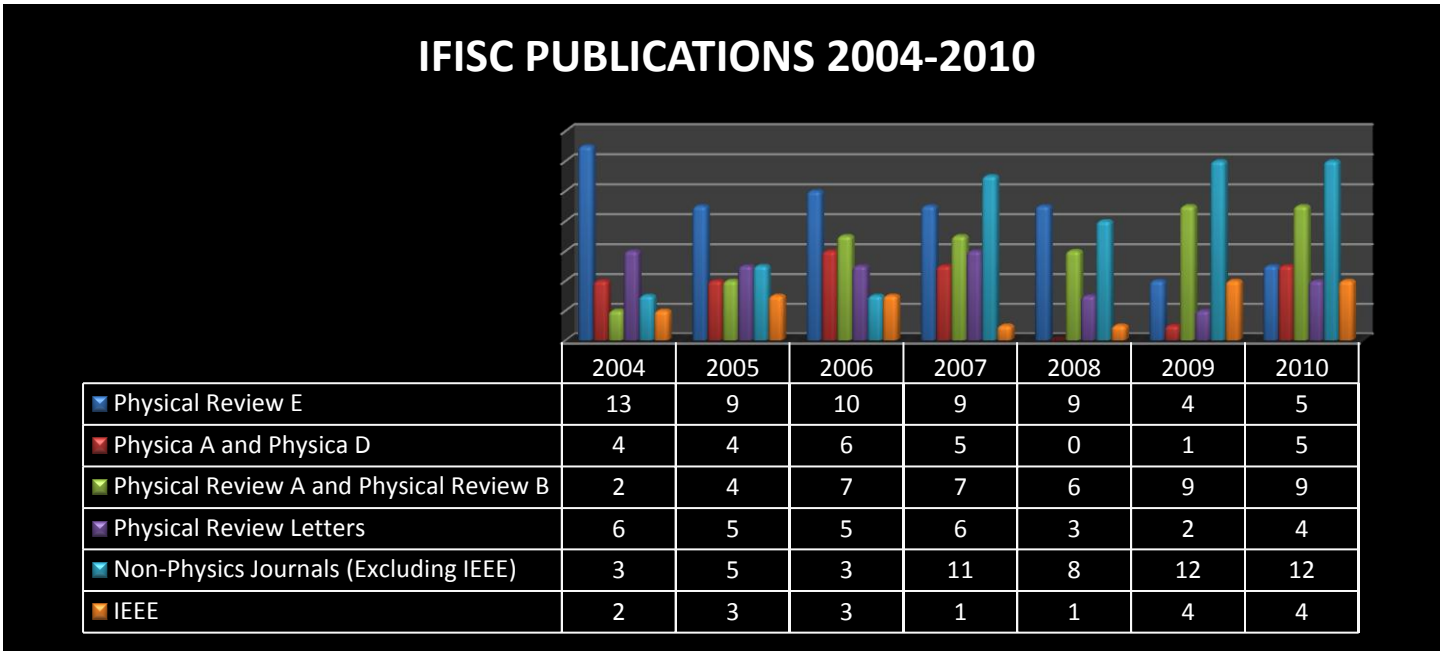
In addition to 19 publications in IEEE journals and Applied Physics, these publications are in the following journals:

- 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, Biophysics Journal, Physical Biology, BMC Systems Biology, Oikos, The American Naturalist, Trends in Ecology and Evolution, Theoretical Ecology, Ecological Complexity, Ecological Modelling, J. Royal Society Interface. HFSP Journal, Developmental Dynamics, Marine Ecology Progress Series, PLoS ONE, PLoS Computational Biology, Birth Defects Research, J. of Physiology, Neuroscience Letters, J. Neurophysiology, J. of Neuroscience, Neuroimage, European J. of Pharmaceutical Sciences .
- J. Economic Dynamics and Control, American Journal of Sociology, J. Artificial Societies and Social Simulation, J. of Conflict Resolution, Advances in Complex Systems.



JOURNALS WITH LARGEST NUMBER OF PUBLICATIONS

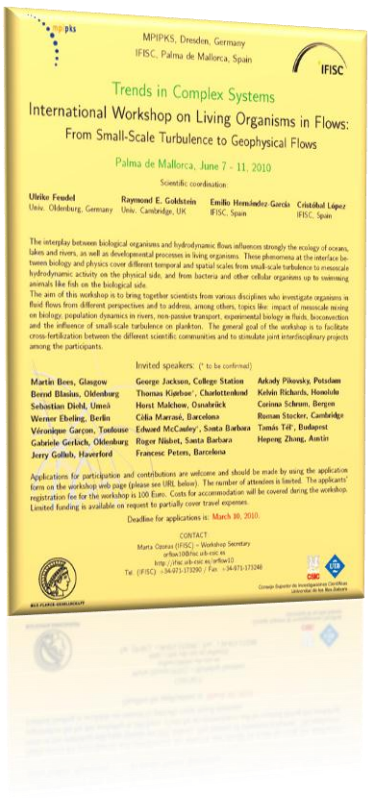
IFISC PUBLICATIONS	2004	2005	2006	2007	2008	2009	2010	TOTAL
Physical Review E	13	9	10	9	9	4	5	59
Physical Review Letters	6	5	5	6	3	2	4	31
Physical Review A	0	3	3	3	5	7	4	25
European Physical Journal	2	2	0	3	1	7	5	20
Physical Review B	2	1	4	4	1	2	5	19
IEEE	2	3	3	1	1	4	4	18
Physica A	3	3	2	4	0	1	3	16
Europhysics Letters	1	3	0	2	1	1	2	10
Non-Physics Journals (excluding IEEE Journals)	3	5	3	11	8	12	12	54

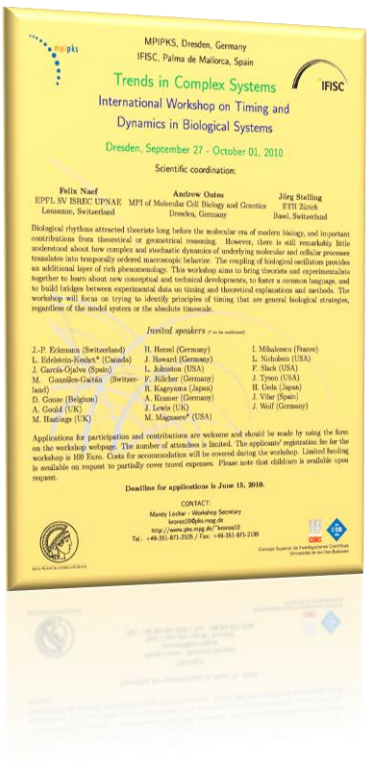


6. CONFERENCES AND WORKSHOPS

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

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





The Max Planck Institute for the Physics of Complex Systems, Dresden (MPIPKS) and the Institute for Cross-Disciplinary Physics and Complex Systems, Palma de Mallorca (IFISC) organize a joint workshop program on “Trends in Complex Systems”. The program consists of a series of IFISC-MPIPKS workshops, held in Mallorca and Dresden. The Program runs initially during the period 2008-2010. The events in Mallorca were 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 was given to frontier subjects which develop rapidly and to new interdisciplinary topics. Workshops extended over one week. Participation was limited to 60-80 persons. Each workshop consisted of talks on advanced topics, discussions, and exploratory research for new scientific collaborations. Local costs of all accepted participants were covered by the local organizing institute.

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.*

The interplay between biological organisms and hydrodynamic flows influences strongly the ecology of oceans, lakes and rivers, as well as developmental processes in living organisms. These phenomena at the interface between biology and physics cover different temporal and spatial scales from small-scale turbulence to mesoscale hydrodynamic activity on the physical side, and from bacteria and other cellular organisms up to swimming animals like fish on the biological side.

The aim of this workshop is to bring together scientists from various disciplines who investigate organisms in fluid flows from different perspectives and to address, among others, topics like: impact of mesoscale mixing on biology, population dynamics in rivers, non-passive transport, experimental biology in fluids, bioconvection and the influence of small-scale turbulence on plankton. The general goal of the workshop is

to facilitate cross-fertilization between the different scientific communities and to stimulate joint interdisciplinary projects among the participants.

Invited speakers:

Martin A. Bees, University of Glasgow, UK
Bernd Blasius, Carl von Ossietzky University Oldenburg, Germany
Massimo Cencini, Università degli Studi di Roma "La Sapienza", Italy
Sebastian Diehl, Umea University, Sweden
Werner Ebeling, Humboldt University, Berlin, Germany
Véronique Garçon, LEGOS (CNRS/CNES/UPS), Toulouse, France
George Jackson, Texas A&M University, College Station, USA
Amala Mahadevan, Boston University, USA
L. Mahadevan, Harvard University, USA
Horst Malchow, University of Osnabrueck, Germany
Cèlia Marrasé, Institut de Ciències del Mar (CSIC), Barcelona, Spain
Zoltán Neufeld, University College Dublin, Ireland
Roger Nisbet, University of California, Santa Barbara, USA
Vicente Pérez-Muñuzuri, Universidad de Santiago de Compostela, Spain
Francesc Peters, Institut de Ciències del Mar (CSIC), Barcelona, Spain
Arkady Pikovsky, University of Potsdam, Germany
Kelvin Richards, University of Hawaii, USA
Corinna Schrum, University of Bergen, Norway

KRONOS10 .TIMING AND DYNAMICS IN BIOLOGICAL SYSTEMS

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

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, (MPI-CBG). Dresden, Germany.*
- Jörg Stelling, *ETH Zürich, Basel, Switzerland.*

Biological rhythms attracted theorists long before the molecular era of modern biology, and important contributions from theoretical or geometrical reasoning. However, there is still remarkably little understood about how complex and stochastic dynamics of underlying molecular and cellular processes translates into temporally ordered macroscopic behavior. The coupling of biological oscillators provides an additional layer of rich phenomenology. This workshop aims to bring theorists and experimentalists together to learn about new conceptual and technical developments, to foster a common language, and to build bridges between experimental data on timing and theoretical explanations and methods. The workshop will focus on trying to identify principles of timing that are general biological strategies, regardless of the model system or the absolute timescale.

