IFISC ANNUAL REPORT *

2012

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Instituto de Física Interdisciplinar y Sistemas Complejos

Universitat de les Illes Balears

CSIC

Consejo Superior de Investigaciones Científicas

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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 disciplines.

COMPLEX SYSTEMS:
STATISTICAL AND NONLINEAR PHYSICS

Quantum physics: photons, electrons and information

Nonlinear optics and dynamics of Optoelectronic devices

Fluid dynamics, biofluids, and Geophysical fluids

Biological physics and nonlinear phenomena in ecology and physiology

Dynamics and collective phenomena of social systems

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 two IBM iDataplex clusters, one of them part of the Grid-CSIC initiative to promote e-science, that at the end of 2012 had 576 and 544 computational cores respectively. Other computational tools at IFISC include several servers and a fully integrated network consisting on about 50 desktops and a similar number of laptops.

ELECTRONICS LAB

The Nonlinear Electronics Lab focuses on the application of nonlinear dynamics to a variety of topics including synchronization of chaotic systems and information processing based on delay-coupled dynamical systems. The Nonlinear Electronics Lab currently offers a diversity of circuits for the demonstration of chaos and bifurcation phenomena (including Chua, Mackey-Glass and Rössler oscillators), chaos synchronization, and the study of networks with delay-coupled nonlinear elements for information processing.

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 flows 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.

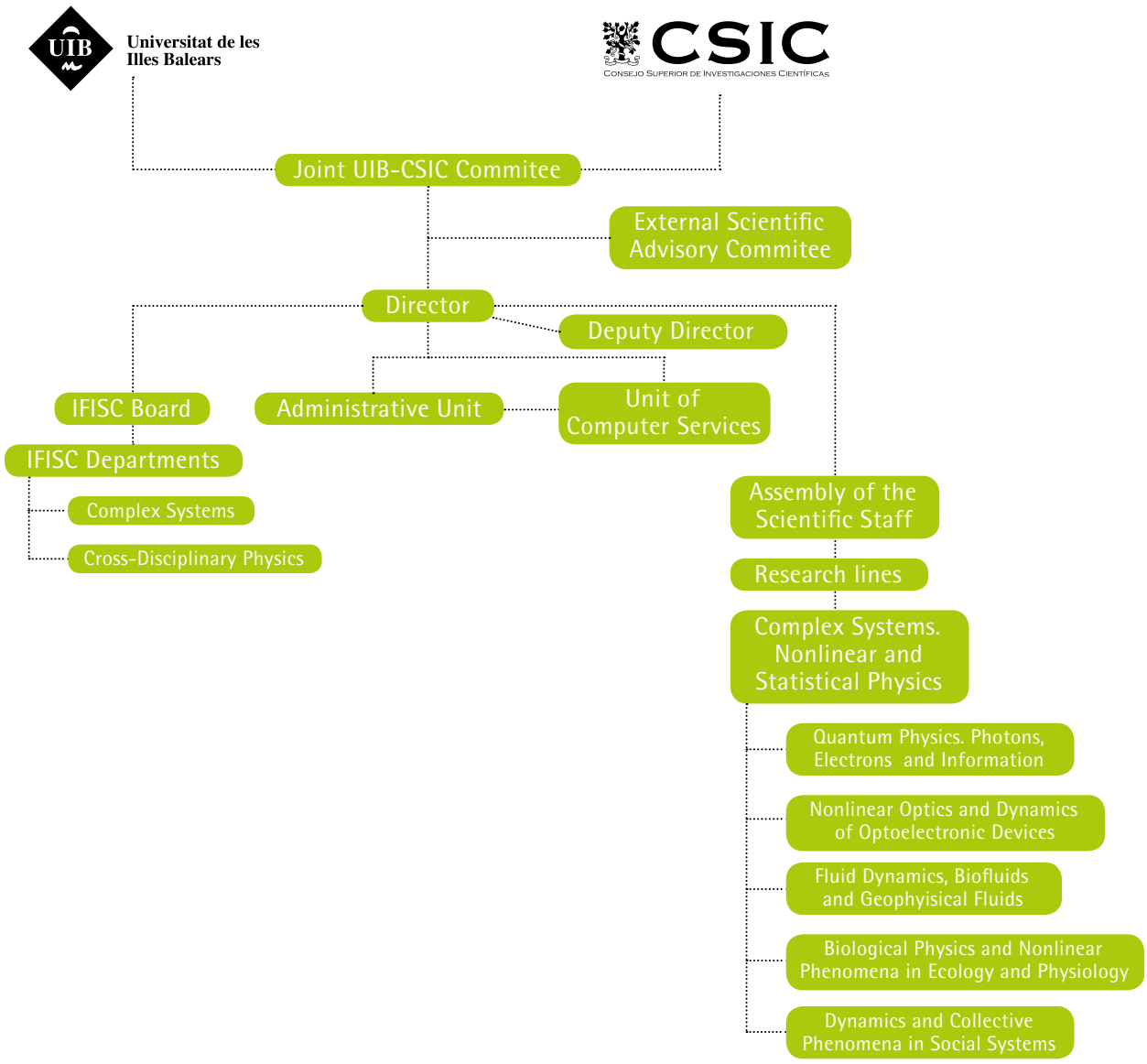
Biological physics and nonlinear phenomena in ecology and physiology

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, 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 under study. New emphasis is on data driven research on socio-technical systems, including the impact of ICT, and in particular online social networks.

1.2 STRUCTURE CHART



1.3 SOME REPRESENTATIVE RESEARCH RESULTS OF 2012

In the following we summarize some research results published during 2012. They are representative of the different research lines and thus illustrate the range of topics studied at IFISC

Synchronization in Simple Network Motifs with Negligible Correlation and Mutual Information Measures

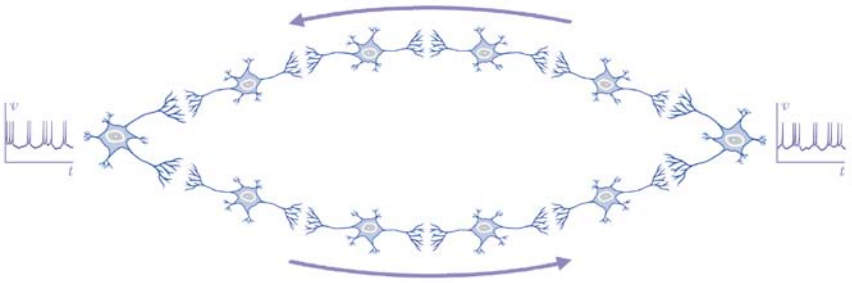
Physical Review Letters 108, 134101

In this manuscript, we addressed two fundamental and far-reaching questions in the field of delay-coupled oscillators: Can different or even identical coupled oscillators be completely uncorrelated and still be synchronized? What can be concluded from the absence of correlations or even mutual information in networks of dynamical elements about their connectivity? We showed that for realistic configurations of coupled dynamical elements negligible correlation or mutual information was observed, although the elements were synchronized and completely determined each other's behaviors.

The dynamics of coupled systems has been extensively studied in biological networks, lasers, neural networks and many other self-organizing systems. One of the key ingredients in many of these studies is the network topology in which the dynamical elements are embedded. In real-world systems, however, the underlying network topology is often unknown, and only measured time series of a subset of elements or of a mean field are available. Prominent examples are climate modeling, ecological modeling, and neuroscience, among others. In all these areas, correlation measures are being extensively used to deduce functional or, in some cases, effective connectivity.

We show, both numerically and experimentally, that under certain circumstances two elements that are connected via an uncorrelated signal can be synchronized in the generalized sense. Our results are not restricted to delay-coupled oscillators but are expected to be valid for any oscillator operating in the regime of consistency. Importantly, correlations and mutual information below the statistical limit, imposed by the finite number of data points, do not prevent identical synchronization from occurring between distant elements.

Our findings raise the question, whether and to what extent indirect network connections are being underestimated, since the related collective behavior and even synchronization are less likely to be detected.



A circular arrangement of neurons leading to synchronized firing

Fluctuation Relations for Spintronics

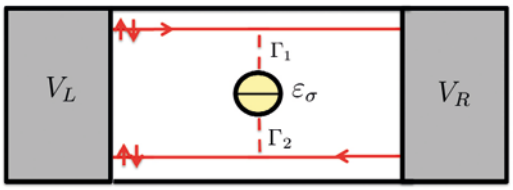
Physical Review Letters 108, 246603

Spintronics is a cutting-edge research area in which the electronic spin degree of freedom plays a central role. Spintronics aims at extracting, manipulating and detecting spin-polarized currents using all-electrical setups. Key to this approach are spin-orbit interactions that occur naturally in asymmetric semiconductor heterostructures. In these systems, the spin-orbit strength, i.e., the coupling between the spins and the electric field, can be tuned externally. It is thus highly desirable to underpin the theoretical foundations of spin transport in semiconductor nanostructures under the influence of electric, magnetic fields and possibly coupled to ferromagnetic contacts.

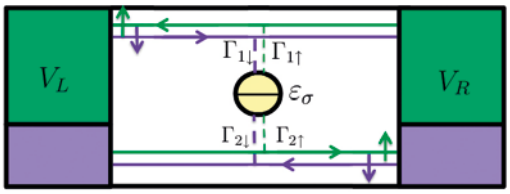
We have recently derived fluctuation relations that connect spin conductances and spin fluctuations out of equilibrium. Our results are valid even in the presence of arbitrary electron-electron interactions. Our derivation uses the microreversibility principle at equilibrium and special symmetries of the cumulant generating function. Importantly, we have found that local detailed balance is generally not fulfilled out of equilibrium. We illustrate our findings with a quasi-localized quantum level coupled to partially polarized helical edge states such as those occurring in topological insulators (see Figure).

Our results are important because they extend fluctuation-dissipation relations beyond equilibrium in spintronic devices. Thus, knowledge of lower-order current cumulants (spin noise susceptibility) can be used to infer the main properties of higher order response coefficients (spin-dependent differential conductance). Further developments might include time-dependent fields and nonzero frequency fluctuations.

A



B



Quantum Correlations and Mutual Synchronization

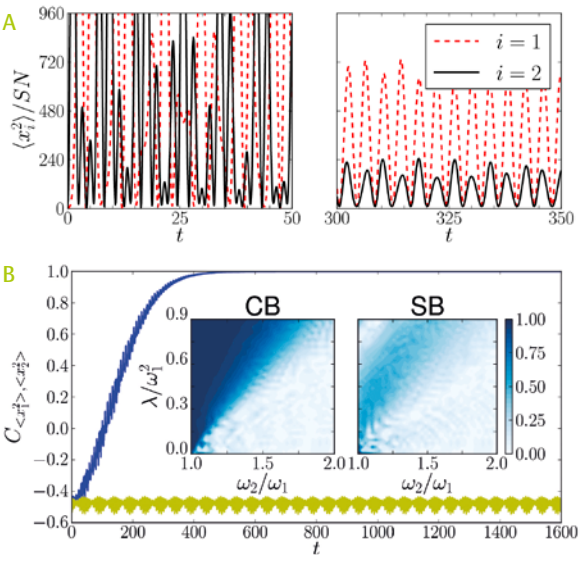
Physical Review A 85, 052101

We consider the phenomenon of mutual synchronization in a fundamental quantum system of two detuned quantum harmonic oscillators dissipating into the environment. We identify the conditions leading to this spontaneous phenomenon, showing that the ability of the system to synchronize is related to the existence of disparate decay rates and is accompanied by robust quantum discord and mutual information between the oscillators, preventing the leak of information from the system.

Synchronization phenomena have been observed in a broad range of physical, chemical, and biological systems under a variety of circumstances. In some instances synchronization (also known as entrainment in this context) is induced by the presence of an external forcing or driving that acts as a pacemaker; in others it appears spontaneously as a consequence of the interaction between the elements. The latter case is the most relevant in the context of complex systems since it appears as an emergent collective phenomenon that takes place despite the natural differences between the elements.

Synchronization has been extensively studied in classical non-linear systems. In the quantum world, however, nonlinearity present methodological difficulties preventing a full insightful treatment. In this work we have taken a first step toward the characterization of this phenomenon in the quantum regime, showing that it is possible to find it even in a linear system during the transient dynamics when dissipation takes place appropriately. We find that synchronization happens in the presence of a common bath due to a separation be-tween dissipation rates, leading to a surviving eigenmode whose frequency governs the dynamics.

We also show that quantum correlations are preserved due to this least dissipative eigenmode. Therefore in the quantum regime, synchronization between quantum harmonic oscillators is accompanied by robust quantum correlations.



A. Synchronization of position quadratures after a transient.
B. Synchronization indicator for common (separate) heat baths

Insets show the dependence on frequencies/coupling.

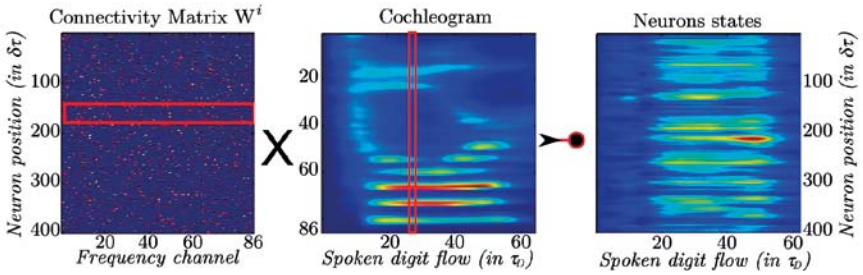
Photonic Information Processing Beyond Turing: An Optoelectronic Implementation of Reservoir Computing

Optics Express 20, 3241-3249

Many information-processing challenges are difficult to solve with traditional Turing or Von Neumann approaches. Implementing unconventional computational methods is therefore essential and optics provides promising opportunities. In this manuscript we experimentally demonstrated optical information processing using a nonlinear optoelectronic oscillator subject to delayed feedback. We implemented a neuro-inspired concept, called Reservoir Computing, proven to possess universal computational capabilities. By exploiting the transient response of a complex dynamical system to an input data stream, we achieved competitive processing figures of merit for spoken digit recognition and time series prediction tasks.

As highlighted in the 'News and Views' article "OPTICAL COMPUTING: Photonic neural networks", by D. Woods and T. J. Naughton, April 2012 issue of NATURE PHYSICS, our work provides new and interesting ways to solve computational problems using optical communications hardware. In addition, it stimulates further investigations into how nature does compute.

The work is related to the European FP7 Project 'Phocus' which was coordinated by IFISC.



Injection of a spoken digit into the delay-based reservoir showing the input connectivity matrix (left), a Cochleagram of a spoken digit (middle) and the resulting input data of the reservoir network (right). In the connectivity matrix the color code represents the magnitude of the input scaling factors, in the Cochleagram and in the Network input data the color encodes the amplitudes of the signals, with red (blue) corresponding to large (small) values

Logical operations with localized structures

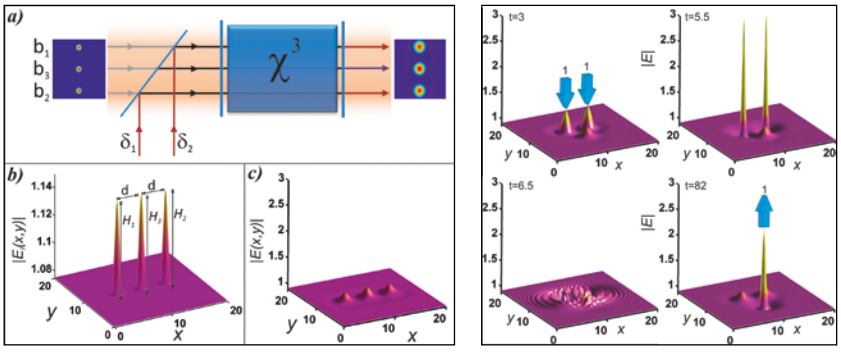
New Journal of Physics 14, 013040

This paper contains a proof of concept of the possibility of computing through excitable localized structures. It does so by building three logical gates (OR, AND & NOT) that provide full logical functionality.

The human brain is a computing device capable of solving very complex tasks in a much more efficient that an electronic computer, that excels in numerical calculation and fast retrieval of information. The human brain does so despite the relatively slow function of its elementary units, neurons, when compared to electronic transistors, because it is able to combine information in a very efficient way performing a very large number of operations in parallel, while electronic computers are based on von Neumann's serial design. Interestingly, neurons perform computations through excitability, a mechanism that leads to all or none responses to external perturbations, e.g. inputs of information to be processed, with respect to a threshold value.