Invited speakers:

Hang-Hun Ahn, Chungnan National University (South Korea)
J.-P. Eckmann, Univ. of Geneva (Switzerland)
J. García-Ojalvo, Polytechnical Univ. of Cataluña (Spain)
M. González-Gaitán, Univ. of Geneva (Switzerland)
D. Gonze, Free Univ. of Brussels (Belgium)
A. Gould, MRC National Institute for Medical Research, London (UK)
M. Hastings, MRC Laboratory of Molecular Biology, Cambridge (UK)
H. Herzel, Humboldt Univ. at Berlin (Germany)
J. Howard, MPI-CBG, Dresden (Germany)
F. Jülicher, MP-PKS, Dresden (Germany)

R. Kageyama, Kyoto University (Japan)
A. Kramer, Charité Univ. Hospital, Berlin (Germany)
L. Nicholson, Cornell University (USA)
Ewa Poluch, MPI-CBG, Dresden (Germany)
Iva M. Tolic-Norrelykke, MPI-CBG, Dreden (Germany)
J. Tyson, Virginia Polytechnic (USA)
H. Ueda, RIKEN, Kobe (Japan)
J. Vilar, Univ. del País Vasco (Spain)
J. Wolf, Max Delbrüch Center for Molecular Medicine, Berlin (Germany)

6.2 IFISC WORKSHOPS

http://ifisc.uib-csic.es/workshops

IFISC aims to position itself as a reference place for international workshops defining future trends in the field.

NEW TRENDS IN PHOTONICS

IFISC, Palma de Mallorca, January 14, 2010

Scientific coordination:
Ingo Fischer, IFISC, Palma de Mallorca, Spain

In the year of the 50th birthday of the laser, the workshop covered modern aspects of laser physics. The program included 2 eminent invited speakers from the U.S. and 4 local speakers. The subjects ranged from modern energy efficient laser sources, via nanolasers and how far they can be reduced in size, integrated semiconductor ring lasers up to spatio-temporal dynamics in VCSELs and nonlinear cavities and delay-coupled lasers. The talks were followed by lively and fruitful discussions. The workshop was complemented by a tour through the new photonics lab facilities at IFISC.

Invited Speakers:
Kent Choquette (University of Illinois)
Cun-Zheng Ning (Arizona State University)
Alessandro Scirè, IFISC, Palma de Mallorca, Spain
Claudio Mirasso, IFISC, Palma de Mallorca, Spain
Damià Gomila, IFISC, Palma de Mallorca, Spain

MLMA´10: MECHANICS OF LARGE MOLECULAR ASSEMBLIES

http://ifisc.uib-csic.es/mlma10

IFISC, Palma de Mallorca, April 8-11, 2010

Scientific coordination:

Stephan W. Grill, *MPI-PKS and MPI-CBG, Dresden, Germany*
Ewa Paluch, *MPI-CBG, Dresden, Germany*
Manuel A. Matias, *IFISC CSIC-UIB, Palma de Mallorca, Spain*

Supported by the European Science Foundation

This workshop explored cell biological, biophysical and theoretical aspects of the dynamics of molecular assemblies. A particular focus was to understand the link between the behavior on cellular length- and time-scales and the dynamics at the single-molecule level. It brought together experimentalists and theorists, and connected biological work aimed at understanding cellular behavior with theoretical approaches aimed at providing coarse-grained descriptions of the underlying physical mechanisms.
The workshop covered the following topics:

Mechanics of the actomyosin cortex
Bleb mechanics, cleavage furrow and cortex stability, cellular polarization, cortical flow, active hydrodynamics, active polar gels.

Mechanics of DNA motors
Proofreading and pausing by RNA polymerase II, RNA secondary structure, proofreading by DNA polymerases, stochastic models of elongation.

Invited speakers:

Carrie Cowan, IMP, Vienna, Austria
Anthony Hyman, MPI-CBG, Dresden, Germany
Borja Ibarra, CNB-CSIC, Madrid, Spain
Juan M.R. Parrondo, U. Complutense, Madrid, Spain
Jacques Prost, ESPCI, Paris, France

ROBUST CONFERENCE: EMERGENCE AND DESIGN OF ROBUSTNESS

http://ifisc.uib-csic.es/robust

IFISC, Palma de Mallorca , September 21 - 25, 2010

Scientific Coordinators:

Marc-Thorsten Hütt, *Jacobs University, Bremen, Germany*
Alexander S. Mikhailov, *Fritz Haber Institute, Berlin, Germany*
Raúl Toral, *IFISC (UIB-CSIC), Palma de Mallorca, Spain*

Supported by Volkswagen Stiftung

High robustness against noise and structural damage is a fascinating property of biological systems. Both living cells and entire organisms are able to maintain their complex functional dynamics despite the presence of strong environmental variations and of internal fluctuations. They are typically able to adjust to the occurrence of structural perturbations, induced by mutations or external impact, and can continue to operate in a required way, without collapse or disruption of their functions.

What are dynamical mechanisms and network architectures which promote robustness? Is it possible to formulate general principles that determine robust functional dynamics? Does robustness emerge through natural evolution? Can computer evolution processes be used to design robust systems? What are the footprints of robustness and can one discern common structural motifs and other statistical properties in robust systems of various origins?

The conference was opened to all interested scientists. Besides the invited-speakers talks there was a number of contributed talks and a posters session.

Invited speakers:

A. Arenas, Dept. Enginyeria Informàtica i Matemàtiques, Universidad Rovira i Virgili, Tarragona, Spain
D. Armbruster, Department of Mathematics, Arizona State University, Tempe, USA
S. Bornholdt, Institut für Theoretische Physik, Universität Bremen, Germany
P. Colet, Instituto de Física Interdisciplinar y Sistemas Complejos, UIB-CSIC, Palma de Mallorca, Spain
J. Garcia-Ojalvo, Departament de Física i Enginyeria Nuclear, Escola Tecnica Superior d'Enginyeries Industrial i Aeronàutica de Terrassa, Terrassa, Spain
T. Gross, Max-Planck-Institut für Physik Komplexer Systeme, Dresden, Germany
K. Kaneko, Department of Basic Science, University of Tokyo, Japan
A. Kirman, Groupement de Recherche en Economie Quantitative d'Aix-Marseille, France
A. Lesne, Laboratoire de Physique Theoreque de la Matiere Condensee, Universite Pierre et Marie Curie, Paris, France
M. Mackey, Department of Physiology and Centre for Nonlinear Dynamics in Physiology and Medicine, McGill University, Drummond, Canada
M. Angel Munoz, Instituto Carlos I de Física Teórica y Computacional, Granada, Spain
K. Peters, Faculty of Traffic and Transport Sciences Technical University Dresden, Germany
J. María Sancho, Universidad de Barcelona, Spain
B. Sendhoff, Honda Research Institute Europe, Offenbach, Germany
K. Sneppen, Niels Bohr Institute, University of Copenhagen, Denmark
D. Sornette, Chair of Entrepreneurial Risks, ETH Zurich, Switzerland
A. Trusina, Niels Bohr Institute, University of Copenhagen, Denmark
K. Windt, School of Engineering and Science, Jacobs University Bremen, Germany
D. Zanette, Centro Atomico Bariloche, Rio Negro, Argentina

6.3 EXPLORATORY WORKSHOPS

During 2010 IFISC started a series of Exploratory Workshops designed as brain stormy sessions to identify new research challenges.

HOW DOES INFORMATION PROCESSING EMERGE IN THE BRAIN?

IFISC, Palma de Mallorca, March 9-10, 2010

Scientific Coordinators:

Claudio Mirasso, IFISC, Palma de Mallorca
Ingo Fischer, IFISC, Palma de Mallorca

Increasing evidence suggests that the information-processing capabilities of the human brain rely on its ability to operate on multiple temporal and spatial scales in a coordinated way. However, the way in which multi-scale coordination enables high-performance processing of information is still unclear, and thus the potential to harness brain-inspired strategies for ICT applications remains unfulfilled. Some people suggest that the main orchestrator through which multiple structural and functional scales drive efficient brain functionality is the dynamical self-organization of neuronal activity. To discuss this hypothesis, we bring to the IFISC a group of recognized international scientists. Physicists, medical doctors, biologists, engineers and psychologists met for two days at IFISC to aboard this fascinating problem.