Several alternative methods for handling information have been proposed, including the optical storage of information by means of localized structures, i.e. high intensity spots, in nonlinear optical systems, also known as cavity solitons in this context. Within this scheme, the presence of a spot represents a 1, and conversely for a 0. This technique has the advantage that it could be performed at optical speeds, which exceed electronic devices.

Here we show that, beyond storage, localized structures in optical cavities can be used to perform universal logical operations. To do that we leverage an excitable regime we found in these structures in previous work [PRL **94**, 063905 (2005)]. We show that logical gates can be built by pinning these excitable structures at suitable positions in the plane transverse to optical propagation. Two of the pinning points act as input ports while the third one, located in the middle, acts as the output port of the logical gate. The idea behind the operation of the gate is that an excitable excursion at the input ports can trigger an excitable excursion at the output one. For an AND gate the location and the pinning strength is chosen such that both input posts must be excited in order to trigger an output excitable excursion while for an OR gate it is enough to have just one input port activated. A NOT gate can be also designed with a slightly different scheme which involves a regime of localized structures with oscillatory amplitude. One of the advantages of the proposal is the possibility of combining a large number of gates in the transverse plane so that many operations can be performed in parallel, mimicking the brain high parallelism. Besides, the optical logical gates proposed here are easily reconfigurable by moving the location of the pinning spots (or changing the pinning strength) and allow for the concatenation of several logical operations.



Left: Setup. Right: AND logical gate

The Diverse Effects of Mechanical Loading on Active Hair Bundles

PNAS 109, 1943–1948

The ear has extraordinary capabilities, it is amazingly sensible over an impressive range of sound volumes and frequencies. This ability is due to a highly non-linear behavior of specialized receptor cells inside the ear called hair-cells which act as the ear's miniature amplifiers. This interdisciplinary study shows how hair-cells are affected by the environment inside the ear.

Receptor cells in each sensory system convert different types of energy into an electrochemical nerve impulse which can be processed by the brain. In the case of hearing this transduction is performed by the hair cells. These receptor cells are responsible for the conversion of mechanical movements (air's vibrations) into an electrical signal (see Fig 1). The hair cell's mechano-electrical transduction process is highly non-linear and has been experimentally characterized only during the last few years. Hair cells must amplify the incoming (mechanical) signal in order to distinguish it form background noise. This amplification process results in the exquisite capabilities of the auditory system. Consequently, it can be said that the hair cells are the nonlinear building-blocks of the ear.

In the last few years a small number of mathematical models have been proposed that describe the transduction process occurring in the hair-cells. Those models are rather complicated and include many parameters with poorly known values. Moreover, the analysis of those models has relayed only on numerical simulations. In this work we characterize the dynamics of these models and show that they are all topologically equivalent. We also propose a simpler mathematical model describing the dynamics of the hair-cells. This minimal model arises form a simplified description of the main biophysical processes taking place inside the hair-cell bundles. In this publication we showed that the dynamics of the minimal model can be treated analytically to a large degree and that it is very rich. Furthermore, the dynamics of the minimal model is topologically equivalent to the other, more complex, models.

We augment the minimal model to explore how the mechanical environment can regulate a bundle's innate behavior and response to input. We find that an unloaded hair bundle can behave very differently from one subjected to a mechanical load. Depending on how it is loaded, a hair bundle can function as a switch, active oscillator, quiescent resonator, or low-pass filter. Moreover, a bundle displays a sharply tuned, nonlinear, and sensitive response for some loading conditions and an untuned or weakly tuned, linear, and insensitive response under other circumstances. Our simple characterization of active hair-bundle motility explains qualitatively most of the observed features of bundle motion from different organs and organisms.

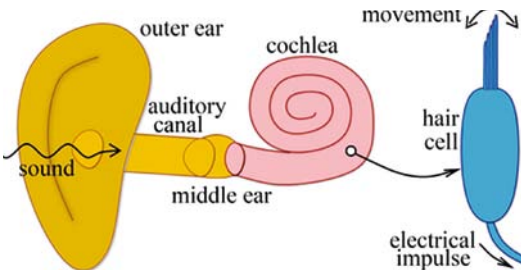
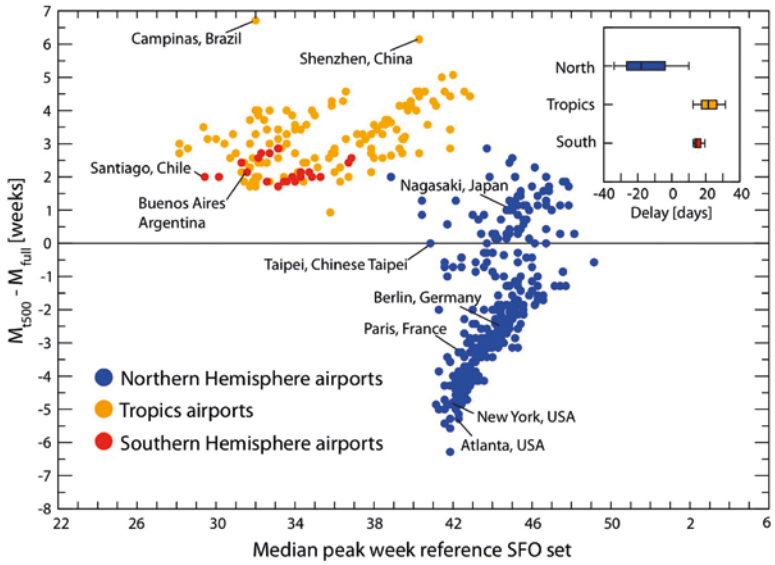


FIG. 1. Schematic view of the location of the hair cells in the inner ear and the mechano-electrical transduction process.

Real-Time Numerical Forecasts of Global Epidemic Spreading: The Impact of Network Sampling

BMC Medicine 10, 165

Mathematical and computational models for infectious diseases are increasingly used to support public-health decisions. Their capacity to forecast disease arrival times, number of cases or even the quantities of drugs or beds needed to treat patients could suppose a major leap forward for doctors and health-system managers. However, the reliability of these methods to offer good quality predictions must be proven before policies can be based on them. Data gathered for the 2009 H1N1 influenza crisis represent an unprecedented opportunity to validate real-time model predictions and define the main success criteria for different approaches. We used the Global Epidemic and Mobility Model to generate stochastic simulations of epidemic spread worldwide, yielding (among other measures) the incidence and seeding events at a daily resolution for 3,362 subpopulations in 220 countries. Using a Monte Carlo Maximum Likelihood analysis, the model provided an estimate of the seasonal transmission potential through the Monte Carlo likelihood analysis and generated ensemble forecasts for the activity peaks in the northern hemisphere in the fall/winter wave. These results were validated against the real-life surveillance data collected in 48 countries, and their robustness assessed by focusing on 1) the peak timing of the pandemic; 2) the level of spatial resolution allowed by the model; and 3) the clinical attack rate and the effectiveness of the vaccine. In addition, we studied the effect of data incompleteness on the prediction reliability. Real-time predictions of the peak timing are found to be in good agreement with the empirical data, showing strong robustness to data that may not be accessible in real time (such as pre-exposure immunity and adherence to vaccination campaigns), but that affect the predictions for the attack rates. The model also allows us to assess the level of information about mobility required to produce high quality predictions. In the figure, the predicted peak time for the influenza pandemic is compared between the SFO (complete model) and a model containing information only for the 500 most trafficked airports (t500).



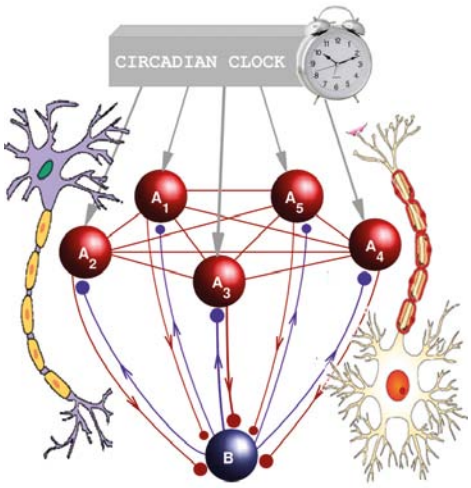
Diversity and Noise Effects in a Model of Homeostatic Regulation of the Sleep-Wake Cycle

PLoS Computational Biology 8: e1002650

The sleep-wake cycle in humans and other animals is regulated by different patterns of activity of neurons in the brain, acting in consonance with the so-called circadian clock which is a group of neurons in the hypothalamus that provides the basic daily rhythm to our organism, and strongly influenced by the light and dark stimuli provided by the terrestrial day-night cycle.

Neurotransmitters Orexin and Glutamate are two of the substances segregated by the neurons and that mediate the chemical communication between them. In particular, recent work has identified the slow accumulation and release of orexin as one of the main factors leading to the succession of wake and sleep states in the brain. Neurons are however distinct in shape, size and other properties, and a classical problem in neurophysiology is to understand the appearance of well-defined and precise rhythms arising from the coordination of a large number of neurons which are different and then will tend to produce different periodicities if not acting together.

In this work we model mathematically the electrical oscillations of orexin- and glutamate-producing neurons, coupled in different ways and taking into account heterogeneity in their activation parameters. We find that, rather than disturbing the establishment of the 24 hour wake-sleep cycle, a moderate amount of neuron diversity helps to sustain and make robust this rhythm. A phenomenon called *diversity-induced resonance* makes the system of different neurons more ready to follow the external circadian day-night cycle than in the case in which all neurons are exactly equal.



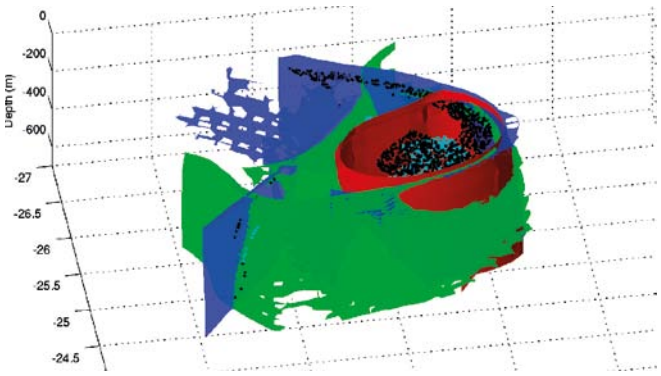
Oceanic three-dimensional Lagrangian Coherent Structures

Ocean Modelling 51, 73-83

Mixing and transport processes are fundamental to the physical, chemical and biological properties of the oceans, from plankton dynamics to the forecasting of the dispersion of pollutant spills. A very useful way to study these processes is through the characterization of the *Lagrangian Coherent Structures* (LCS). These structures are templates for the flow dynamics, acting as separatrices that divide the flow in regions with different dynamical behaviour. They provide a global geometric view of the flow, and give information on the existence of barriers and avenues to the transport of substances. They may correspond to persistent structures like eddies, fronts, jets or filaments.

Up to now the study of the LCS has been mainly restricted to the marine surface, but it is relevant to consider the full three-dimensional structure, that is, the vertical velocities in the ocean. In particular, in the so-called upwelling regions, which are the most biologically active marine zones in the world, vertical velocities are crucial in order to transport cold deep rich-in-nutrient waters, to the upper euphotic layers where plankton lives. Another example of locations where there are significant vertical processes is provided by mesoscale eddy boundaries that produce submesoscale structures via frontogenesis.

In our work we have addressed the study of three dimensional LCS in the Benguela (southwest African coast) upwelling region. For this we have computed finite-size Lyapunov exponents from the output velocity field of the regional ocean modeling system (ROMS). LCS show a curtain-like geometry in which the strongest attracting and repelling structures appear as quasivertical surfaces. In adition, we observe that the average stirring generally decreases with depth, showing a local maximum at a depth of approximately 100 meters. We have also analyzed a prominent cyclonic eddy that was pinched off from the upwelling front, and studied its filamention dynamics in three dimensions. The LCSs were observed to provide pathways and barriers organizing the processes and geometry of transport into and out of the eddy, extending up to a depth of about 600 meters.



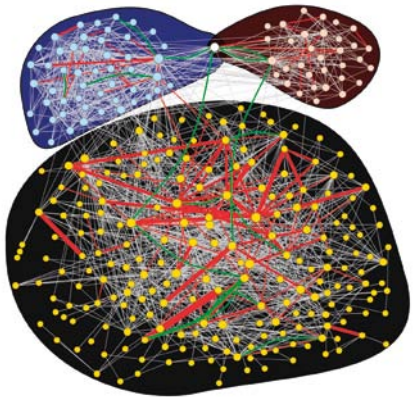
What is happening in Twitter? The strength of intermediary ties in online social media

PLoS ONE 7, e29358

Online social networks are becoming prevalent vehicles worldwide for social interactions and information diffusion. The major role played recently by sites such as Facebook or Twitter for the coordination of the popular revolts in the Arabic Spring shows the potential of these tools to facilitate and boost social activity.

Despite the spread of online social networks, the mechanisms ruling the interactions between users, the relation between network structure and users' activity, and their differences or similarities with the traditional offline social networks are not yet well understood. On the one hand, the existence of users with millions of contacts seems to downgrade the social importance of online interactions. On the other hand, the capability of these networks to put in contact close friends seems to argue in their favor. In this work, we face these issues by using a complex science approach to Twitter. We identify social groups in the follower network of Twitter using several clustering techniques. We show that the most personal public interactions between users, commonly known as replies and mentions, occur most likely as internal communications inside groups, or across groups that share a large fraction of connections. The activity associated with the propagation of information, the so-called retweets, shows a preference for concentrating on connections joining different groups or even more likely across links involving users that act as intermediaries between groups. This makes intermediary users, i.e., those belonging to more than one group, the most important users for the propagation of information. Our results build on the relationship between the functionality and structure of online social groups and are in accordance with the theory known as the *strength of the weak ties*, which is considered the paradigm that explains the functionality of offline social networks. This agreement emphasizes the fact that despite the peculiarities of online networks (e.g., Twitter, with some celebrities congregating thousands or even millions of connections), the activity follows similar principles (from the groups' perspective) to offline social networks.

The figure shows a small part of Twitter's follower network. We present three social groups detected by a clustering algorithm. Users are marked as circles of a color depending on the group they belong to. Gray links correspond to the follower relations, red links to the replies and mentions, and green links to the retweets. Red links tend to be inside groups, while green links happen also between groups. The user that is marked with the white color belongs to both blue and brown groups, and she attracts several retweets. This is a characteristic feature for users having such intermediary position in the network.

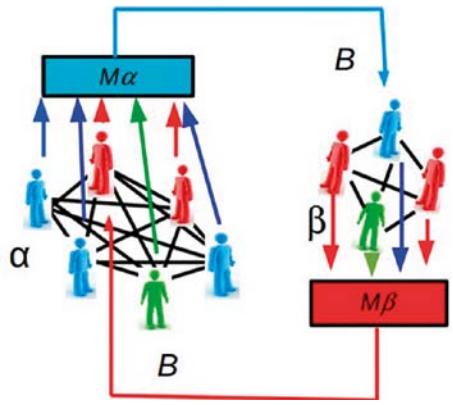


Cross-Cultural Reciprocal Interactions through Mass Media

PLoS ONE 7, e51035

An important issue in the problem of opinion formation is the competition between collective self-organization (a spontaneous process mostly driven by local interactions) and the effect of mass-media or propaganda messages (imposed organization in the form of a global coupling). Past nontrivial results about this problem show that strong messages do not homogenize, but rather produce social polarization, and also that social interactions can lead to a social consensus different from the external message provided there are long range links in the social network of interactions *(J.C. González-Avella et al., New J. Phys. 12, 013010 (2010)).* In this work we investigate the problem of cross-cultural interactions through mass media, a question motivated by the fact that different groups that may have had little direct contact with each other can today, however, have access to their reciprocal mass media messages. An example is the development in India of American values, norms and stereotypes about America through the experience of watching American television series, together with the influence of Indian movies in the US.

Our system consists of two populations of social agents whose dynamics is described by Axelrod's model of cultural dissemination, mutually coupled through global interactions. The global interactions act as fields that can be interpreted as mass media. The mass media content reaching one population corresponds to the statistical mode or cultural trend originated in the other population, and viceversa. We observe nontrivial collective behaviors, such as the emergence of a largest minority group in a population, sharing a state different from that of the applied global field, and the occurrence of localized ordered states. In this last case, one population reaches a common cultural state while several states coexist on the other population. This situation can be considered as a social analogue to the chimera state recently reported in globally coupled populations of oscillators.



Representation of two populations α and β interacting through their reciprocal global fields $\mathbf{M}_\alpha$ and $\mathbf{M}_\beta$, each acting with intensity B.

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
CRISTOBAL 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
LLORENÇ SERRA	University Professor UIB
TOMÀS SINTES	University Professor UIB
RAÚL TORAL	University Full Professor UIB
ROBERTA ZAMBRINI	CSIC Tenured Scientist

Contribution of the permanent staff to the IFISC research lines:

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 one line of research. The following table summarizes the participation of the senior researchers in the different lines during 2012.

	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	Llorenç Serra	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
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
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			X	





2.2 POSTDOCTORAL RESEARCH ASSOCIATES

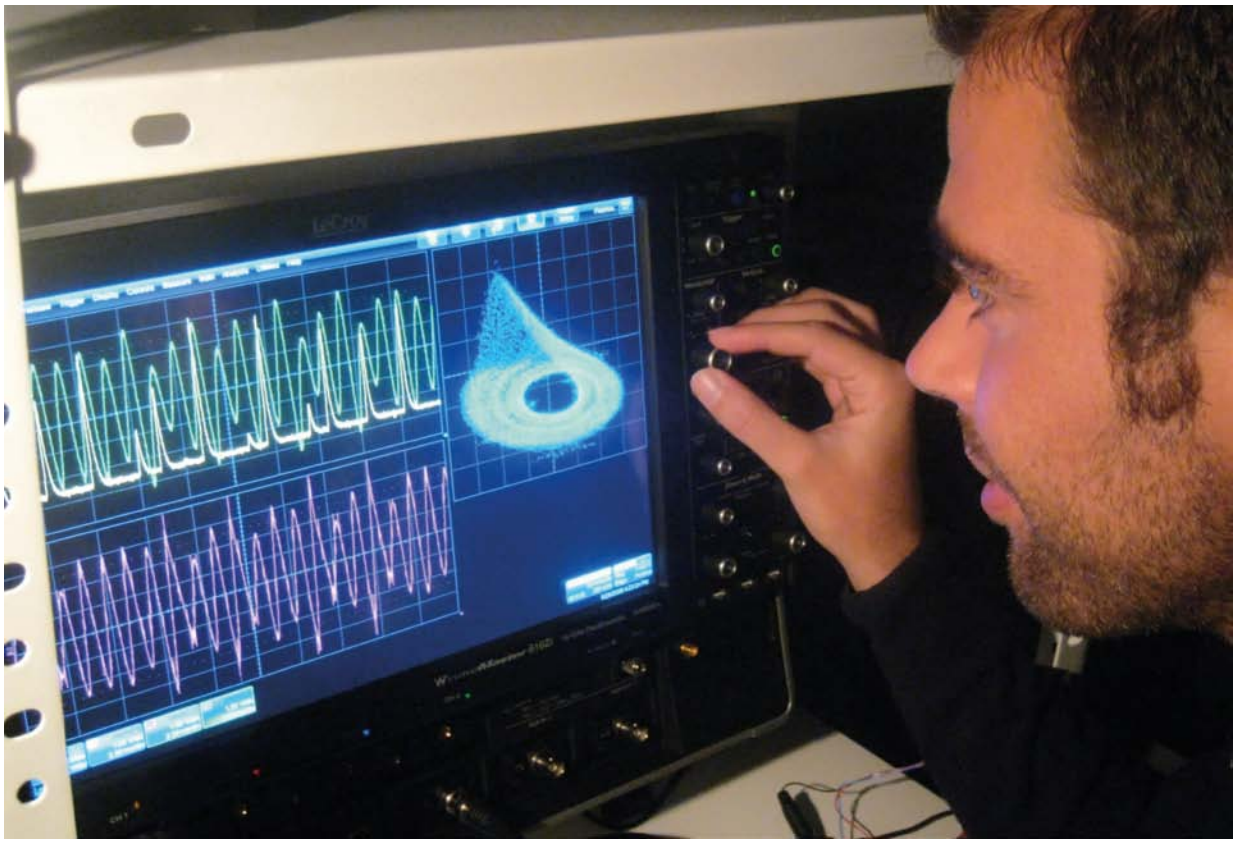
DANIEL BRUNNER	Marie Curie Contract
JUAN JOSÉ CERDÀ	UIB lecturer
MARINA DIAKONOVA	Postdoctoral Contract Project FISICOS
VALENTIN FLUNKERT	German Academic Exchange Service Fellowship
FERNANDO GALVE CONDE	JAE-CSIC Postdoctoral Contract
THOMAS JÜNGLING	Postdoctoral Contract Project FISICOS
HIDEYUKI KATO	Japanese Government Fellowship
ERNESTO M. NICOLA	JAE-CSIC Postdoctoral Contract
JONG SOO LIM	UIB Postdoctoral Contract
JOSÉ JAVIER RAMASCO	Ramon y Cajal Postdoctoral Contract
MIGUEL C. SORIANO	UIB lecturer
KRZYSZTOF SUCHECKI	Postdoctoral Contract Project FISICOS
PAULA TUZÓN	Postdoctoral Contract Project FISICOS
RUGGERO VASILE	Postdoctoral Contract Project FISICOS
DANIELE VILONE	Postdoctoral Contract Project FISICOS
JORDI ZAMORA MUNT	Postdoctoral Contract Project FISICOS

2.3 PHD STUDENTS

JOÃO BETTENCOURT	FCT Fellowship, Portugal
ADRIÁN CARRO PATIÑO	UIB Fellowship
MIGUEL A. ESCALONA-MORÁN	Fellowship Project PHOCUS
JUAN FERNÁNDEZ GRACIA	Govern Balear Fellowship
LUIS FERNÁNDEZ LAFUERZA	JAE-CSIC Fellowship
PABLO FLEURQUIN	Fellowship European Project COMPLEXWORLD
JUAN GARCÍA-PRIETO CUESTA	Internship: Intituto de Biotecnología de Madrid Fellowship
GERARDO GÓMEZ	FPI Fellowship, EVOCOG group
PRZEMYSLAW GRABOWICZ	JAE CSIC Fellowship
ISMAEL HERNÁNDEZ	FPI Fellowship Project FISICOS
KONSTANTIN HICKE	Govern Balear Fellowship
LEONARDO LYRA GOLLO	FPI Fellowship Project FISICOS
GONZALO MANZANO PAULE	Fellowship Project FISICOS
JADE MARTÍNEZ	Govern Balear Fellowship
RICARDO MARTÍNEZ	JAE-CSIC Fellowship
FERNANDA MATIAS	CNPQ Brasil Fellowship
NEUS OLIVER	JAE-CSIC Fellowship
PEDRO JOSÉ PARRA RIVAS	PIE-CSIC + FISICOS Project
ANTONIO PÉREZ SERRANO	Govern Balear Fellowship
XAVIER PORTE PARERA	FPI Fellowship Project DECODICA
VÍCTOR M. RODRÍGUEZ MENDEZ	Contract European LINC Project
ENRICO SER GIACOMI	Contract European LINC Project

2.4 TECHNICAL AND ADMINISTRATIVE SUPPORT

PEP CANYELLES PERICÀS	Lab Technician
INMA CARBONELL	Administration Unit Head
DANIEL PALOU VAN ENGELEN	Lab Technician
DAVID DE LA MONTAÑA GUTIÉRREZ	Computing Lab Technician
MARTA OZONAS	Secretary
ROSA MARÍA RODRÍGUEZ	Outreach
RUBÉN TOLOSA	Computing Lab Technician
MARIA ANTÒNIA TUGORES PONS	GridCSIC Technician
NEUS VERDERA	Secretary replacement



2.5 VISITORS

LONG-TERM VISITORS (more than one month)

JOSÉ MANUEL GUTIÉRREZ LLORENTE	Universidad de Cantabria, España. April-July
ALEJANDRO HERRADA MEDERER	CMPG (Centre of Microbial and Plant Genetics) K.U. Leuven, Belgium. January-December
KONSTANTIN KLEMM	Bioinformatik, Universitat Leipzig, Germany. January-April
ARKADY PIKOVSKY	Department of Physics and Astronomy Potsdam University. March
FRANCESCO PLASTINA	Dipartimento di Fisica, Universita della Calabria Cosenza, Italy. June-July
ANGEL PLASTINO	Universidad Nacional de La Plata, Argentina. June-July
PEYMAN ZARRINEH	CMPG (Centre of Microbial and Plant Genetics) K.U. Leuven, Belgium. January-February





SHORT-TERM VISITORS (Less than one month)

SVEN ABERG	Lund University, Sweden. March
THORSTEN ACKEMANN	University, Glasgow, Scotland. March
LENNERT APPELTANT	Vrije Universiteit, Brussels, Belgium. July
IÑIGO ARTUNDO	VLC Photonics, Valencia, Spain. April
ALAIN BARRAT	Centre de Physique Théorique, Marseille, France and ISI, Torino, Italy. September
MICHAEL BATTY	CASA, University College London, UK. October
CIRO CATTUTO	ISI, Torino, Italy . September
YANNE CHEMBO	Optics Department, FEMTO-ST Institute, Besançon, France. October
BERNAT COROMINAS	Universitat Pompeu Fabra, Barcelona, Spain. February
JAN DANCKAERT	Vrije Universiteit, Brussels, Belgium . July
OSCAR DELGADO	Universidad Carlos III, Madrid. October
OMJYOTI DUTTA	ICFO, Barcelona. November
JUAN GARCÍA	Centro de Tecnologias Biomédicas, Universidad Polltécnica de Madrid. April
GIANLUCA GIORGI	Universität des Saarlande, Germany. July and October
ANDREA GUAZZINI	Physics of Complex Systems Laboratory, Centre for the study of complex dynamics, Universita' di Firenze, Italy. March
FEDERICA HAUPT	Aachen University, Germany. March
SHLOMO HAVLIN	Bar-Ilan University, Ramat-Gan, Israel. September
JORDAN M. HOROWITZ	Universidad Complutense, Madrid. July
MIGUEL HOYUELOS	Universidad de Mar del Plata, Argentina. September
BERNARDO HUBERMAN	Hewlett-Packard Labs, Palo Alto, CA, USA. May
ADRIAN JACOBO	Rockefeller University, NY, USA. March
MINCHUL LEE	Kyung Hee University, College of Applied Science, Department of Applied Physics, Korea. July
HAYDEE LUGO	Dept. de Fundamentos del Análisis Económico, Universidad Complutense de Madrid . June
DANIEL LÜSEBRINK	Forschungszentrum Jülich, Germany. September
ANDREI MANOLESCU	Reykjavik University, Iceland. May
NAOKI MASUDA	The University of Tokyo, Japan. March
AISSATOU MBOUSSI	Laboratory of Modelling and Simulation in Engineering and Biological Physics, Department of Physics, University of Yaoundé I, Cameroon. March
MICHAEL MOSKALETS	Kharkiv Polytechnic Institute, Kharkiv, Ukraine. March and July
SILVIA ORTIN	Instituto de Física de Cantabria, Universidad de Cantabria, Santander. March
JUAN M. R. PARRONDO	Universidad Complutense de Madrid . July
DIEGO PAZÓ	IFCA (CSIC-UC) Santander. March
GONZALO DE POLAVIEJA	Instituto Cajal, Madrid. October
CHIARA POLETTO	Inserm, Ins. National de la Sante, Paris, France. October
FILIPPO RADICCHI	Universitat Rovira i Virgili, Tarragona. May
JUAN MARTIN RANDANZZO	Centro Atómico Bariloche y CONICET, Argentina. October
ANXO SÁNCHEZ	Universidad Carlos III de Madrid, Spain. February
THOMAS SCHÄPERS	Peter Grünberg Institute (PGI-9), Forschungszentrum Jülich, Germany and Physikalisches Institut A, RWTH Aachen University, Germany. June
LUTZ SCHIMANSKY-GEIER	Humboldt Universität, Berlin, Germany. April
CHRISTOPHE SCHINCKUS	University of Leicester, London School of Economics, UK. June
ECKHARD SCHÖLL	Institute for Theoretical Physics, TU Berlin, Germany. June
CHRIS VAN DEN BROECK	Hasselt University, Belgium. February
DAVID VAN DEN VIJVER	Erasmus Medical Center, Rotterdam, Netherlands. February

2.6 MASTER AND COLLABORATION STUDENTS

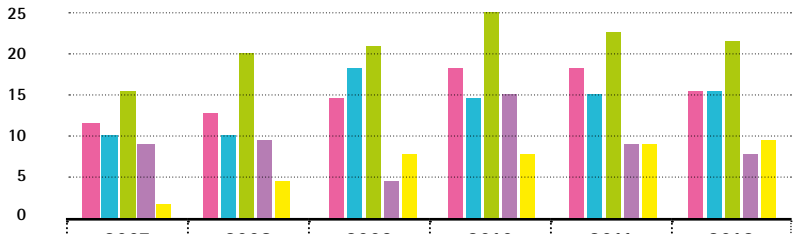
In addition to the IFISC personnel, Master and Collaboration students have been also involved in IFISC research:

MARC ALOMAR
MARIA ISABEL ALOMAR BENNASSAR
ANTONIO BOSCH TERRASSA
JULIÁN BUENO MORAGUES
PAU GISPERT VICTORY
JAVIER HERNÁNDEZ
SIMONE LORETI
BEATRIZ MATO MORA
JAVIER OSCA COTARELO
AQUILINA PÉREZ SIERRA
JUAN SITGES RIERA

2.7 SUMMARY OF IFISC HUMAN RESOURCES

HUMAN RESOURCES IFISC 2012

	Total	Male	Female
Permanent staff	16	13	3
Postdoctoral fellows	16	14	2
PhD students	22	19	3
Long-term visitors	7	7	0
Support personnel	9	4	5
Total	70	57	13



	2007	2008	2009	2010	2011	2012
Permanent Staff	12	13	14	17	17	16
Postdoctoral Fellows	10	10	17	14	15	16
PHD Students	16	20	22	25	23	22
Long Term Visitors	8	9	4	15	8	7
Support Personnel	2	4	7	7	8	9
Total	48	56	64	78	71	70

VISITING SCIENTISTS AT IFISC 2007-2012

	Shorts visits	Long visits	Total visits
Spain	79	2	81
Europe	136	25	161
Rest of the world	53	24	77
Total	268	51	319

3

RESEARCH PROJECTS AND FUNDING

DURING 2012 IFISC HAS RECEIVED FUNDING VIA THE ACTIVE RESEARCH PROJECTS LISTED BELOW. IN BRIEF:

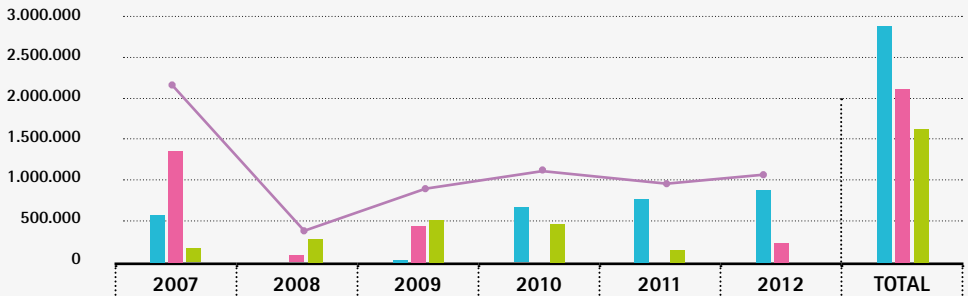
- European Commission Framework Program projects: **9**
- Spanish National Plan: **4**
- Regional Balear Government: **2**

SUMMING UP THE BUDGET OF THE ACTIVE PROJECTS IN 2012 WE GET:

- Grand total budget of active projects in 2012: **4.200.442 €**
- Grand total budget of European Commission active projects in 2012: **2.228.669 €**
- Budget of EC-funded active projects in 2012: **53,06** % of total

BUDGET FIGURES FOR THE PERIOD 2007-2012 ARE SUMMARIZED IN THIS TABLE (WITH BUDGET OF A PROJECT ASSIGNED TO THE YEAR IT IS GRANTED):

BUDGET IFISC'S RESEARCH PROJECTS 2007-2012 (IN €)



	2007	2008	2009	2010	2011	2012	TOTAL
European Commission	588.396	0	53.000	635.489	789.228	803.952	2.870.065
Spanish National Plan for Science	1.377.330	92.890	415.952	0	0	261.360	2.147.532
Other Funding	161.630	274.280	500.625	470.279	188.700	0	1.595.514
Total	2.127.356	367.170	969.577	1.105.768	977.928	1.065.312	6.613.111

3.1 RESEARCH PROJECTS FUNDED BY THE EUROPEAN COMISSION

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.
IFISC Principal Investigators: Claudio Mirasso (UIB) and Ingo Fischer (CSIC).
(2010-2012).
UIB Budget: 305.261 €.
CSIC Budget: 330.228 €.