Invited speakers:

Bob van Dijk, Free University of Amsterdam

Tong-Boon Tang, University of Edinburgh

List of participants:

Javier Buldú, Universidad Rey Juan Carlos, Madrid.

Miguel Cornelles, IFISC

Jordi García-Ojalvo, Universidad Politécnica de Cataluña

Emilio Hernández-García, IFISC

Fernando Maestú, Centro de Tecnología Biomédica, Madrid

Victor Martínez Eguiluz, IFISC

Enric Munar, EVOCOG, IFSIC

Gordon Pipa, University of Osnabrueck, Germany

Antonio Pons, Universidad Politécnica de Cataluña

Francisco del Pozo, Centro de Tecnología Biomédica, Madrid

Irene Sendiña, Universidad Rey Juan Carlos, Madrid

Tomás Sintes, IFISC

Raúl Toral, IFISC

QUANTUM10: COMPLEX QUANTUM SYSTEMS

http://ifisc.uib-csic.es/quantum10

IFISC, Palma de Mallorca , October 14-15, 2010

Scientific Coordinators:

Roberta Zambrini, IFISC, Palma de Mallorca
David Sánchez, IFISC, Palma de Mallorca

The aim of the workshop is to bring together people working on different topics in quantum physics that share a common frame as complex systems. Growing interest on complexity is reflected by conferences on this subject and devoted journals, with many interdisciplinary connections between physics and biology, sociology, economics, etc... There are only few explicit attempts, however, to consider quantum systems from the perspective of complex phenomena.

Our purpose is to bring together 15-18 participants to present and review their work with emphasis on results related to complex systems such as:

- Emergent behaviors in many-body and extended systems.
- Nonlinear dynamical properties including chaos, stochastic resonance, synchronization, localization...
- Characterization of complexity from an information and statistical point of view.
- Quantum complex networks.

Invited speakers:

Antonio Acín, ICFO-Institut de Ciencies Fotoniques
Fabio Benatti, Università di Trieste
Filippo Caruso, Universität Ulm
Milena Grifoni, Universität Regensburg
Susana Huelga, Universität Ulm
Giovanna Morigi, Universität des Saarlandes
John Lapeyre, ICFO-Institut de Ciencies Fotoniques
Thomas Pohl, Max-Planck-Institute for the Physics of Complex Systems, Dresden
Juan Diego Urbina, Universität Regensburg
Thomas Wellens, Albert-Ludwigs-Universität Freiburg
Sandro Wimberger, Universitaet Heidelberg
David Zueco, Universidad de Zaragoza

6.4 INVITED TALKS IN CONFERENCES AND WORKSHOPS

Fischer, Ingo

Emission Tailoring of Broad Area VCSELs.

IFISC Workshop on New Trends in Photonics, Palma de Mallorca, Spain.

January 14

Hernández-García, Emilio

Stretching fields and lines from finite-size Lyapunov exponents: ocean transport and biological impact

Workshop on Exploring Complex Dynamics in High-Dimensional Chaotic Systems: From Weather Forecasting to Oceanic Flows. ECODYC10, Dresden, Germany

January 29

González-Avella, Juan Carlos

Threshold model with external influence

Red Temática: Dinámica y Fenómenos colectivos de sistemas socioeconómicos. 2do. Workshop; Valencia, Spain.

February 22 - 24

Nicola, Ernesto M.

A common symmetry-breaking mechanism connects diverse mass-conserved reaction-diffusion models of cell polarization

Invited talk given at the workshop "Mechanics of large molecular assemblies: from single molecules to cell shape". Campanet, Spain

April 8-11

Zambrini, Roberta

Spatial entanglement in OPOs with photonic crystals

5th Workshop on Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons, Torino, Italy

May 23-29

Toral, Raúl

Stochastic simulations: beyond the Metropolis algorithm.

ZCAM launching meeting Zaragoza.Spain

May 27-28

Serra, Llorenç

Quantum wires and two dimensional electron gases with inhomogeneous Rashba interaction

International Conference on theoretical Physics, Dubna-Nano 2010. Dubna, Russia

July 5-10

Sánchez, David
Quantum wires with localized spin-orbit interaction.
Spintronics Days at UPV-EHU, Bilbao, Spain
July 27-28

Gomila, Damià
Pattern formation and localized structures with intracavity photonic crystals.
International Workshop on Complexity in Periodically Structured Systems, Dresden, Germany
August 30 – September 3

Fischer, Ingo
Dynamics and Applications of Delay-Coupled Systems.
Dynamics Days Europe, Bristol, U. K. plenary talk. UK
September 6-10

Colet, Pere
Laseres Caoticos y su Aplicacion a Telecomunicaciones.
Escuela Andina de Optica y Fotonica, OPTOANDINA 2010, Lima, Peru
September 13-17

Toral, Raúl
Macroscopic ordering induced by microscopic disorder.
11th Granada Seminar on Computational and Statistical Physics. Granada, Spain
September 13-17

Sánchez, David
Effective fields and Kondo effects in spin-orbit quantum dots.
Nanoelectronics: Concepts, Theory and Modelling (NanoCTM). Malvern, UK
September 15-18

Eguíluz, Víctor M.
The voter model: from complex networks to co-evolution.
DYNAMICS ON AND OF COMPLEX NETWORKS IV, Satellite Workshop of European Conference on Complex Systems, Lisboa, Portugal
September 16

López, Cristóbal
Ocean transport and marine biological dynamics from Finite-Size Lyapunov Exponents.
Anomalous transport: from Billiards to Nanosystems. Sperlonga, Italy
September 19-24

Colet, Pere

Detection of change points in time series using nonlinear spatio-temporal dynamics.

ROBUST - Conference on Emergence and Design of Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain.

September 21-25

Toral, Raúl

Diversity-induced resonance.

ROBUST - Conference on Emergence and Design of Robustness, Palma de Mallorca, Spain

September 23

Gollo, Leonardo L.

Dynamical relaying promotes zero-lag long-range cortical synchronization in different frequency bands.

Donders Discussions. Nijmegen, Holland

October 22

Fischer, Ingo

Dynamics of Delay-Coupled Systems: From Lasers to the Brain.

DYCOEC-Workshop, Besancon, France.

November 8-10

Larger, Laurent

Electro-optic delay dynamics used as a reservoir for Liquid State Computing

Journées du GdR DYCOEC, Besançon, France

November 8 - 10

Serra, Llorenç

Transport in quantum wires with Rashba interaction.

Theory days on electronic transport in Q dots and wires. Toulouse, France

November 17 - 19

Fischer, Ingo

Systems Coupled with Delay:Dynamics and Applications.

Symposium of Berlin Center for Studies of Complex Chemical Systems, Berlin, Germany.

December 12

6.5 SEMINAR TALKS IN OTHER RESEARCH CENTERS

Castelló, Xavier
Collective phenomena in social systems: a statistical physics approach to language competition.
EVOCOG research group. (Evolución y cognición humana), Palma Mallorca, Spain
March 10

Eguíluz, Víctor. M.
Functional networks and structural connectivity in complex systems in the presence of delays.
Universidad Carlos III, Madrid, Spain
May 20

Grabowicz, Przemyslaw A.
Heterogeneity shapes groups growth in social online community.
GISC Madrid, Spain
May 26

Hernández Carrasco, Ismael
On the capacity and reliability of diagnosis from finite-size Lyapunov exponents (FSLEs) in suface marine flows.
LEGOS seminar in LEGOS. Toulouse, France
May 31

Vaz Martins, Teresa.
Disorder Induced Resonance: applications to biological systems.
Talk given at John Innes Centre, Norwich Research Park, Norwich, UK.
June 10

Heinsalu, Els.
Birth, death, and diffusion.
UNESCO seminar, Institute of Theoretical Physics, University of Wroclaw, Poland
June 11

Patriarca, Marco.
Kinetic wealth exchange models and a variational principle for the Pareto power law.
Visiting talk at the Department of Physics, University of Wroclaw, Poland
June 11

Castelló, Xavier
Social consensus problems in complex networks: the dynamics of language competition.
Department of Fundamental Physics, University of Barcelona, Barcelona, Spain
July 5

Patriarca, Marco

Diversity effects in a homeostatic model of the wake-sleep cycle.

Department of Physics, University of Sidney, Australia

July 15

Patriarca, Marco

Variational principle for the Pareto power law.

TUT-Tallinn University of Technology, Estonia

September 6

Nguimdo, Romain Modeste

Chaos encryption potential using electro-optic phase chaos generator.

Instituto de Física de Cantabria, IFCA (CSIC U. Cantabria), Santander, Spain

October 4 – 9

Sánchez; David

Quantum wires with localized spin-orbit interaction.

Department of Theoretical Physics of the University of Geneva.Italy

October 19

Fischer, Ingo

Dynamics and Applications of Delay-Coupled Systems.

Eugene-Wigner-Colloquium, TU Berlin, Germany.

October 28

Sukow, David.

Nonlinear Photonics with Semiconductor Lasers: Time Delayed Feedback and Polarization Configurations.

Masters 2 seminar at Institut FEMTO-ST / Optique Université de Besançon, France

November 8-10

Fischer, Ingo

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

Université de Franche-Comté, France.

November 10

Sánchez, David.

Nonlinear fluctuation-dissipation relations and magnetoasymmetries in mesoscopic conductors.