LINC

LEARNING ABOUT INTERACTING NETWORKS IN CLIMATE

[FP7-PEOPLE-2011-Marie Curie Initial training Network (ITN), PITN-GA-2011-289447] European Commission.
IFISC Principal Investigator: Emilio Hernández-García
(2011-2015)
Budget: 502.162 €.

NANOCTM

NANOELECTRONICS: CONCEPTS, THEORY AND MODELING

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

NOVALIS

A NOVEL ARCHITECTURE FOR A PHOTONICS LIQUID STATE MACHINE.

[275840] Marie Curie Intra-European Fellowships for career development.
European Commission.
Principal Investigator: Daniel Brunner. (2011-2013)
Budget: 167.066 €.

PhD ComplexWorld

ANALYSIS OF AIR TRANSPORTATION USING COMPLEX NETWORKS.

Subproject of SESAR. European Commission-SESAR Joint Undertaking-Eurocontrol.
Contract 10-220210-C4.
Principal Investigator: Maxi San Miguel. (2011-2015)
Budget: 120.000 €.

PhysCoCo

PHYSICS OF COMPETITION AND CONFLICTS.

[COST-MP0801] European COST ACTION
Coordinator: P. Richmond (Trinity, Dublin, Ireland).
IFISC 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).
IFISC Principal Investigator: Damià Gomila. (2008-2012)

EUNOIA

EVOLUTIVE USER-CENTRIC NETWORKS FOR INTRAURBAN ACCESSIBILITY.

[Number 318367- STREP].
Principal investigator and Euroepan Coordinator: Maxi San Miguel.
(2012-2014).
UIB Budget: 452.581 €.
CSIC Budget: 41.177 €.

LASAGNE

MULTI-LAYER SPATIOTEMPORAL GENERALIZED NETWORKS.

[FP7-ICT-2011-8. Proposal 318132].
IFISC Principal investigator: Maxi San Miguel. (2012-2015).
UIB Budget: 205.282 €.
CSIC Budget: 104.912 €.

3.2 RESEARCH PROJECTS OF THE SPANISH NATIONAL PLAN FOR SCIENCE

FISICOS

FISICA INTERDISCIPLINAR DE SISTEMAS COMPLEJOS

[FIS2007-60327]
Principal Investigator: Maxi San Miguel.
Deputy Principal Investigator: Raúl Toral.
(2007-2013)
Budget: 1.318.900 €.

DeCoDicA

DELAY-COUPLED DIODE LASERS FOR PHOTONIC APPLICATIONS.

[TEC2009-14101] MICINN.
Principal Investigator: Ingo Fischer.
(2009-2012)
Budget: 236.313 €.

TIQS

TRANSPORT AND INFORMATION IN QUANTUM SYSTEMS.

[FIS2011-23526].
Principal investigator: Llorenç Serra.
(2012-2014)
Budget: 183.920 €.

MODASS

MODELING AND ANALYSIS OF SOCIAL SYSTEMS.

[FIS2011-24785].
Principal investigator: Víctor M. Eguíluz.
(2012-2014)
Budget: 77.440 €.

Granted in 2012 to be started in 2013

TOWARDS BRAIN-INSPIRED EFFICIENT PHOTONIC INFORMATION PROCESSING.

[TEC2012-36335].
Principal investigator: Ingo Fischer.
(2013-2015)
Budget: 278.460 €.

COMPLEX SYSTEMS PHYSICS: INFORMATION, TECHNOLOGY, SOCIETY AND ECOLOGY.

[FIS2012-30634].
Principal investigator: Maxi San Miguel.
(2013-2015)
Budget: 498.420 €.

LAGRANGIAN COHERENT STRUCTURES IN THE OCEAN DYNAMICS

[CTM2012-39025-C02-01].
Principal investigator: Cristóbal López.
(2013-2015)
Budget: 157.950 €.

3.3 OTHER IFISC RESEARCH PROJECTS

NoLocal

EFECTOS DEL ACOPLAMIENTO NO-LOCAL EN SISTEMAS COMPLEJOS

Proyecto Intramural Especial. CSIC.
Principal Investigator: Damià Gomila
(2011-2012)
Budget: 25.000 €.

TurBiD

IMPACT OF TURBULENCE ON BIOLOGICAL DYNAMICS

Proyecto Intramural Especial. CSIC. [200450E644].
Principal Investigator: Emilio Hernández-García.
(2009-2012)

PIEModelizacion

MODELIZACIÓN COMPUTACIONAL EN SISTEMAS COMPLEJOS

[201050E119] Proyecto Intramural Especial. CSIC.
Principal Investigator: Pere Colet.
(2010-2013)

COQUSYS

COMPLEXITY AND QUANTUM SYSTEMS

[200450E566]. Proyecto Intramural Especial CSIC.
Principal Investigator: Maxi San Miguel.
(2009-2012)

3.4 RESEARCH PROJECTS WITH PARTICIPATION OF IFISC MEMBERS

RedFueraEq

RED ESPAÑOLA DE FISICA DE SISTEMAS FUERA DE EQUILIBRIO

FIS2010-11438-E Accion Complementaria. MICINN.
IFISC Coordinator: David Sánchez.
(2011-2012)

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 M. Eguíluz. (2010-2013)

3.5 OTHER FUNDING

GrupCompetitius FESC

GRUPO DE FISICA EXPERIMENTAL DE SISTEMAS COMPLEJOS

Govern Balear.
Principal Investigator: Ingo Fischer.
(2011-2014)
Budget: 36.000 €.

GrupCompetitius GFI

GRUPO DE FÍSICA INTERDISCIPLINAR

Govern Balear.
Principal Investigator: Maxi San Miguel
(2011-2014)
Budget: 36.000 €.

FISICOSPT

PROJECT TECHNICIAN

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

4

IFISC SEMINARS

4 IFISC SEMINARS

Coordinators:
Rosa López and Manuel Matías

Colloquia:
Ingo Fischer

DURING 2012 A TOTAL OF **55** SEMINARS HAVE BEEN GIVEN AT IFISC, INCLUDING THE FOLLOWING FOUR COLLOQUIA:

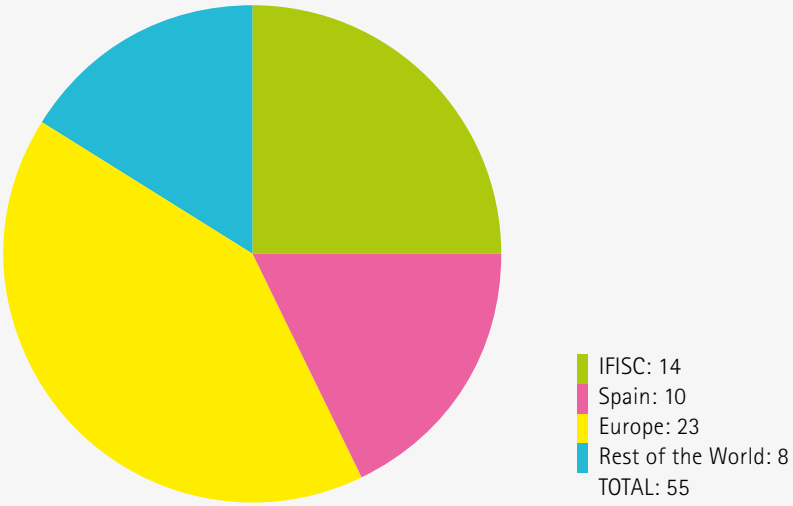
30-05-2012	SOCIAL MEDIA AND ATTENTION Bernardo Huberman, Hewlett-Packard Labs, Palo Alto, CA, USA
27-06-2012	ADAPTIVE CONTROL AND SYNCHRONIZATION IN DELAY-COUPLED COMPLEX NETWORKS Eckehard Schöll, Institute for Theoretical Physics, TU Berlin, Germany
12-09-2012	NEW DIRECTIONS IN NETWORK SCIENCE AND APPLICATIONS TO CLIMATE Shlomo Havlin, Bar-Ilan University, Ramat-Gan, Israel
11-10-2012	MODELLING DISRUPTION IN LARGE SCALE TRANSIT SYSTEMS Michael Batty, CASA, University College London, UK

This amounts to more than one seminar per week on average. The full listing can be found in http://ifisc.uib-csic.es/seminars/ and in the Appendix of this Report.

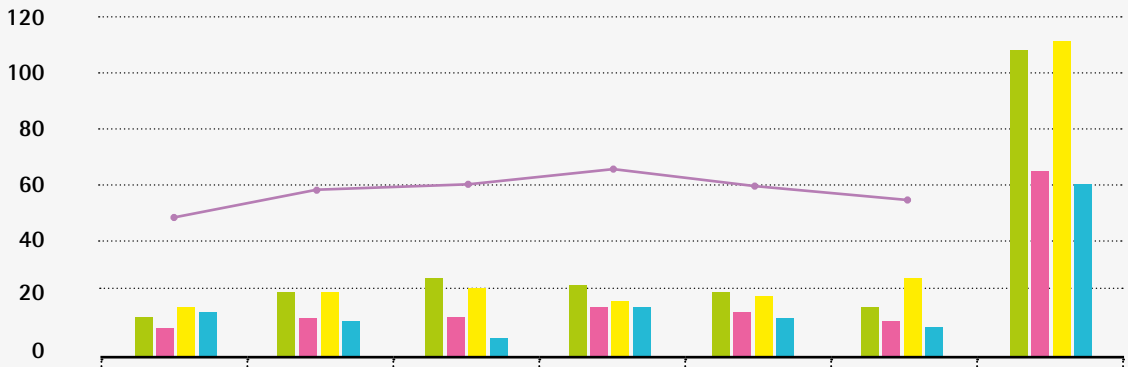
Seminars are broadcasted live and recorded.You can watch and retrieve them at http://ifisc.uib-csic.es/seminars/

The following graphs show the distribution of seminars by geographic procedence of the speaker for 2012 and for the previous years:

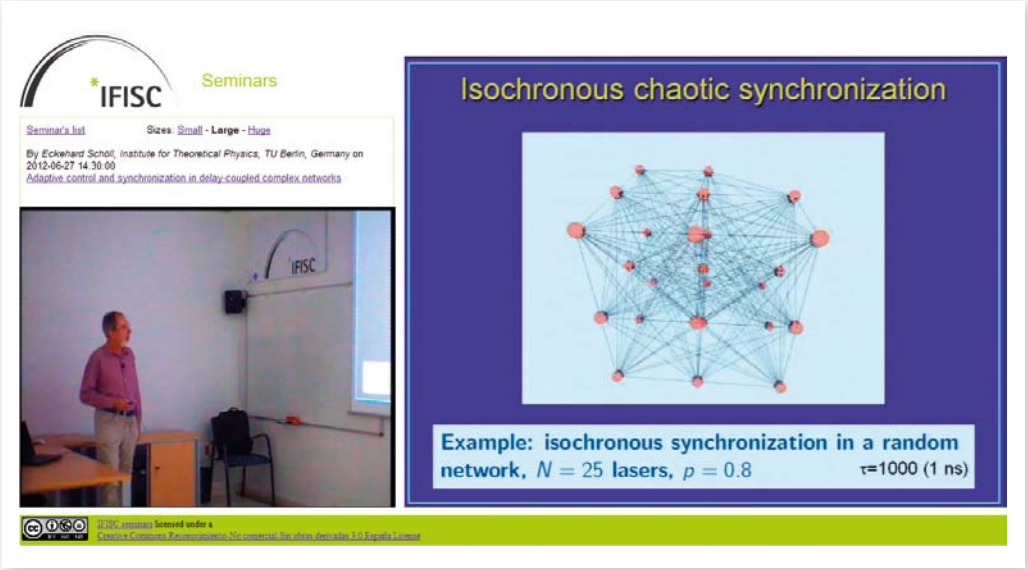
IFISC SEMINARS 2012



IFISC SEMINARS 2007-2012



	2007	2008	2009	2010	2011	2012	TOTAL
IFISC	12	19	23	21	19	14	108
Spain	7	11	12	14	13	10	67
Europe	16	19	20	16	17	23	111
Rest of the world	13	10	5	14	11	8	60
Total	48	59	60	65	60	55	347



5

PUBLICATIONS

5 PUBLICATIONS

IFISC RESEARCH RESULTS HAVE ORIGINATED THE FOLLOWING PUBLICATIONS DURING 2012:

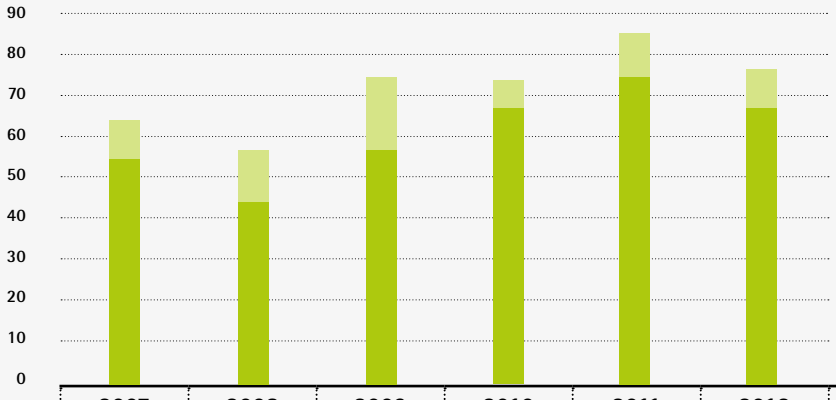
- Papers in journals indexed in the Journal Citation Reports: **66**
- Papers in other journals: **6**
- Book chapters: **6**

The following tables put these numbers in the context of the publication activity during the past years, and specify which are the main journals in which IFISC papers are published. It is a strategic compromise of IFISC to target cross-disciplinary research areas lying outside the domain of traditional physics. The success in this objective is highlighted in the tables by indicating the number of publications in *non-physics journals*.

With respect to publications in high impact journals, in the period 2007-2011 IFISC has published 2 papers in Science, 7 papers in PNAS, and 25 papers in Physical Review Letters

Full listing of publications and links to the full text are in http://ifisc.uib-csic.es/publications/ and in the Appendix of this Report.

IFISC PUBLICATIONS 2007-2012



	2007	2008	2009	2010	2011	2012	TOTAL
JCR Journals	53	42	56	64	72	66	335
Other Publications	9	14	18	7	12	12	72
Total	62	56	74	71	84	77	424

JOURNALS WITH THE LARGEST NUMBER OF PUBLICATIONS

IFISC PUBLICATIONS	2007	2008	2009	2010	2011	2012	TOTAL
Physical Review E	9	9	4	5	11	11	49
Physical Review A	3	5	7	4	4	3	26
Physical Review Letters	6	3	2	4	6	4	25
European Physical Journal	3	1	7	5	2	6	24
Physical Review B	4	1	2	5	5	2	19
IEEE	1	1	4	4	4	1	15
Physica A	4	0	1	3	3	3	14
Europhysics Letters	2	1	1	2	2	2	10
Non-Physics Journals (excluding IEEE Journals)	11	8	12	12	16	15	74

6

CONFERENCES AND WORSHOPS

Fises 12 – XVIII Congreso de Física Estadística

International Conference on Delayed Complex Systems DCS 2012

6.1 IFISC WORKSHOPS

2012 International Symposium on Nonlinear Theory and its Applications (Nolta 2012)

OCTOBER 23-26, 2012
IN HOTEL MELIA VICTORIA, PALMA DE MALLORCA, SPAIN.
SCIENTIFIC ORGANIZERS: CLAUDIO MIRASSO & INGO FISCHER.

NOLTA is an annual symposium promoted by the Research Society of Nonlinear Theory and its Applications of the IEICE (Japan) aimed to provide a forum for exchange of the latest results and applications of Nonlinear Science.

Fises'12 XVIII Congreso de Física Estadística

OCTOBER 18-20, 2012
IN PALMA DE MALLORCA, SPAIN.
SCIENTIFIC ORGANIZERS: THE FISES COMMITTEE.
LOCAL ORGANIZERS: P. COLET, E. HERNÁNDEZ-GARCÍA, M. MATÍAS AND R. TORAL (IFISC).

The aim of this 18th edition of FISES was to promote Statistical and Non Linear Physics in Spain and the scientific and academic exchange between the different groups that research in these disciplines.

International Conference on Delayed Complex Systems DCS 2012

JUNE 04-08, 2012
IN PALMA DE MALLORCA, SPAIN
SCIENTIFIC ORGANIZERS: ECKEHARD SCHÖLL
(TU BERLIN) AND INGO FISCHER (IFISC).

The aim of the conference was to address fundamental developments and state-of-the-art applications of delay differential equations in various scientific disciplines. In particular, it was intended to focus on nonlinear dynamical systems and complex net¬works with time delay occurring in physics, chemistry, biology, and neuroscience, where memory effects and finite signal propagation and processing times are important

Search and Stochastic Phenomena in Complex Physical and Biological Systems

MAY 28-JUNE 01, 2012
IN IFISC, CAMPUS UNIVERSITY OF THE BALEARIC ISLANDS,
PALMA DE MALLORCA, SPAIN.
SCIENTIFIC ORGANIZERS: RAÚL TORAL, HORACIO WIO, CARLOS MEJÍA.

Search processes play a fundamental role in physical, chemical and biological systems. Examples are diffusion-limited encounters of molecules involved in a chemical reaction; the search for a global minimum in a complex energy landscape; proteins searching for their specific target sites on DNA; dwell times in mechanochemical cycles of molecular motors; animal foraging; automated searches of registers in databases, or search engines exploring the Internet.

The aim of our exploratory workshop was to bring together leading scientists to discuss recent theoretical and experimental progress in studies of search processes, and to advance the synergies between the communities working in condensed matter and statistical physics, quantitative biology, and mathematics.

6.2 SCHOOLS

LINC First School. Learning about Interacting Networks in Climate

SEPTEMBER 10-12, 2012
IN IFISC, CAMPUS UNIVERSITY OF THE BALEARIC ISLANDS, PALMA DE MALLORCA, SPAIN.
SCIENTIFIC ORGANIZER: EMILIO HERNÁNDEZ-GARCÍA

IFISC organized for the first time the LINC School. This is a training event addressed to the fellows of the European Marie Curie Training Network LINC, but open also to external students. The School consisted of theoretical and practical courses on Network Theory, on Climate Science, and on Software Development.

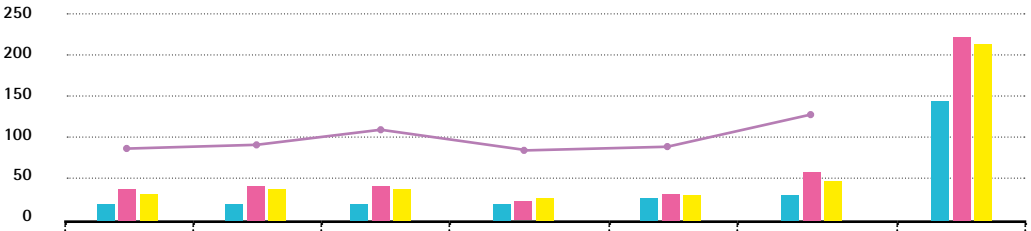
LINC First School. Learning about Interacting Networks in Climate

6.3 COMMUNICATIONS TO SCIENTIFIC CONFERENCES 2012

- Invited talks: **31**
- Oral Communications: **53**
- Posters: **48**
- Total: **132**

They are listed in the Appendix of this Report.

CONFERENCES AND WORKSHOPS 2007-2012



	2007	2008	2009	2010	2011	2012	TOTAL
Invited talks	22	21	20	22	25	31	141
Oral talks	35	37	45	28	32	53	230
Posters	29	35	42	32	31	48	217
Total	86	93	107	82	88	132	588

6.4 SCIENTIFIC COMMITTEES AND ORGANIZATION OF CONFERENCES AND WORKSHOPS

MAXI SAN MIGUEL
Member of the C3 Commission (Statistical Physics)
of the International Union on Pure and Applied Physics.
January 1-December 31

MAXI SAN MIGUEL
CODYM-ECCS2012: Cultural and Opinion Dynamics:
Modeling, Experiments and Challenges for the future.
Member of the program committee.
January 1- December 31

TORAL, RAÚL; MEJÍA-MONASTERIO, CARLOS; WIO, HORACIO
Conference on Search and Stochastic Phenomena
in Complex Physical and Biological Systems.
May 28-June 1

FISCHER, INGO; CORNELLES SORIANO, MIGUEL; FLUNKERT,
VALENTIN; MIRASSO, CLAUDIO
DCS 2012, International Conference on Delayed
Complex Systems, Palma de Mallorca, Spain.
June 4-8

MAXI SAN MIGUEL
Member of the Steering Committee of the European
Conference on Complex Systems.
July 1

HERNÁNDEZ-GARCÍA, EMILIO; LÓPEZ, CRISTÓBAL
Members of the organizing Committee of the 2nd International Workshop
on Nonlinear Processes in the Ocean and the Atmosphere, Madrid, Spain.
July 3-6

COLET, PERE
Second Gefenol Summer School on Physics of Complex and Small Systems.
Member of the program committee.
September 3-14

FISCHER, INGO
Information processing with recurrent dynamical systems:
theory and experiment.
ECCS'12 Satellite Meeting, Brussels, Belgium.
September 6

HERNÁNDEZ-GARCÍA, E.
LINC First School "Learning about Interacting Networks
in Climate".
September 10-12

FISCHER, INGO.
Cleo Focus meeting, Amsterdam, Netherlands.
September 16-20

MAXI SAN MIGUEL
EUNOIA kick-off meeting.
October 10-11

TORAL, R; COLET, P; HERNÁNDEZ-GARCÍA, E; MATÍAS, M
FISES 2012. Organization of the conference.
October 18-20

P. BIENSTMANN; D. BRUNNER; S. MASSAR; S. ORTÍN; H. TOUTOUNJI
Session on Unconventional Approaches to Computation.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

MIRASSO, CLAUDIO R.; FISCHER, INGO
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

MAXI SAN MIGUEL
LASAGNE Kick-off meeting, Palma de Mallorca, Spain.
November 24-25

7

OTHER ACTIVITIES

7 OTHER ACTIVITIES

7.1 MASTER THESIS

Dynamics of Semiconductor Lasers Subjected to Polarization Rotated Feedback and its Application to Fast Random Bit Generation

OLIVER, NEUS
SUPERVISORS: FISCHER, INGO; SORIANO, MIGUEL C.

7.2 PHD THESIS

Fluctuations in Interacting-Particle Systems: a Theoretical Study

LAFUERZA, LUIS F.
SUPERVISOR: RAUL TORAL

Dynamics and Synchronization of Motifs of Neuronal Populations in the Presence of Delayed interactions

GOLLO, LEONARDO LYRA
SUPERVISOR: CLAUDIO R. MIRASSO

Reservoir Computing Based On Delay-Dynamical Systems

APPELTANT, LENNERT
SUPERVISORS: FISCHER, INGO; DANCKAERT, JAN; VAN DER SANDE, GUY

7.3 AWARDS

Annual Research and Innovation Award of Onda Cero Mallorca. Awarded to IFISC

17/12/2012

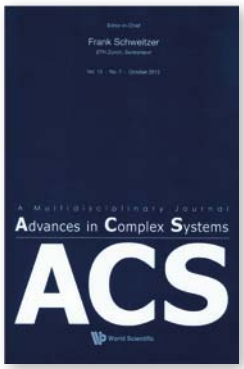
7.4 MEMBERS OF EDITORIAL BOARD OF SCIENTIFIC JOURNALS

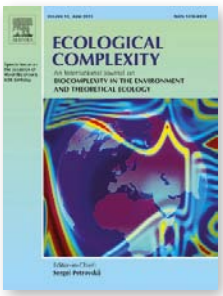
Associate Editor of *Advances in Complex Systems.*
EGUÍLUZ, VICTOR M.

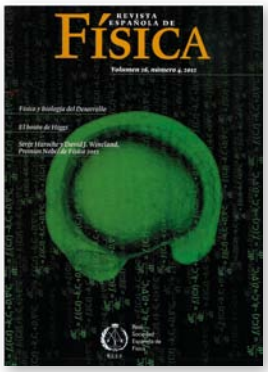
Subdirector of *Revista Española de Fisica.*
HERNANDEZ-GARCIA, E.

Member of the Editorial Advisory Board of the journal *Ecological Complexity.*
HERNANDEZ-GARCIA, E.

Member of the the Editorial Board of *EPJ Data Science.*
SAN MIGUEL, M.







7.5 RESEARCH STAYS IN OTHER CENTERS

Stay at Seoul National University (Seoul)
Jong Soo Lim
From 17/12/2012 to 7/1/2012

Stay at Yahoo! Research (Barcelona)
Przemyslaw Grabowicz
Complex systems approach to online social networks studies.
From 15/2/2012 to 30/8/2012

Applied Physics Research Group (APHY), Vrije Universiteit Brussel (Brussels, Belgium)
Parra-Rivas, P.J.
From 28/10/2012 to 7/11/2012

Chaos and Evolutionary Dynamics.Scientific collaboration with the Physics Department, Universidad Autónoma Nacional de México (Alberto Robledo group)
Daniele Vilone
From 21/5/2012 to 11/6/2012

Visit to Tokyo University (Tokyo, Japan, Dr. N. Masuda group)
Eguíluz, V.M.
From 10/1/2012 to 13/1/2012

Stay at IPRC - International Pacific Research Center (Honolulu, Prof. Kelvin Richards's group). This included participation in the research cruise MIXET1 in the western equatorial Pacific (April 19th- May 14th, 2012)
Hernandez-Carrasco , Ismael
From 29/3/2012 to 29/6/2012

Research Stay at Instituto de Física Teórica, UNESP, Sao Paulo, Brasil
Mirasso, Claudio R.
From 8/12/2012 to 11/12/2012

Visit to Instituto Nacional de Pesquisas Espaciais, Sao Paulo, Brasil
Mirasso, Claudio R.
From 12/12/2012 to 12/12/2012

Visit to Departamento de Física, Universidad de Buenos Aires.
Mirasso, Claudio R
From 17/12/2012 to 18/12/2012

Visit to Centro de Investigaciones Ópticas de La Plata.
Mirasso, Claudio R
From 17/12/2012 to 18/12/2012

Stay at Smithsonian Conservation Biology Institute (Front Royal, USA; supervisor: Justin M. Calabrese).
Ricardo Martinez-Garcia
From 11/3/2012 to 25/5/2012

Stay at the Physics Dept. of Lehigh University.
Toral, Raul
From 1/7/2012 to 15/8/2012

Visit to Department of Physics, Humboldt University of Berlin.
Toral, Raúl
From 29/10/2012 to 3/11/2012

Meeting at SGAI (CSIC) to develop a global CSIC-grid user interface. After evaluating different possibilities, the IFISC interface was selected
Tugores, Antònia
From 17/5/2012 to 18/5/2012

Visit to Finite Systems department at Max Planck Institute for the Physics of Complex Systems (group of Dr. T. Pohl., Dresden, Germany).
Zambrini, Roberta
From 23/1/2012 to 26/1/2012

Visit to Physics Department, University of Cork (group of Dr. T. Bush., Cork, Ireland)
Zambrini, Roberta
From 8/7/2012 to 11/7/2012

Visit to Institute for Theoretical Physics, University of Ulm(group of Prof. S. Huelga., Ulm, Germany).
Zambrini, Roberta
From 30/9/2012 to 2/10/2012

7. 6 POSTGRADUATE COURSES

IFISC Master in *Physics of Complex Systems*

In October 2012 IFISC started a new Master program in Physics of Complex Systems. It is a one year (60 ECTS) official Master of the University of the Balearic Islands, in collaboration with CSIC. The courses provide an innovative entry point to Complex Systems fundamentals and applications and introduce the students in the research lines developed at IFISC. They are though by IFISC researchers.

This is the Master syllabus:

Structural module courses:

Complex networks (3 credits)	V. M. Eguíluz
Cooperative and critical phenomena (5 credits)	M. San Miguel, T. Sintes
Dynamical systems and chaos (6 credits)	M. Matías, P. Colet
Introduction to complex systems (3 credits)	M. San Miguel, E. Hernández-García, R. Zambrini
Pattern formation (3 credits)	E. Hernández-García
Scientific presentation and visualization (3 credits)	J. J. Ramasco
Stochastic processes (3 credits)	P. Colet, R. Toral
Stochastic simulation methods (5 credits)	R. Toral, P. Colet
Quantum physics for complex systems (6 credits)	L. Serra, R. Zambrini

Specific module courses (12 credits minimum)

Collective phenomena in social dynamics (3 credits)	M. San Miguel, J. J. Ramasco
Information theory (3 credits)	R. López
Modelling and dynamics of neural systems (3 credits)	C. Mirasso
Non equilibrium collective phenomena (3 credits)	C. López
Nonlinear photonics (6 credits)	I. Fischer
Quantum and nonlinear optics (3 credits)	R. Zambrini
Quantum transport and quantum noise (3 credits)	D. Sánchez
Spatiotemporal dynamics (3 credits)	D. Gomila
Statistical physics in biological systems (3 credits)	T. Sintes
Systems biology (3 credits)	M. Matías
Turbulence and nonlinear phenomena in fluid flows (3 credits)	C. López

Master thesis (11 credits)

Other Postgraduate Courses Tought in 2012

Master in Physics, University of the Balearic Islands

- **Cooperative and critical phenomena. Applications**
  Victor M. Eguíluz, Maxi San Miguel, Tomàs Sintes
- **Nonlinear dynamical systems and spatio temporal complexity**
  Pere Colet
- **Stochastic simulation methods**
  Pere Colet, Raúl Toral
- **Introduction to statistical and nonlinear physics**
  Pere Colet, Cristóbal López, Maxi San Miguel, Tomàs Sintes
- **Nonlinear phenomena in biology**
  Claudio Mirasso, Cristóbal López, Tomàs Sintes, Raúl Toral
- **Introduction to quantum systems**
  David Sánchez, Rosa López
- **Electronic properties of nanostructures**
  Llorenç Serra Crespí, David Sánchez, Rosa López

Master in Cognition and Human Evolution, University of the Balearic Islands

- **Computational Models of Social Evolution**
  Víctor M. Eguíluz

Master in Neurosciences, University of Barcelona

- **Modeling Neuronal Systems: An Introduction (2-hours lecture).**
  Claudio R. Mirasso

7.7 OTHER

IFISC provided practical training to two *computer technician* students from the center IES Emilio Darder (FP intermediate level) from 26 March to 22 June.

8

OUTREACH ACTIVITIES

8.1 CONFERENCE SERIES

Conference Series "Exploring Boundaries Between Disciplines V"

To know how brain works means, somehow, to know ourselves, something that has been already studied by diverse disciplines. This way, a special relationship gets settled between neuroscience with other fields like psychology, philosophy, physics, mathematics or medicine. The progress on brain knowledge diminishes the importance of some beliefs, demystifies dogmas, confirms suspicions, provides human behavior patterns, improves our health, raise our welfare state,... the list would be very long. For this reason it seems normal that 2012 has been promoted as 'Spanish neuroscience year' by a parliamentary initiative.

To celebrate this event, IFISC and EVOCOG, associated unit on Evolution and Human Cognition, coordinate this Conference Series about Cognitive Neuroscience, where they combine brain knowledge from a medical and psychological point of view.