Instituto de Ciencias de Materiales de Madrid (CSIC), Spain

December 23

6.6 TALKS IN CONFERENCES AND WORKSHOPS

F. Lafuerza, Luis; Toral, Raúl; Colet, Pere.
Non equilibrium transition in a system of active rotators near the excitable regime.
EPSRC Symposium Workshop on Non-equilibrium dynamics of spatially extended interacting particle systems (NEQ), University of Warwick, Coventry, UK.
January 11-13

Jacobo, Adrian; Gomila, Damià; Colet, Pere; Matias Manuel A.
All Optical Logical Operations Using Excitable Cavity Solitons.
IEEE Photonics Winter Topicals 2010. Palma de Mallorca, Spain
January 11-13

Gollo, Leonardo L. ; Kinouchi, Osame; Copelli, Mauro.
Active dendrites stochastic neuronal model.
Stochastic models in neuroscience 2010 18-22 january Marseille, France
January 21

Matías, Manuel A.
Elements of a Continuum Theory of Vertebrate Segmentation.
Workshop on "Development: at the crossroads of System Biology". Ronda, Málaga, Spain
March 14-18

Grabowicz, Przemyslaw A. ; Eguíluz, Víctor M.
Model of group dynamics for an online community.
DPG Spring Meeting AKSOE Division Regensburg. Germany
March 21-26

F. Lafuerza, Luis; Colet, Pere; Toral, Raúl.
Non-equilibrium transition in a model or coupled active rotators.
103rd Statistical Mechanics Meeting, Rutgers University, New Brunswick, NJ, USA
May 9-11

Giorgi, Gian Luca.
Entanglement dynamics of dissipative harmonic oscillators in presence of diversity.
5th Workshop on Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons, Torino, Italy
May 23-29

S. Bacelar, Flora; M. 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.
CMPD 3 Conference on Computational and Mathematical Population Dynamics, Bordeaux, France.
May 31 - June 4

Bochove, Erik J. ; Aceves, Alejandro B. ; Deiterding, Ralf; Crabtree, Lili; Braiman, Yehuda; Jacobo, Adrian; Colet, Pere; Shakir, Sami.
Passively-phased fiber laser array dynamics.
Laser Optics 2010, St. Petersburg, Russia
June 28 – July 2

Vaz Martins; Livina, Valeria; Majtey, Ana; Toral, Raúl.
Resonance induced by repulsive interactions in a model of globally coupled bistable systems.
First Porto Meeting on Theory and Experiment in Nonlinear Physics, 7-9 July, Porto, Portugal.
July 7 - 9

Heinsalu, Els; Patriarca, Marco; Marchesoni, Fabio.
Stochastic resonance in a surface dipole.
Dynamics Days Asia Pacific 6 (DDAP6). Sydney, Australia
July 12

Patriarca, Marco; Heinsalu, Els; Marchesoni, Fabio.
Dimer diffusion in a washboard potential.
Dynamics Days Asia Pacific 6 (DDAP6). Sydney, Australia
July 12

Tugores, María Antònia.
Grid-CSIC at IFISC.
Grid y e-Ciencia 2010, Valencia, Spain
July 14-17

Patriarca, Marco; Hernández-García, Emilio; Toral, Raúl; Postnova, Svetlana; Braun, Hans Albert.
Diversity effects in a homeostatic model of the wake-sleep cycle.
STATPHYS 24, the XXIV International Conference on Statistical Physics of the International Union for Pure and Applied Physics (IUPAP), Cairns, Queensland, Australia
July 23

Heinsalu, Els; Patriarca, Marco.
Influence of geography on language competition.
Unwinding Complexity: Statistical Physics Perspectives on Complex Systems and Complex Materials, Port Douglas, Australia
July 25

Patriarca, Marco; Chakraborti, Anirban.
Variational Principle for the Pareto Power Law.
Unwinding Complexity: Statistical Physics Perspectives on Complex Systems and Complex Materials, Port Douglas, Australia
July 25

Hernández-Garcia, E.
Biological impact of ocean transport: A finite-size Lyapunov characterization.
3rd Conference on Nonlinear Science and Complexity, Ankara, Turkey.
July 29

Fernández-Gracia, Juan; M. Eguíluz, Víctor; San Miguel, Maxi.
Voter model and interevent time distributions.
TWCS'2010 - Turunc Workshop on Complex Systems 2010, ITAP. Turunc, Marmaris, Turkey
August 30 - September 1

Castelló, Xavier; Loureiro-porto, Lucía; San Miguel, Maxi
Agent-based models of language competition.
Societas Linguistica Europaea (SLE)43RD ANNUAL MEETING, VILNIUS. Lithuania
September 2 - 5

Komin, Niko; Toral, Raúl.
Phase transitions induced by microscopic disorder.
Dynamics Days Europe. Bristol, UK
September 6 - 10

Pérez-Serrano, Antonio; Javaloyes, Julien; Balle, Salvador
Multistability and multimode dynamics in lasers.
Dynamics Days Europe 2010. Bristol , UK
September 7

Patriarca, Marco; Hernández-García, Emilio; Toral, Raúl; Postnova, Svetlana; Braun, Hans Albert.
Noise and diversity effects in a homeostatic model of wake-sleep cycle.
Emergence and Design of Robustness, Palma de Mallorca, Balearic Islands, Spain
September 21-25

Hernández-Garcia, E.
Savanna-Fire Model: Combined effects of tree-tree establishment competition and spatially explicit fire on the spatial pattern of trees in savannas.
ROBUST - Conference on Emergence and Design of Robustness, Palma de Mallorca, Spain
September 24

Nicola, Ernesto M.
Tunability of genetic oscillators with mixed feedback loops.
"Trends in Complex Systems": International Workshop on Timing and Dynamics in Biological Systems. Dresden, Germany
September 26 – October 3

Sintes, Tomás

Clonal plant growth: restoration strategies and CO2 sequestration. An application of non-equilibrium growth models to ecology.

I European Seagrass Restoration Workshop. Setubal, Portugal

September 30 – October 1

Grabowicz, Przemyslaw A. ; Eguíluz, Víctor M.

Heterogeneity shapes groups growth in social on-line communities.

ESF-COST Conference on Future Internet and Society: A Complex Systems Perspective Acquafredda di Maratea, Italy

October 2 -7

Sukow, David.

Square wave solutions in semiconductor lasers with delayed mutual rotated optical coupling.

DYCOEC: Synchronization, Control, and Bio-dynamics, Besancon, France

November 8 - 10

Nicola, Ernesto M.

Genetic oscillators with mixed feedback loops.

"'Systems Biology: Bridging the Gap between Disciplines". Barcelona, Spain

December 8 - 12

6.7 POSTER PRESENTATIONS

Gollo, Leonardo L. ; Iglesias, Javier; Villa, Alessandro E. P. ; Mirasso. Claudio R.
Synchronization of distant cortical areas through thalamic relay.
Dynamics Days 2010 International Conference on Chaos and Nonlinear Dynamics Evanston, IL, USA
January 5

Soriano, Miguel C. ; Zunino, Luciano; Rosso, Osvaldo A.; Fischer, Ingo; Mirasso, Claudio R.
Quantifying complexity of the chaotic regime of a semiconductor laser subject to feedback via information theory measures.
SPIE Photonics Europe 2010, Brussels, Belgium
April 15

Hernández-Carrasco, Ismael; Hernández-García, Emilio; López, Cristóbal, Turiel, Antonio.
How reliable are Finite-Size Lyapunov Exponents for the assessment of ocean evolution?.
EGU-2010. Viena.
May 2 - 7

Hernández-Carrasco, Ismael; Hernández-García, Emilio; López, Cristóbal; Turiel, Antonio.
Reliability of Lagrangian diagnosis from finite-size Lyapunov exponents.
Workshop 'ORFLOW10'. Palma de Mallorca, Spain
June 7 - 11

Bettencourt, Joao; López, Cristóbal; Hernández-García, Emilio.
Coherent Structures in a Three Dimensional Turbulent Velocity Field.
Workshop ORFLOW 2010. Palma de Mallorca, Spain
June 7 - 11

Serra, L; Gelabert, M.
Linear conductance of a spin-orbit stripe with polarized contacts.
Nanomediterraneo II. Alicante, Spain
June 17 -18

Bochove, Erik J; Aceves, Alejandro B. Deiterding, Ralf; Crabtree, Lily; Braiman, Yehuda; Jacobo, Adrian; Colet, Pere.
Dynamic Stability Analysis Of Passively-phased Ring-geometry Fiber Laser Array.
Nonlinear Photonics, NP2010, Karlsruhe, Germany.
June 21 -24

Gomila, Damià; Jacobo, Adrian; Matias, Manuel A; Colet, Pere.
Logical Operations Using Excitable Cavity Solitons.
Nonlinear Photonics, NP2010, Karlsruhe, Germany.
June 21 - 24

Jacobo, Adrian; Gomila, Damià; Matias, Manuel A; Colet, Pere.
Interaction of Oscillatory Cavity Solitons.
Nonlinear Photonics, NP2010, Karlsruhe, Germany.
June 21 - 24