PROGRAMME

WEDNESDAY, FEBRUARY 29 I 7 PM

Belleza y sorpresa: las bases neurobiológicas del ilusionismo
Beauty and surprise: neurobiological basis on conjuring

LUIS MIGUEL MARTÍNEZ OTERO, INVESTIGADOR DEL LABORATORIO DE NEUROCIENCIAS VISUALES. INSTITUTO DE NEUROCIENCIAS DE ALICANTE CSIC-UMH.*VISUAL NEUROSCIENCE L ABORATORY RESEARCHER. NEUROSCIENCE INSTITUTE, ALICANTE, CSIC-UMH.*

WEDNESDAY, MARCH 7 I 7 PM

Mente y cerebro: el fantasma en la máquina. ¿Disponemos de exorcistas eficaces?
Mind and brain: phantom in the machine. Do we have effective exorcists?

CAMILO JOSÉ CELA CONDE. DIRECTOR DEL GRUPO DE INVESTIGACIÓN EN "EVOLUCIÓN Y COGNICIÓN HUMANA" (EVOCOG), UNIVERSIDAD DE LAS ISLAS BALEARES.
EVOCOG DIRECTOR, BALEARIC ISLANDS UNIVERSITY.

WEDNESDAY, MARCH 14 I 7 PM

Música y neurorehabilitación
Music and neurorehabilitation

ANTONI RODRIGUEZ-FORNELLS. PROFESOR INVESTIGADOR DE LA UNIDAD DE COGNICIÓN Y PLASTICIDAD CEREBRAL (ICREA. *COGNITION AND BRAIN PLASTICITY UNIT.*) DE LA UNIVERSIDAD DE BARCELONA Y EL INSTITUTO DE INVESTIGACIÓN BIOMÉDICA DE BELLVITGE (IDIBELL).

WEDNESDAY, MARCH 21 I 7 PM

El enigma de la memoria humana
Human memory enigma

FERNANDO MAESTÚ. PROFESOR TITULAR PSICOLOGÍA BÁSICA, UNIVERSIDAD COMPLUTENSE DE MADRID.
UNIVERSITY FULL PROFESSOR OF BASIC PSYCHOLOGY, UNIVERSIDAD COMPLUTENSE DE MADRID.

WEDNESDAY, MARCH 28 I 7 PM

Envejecimiento, neurodegeneración y Alzheimer
Aging, neurodegeneration and alzheimer

JOSÉ LUIS CANTERO LORENTE. DIRECTOR DEL LABORATORIO NEUROCIENCIA FUNCIONAL.
FUNCTIONAL NEUROSCIENCE LABORATORY DIRECTOR.
UNIVERSIDAD PABLO DE OLAVIDE DE SEVILLA.

IFISC organized the Conference Series with the collaboration of La Caixa (Obra Social).

8.2 OTHER CONFERENCES AND EVENTS

Conference: La economía de la atención: cómo captar el interés en la era de la Información y las redes Sociales. (Attention Economy: How To Attract Interest in the Age of Information and Networks)

Speaker: *Professor Bernardo A. Huberman is Director of the Social Computational Laboratory in Hewlett-Packard Labs of Palo Alto, USA, and he is a professor of the Symbolic Systems program in the Stanford University, USA. He is also member of the American Association for the Advancement of Science. He has won the CECOIA prize, on Economy and Artificial Intelligence and the IBM prize of the Computational Economy Society. He has 17 patents and has published more than 270 articles in prestigious scientific reports. One sample of his activity in the last years is the book "The Laws of the Web: Patterns in the Ecology of Information". All his scientific results have had a big media effects in the international press.*

Resume*: We live in a transformation process of the traditional model of content´s production and consumption that a few people and organizations produce for the rest: from photographs to news, as long as encyclopedias. The creation of internet has inverted this model and nowadays millions of people produce contents in blogs, wikis, videos, music, etc. so fast and so much quantity that it´s impossible to pay attention to all.*

This fact, together with the instantly and free possibility access to information from any place of the world, has devalued information. People values what is limited and not what is plentiful, so what it´s really precious, ambitious and required today is the attention. As a result, we go to an economy where attention is more important than money like the coin that everybody wants and competes for.

Prof. Bernardo A. Huberman presented in his conference some of the universal patterns in the attention economy and how they affect in the contents creation and consumption nowadays. He also showed how these patterns allow predicting some events of social and commercial interest by measuring the social media attention.

Jornada de presentación Programa FET + Call 10 ICT, VII Programa Marco

On July 12th, 2012, IFISC organized a one day open meeting devoted to the discussion of the FET programme and the Call 10 of ICT of the VII Framework Programme. The event was scheduled in three presentations given by personnel of the Centro para el Desarrollo Tecnológico Industrial (CDTI). Juana Sanchez, National contact Point of programme ICT in Spain, talked about the programmes ICT/FET in 2013. Emilio Iglesias talked about opportunities in TIC in 2013 and Juana Sanchez talked also about practical recommendations for the preparation of proposals. The meeting was aimed for researchers and people interested in European projects.

8.3 PARTICIPATION IN THE BALEARIC SCIENCE AND TECHNOLOGY WEEK (SCIT12)

NOVEMBER, 13, 15, 20 AND 22

The Science and Technology Week is the most important scientific outreaching initiative in the Balearic Islands. The main goal is to get science closer to all kind of people of any age, stimulate scientific knowledge and motivate citizens to participate in scientific matters by doing outreaching activities.

IFISC joined this initiative opening its doors and inserting science in the cultural program combining recreational factor and scientific accuracy. The goal was to make public and show its scientific work and try to improve its public perception. This year, the Open Doors Journey is directed to computing science and modeling. Modeling through computing science is a very useful tool to understand science (weather predictions, disease propagation, ...) This activity and different workshops showed what simulations are and what they are for, what a supercomputer is, or what kind of supercomputers are in the Spanish territory.

High-school students from the centers Sant Josep Obrer, Agora Portals, Pius XII and Emili Darder participated in the activities.

8.4 OSA-IFISC ACTIVITIES

*IFISC organized the **Third edition** of the Solar Car Race, an optical creation and application contest. The velocity competition took place on June 18 at 11 a.m. in a circuit in front of the Instituts Universitaris building in the UIB campus.*

The race was organized by a PhD students group from IFISC and the OSA Student Chapter, the Optical Society of America that organizes optical outreaching activities.

With the race registration, participants got a solar car mounting kit. Registered people had to design his own version for the car with one condition, to keep the solar panel that was given as the only energy source.

Participants had the option of different prizes in the velocity contest. As something new, this year could participate in other categories of recycling, creativity and scientific technological application by presenting an explanation poster of the car´s design. The prizes were given on June 18 at 2 p.m. in the UIB campus. The Third Solar Car Race counts with the OSA support, the IFISC and the electronic company Fadisel.

This year the participation of secondary schools was remarkable. They had been working on the car from the technology and science areas. Participated: IES Josep Sureda i Blanes, IES Joan Maria Thomas, IES Antoni Maura, Col·legi Mare de Déu de les Escoles Pies, IES Joan Alcover, IES Portocristo, IES Felanitx, IES Mossèn Alcover, Col·legi Lluís Vives, IES Francesc de Borja Moll and IES Josep Maria Llompart.

8.5 PRESS & MEDIA

IFISC research has been given attention by newspapers and other media. During 2012, IFISC activities have originated 59 press releases and appearances in the written press, and 12 clips in radio and TV. See the full listings in the Appendix.

EFE-PALMA

Científicos de Balears y de EEUU descifran los secretos del oído

Científicos del Instituto de Física Interdisciplinar y Sistemas Complejos (IFISC), vinculado a la UIB y al CSIC, y de la Universidad Rockefeller de Nueva York han publicado un estudio en el que descifran los secretos que permiten al oído amplificar sonidos muy débiles.

Según informó ayer la Universitat de les Illes Balears (UIB) en un comunicado, el estudio interdisciplinario se ha publicado

Ernesto M. Nicola

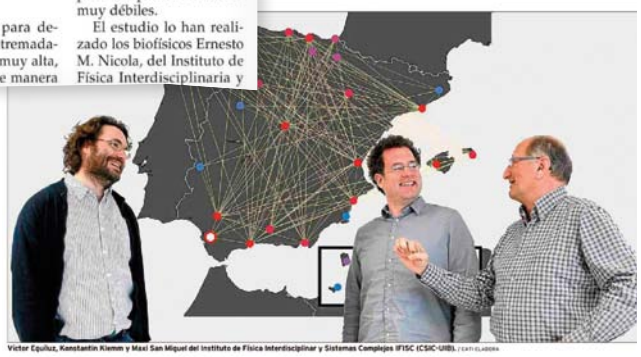
guir de manera muy precisa entre sonidos de diferentes frecuencias, sino también de captar tanto sonidos extraordinariamente débiles como muy fuertes.

Avances

Su capacidad para detectar sonidos extremadamente débiles es muy alta, destaca la UIB, de manera

Durante los últimos años, los biólogos han avanzado en el conocimiento de los elementos que componen el oído, identificando aquellas partes que lo capacitan para amplificar sonidos muy débiles.

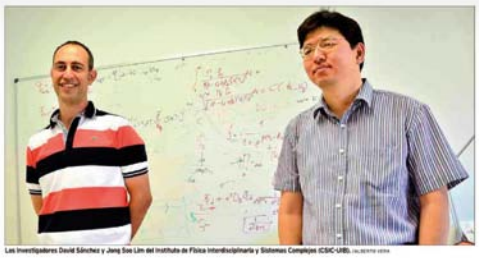
El estudio lo han realizado los biofísicos Ernesto M. Nicola, del Instituto de Física Interdisciplinaria y



Víctor Eguíluz, Konstantin Klemm y Maxi San Miguel del Instituto de Física Interdisciplinar y Sistemas Complejos IFISC (CSIC-UIB). / CATI ELADERA

Los más 'influyentes' de la red

tigadores de Baleares han desarrollado una metodología que permite clasificar los una red en función de su importancia para el funcionamiento del sistema. **Elena Soto**



Los investigadores David Sánchez y Jeng Soo Lim del Instituto de Física Interdisciplinaria y Sistemas Complejos (CSIC-UIB).

El magnetismo del electrón

›Física/ Un grupo de la UIB acaba de publicar un trabajo sobre las propiedades del ruido cuántico, una investigación teórica que ayudará en la fabricación de los dispositivos nanoelectrónicos del futuro. **Elena S**

DIVULGACIÓ

L'IFISC obre les portes als instituts per la Setmana de la Ciència

▶ Alumnes de diversos centres de secundària participaren en les activitats divulgatives

J. MATEU
PALMA

■ L'Institut de Física Interdisciplinària i Sistemes Complexos (IFISC, CSIC-UIB), ha obert aquesta setmana les portes als alumnes dels centres d'educació secundària amb motiu de la Setmana de la Ciència.

Escolars de diversos centres han pogut participar en tallers i conferències amb els quals els responsables de l'IFISC han donat a conèixer part de la recerca que duen a terme en el camp de la computació i el càlcul científic des de la perspectiva de la física interdisciplinària.

Entre d'altres actes, els alumnes

Un grup d'alumnes durant una de les activitats d'ahir. UIB

varen participar ahir en l'activitat titulada 'Computació i càlcul científic. Una perspectiva des de la física interdisciplinària', que pretenia donar a conèixer als participants la metodologia i les eines dels investigadors de l'IFISC.

L'activitat també es proposava donar a conèixer la utilitat del càlcul computacional en la ciència i la iniciativa IBERGRID de computació científica a Espanya i Portugal. A més hi va haver xerrades, tallers i jocs d'experimentació per acostar els joves als mètodes i eines científiques de manera directa.

Les activitats de divulgació a l'IFISC continuaran els propers dies 20 i 22 de novembre.

APPENDIX

APPENDIX

a.4. Ifisc seminars and talks 2012

In the electronic version of this report, titles are hyperlinked to the recording of the seminar, if available

03 February
Tunable Kondo effect in double quantum dots coupled to ferromagnetic contacts
Rosa Lopez, IFISC

07 February
Use of Antiretroviral Drugs for Prevention of New Infections with HIV
David van de Vijver, Erasmus Medical Center, Rotterdam, Netherlands

09 February
Scaling in complex systems: Evolution under order/disorder tensions
Bernat Corominas, Universitat Pompeu Fabra, Barcelona, Spain

13 February
A physicist›s approach to social dilemmas on networks: we›ve been wrong all along
Anxo Sánchez, Universidad Carlos III de Madrid, Madrid, Spain

21 February
The many faces of the second law
Christian Van den Broeck, Hasselt University, Belgium

29 February
Energy landscapes and encodings
Konstantin Klemm, Universität Leipzig, Germany

08 March
Chaotic destruction of Anderson localization in nonlinear lattices
Arkady Pikovsky, Department of Physics, Potsdam University, Potsdam, Germany

09 March
Effects of Perturbation on the Generation and Propagation of Action Potential in a Single Nerve Fibre
Aissatou Mboussi, Laboratory of Modelling and Simulation in Engineering and Biological Physics, Department of Physics, University of Yaoundé I, Cameroon

14 March
Single-electron source : Adiabatic versus non-adiabatic emission regimes
Michael Moskalets, Kharkiv Polytechnic Institute, Kharkiv, Ukraine

15 March
Collective fluctuations in networks of noisy components
Naoki Masuda, The University of Tokyo, Japan

16 March
Spatiotemporal Patterns in Locally Coupled Genetic Oscillators
Adrian Jacobo, Max Planck Institute for the Physics of Complex Systems (MPI-PKS), Dresden, Germany

22 March
Pairing and Quantum Chaos
Sven Aberg, Lund University, Sweden

27 March
Nonlinear Photonics in semiconductor lasers: Solitonic microlasers and spin effects
Thorsten Ackemann, Strathclyde University, Glasgow, Scotland, UK

28 March
Cognitive network structure of Human Virtual Interactions: recent experimental results (March 2012)
Andrea Guazzini, Physics of Complex Systems Laboratory, Centre for the study of complex dynamics, Universita' di Firenze, Italy

28 March
Characteristic (or covariant) Lyapunov vectors: fundamentals and applications to spatio-temporal chaos
Diego Pazó, IFCA (CSIC-UC), Santander, Spain

02 April
Photonic Integration: What, Why, When and How
Iñigo Artundo (VLC Photonics), Valencia, Spain

03 April
Asymmetric Thermopower and Dephasing in Mesoscopic Conductors
David Sánchez, IFISC

03 April
Dynamics of semiconductor lasers subjected to polarization rotated feedback and its application to fast random bit generation.
Neus Oliver (IFISC)

18 April
Relating the ear›s minuscule amplifiers to their environment
Ernesto Nicola, IFISC

25 April
Fluctuations in Models of Self-Propelled Particles
Lutz Schimansky-Geier, Humboldt Universität, Berlin, Germany

02 May
Dynamics and Synchronization of delay-coupled semiconductor lasers
Konstantin Hicke, IFISC

03 May
Persistent Mutual Information and Measures of Emergence
Marina Diakonova, Complexity Science DTC, University of Warwick, UK

08 May
Hunting numbers: Optimal strategies in mental searches
Filippo Radicchi, Universitat Rovira i Virgili, Tarragona, Spain

16 May
Time dependent quantum transport treated with the generalized master equation
Andrei Manolescu, Reykjavik University, Iceland

23 May
Growth of (finite) Perturbations in Spatiotemporal Systems. Application to Ensemble Weather Forecasting
José Manuel Gutiérrez Llorente,

Instituto de Física de Cantabria - IFCA (CSIC-UC), Santander, Spain

30 May
Social Media and Attention - IFISC Colloquium
Bernardo Huberman, Hewlett-Packard Labs, Palo Alto, CA, USA

04 June
Quantum Transport in Semiconductor Nanowires
Thomas Schäpers, Peter Grünberg Institute (PGI-9), Forschungszentrum Jülich, Jülich, Germany II. Physikalisches Institut A, RWTH Aachen University, Aachen, Germany

13 June
Synchronization transitions in a growing network of star-coupled nonidentical semiconductor lasers
Jordi Zamora-Munt, IFISC

14 June
Numerical modelling of climate: Scientific basis and uncertainties in climate change projections
José Manuel Gutiérrez Llorente, Instituto de Física de Cantabria - IFCA (CSIC-UC), Santander, Spain

15 June
High Performance Computing in the New Nuredduna
Pere Colet, Rubén Tolosa, Maria Antònia Tugores; IFISC

20 June
Decoherence and non-Markovianity
Francesco Plastina, Università della Calabria, Cosenza, Italy

27 June
Adaptive control and synchronization in delay-coupled complex networks
IFISC Colloquium
Eckehard Schöll, Institute for Theoretical Physics, TU Berlin, Germany

04 July
Mesoscopic Charge Relaxation in a Strongly-Correlated Quantum Dot System
Minchul Lee, Kyung Hee University, College of Applied Science, Department of Applied Physics, Korea

13 July
Thermodynamics with Feedback: Extracting Work from Information
Jordan M. Horowitz, Universidad Complutense, Madrid, Spain

16 July
On the effect of heterogeneity in stochastic interacting-particle systems
Luis Fernández Lafuerza, IFISC

17 July
Finite-frequency noise of a single-electron source
Michael V. Moskalets, Kharkiv Polytechnic Institute, Kharkiv, Ukraine

19 July
Reservoir Computing based on Delay-dynamical Systems
Lennert Appeltant, Vrije Universiteit, Brussels, Belgium

20 July
Dynamics and Synchronization of Motifs of Neuronal Populations in the Presence of Delayed Interactions
Leonardo Lyra Gollo, IFISC

05 September
Mining networks of human contact with wearable sensors
Ciro Cattuto, ISI, Torino, Italy

12 September
New directions in network science and applications to climate
IFISC Colloquium
Shlomo Havlin, Bar-Ilan University, Ramat-Gan, Israel

17 September
Thermal driving forces in colloidal suspensions
Daniel Lüsebrink, Forschungszentrum Jülich, Germany

20 September
Generic framework for reaction diffusion systems
Miguel Hoyuelos, Universidad de Mar del Plata, Argentina

24 September
Los físicos malditos

Miguel Hoyuelos, Universidad de Mar del Plata, Argentina

26 September
Optimizing surveillance for livestock disease spreading through animal movements
Alain Barrat, Centre de Physique Théorique, Marseille, France and ISI, Torino, Italy

02 October
Impact of heterogeneous features of hosts and pathogens in the spatial spread of epidemics
Chiara Poletto (Inserm, Ins. National de la Sante, Paris, France)

03 October
Solving a general three-body atomic problem with Generalized Sturmian Functions
Juan Martín Randazzo (Centro Atómico Bariloche y CONICET, Argentina)

03 October
Decision-making in animal collectives
Gonzalo de Polavieja, Instituto Cajal, Madrid, Spain

11 October
Modelling Disruption in Large Scale Transit Systems
FISC Colloquium
Michael Batty, CASA, University College London, UK

30 October
Monolithic optical frequency comb generators: theory and applications
Yanne K. Chembo, Optics Department, FEMTO-ST Institute, Besançon, France

07 November
Quantum Synchronization
Roberta Zambrini, IFISC

13 November
Mesoscale three-dimensional Lagrangian Coherent Structures
João Bettencourt, IFISC

21 November
Non-Markovian dynamics of continuous variable open systems
Ruggero Vasile, IFISC
29 November
Beyond standard Hubbard models
Omjyoti Dutta, ICFO, Barcelona

12 December
Chaotic synchronization in networks of nonlinear units with time-delayed couplings
Thomas Jüngling, IFISC

18 December
Fluctuations in interacting particle systems: a theoretical study
Luis Fernández Lafuerza, IFISC

a.5. Publications

In the electronic version of this report, titles are hyperlinked to the summary and PDF file of the publications

a.5.1 JCR Publications

The diverse effects of mechanical loading on active hair bundles. Ó Maoiléidigh, Dáibhid; Nicola, Ernesto M.; Hudspeth, A. J.. Proceedings of the National Academy of Sciences of the USA (PNAS) 109, 1943-1948 (2012).

Tunable Kondo Effect in a Double Quantum Dot Coupled to Ferromagnetic Contacts. Zitko, Rok; Lim, Jong Soo; López Rosa, Martinek, Jan; Simon, Pascal. Physical Review Letters 108, 166605 (2012).

Synchronization in simple network motifs with negligible correlation and mutual information measures. Soriano, M. C.; Van der Sande, G. ; Fischer, I.; Mirasso, C. R. . Physical Review Letters 108, 134101 (2012).

Adler synchronization of spatial laser solitons pinned by defects. Paulau, P.V.; McIntyre, C.; Noblet, Y.; Radwell, N.; Firth, W.J.; Colet, P.; Ackemann, T.; Oppo, G.-L. . Physical Review Letters 108, 213904 (1-5) (2012).

Fluctuation Relations for Spintronics. Lopez, R.; Lim, J.S.; Sanchez, D.. Physical Review Letters 108, 246603 (1-5) (2012).

Diversity and noise effects in a model of homeostatic regulation of the sleep-wake cycle. Patriarca, M.; Postnova, S.; Braun, H.A.; Hernandez-Garcia, E.; Toral, R.. PLoS Computational Biology 8, e1002650 (1-17) (2012).

Real-time numerical forecast of global epidemic spreading: case study of 2009 A/H1N1pdm. Tizzoni, Michele; Bajardi, Paolo; Poletto, Chiara; Ramasco, Jose J.; Balcan, Duygu; Goncalves, Bruno; Perra, Nicola; Colizza, Vittoria; Vespignani, Alessandro . BMC Medicine 10, 165 (2012).

A model for cross-cultural reciprocal interactions through mass media. Gonzalez-Avella, J.C.; Cosenza, M.G.; San Miguel, M.. PLoS ONE 7, e51035 (2012).

Social features of online networks: The strength of intermediary ties in online social media. Grabowicz, Przemyslaw A.; Ramasco, José J.; Moro, Esteban; Pujol, Josep M.; Eguíluz, Víctor M.. PLoS ONE 7(1), e29358 (2012).

Implication of extreme life span in clonal organisms : millenary clones in meadows of the threatened seagrass Posidonia oceanica.. Arnaud-Haond, S.; Duarte, C.; Diaz-Almela, E.; Marbà, N.; Sintes, T.; Serrao, E. . PLoS ONE 7, e30454 (2012).

Influence of opinion dynamics on the evolution of games . Gargiulo, Floriana; Ramasco, Jose Javier. PLoS ONE 7, e48916 (2012).

Real-time frequency dynamics and high-resolution spectra of a semiconductor laser with delayed feedback. Brunner, Daniel; Porte, Xavier; Soriano, Miguel C.; Fischer, Ingo. Scientific Reports 2, 732 (2012).

Social and strategic imitation: the way to consensus. Vilone, Daniele; Ramasco, José J.; Sánchez, Angel; San Miguel, Maxi. Scientific Reports 2, 686 (2012).

A measure of individual role in collective dynamics. Klemm, Konstantin; Serrano, M. Angeles; Eguiluz, Victor M.; San Miguel, Maxi . Scientific Reports 2, 292 (2012).

Heterogeneity shapes groups growth in social online communities. Grabowicz, P.A.; Eguíluz, Víctor M.. *EPL* (Europhysics Letters) 97, 28002 (2012).

Global dynamics of oscillator populations under common noise. Braun, W.; Pikovsky, A.; Matias, M.A.; Colet, P.. EPL (Europhysics Letters) 99, 20006 (1-6) (2012).

Aesthetic appreciation: event-related field and time-frequency analyses. Munar, E.; Nadal, M.; Castellanos, N; Flexas, A; Maestú, F.; Mirasso, C. and Cela-Conde, J.. Frontiers in Human Neuroscience 5, 1-11 (2012).

On the Phase Noise Performance of Nonlinear Double-Loop Optoelectronic Microwave Oscillators. Nguimdo, Romain Modeste; Chembo, Yanne K; Colet, Pere; Larger Laurent. IEEE Journal of Quantum Electronics 48, 1415-1423 (2012).

Swarming and pattern formation due to selective attraction and repulsion. Romanczuk,Pawel; Schimansky-Geier,Lutz. Interface Focus 2, 746-756 (2012).

Photonic information processing beyond Turing: an optoelectronic implementation of reservoir computing. Larger, Laurent; Soriano, Miguel C.; Brunner, Daniel; Appeltant, Lennert; Gutierrez, José Manuel ; Pesquera, Luís; Mirasso,Claudio R.; Fischer, Ingo. Optics Express 20, 3241-3249 (2012).

Electro-optic phase chaos systems with an internal variable and a digital key. Nguimdo, Romain Modeste; Colet, Pere. Optics Express 20, 25333–25344 (2012).

Chaos synchronization in networks of delay-coupled lasers: Role of the coupling phases.. Flunkert, V. and Schöll, E.. New Journal of Physics 14, 033039 (1-21) (2012).

Logical operations with localized structures. Jacobo, Adrián; Gomila, Damià; Matías, Manuel A.; Colet, Pere. New Journal of Physics 14, 013040 (1-9) (2012).

Transport through Majorana nanowires attached to normal leads. Lim, Jong Soo; López, Rosa; Serra, Llorenç. New Journal of Physics 14, 083020 (1-17) (2012).

Unified view of correlations using the square-norm distance. Bellomo, B.; Giorgi,G.L.; Galve, F.; Franco,R.L.; Compagno,G; Zambrini, R.. Physical Review A 85, 032104 (2012).

Quantum correlations and mutual synchronization. Gian Luca Giorgi, Fernando Galve, Gonzalo Manzano, Pere Colet and Roberta Zambrini. Physical Review A 85, 052101 (1-7) (2012).

Spatial fluctuations in an optical parametric oscillator below threshold with an intracavity photonic crystal. Garcia-March, Miguel-Angel; De Castro, Maria; Zambrini, Roberta . Physical Review A 85, 053804 (1-11) (2012).

Thermally driven ballistic rectifier. Matthews, J.; Sanchez, D.; Larsson, M.; Linke H.. Physical Review B 85, 205309 (1-4) (2012).

Magnetic-field instability of Majorana modes in multiband semiconductor wires. Lim, Jong Soo; Serra, Llorenç; Lopez, Rosa; Aguado, Ramon. Physical Review B (Rapid Communications) 86, 121103(R) (1-4) (2012).

Statistical physics approach to dendritic computation: The excitable-wave mean-field approximation. Gollo, L. L.; Kinouchi, O.; Copelli, M.. Physical Review E 85, 011911 (1-13) (2012).

Temporal disorder in up-down symmetric systems. Martinez-Garcia, Ricardo; Vazquez, Federico; Lopez, Cristobal, Muñoz, Miguel A.. Physical Review E 85, 051125 (1-10) (2012).

Zero-lag synchronization and bubbling in delay-coupled lasers. Tiana-Alsina, Jordi; Hicke, Konstantin; Porte Xavier; Soriano, Miguel C.; Torrent, M. Carme; Garcia-Ojalvo, Jordi; Fischer, Ingo. Physical Review E 85, 026209 (2012).

Spectral and correlation properties of rings of delay-coupled elements: Comparing linear and nonlinear systems. D'Huys, O.; Fischer, I.; Danckaert, J.: Vicente, R.. Physical Review E 85, 056209 (1-5) (2012).

Distinguishing chaotic and stochastic dynamics from time series by using a multiscale symbolic approach. Zunino, L.; Soriano, M. C.; Rosso, O. A. . Physical Review E 86, 046210 (2012).

Signal integration enhances the dynamic range in neuronal systems. Gollo, L. L.; Mirasso, C. R.; Eguíluz, V. M. . Physical Review E 85, 040902(R) (1-5) (2012).

Dynamics of link states in complex networks: The case of a majority rule. Fernández-Gracia, J.; Castelló, X.; Eguíluz, V.M.; San Miguel , M.. Physical Review E 86, 066113 (1-8) (2012).

Anticipated synchronization and the predict-prevent control method in the FitzHugh-Nagumo model system. Mayol, C; Mirasso, C.R.; Toral R.. Physical Review E 85, 056216 (2012).

Thermodynamics of urban population flows. Hernando, A.; Plastino, A.. Physical Review E 86, 066105 (2012).

Competitive Brownian and Levy walkers. Heinsalu, E.; Hernandez-Garcia, E.; Lopez, C.. Physical Review E 85, 041105 (1-10) (2012).

Experimental time-delayed feedback control with variable and distributed delays. Jüngling, Thomas; Gjurchinovski, Aleksandar; Urumov, Viktor. Physical Review E 86, 046213 (1-10) (2012).

Seasonal and regional characterization of horizontal mixing in the global ocean. Hernández-Carrasco, Ismael; López, Cristóbal; Hernández-García, Emilio; Turiel, Antonio. . Journal of Geophysical Research 117, C10007 (1-12) (2012).

Oceanic three dimensional Lagrangian Coherent Structures: A study of a mesoscale eddy in the Benguela upwelling region.. Bettencourt, Joao; López, Cristóbal; Hernández-García, Emilio. Ocean Modelling 51, 73-83 (2012).

Wave mixing rise inferred from Lyapunov exponents. Galan, A; Orfila, A; Simarro, G; Hernández-Carrasco, I; López, C. Environmental fluid mechanics 12, 291-300 (2012).

Variational principle underlying scale invariant social systems. Hernando, A.;

Plastino, A.. European Physical Journal B 85, 293 (2012).

Entropic entanglement criteria for Fermion systems. Zander, C.; Plastino, A.R.; Casas, M.; Plastino, A.. European Physical Journal D 66, 14 (1-13) (2012).

Challenges in Complex Systems Science. San Miguel, Maxi; Johnson, Jeffrey H.; Kertesz, Janos; Kaski, Kimmo; Díaz-Guilera, Albert; MacKay, Robert S.; Loreto, Vittorio; Erdi, Peter; Helbing, Dirk. European Physical Journal-Special Topics 214, 245-271 (2012).

Manifesto of Computational Social Science. Conte, R.; Gilbert, N.; Bonelli, G.; Cioffi-Revilla, C.; Deffuant, G., Kertesz, K.; Loretto, V., Nadal, J.P.; Sanchez, A.; Nowak, A.; Flache, A.; San Miguel, M.; Helbing, D.. European Physical Journal-Special Topics 214, 325–346 (2012).

Big Science and Big Administration. Smart, J.; Scott, M.; McCarthy, J.B.; Tan, K. T.; Argyrakis, P.; Bishop, R.; Havlin, S.; San Miguel, M.; Stauffacher, D.. European Physical Journal-Special Topics 214, 635-666 (2012).

Classical and quantum effects in spatially modulated optical parametric oscillators . de Castro, Maria; Gomila, Damia; Zambrini, Roberta.. European Physical Journal-Special Topics (EPJ ST) 203, 217-225 (2012).

Evolution of wikipedia's category structure. Suchecki, K.; Salah, A.A.A.; Gao, C.; Scharnhorst, A.. Advances in Complex Systems 15, Suppl. 1, 1250068 (1-21) (2012).

Modeling two-language competition dynamics. Patriarca, M.; Castelló, X.; Uriarte, J.R.; Eguíluz, V.M.; San Miguel, M.. Advances in Complex Systems 15, 1250048 (2012).

Cognitive network structure: an experimental study. Guazzini, Andrea; Vilone, Daniele; Bagnoli, Franco; Carletti, Timoteo; Lauro Grotto, Rosapia. Advances in Complex Systems 15, 1250084 (2012).

Noise and oscillations in biological systems: multidisciplinary approach between experimental biology, theoretical modelling and synthetic biology. Ullner, E; Ares, S; Morelli; LG; Oates; AC; Julicher, F; Nicola; Ernesto M.; Heussen, R; Whitmore, D; Blyuss, K; Fryett, M; Zakharova, A; Koseska, A; Nene, NR; Zaikin, A.. International Journal of Modern Physics B 26, 1246009 (2012).

Ice polyamorphism in the minimal Mercedes-Benz model of water. Cartwright, J.; Piro, O.; Sánchez, P.A.; Sintes, T. . Journal of Chemical Physics 137, 244503(1-7) (2012).

Fully automated lab-on-valve-multisyringe flow injection analysis-ICP-MS syst.:An effective tool for fast,sensitive and selective determin. of Th & U at envtal. levels exploiing solid phase extraction. Avivar, J.; Ferrer, L.; Casas, M.; Cerdà, V.. Journal of Analytical Atomic Spectrometry 27, 327-334 (2012).

How to convert SPME to P3M: Influence functions and error estimates. Ballenegger, V.; Cerdà, J.J.; Holm, C.. Journal of chemical theory and computation 8, 936-947 (2012).