Heinsalu, Els; Patriarca, Marco; Marchesoni, Fabio.
Dimer diffusion in a washboard potential under the action of a constant force.
Bayer Research Poster Event at the 60th Lindau Nobel Laureate Meeting, Mainau, Germany
July 2

Cerda, J. ; Sanchez, P; Sintes, T; Ballenegger, V. ; Holm, C.
Numerical study of semifexible magnetic filaments.
International Soft Matter Conference 2010. Granada, Spain
July 5 - 8

Sanchez, P.; Cerda, J.; Sintes, T.; Ballenegger, V.; Holm, C.; Piro, O.
Self-organization of stiff magnetic filaments near an attractive surface.
International Soft Matter Conference 2010. Granada, Spain
July 5 -8

Sanchez, P.; Cerda, J.; Sintes, T.; Ballenegger, V.; Piro, O.; Holm, C.
Effects of external magnetic fields on equilibrium properties of magnetic filaments.
International Soft Matter Conference 2010. Granada, Spain
July 5 - 8

Heinsalu, Els; Hernandez-Garcia, Emilio; Lopez, Cristobal.
Nonlocally interacting particle systems: Levy flights versus Gaussian jumps.
STATPHYS 24, the XXIV International Conference on Statistical Physics of the International Union for Pure and Applied Physics (IUPAP) Cairns, Queensland, Australia
July 20

Gollo, Leonardo L. ; Mirasso, Claudio R. ; Atienza, Mercedes; Crespo-Garcia, Maite; Cantero, Jose L.
Zero-lag long-range synchronization via hippocampal dynamical relaying.
CNS 2010 -San Antonio Texas. July 24-30.Texas, USA.
July 25

Tugores, María Antònia; Colet, Pere.
Grid Computing for complex systems dynamics.
EGI Technical Forum 2010. Amsterdam, Holand
September 14 – 17

Hernández-Carrasco, Ismael; López, Cristóbal; Hernández-García, Emilio; Rossi, Vincent; Garçon, Veronique.
Transport of plankton in the Benguela upwelling system.
Anomalous Transport: from Billiards to Nanosystems. Sperlonga, Italy
September 20 - 25

Bettencourt, Joao; López, Cristóbal; Hernández-García, Emilio.
Coherent Structures in a Three Dimensional Velocity Field.
Anomalous Transport: from Billiards to Nanosystems – Sperlonga, Italy
September 20 -24

S. Bacelar, Flora; M. Calabrese, Justin; Hernández-García, Emílio.
Combined effects of tree-tree establishment competition and spatially explicit fire on the spatial pattern of trees in savannas.
ROBUST - Emergence and Design Robustness: General Principles and Applications to Biological, Social and Industrial Networks .Palma de Mallorca, Spain
September 21 - 25

Pineda, M. ; Toral, R. ; Hernández-García, E.
Noisy continuous-opinion dynamics.
ROBUST - Emergence and Design Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain
September 21 - 25

Komin, Niko; Murza, Adrian; Toral, Raúl; Hernández-García, Emilio.
Synchronization properties of coupled circadian oscillators.
ROBUST - Emergence and Design of Robustness. Palma de Mallorca, Spain
September 21 - 25

Sintes, Tomás
Robustness in segrass growth models.
ROBUST - Conference on Emergence and Design of Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain
September 21 - 25

Fernández-Gracia, Juan; M. Eguíluz, Víctor; San Miguel, Maxi.
Updating rules in social simulations.
ROBUST - Emergence and Design Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain
September 21 – 25

Lafuerza, Luis F.; Colet, Pere; Toral, Raúl.
Non-Universal results induced by diversity distribution in coupled excitable systems.
ROBUST - Emergence and Design Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain
September 21 – 25

Vaz Martins, Teresa; Pineda, Miguel; Toral, Raúl.
Divide and conquer.
ROBUST - Conference on Emergence and Design of Robustness: General Principles and Applications to Biological, Social and Industrial Networks. IFISC, September 21-25, 2010. Palma de Mallorca, Spain
September 21 – 25

Lafuerza, L. F.; Colet, Pere; Toral, Raúl.
Nonuniversal results induced by diversity distribution in a system of coupled active rotators.
ROBUST - Emergence and Design Robustness: General Principles and Applications to Biological, Social and Industrial Networks. Palma de Mallorca, Spain
September 22

M. De Castro, Maria; Garcia-March, Miguel Angel; Gomila, Damià; Zambrini, Roberta.
Spatial entanglement in multimode devices with photonic crystals.
Ninth International Conference on Photonic and Electromagnetic Crystal Structures PECS-IX. Granada, Spain
September 29

Giorgi, Gian Luca.
Ion-trap simulation of the quantum phase transition in an exactly solvable model of spins coupled to bosons.
XXVI Trobades Científiques de la Mediterrània - Correlations in Quantum Gases MaÃ³. Mahón, Menorca, Spain
September 30 – October 2

Romain Modeste Nguimdo, Roman Lavrov, Pere Colet, Maxime Jacquot, Yanne Kouomou Chembo, Laurent Larger.
Effect of fiber dispersion on broadband chaos communications implemented by electro-optic nonlinear delay phase dynamics.
Journèes nationales d'optiques guidèes (JNOG), Besancon, France
October 19 - 22

Gollo, Leonardo L. ; Sporns, Olaf; Breakspear, Michael; Mirasso, Claudio.
Synchronization and phase-coding of delayed coupled cortical structures: a neural mass approach.
Donders Discussions 21 and 22 October 2010 Nijmegen, Netherlands
October 21

López, Cristóbal; Heinsalu, Els; Hernández-García, Emilio.

Spatial clustering of interacting particles: Levy flights versus Gaussian jumps.

Statistical Physics of Collective Motion, Dresden, Germany

November 8 - 12

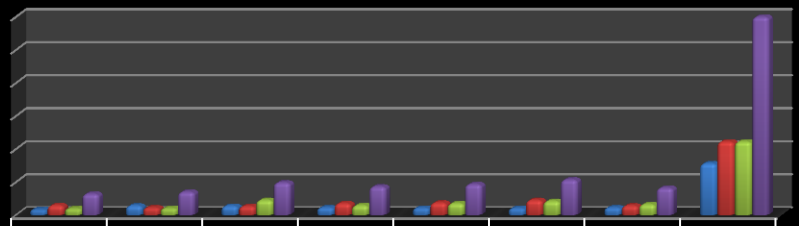
Lafuerza, Luis F.; Toral, Raúl.

Exact solution of a stochastic protein degradation model including delay.

Systems Biology: Bridging the Gaps between Disciplines. 6th Meeting of the Spanish Systems Biology Network (REBS) BARCELONA, December 9th-10th 2010. Spain

December 9 - 10

CONFERENCES AND WORKSHOPS 2004-2010



	2004	2005	2006	2007	2008	2009	2010	TOTAL
INVITED TALKS	16	28	27	22	21	20	22	156
ORAL TALKS	29	22	26	35	37	45	28	222
POSTERS	19	20	45	29	35	42	32	222
TOTAL	64	70	98	86	93	107	82	600

6.8 SCIENTIFIC COMMITTEES AND ORGANIZATION OF CONFERENCES AND WORKSHOPS

San Miguel, Maxi
Member of the International Advisory Committee.
Statphys 2010, July 19-23, Cairns, Australia.
July 1 - 23

Fischer, Ingo
IFISC Workshop on "New Trends in Photonics".
IFISC, Palma de Mallorca, Spain
January 14

Matías, Manuel A.
Mechanics of large molecular assemblies: from single molecules to cell shape.
Workshop organized to foster interactions between three biophysical groups at the MPI-CBG (Max Planck Institute of Molecular Cell Biology and Genetics) of Dresden and IFISC, Palma de Mallorca, Spain
April 8 - 11

Fischer, Ingo.
Jury member for Prix scientifiques quinquennaux du F. R. S. -FNRS, Prix Dr A. De Leeuw-Damry-Bourlart.
Brussels, Belgium
May 18

Feudel, Ulrike; Goldstein, Raymond E. ; Hernandez-Garcia, Emilio; Lopez, Cristobal.
Scientific Coordinators of the International Workshop on Living Organisms in Flows: From Small-scale Turbulence to Geophysical Flows (Orflow10).
A conference of the Trends in Complex Systems series. Palma de Mallorca, Spain
June 7 - 11

Toral, Raúl
Organization of international Conference on Emergence and design of robustness.
ROBUST Conference. Palma de Mallorca, Spain
September 21 – 25

Fischer, Ingo
European Semiconductor Laser Workshop.
Pavia, Italy
September 24 – 25

San Miguel, Maxi

Scientific Commitee member of the ESF-COST High Level Conference "Future Internet and Society: a Complex Systems Perspective".

Acquafredda di Maratea, Italy

October 4 - 8

Zambrini, Roberta

IFISC Workshop on "Complex Quantum Systems".

Palma de Mallorca, Spain

October 14 - 15

Ramasco Sukia, Jose J.

Complex Energy meeting

scientific committee Complex Energy EU initiative. Brussels, Belgium

November 15 - 16

Serra, Llorenç

Theory Days on Transport in quantum wires and dots

Praticipation in the scientific commitee of this meeting hosted by University Paul Sabatier and CNRS.Tolousse, France

November 17 - 19

7. OTHER ACTIVITIES

7.1 MASTER THESIS

Effects of the topology and delayed connections in the synchronization properties of a neuronal network

Guadalupe Clara García (Supervisors: Claudio Mirasso and Víctor M. Eguíluz)

Divide and conquer

Teresa Vaz Martins (Supervisor: Raúl Toral)

A continuum model of vertébrate segmentation base don the Complex Ginzburg-Landau equation

Jose María Aparicio (Supervisor: Damià Gomila)

7.2 PhD THESIS

Collective phenomena in social dynamics: consensus problems, ordering dynamics and language competition

Xavier Castelló Llobet (Supervisor: Maxi San Miguel and Víctor M. Eguíluz)

April 16

Nonlinear Dynamics in Photonic Systems: Generic models for semiconductor ring lasers & dissipative solitons

Lendert Gelens (Supervisors: Jan Danckaert, Guy Van der Sande and Damià Gomila)

May 21

Coevolution and local versus global interactions in collective dynamics of opinion formation, cultural dissemination and social learning

Juan Carlos González-Avella (Supervisors: Maxi San Miguel and Víctor M. Eguíluz)

September 20

Nonlinear Dynamics and Regime Shifts in Ecosystems

Flora Souza Bacelar (Supervisor: Emilio Hernández-García)

November 11

Phase Transitions Induced by Diversity and Examples in Biological Systems
Niko Komin (Supervisor: Raúl Toral)
December 17

Divide and conquer: resonance induced by competitive interactions
Teresa Vaz Martins (Supervisor: Raúl Toral)
December 21

7.3 RESEARCH STAYS IN OTHER CENTERS

Herrada, E. Alejandro.
KU Leuven. Leuven, Belgium.
January 13 – March 13

Nguimdo, Romain Modeste.
Institut FEMTO-ST, CNRS-University of Franche-Comte, Besançon, France.
From 1/2/2010 to 1/5/2010

Grabowicz, Przemyslaw A.
GISC, University Carlos III of Madrid, Leganes, Spain.
March 15 – June 30

Ismael Hernández Carrasco.
Stay at LEGOS. Toulouse, France.
April 1 - May 31.

F. Lafuerza, Luis.
Research stay in Boston University Physics Department, USA
April 12 - July 7.

Eguíluz, V. M.
Universidad Carlos III. Madrid, Spain
May 19 - 21

Nicola, Ernesto M.
Stay at Max Planck Institute for the Physics of Complex Systems. Dresden, Germany.
May 20 - 30

Heinsalu, Els; Patriarca, Marco.
Complex Systems and Nonlinear Dynamics Division, Institute of Theoretical Physics, University of Wroclaw, Wroclaw, Poland.
June 3 - 16

Lyra Gollo, Leonardo.
Indiana University. USA
July 5 – October 5

Patriarca, Marco; Heinsalu, Els.
Brain Dynamics Group, School of Physics, University of Sydney, Australia.
July 15

Hernández-Carrasco, Ismael.
Institut de Ciencies del Mar -CMIMA (CSIC) Barcelona, Spain.
From 19/7/2010 to 23/7/2010

Patriarca, Marco; Heinsalu, Els.
Department of Cybernetics, TUT-Tallinn University of Technology, Estonia.
September 6

Guadalupe C. Garcia.
Stay at Center for Neural Science, John Rinzel's Lab ., New York University. USA
September 24 – January 6

Romain Modeste Nguimdo.
Instituto de Física de Cantabria, IFCA (CSIC-UC), Santander, Spain.
October 4 - 9

Sánchez, David.
Department of Theoretical Physics, University of Geneva, Italy.
October 17 - 22

Nicola, Ernesto M.
Visit to Max-Planck Inst. for Phys. Complex Sys. Dresden, Germany.
November 17 - 24

Matías, Manuel A.
Visit to MPI-PKS and MPI-CBG, Dresden, Germany.
December 1 - 8

7.4 MEMBERS OF EDITORIAL BOARD OF SCIENTIFIC JOURNALS

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

Hernandez-Garcia, E. ; Lopez, C..
Coeditors of the Special Issue on Nonlinear Processes in Oceanic and Atmospheric Flows in the journal Nonlinear Processes in Geophysics.

San Miguel, Maxi
Associate Editor of the European Physical Journal B (New Section on Complex Systems)

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 credits).
Mirasso, Claudio.
July 12 - 15

8. OUTREACH ACTIVITIES

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

8.1 CONFERENCE SERIES

CONFERENCE SERIES "EXPLORING BOUNDARIES BETWEEN DISCIPLINES III"

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

The conference series covers different aspects of complex systems and cross-disciplinary studies.

The science of the 20th century has been characterized by a progressive specialization that has enabled major advances in specific areas. The great challenge of the 21st century science is to explore the boundaries between different areas of knowledge and interdisciplinary development, thus enabling the understanding of complex phenomena.

Conference Series "Exploring boundaries between disciplines III" took place in the Cámara de Comercio.

- **March 10: "Human society and microbe society: are we different?"**Dr. Fernando Baquero. *Profesor de Investigación en Evolución Bacteriana. Hospital Universitario Ramón y Cajal. Centro de Astrobiología, INTA-CSIC, Madrid.*
- **March 24**: **"Physics, Mathematics and sustainability: an interdisciplinary vision (and unauthorized)"** Dr. Anxo Sánchez. *Catedrático de Matemática Aplicada de Madrid. Grupo Interdisciplinar de Sistemas Complejos. Universidad Carlos III, Madrid.*
- **March 31**: **"The physics of financial markets. A model for human behavior?"** Dr. Josep Perelló. *Professor Associat al Departament de Física Fonamental de la Universitat de Barcelona.*

8.2 DEMOLAB PROGRAM/OPEN DAYS

In collaboration with DemoLab Program (UIB-*Sa Nostra Caixa de Balears*), IFISC has organized different activities as guided visits, laboratory workshops and outreach talks:

- **October 18. Visit of the IES Son Pacs. 1º de Bachillerato (30 students)**
  Guided visit of IFISC facilities. Talks: "*La Física de los Sistemas Complejos*" given by Dr. Raúl Toral" and "*Caos y Sincronización: un cóctel para las comunicaciones seguras*" given by Dr. Pere Colet.

- **November 8. Visit of the IES Josep Maria Llompart. 1º de Bachillerato (30 students)**
  Presentation of the Institute by Dr. Emilio Hernández-García and talk given by Dr. Claudio Mirasso: "*Láseres qué son y para qué sirven*".

- **November 22. Visit of the IES Josep Maria Llompart. 1º de Bachillerato (30 students)**
  Presentation of the Institute and talk: "*Una introducción a la Física de los Sistemas Complejos"* given by Dr. Juan Carlos González Avella.
  Optical Workshop at the Photonics Lab conducted by Dr. Miguel C. Soriano and the students Neus Oliver and Xavier Porte (PhD students).

8.3 PARTICIPATION IN THE BALEARIC SCIENCE AND TECHNOLOGY WEEK (SCIT10)

The Balearic Science and Technology Week is organized yearly by the Goverment of the Balearic Islands. Contributions of IFISC in 2010 include:

- **8.3 a) 50th Laser Anniversary (October 22- December 14)**
- **8.3 b) IFISC in Menorca Museum (November 11-13)**
- **8.3 c) Exhibition of CSIC in Baleares: Science in images. (November 29- December 12)**

8.3 a) 50th Laser Anniversary (October 22 – December 14)

To commemorate this scientific anniversary and to approach laser and its applications to the public in general, IFISC (CSIC-UIB) organized this program of activities in collaboration with *Conselleria d'Innovació, Interior i Justícia, through Direcció General de Recerca, Desenvolupament Tecnològic i Innovació* and *Oficina de Suport a la Recerca (OSR) of the Universitat de les Illes Balears. CaixaForum, Catedral de Mallorca and Ayuntamiento de Palma* also collaborated.

October 22: Laser - 50 years of an invention that has changed our lifes

- **6:00 p.m: Opening ceremony of the Week of Science and Technology in the Balearic Islands.**
  Participants included the director of "Recerca, Desenvolupament Tecnològic i Innovació del Govern de les Illes Balears", doctor Pere Oliver and the President of the University of Balearic Islands, Prof. Montserrat Casas.
- **6:30 p.m: Conference by Claudio Mirasso: Laser- 50 years of an invention that has changed our lifes. Presented by Prof. Jordi Lalucat, UIB vicerector of research.**
- **7:30 p.m: Laser Graffitti Exhibition at the Wall of *SES VOLTES***. It included the permormance of the graffic designers Hock and OA and the illustrators Xavier Canyelles and Pep Homar.

More than 300 people attended.

November 24: Round Table. Laser and Medicine: Applications and challenges.

The conference took place at Caixaforum in Palma, Plaza de Weyler, 3, coordinated by doctor Felix Grases, director the Institute UNICS, UIB.

Invited Experts:

- Dr. José Francisco Noguera Aguilar, General Surgery Department Head and Digestive Tract; experimental operating theater manager and director of the Digestive Medical and Surgical Institute, Hospital Son Llàtzer.

- Dr. José Luis Olea Vallejo. Ophtalmology Department of the Hospital Son Dureta. Head of the Unit-section Vítreo-Retina.
- Dr. Enrique Pieras Ayala. Urology Department of Hospital Son Dureta and USP Clínica Palmaplanas.
- Dr. Aureli Torné Bladé. Cancer Gynecology Consultor; "Instituto Clínico de Ginecología Obstetricia y Neonatologia (ICGON); Hospital *Clínic* de Barcelona". President of the "Asociación Española de Patología Cervical y Colposcopia"

December 14. Conference: Laser applications in art conservation – Ceramic Works of Gaudí at Palma de Mallorca Cathedral.

Catedral de Palma. Plaça de la Almoïna, s/n (Palma)

Conference by Dr. Mercè Gambús, professor of Historical Science Department of Arts Theory, and principal investigator of the "Grupo de Conservación del Patrimonio Artístico Religioso" of UIB, and Dr. Francisco José Perales, professor of the Science and Informatics Department and principal investigator of the Graffic and Vision by computer and artifitial intelligence Unit of the UIB. The President of the Chapter of the Cathedral, Joan Bauzà, and the UIB vicerector of research, Prof. Jordi Lalucat attended the event. More than 300 people had access to the Royal Chappelle and could visit the restoration of the ceramic collection, framework and Episcopal chair.

8.3 b) IFISC in Menorca (November 11- 13)

Museo de Menorca (Mahón)

During the Balearic Week of Science, IFISC organized some outreach activities in Menorca. These included: the celebration of the 50 years of laser with a conference given by Prof. Claudio Mirasso and a graffiti exhibition performed by Xavier Siquier, and an exhibition with a workshop on complex systems covering aspects of chaos, synchronization and pattern formation.

The IFISC program of activities was organized in collaboration with the *Conselleria d'Innovació, Interior i Justícia, through Direcció General de Recerca, Desenvolupament Tecnològic i Innovació, la Conselleria d'educació y Cultura, the Museo de Menorca and the Institut Menorquí d'estudis.*

During the 3 days of activities more than 400 students of different High Schools from Menorca like *IES Cap de Llevant, IES M. Angels Cardona, IES Pacual Calvó, IES Joan Ramis* attended the exhibition.

List of activities:

- Workshops: IFISC and Complex Systems Workshops: chaos, patterns and synchronization.
- Exhibition and Workshops: "50 years of laser."
- Exhibiton in the cloister of the Museum: "IFISC and Complex Systems Exhibition"

- Conference by Claudio Mirasso: Laser - 50 years of an invention that has changed our lifes. November 13.
- Laser Graffitti Exhibition at the cloister of the Museum**.** November 13.
  Javier Siquier (OA) Visual Artist, who performed the laser-graffiti exhibition

More than 150 people attended, the conference and laser-graffitti exhibition.

8.3 c) CSIC in Baleares: Science in images.

The Delegation of CSIC in Baleares presented at CaixaForum Palma, and within the Week of Science 2010, the exhibition: " El CSIC en las Illes Balears: Ciencia en imágenes". The exhibition was open from November 29th to December 12th. IFISC participated as one of the two CSIC Institutes in the Balearic Islands.

8.4 2010 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 two stands in the event in Mallorca (May 13-15).

- Stand 1: **IFISC AND COMPLEX SYSTEMS** The stand aimed to become a place of learning and fun. Through experiences, workshops and exhibitions, concepts of Chaos theory and complexity were introduced. The interactivity, manipulation and experimentation were present in all the activities, divided into three areas of interest: chaos, patterns and synchronization.

- Stand 2: **50 YEARS OF LASER** with the collaboration of the ***Associació de Físics de les Illes Balears*** (ASFIB): The aim of this stand was to approach laser to the general public by workshops and interactive activities. There was also an exhibition of real devices: semiconductor lasers and gas lasers.

This outreach project was organized with the collaboration of **FECYT** (Fundación Española para la Ciencia y la Tecnología) and the **Conselleria d'Innovació, Interior i Justícia** of the Government of the Balearic Islands.

8.5 OSA-IFISC ACTIVITIES

II MODERN OPTICS DAYS ON JULY 5-9, DEDICATED TO THE 50TH LASER ANNIVERSARY.

In 2010, IFISC and the students of the Optical Society of America (OSA) Chapter organized the II Modern Optics Days on July 5-9, devoted to the 50th Laser Anniversary.

About twenty students attended a conference framed on optics for the 21th century. Main research topics related to laser applications were covered. Those days also facilitated communication between participants. Sessions included laser history, working physical principles, dynamics and applications. There were also lab experiments.

IFISC –OSA SOLAR CAR RACE (JUNE 5)

In this first edition of the solar car race, that took place in Palma at the Enviromental Day (June 5), more than 60 participants with very different profiles attended: high school students, kids, university students, parents, etc.. A solar kit with the basic elements for building a mini solar car was provided to all the contestants when they registered. In addition to the prize to the winner, creativity, application of scientific and technical knowledge, recycling, aesthetics, etc. were also rewarded.

This activity was organized in collaboration with the “Consell de Mallorca”,” Ayuntamiento de Palma” and the movement “moute per Palma”

8.6 PRESS AND MEDIA

PRESS NEWS

- **Referentes de la ciencia española.**
  Expansión. December 25

- **Referentes de la ciencia española.**
  Expansión. December 24

- **Nature Es fa ressó d'un estudi de la UIB.**
  Diari de Balears.December 24

- **La revista "Nature" es fa ressó de la recerca de l'investigador Fernando Galve, de l'IFISC (CSIC-UIB), sobre l'observació de fenómens quántics a temperatura ambient.**
  Nota de Prensa UIB. December 23

- **El profesor Maxi San Miguel, director de l'IFISC (CSIC-UIB), guardonat amb el premi Medalla de la Reial Societat Espanyola de Física.**
  Nota de prensa UIB. December 22

- **Un investigador de Balears gana el Premio de Física.**
  Diario de Mallorca. December 22

- **Un Professor de Física de la Universitat de les Illes Balears guardonat amb el Premi de la Fisica Estatal.**
  Diario de Ibiza. December 22

- **Premios de la Física a expertos en estadástica y materia condensada.**
  El Pais. Com. December 22

- **Un investigador de la UIB gana el Premio de la Física.**
  El Mundo-El día de Baleares. December 22

- **El profesor Maxi San Miguel, director de l'IFISC (CSIC-UIB), guardonat amb el premi Medalla de la Reial Societat Espanyola de Fisica.**
  Nota de prensa UIB. December 21

- **Los "Premios de la Física" española de 2010, de la RSEF y la Fundación BBVA, reconocen a San Miguel Ruibal y Tello León por ser pioneros y referentes en sus áreas.**
  Nota de Prensa Fundación BBVA. December 21

- **La Seu pasa por el escaner.**
  El Mundo-El día de Baleares, Suplemento B@leopolis. December 21

- **Investigadors de la UIB apliquen el làser a la conservació del patrimoni de la Seu.**
  Diario de Mallorca, Suplemento Universitat. December 16

- **Xavier Castelló Llobet. Aportacions de la Física Estadística a la competició entre llengües.**
  Diario de Mallorca, Suplemento Universitat. December 16

- **El patrimonio artístico de la Seu, más cerca gracias al laser y a la tecnología 3D.**
  Diario de Mallorca. December 15

- **El laser entra en la Seu.**
  Ultima Hora. December 15

- **Els investigadors de la UIB apliquen el láser a la conservació del patrimoni a la Seu de Mallorca.**
  Nota de Prensa UIB. December 14

- **El láser a la Seu.**
  Diari de Balears. December 14

- **Investigadores de la UIB explicarán la utilización del laser en la Seu.**
  Ultima Hora. December 14

- **La tesi doctoral de Xavier Castelló, defensada a la UIB, analitza els processos de substitució llingüística des de la fisica estadistica.**
  Nota de Prensa UIB. December 9

- **Mes a prop de predir el futur del Català , gràcies a la Fisica.**
  Diari de Balears. December 9

- **Aportacions de la fisica estadistica a l'estudi de la competició ente llengües.**
  Reportaje de la Tesis de Xavi Castelló, realizado por el Departamento de Comunicación y Prensa de la UIB. December 9

- **Zahnpasta-Zsatz Made in Mallorca.**
  Mallorca Magazin. December 2

- **Inauguración de la exposición "El CSIC en las Illes Balears: Ciencia en imágenes.**
  Nota de Prensa CSIC (Consejo Superior de Investigaciones Científicas) November 29

- **El 98% de los apellidos podrán desaparecer.**
  20 Minutos. November 17

- **El láser que cambia nuestras vidas.**
  Menorca. Diario Insular. November 13

- **Los apellidos que empiezan por "v" se reducirán en 5 generaciones.**
  Diario de Mallorca. November 12

- **Els llinatges amb Z es reduiran 10 vegades en 5 generacions.**
  Diari de Balears. November 12

- **Los apellidos que empiezan por V o Z se reducirán 10 veces antes de 5 generaciones.**
  El Mundo-El DÃa de Baleares. November 12

- **Los apellidos de las últimas letras se reducirán un 90% en 5 generaciones.**
  última Hora. November 12

- **Apellidos al borde de la extinción en 5 generaciones.**
  Ultima Hora Ibiza y Formentera. November 12

- **Dos investigadors de l'IFISC (CSIC-UIB) quantifiquen els efectes en la distribució dels cognoms que es deriven del projecte de llei de Registre Civil.**
  Nota de Prensa UIB. November 11

- **El apellido Zapatero desaparecerá en diez generaciones con la nueva ley.**
  Article in Spanish national newspaper ABC comenting on the work "Evolution of surname distribution under gender-equality measurements". November 10

- **El apellido Zapatero desaparecerá en diez generaciones con la nueva ley.**
  Diario ABC. November 10

- **La Semana de la Ciencia conmemora 50 años del laser.**
  Diario de Menorca. November 9

- **La setmana de la Ciencia conmemora los 50 años del laser.**
  Ultima Hora Menorca. November 9

- **Setmana de la ciencia i la tecnologia.**
  Ultima Hora. November 3

- **El año de la Biodiversidad, el medio siglo del laser y más.**
  El mundo. Dia de Baleares, Suplemento b@leopolis. November 2

- **L'investigador Fernando Galve, de l'IFISC (CSIC-UIB), proposa l'observació de fenòmens quantics a temperatura ambient en un article a la revista Physical Review Letters.**
  Nota de Prensa UIB. November 2

- **El rayo que nos cambió la vida.**
  El Mundo-El Dia de Balears, Suplemento B@leopolis. October 26

- **Grafiti para celebrar los 50 del láser.**
  Diario de Mallorca.October 23

- **Ses Voltes se deja proyectar graffitis para celebrar los 50 años del laser.**
  Diario de Mallorca. October 22

- **La investigadora Rosa López, de l'IFISC (CSIC-UIB), analitza el transport d'electrons en molècules artificials en un article a la "Physical Review letters".**
  Nota de prensa UIB. October 22

- **Ciència per mostrar i tastar.**
  Diario de Mallorca. October 21

- **Ciència per mostrar i tastar.**
  Diario de Mallorca. Suplemento Universitat. October 21

- **La setmana de la Ciència celebrarà el 50 Aniversari del làser.**
  Diario de Mallorca. October 20

- **La semana de la Ciencia celebrará el 50 aniversario del hallazgo del láser.**
  Diario de Mallorca. October 20

- **L'institut de Fisica Interdisciplinária i Sistemes Complexos (UIB-CSIC) organitza les Jornades Sistemes Quàntics Complexos.**
  Nota de prensa UIB. October 14

- **La UIB acull el congrés sobre emergència i disseny de la Robustessa que organitza l'IFISC.**
  Nota de Prensa UIB. September 21

- **Grid Mallorquín con vistas a Europa.**
  Computerworld. September 15

- **L'IFISC (UIB-CSIC) dedica les II Jornades d'óptica Moderna a la celebració del Cinquanté aniversari de la invenció del làser.**
  Nota de prensa UIB. July 2

- **Avances técnicos recientes. Los 50 años del làser.**
  Ultima Hora. Sección Campus Abierto. June 29

- **Los ecosistemas acuáticos.**
  Artículo Publicado en última Hora. Colaboración en la columna de la UIB coordinada por Sebastià Serra Busquets. June 22

- **L'IFISC organitza un congrés internacional a la UIB.**
  Diario de Mallorca. Suplemento Universitat. June 10

- **First Mini-Solar Car Competition in Palma (World Environmental Day).**
  Outreach activity for popularization of renovable energies, optics and electronics, in collaboration with Consell de Mallorca and Ayuntamiento de Palma, funding by Optical Society of America. June 5

- **L'IFISC (UIB-CSIC) organitza el Congrès Internacional Organismes Vius en Fluids: De la turbuléncia de petita escala fins a les escales geofísiques.**
  Nota de Prensa UIB. June 4

- **Vehicles moguts pel sol per difondre les energies renovables.**
  Diario de Mallorca. Suplement Universitat. June 3

- **La interdisciplinariedad Científica. ¿Qué son los sistemas Complejos?.**
  Última Hora. Sección "Campus Abierto". June 1

- **Die Teilchen und das Ganze.**
  Mallorca Zeitung. May 20

- **La recerca de la Universitat protagonitza la Fira de la Ciència.**
  Diario de Mallorca. May 5

- **La carrera es una forma creativa de acercar a la gente las energías renovables.**
  Diario de Mallorca. Suplemento "La Almudaina". May 16

- **Coches Solares Tuneados y Juegos de mesa reciclados.**
  Diario de Mallorca. May 6

- **Ressó Internacional de la recerca duta a terme per l'IFISC.**
  Diario de Mallorca. Suplement Universitat. April 29

- **La "Physical Review Letters" publica un article dels investigadors de l'IFISC Manuel A. Matias, Pere Colet i Damià Gomila.**
  Nota de Prensa UIB. April 26

- **Catástrofe en cascada.**
  Diario de Mallorca. April 24

- **L'IFISC coordina el projecte europeu de recerca PHOCUS.**
  Diario de Mallorca. April 15

- **Bits a la Velocitat de la llum.**
  El mundo Baleares. April 13

- **L'IFISC (UIB-CSIC) coordina un projecte europeu de recerca per dissenyar sistemes fotónics capaços de realitzar càlculs complexos de forma ràpida i eficient.**
  Nota de Prensa UIB. April 12

- **Com s'organitzen les cel·lules per formar teixits? Workshop a l'IFISC: Menachics of large molecular assemblies: from single molecules to cell shape.**
  Nota de prensa UIB. April 8

- **Un mallorquín en el equipo que trabaja en un sistema óptico que imitaría al cerebro.**
  Diario de Mallorca. April 5

- **Un científico de la UIB coordina la creación de un sistema óptico capaz de imitar funciones cerebrales.**
  Última Hora Ibiza. April 5

- **Tecnología.**
  Diario de Ibiza. April 5

- **A la recerca del temps Futur.**
  Revista de la Universitat de les Illes Balears. Número XV. Segona época. 2n semestre de 2009. April 1

- **La personalidad de los operadores de la bolsa, bajo la lupa de los científicos.**
  April 1

- **Física, Matemáticas y Sostenibilidad.**
  Diario de Mallorca. March 26

- **L'IFISC analitza el processament de la informació al cervell humà.**
  Diario de Mallorca. Suplement Universitat. March 11

- **Microbios y humanos tienen varios comportamientos sociales similares.**
  Diario de Mallorca. March 11

- **El Alzheimer golpea donde más duele.**
  Diario de Mallorca. March 10

- **Conferències interdisciplinàries sobre el Coneixement.**
  Diari de Balears. March 10

- **Das wunsche ich mir von der MZ "Das erste treffen des Leserbeirats".**
  Mallorca Zeigtun. March 4

- **A la recerca del temps Futur.**
  Reportaje publicado en la revista enllaç UIB. Número XV. Segona Época. 2n semestre de 2009. March 1

- **Els "Indiana Jones" de la UIB.**
  Revista Universitaria L'Hiperbòlic. January 15

RADIO

- Interview to Claudio Mirasso at IB3 Radio, "Tassa i Mitja" show.
  Fira de la Ciència 2010. June 13.
- Interview to María Moreno.
  Ona Mallorca Radio. "Show 2+2 = 22. June 10.
- Interview to Emilio Hernández-García.
  IB3 Radio. "Aixo no és Sicilia" Show. June 10.

- Interview to Claudio Mirasso
  IB3 Radio. "Balears fa ciencia" Show. October 16.
- **Round Table with Maxi San Miguel, Director of IFISC**.
  Cadena SER Mallorca. "Hoy por hoy Mallorca" Show. October 18.
- Interview to Claudio Mirasso
  Cadena SER Mallorca. "Hoy por hoy Mallorca" Show, October 18.
- **Interview to Claudio Mirasso.**
  ONA Mallorca. "Això no és Sicilia" Show, October, 19.
- **Interview to Claudio Mirasso**
  IB3 Ràdio. "Balears fa ciencia" Show. Science and Technology Week. November 20.
- **Interview to Claudio Mirasso**
  IB3 Radio. "Tassa i Mitja" Show. June, 13.
- **Interview to Raúl Toral**
  ONA Mallorca. "Això no és Sicilia" Show. November 15.
- **Interview to Raúl Toral**
  IB3 Radio. "Show 2+2 = 22. November 16.

TV

- **Interview to Claudio Mirasso (Science Fair)**
  TV de Mallorca, Informativos de la noche, May 13.
- **Interview to Roberta Zambrini (Science Fair)**
  IB3 TV, "Bon día Balears" Show. May 13.
- **Solar Car Race (IFISC-OSA)**
  TV Española. Informativos de la noche. June, 5
- **Anuncio de las actividades organizadas por el IFISC (Science and Technology Week)**
  Mallorca- RTV. Informativo del Mediodía. October 18.
- **Interview to Claudio Mirasso (Science and Technology Week, 50th Anniversary of laser)**
  TV de Mallorca, "De Nit amb Neus Albis" Show, October 19.
- **Interview to Claudio Mirasso and Roberta Zambrini (Science and Technology Week, 50th Anniversary of laser)**
  IB3 TV, "Crònica d'avui" News. Broadcasted live of the laser graffiti exhibition at Ses Voltes, October 22.
- **Interview to Raúl Toral related to the article "El apellido Zapatero desaparecerá en diez generaciones con la nueva ley"**
  TV de Mallorca, November 11

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