Quantal effects and MaxEnt. Holik, F.; Plastino, A.. Journal of Mathematical Physics 53, 073301 (2012).

The Tsallis-complexity of a semiclassical time-evolution. Kowalski, A.M.; Plastino, A.. Physica A 391, 5375-5383 (2012).

A model of partial differential equations for HIV propagation in lymph nodes . B. S. Marinho, Euler; S. Bacelar, Flora; F. S. Andrade, Roberto. Physica A 391, 132-141 (2012).

Reconciling phase diffusion and Hartree–Fock approximation in condensate systems . Giorgi, Gian Luca; de Pasquale, Ferdinando. Physica A 391, 82-86 (2012).

Vertical g factor of hole quantum wires. Gelabert, M. Magdalena; Serra, Llorenç. Physica Scripta T151, 014051 (1-3) (2012).

Parameter-free ansatz for inferring ground state wave functions of even convex potentials. Flego, S.P.; Plastino, A.; Plastino, A.R.. Physica Scripta 85, 055002 (2012).

Physical implications of Fisher-information's scaling symmetry. Flego, S.P.; Plastino, A.; Plastino, A.R.. Central European Journal of Physics 10, 390-397 (2012).

Web Interface for Generic Grid Jobs, WEB4GRID. Tugores, Antònia; Colet, Pere. Computing and Informatics 31, 173-186 (2012).

Temperature effects, Frieden-Hawkins' order-measure, and Wehrl entropy. Pennini, F.; Plastino, A.; Ferri, G.L.. Entropy 14, 2081-2099 (2012).

On extracting probability distribution information from time series. Kowalski, A.M.; Martin, M.T.; Plastino, A.; Judge, G.. Entropy 14, 1829-1841 (2012).

a.5.2 Other publications in journals

Microstructure of Bidisperse ferrofluids in a Monolayer. Dobroserdova, A.; Minina, E; Cerdà, J.J.; Holm, C.; Kantorovich, S.. Solid State Phenomena 190, 625-628 (2012).

Genetic flow directionality and geographical segregation in Cymodocea Nodosa genetic diversity network. Masucci, A. Paolo; Arnaud-Haond, Sophie; Eguiluz, Victor M.; Hernandez-Garcia, Emilio; Serrao, Ester A.. EPJ Data Science 1, 11 (1-11) (2012).

Book Review: 'Party Competition: An Agent-Based Model' (Princeton Studies in Complexity), M. Laver, E. Sergenti (Princeton University Press: Princeton, NJ, 2012). Eguíluz, V.M.. Journal of Artificial Societies and Social simulation 15, 3 (2012).

Fenómenos Colectivos Sociales. San Miguel, Maxi. Revista Española de Fisica 26, 56-63 (2012).

Simultaneous stabilization of periodic orbits and fixed points in delay-coupled

Lorenz systems.. Choe, C.-U., Jang, H., Ri, H.-M., Dahms, T., Flunkert, V., Hövel, P. and Schöll, E.. Cybernetics and Physics 1, 155 (2012).

Cuando las neuronas sincronizan sus relojes. Vicente, R. and Mirasso, C. R.. Mente y Cerebro 53, 62-71 (2012).

a.5.3 Book Chapters

Dynamical properties of two delay-coupled lasers: on spectra, correlations and synchronisation. D'Huys, Otti; Vicente, Raul; Danckaert, Jan; Fischer, Ingo. Semiconductor Lasers and Laser Dynamics V (Panajotov, K; Sciamanna, M; Valle, A; Michalzik, R., Editors) , 843215 (1-12) (2012).

Computing using delayed feedback systems: towards photonics. Appeltant, L.; Soriano, M.C.; Van der Sande, G.; Danckaert, J.; Massar, S.; Dambre, J.; Schrauwen, B.; Mirasso, C.R.; Fischer, I.. Nonlinear Optics and Applications VI (Benjamin J. Eggleton; Alexander L. Gaeta; Neil G. Broderick, Editors) , 84341W (1-6) (2012).

Dynamical classes of collective attention in Twitter. Lehmann,J; Goncalves,B; Ramasco,JJ; Cattuto, C. WWW '12: Proceedings of the 21st international conference on World Wide Web , 251-260 (2012).

Modelling the structure and dynamics of polyelectrolyte multilayers. Cerdà, Juan J.; Qiao, Baofu; Holm, C;. Ionic Interactions in Natural and Synthetic Macromolecules (edited by Alberto Ciferri and Angelo Perico) , 121-166 (2012).

Resistance to Learning and the Evolution of Cooperation. Jimenez, R.; Lugo, H.; San Miguel, M.. Encyclopedia of the Sciences of Learning (edited by Norbert M. Seel) 6, 2848-2849 (2012).

Synchronization and quantum correlations between coupled dissipative oscillators. Manzano, G; Zambrini, R. 2011 Fifth Rio De La Plata Workshop on "Laser Dynamics and Nonlinear Photonics" (IEEE), 1-3 (2012).

a.6. Communications to conferences and talks in other centers

a.6.1 Invited talks in conferences and workshops

Cerdà J.J., Sánchez P., Sintes. T.
Numerical Study of Semiflexible Magnetic Filaments.
Jornadas de usuarios de la Infraestructura Grid. Laboratorio Nacional de Fusión, CIEMAT, Madrid, Spain, 2012.
January 19-20

David Sánchez, Rosa López
Scattering Theory of Nonlinear Thermoelectric Transport.
NanoCTM: Workshop on Thermoelectric Transport, Cargese, France, 2012.
October 18-22

Eguíluz, V. M.
Opinion dynamics: is the voter model a model for voters?
FisEs '12 XVIII Congreso de Física Estadística (Palma de Mallorca, Spain).
October 19

Fischer, Ingo
Delay-Coupled Laser Networks: Complex Behavior, Synchronization and Applications.
DPG Spring Meeting 2012, Berlin, Germany.
March 25-30

Fischer, Ingo
Generalized synchronization of nonlinear oscillators: How to understand and how to detect?
NeFF-Workshop on Non-linear and model-free. Interdependence Measures in Neuroscience, Frankfurt, Germany.
April 26-27

Fischer, Ingo
Chaotic delayed maps and their natural measure.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

Fischer, Ingo
Dynamics and Synchronization Phenomena in Delay-Coupled Laser Systems.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

Gomila, D.; Paulau, P.V.; Colet, P.; Firth, W.J.; Ackemann, T.
Self-localized states in lasers with external feedback.
XVI International Conference "School Foundations & Advances in Nonlinear Science" and International Symposium "Advances in Nonlinear Photonics" FANS & ANPh 2012, Minsk 2012.
September 24-28

Hernández-García, E.
Lines in the ocean: Impacts of chaotic stirring across biological scales.
MEDYFINOL 2012: XVII Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics, Santiago de Chile.
December 3-7

Hernández-García, E.; López, C.
Following the line: Marine birds fly on top of ocean coherent structures.
Search and stochastic phenomena in complex physical and biological systems, Palma de Mallorca, Spain.
June 1

López, C; Heinsalu, E; Hernández-García, E
Competitive Brownian and Levy walkers.
Search and Stochastic Phenomena in Complex Physical and Biological Systems, Palma de Mallorca.
June 1

Maxi San Miguel
Mesa redonda: 25 años de FISES.
FISES 2012, Palma de Mallorca, Spain.
October 18-20

Manzano, Gonzalo; Galve, Fernando; Giorgi, Gianluca; Colet, Pere; Hernández, Emilio; Zambrini, Roberta.
From classical to quantum synchronization.
Quantum twin workshops 2012, Favignana, Trapani, Italy.
May 31-June 2

Maxi San Miguel
Keynote: Social consensus as a

selforganization phenomenon.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

Maxi San Miguel
Modelling collective social dynamics.
Du monde quantique à la dinamique non-linéaire. Symposium en l'honneur de Pierre Glorieux, Lille, France.
November 8

Maxi San Miguel
Opinion Diffusion Shaped by Human Mobility Networks.
Agent-Based models and complex techno-social systems, Zurich, Switzerland.
July 2-4

Maxi San Miguel
What do we learn from simple models of social behavior?
Social Media and Social Networks, Cambridge, UK.
January 18

Maxi San Miguel
Searching for the absorbing state in the voter model.
Search and Stochastic Phenomena in Complex Physical and Biological Systems, Palma de Mallorca, Spain.
May 28-June 1

Maxi San Miguel
Keynote: Social Consensus as a Self-Organization Phenomenon.
SASO 2012: Sixth IEEE International Conference on Self-Adaptive and Self-Organizing Systems, Lyon, France.
September 10-14

Maxi San Miguel
Panel discussion: SASO systems-New research directions.
SASO 2012: Sixth IEEE International Conference on Self-Adaptive and Self-Organizing Systems, Lyon, France.
September 10-12

Maxi San Miguel
Round table: City Systems.
First Open Global Systems Conference, Brussels, Belgium.
November 7-10

Mirasso, Claudio R.; Soriano, Miguel C.; Brunner, Daniel; Appeltant, Lennert; Danckaert, Jan; Fischer, Ingo.
Information processing with transients states generated by delay-coupled dynamical systems.
Dynamics Days South America 2012 Plenary, Cartagena, Colombia.
November 23

Mirasso, Claudio R.; Soriano, Miguel C.; Brunner, Daniel; Fischer, Ingo.
Mimicking the brain: information processing with delay-coupled systems.
MEDYFINOL 2012 XVII edition, Santiago de Chile .
December 5

Ramasco, Jose J.
Influence of opinion on the evolution of games.
IV Workshop in Econosociofísica, Zaragoza, Spain.
November 28-30

Ramasco, Jose J.
Social features of online networks: the strength of intermediary ties in online social media.
Conference on "Web epistemics \– How the Web shapes what we believe and know, how we learn and what we are", Bielefeld, Germany.
February 15-17

López, Rosa
Kondo effect in nanostructures.
NTH School for Contacts in Nanosystems, Austria.
October 2-8

Toral, Raúl
Heterogeneity in stochastic interacting-particle systems.
Invited talk at MEDYFINOL 2012, Santiago de Chile.
December 3-7

Toral, Raúl
Stochastic description of delayed systems.
Invited talk at the International Conference on Delayed Complex Systems, Palma de Mallorca, Spain.
June 4-8

Toral, Raúl
A master equation approach to fluctuations in heterogenous and delayed systems.
Invited talk in "Small Matters" conference at UCSD.
July 23

Tugores, Antònia; Colet, Pere
Web interface for generic grid jobs Web4Grid.
Jornada de Usuarios de Infrastructura Grid, Madrid, Spain. Related to Grid-CSIC project.
January 19-20

Zambrini; Roberta
From classical to quantum synchronization.
6th Workshop on Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons, Torino, Italy.
May 20-26

a.6.2 Other talks in conferences and workshops

Fernández-Gracia, J.; Eguíluz, V.M.; San Miguel, M.
Modeling Broad Interevent Time Distributions: Update Rules in Opinion Models.
The Seventh International Workshop on Agent-based Approaches in Economics and Social Complex Systems AESCS 2012.
January 17-18

Vilone, D.; Ramasco, J.J; San Miguel, M.; Sánchez, A.
Effects of mixed dynamics in spin systems with conserved magnetization.
Talk presented at the GISC Workshop 2012, Universidad Autónoma de Madrid, Spain.
February 3

Ramasco, Jose J.
Social features of online networks: the strength of intermediary ties in online social media.
CompleNet 2012, Melbourne, Florida,

USA.
March 7-9

Sánchez, David; Serra, Llorenç
Asymmetric thermopower in mesoscopic transport.
V Encuentro de la Red Española de Física de Sistemas Fuera del Equilibrio 2012, Sevilla, Spain.
March 7-9

Ramasco, Jose J.
The strength of intermediary ties in online social media.
Sunbelt Social Network Conference XXXII, Los Angeles, USA.
March 12-18

F. Galve, L. A. Pachon, D. Zueco
Bringing Entanglement to the High Temperature Limit.
Quantum Information and Measurement, Berlin, OSA, 2012.
March 19-21

Tuzón, Paula; Ramasco, José J.; Eguíluz, Víctor M.; San Miguel, Maxi
Single vs multiple source mechanisms in social diffusion.
DPG Spring Meeting 2012, Berlin, Germany.
March 25-30

Tugores, Antònia; Colet, Pere
Web4Grid, web interface for grid jobs.
EGI Community Forum 2012, Munich, Germany.
March 26-30

Oliver, N.; Soriano, M. C.; Sukow, D. W.; Fischer, I.
Dynamics of semiconductor lasers with delayed polarization-rotated feedback and its application for fast random bit generation.
DPG Spring Meeting 2012 of the Condensed Matter Section, Berlin, Germany.
March 26

Hicke, K; Tiana-Alsina,J; Porte, X.; Soriano, M. C.; Torrent, M. C.; Garcia-Ojalvo, J.; Fischer, I.
Synchronization in mutually delay-coupled semiconductor lasers and its decay due to bubbling.
DPG Spring Meeting 2012, Berlin, Germany.
March 27

Fernández-Gracia, Juan
Opinion diffussion on commuting populations.
DPG Spring Meeting 2012 of the Condensed Matter Section.
March 27

D'Huys, Otti; Vicente, Raúl; Danckaert, Jan; Fischer, Ingo
Dynamical properties of two delay-coupled lasers: on spectra, correlations and synchronisation.
Talk at SPIE 2012 Photonics Europe Conference, Brussels, Belgium.
April 16-19

F. Galve, G. L. Giorgi and R. Zambrini
Quantum Discord of Two Qubits: Maximally correlated states and sufficiency of perfect measurements.
Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons, Turin, Italy.
May 21-25

Martínez García, Ricardo; Calabrese, Justin M.; López, Cristóbal
A nonlocal model for savannas.
Search and stochastic phenomena in complex physical and biological systems, Palma de Mallorca, Spain.
May 29

Lafuerza, Luis; Toral, Raúl
Collective fluctuations in systems of non-identical random walkers.
Search and stochastic phenomena in complex physical and biological systems, Palma de Mallorca, Spain.
May 30

Ackemann, T.; Noblet, Y.; Paulau, P.V.; McIntyre, C.; Colet, P.; Firth, W.J.; Oppo G.-L.
Effects of disorder in broad-area VCSELs: Mapping and locking dynamics.
5th European Workshop on VCSELs, TU-Berlin, Germany.
June 1

Tuzón, P.; Ramasco, J.J.; Eguíluz, V.M.; San Miguel, M.
Discriminating single and multiple source mechanisms in social spreading processes.
NoLineal 2012, Zaragoza, Spain.
June 4-6

Brunner, D.; Cornelles Soriano, M.; Larger, L.; Mirasso, C.; Fischer, I.; Appeltant, L.; L. Larger,
Information processing utilizing delay systems.
International Conference on Delayed Complex Systems.
June 4-8

Tuzón, Paula; Ramasco, José J.; Eguíluz, Víctor M.; San Miguel, Maxi.
Discriminating single and multiple source mechanisms in social spreading processes.
Nolineal 2012, Zaragoza, Spain.
June 4-6

Bettencourt, Joao; López, Cristóbal; Hernández-García, Emilio;
Estruturas Lagrangeanas Coerentes na mesoescala oceânica.
Encontro de Oceanografia Física, Figueira da Foz, Portugal.
June 15-16

Noblet, Yoann; Paulau, Pavel V.; McIntyre, Craig; Firth, William; Colet, Pere; Oppo,Gian-Luca
Adler synchronization of spatial laser solitons pinned by defects.
2012 Nonlinear Photonics (NP) Topical Meeting, Colorado Springs, USA.
June 17-21

Carro, Adrián; Toral, Raúl; San Miguel, Maxi
Stochastic resonance and diversity in an agent-based herding model.
Workshop on Heterogeneous Interacting Agents, University of Pantheon-Assas Paris II, Paris, France.
June 19-23

Fernández-Gracia, Juan
Opinion diffusion shaped by human mobility.
18TH INTERNATIONAL CONFERENCE ON COMPUTING IN ECONOMICS AND FINANCE, Prague, Czech Republic.
June 27

Fleurquin, Pablo; Ramasco, José J.; Eguíluz Víctor M.
Characterization of delay propagation in the airport network.
2012 Air Transport Research Society Conference, Tainan, Taiwan.
June 27-30

San Miguel, Maxi
Presentación del Flagship FuturICT.
MINECO, Madrid, Spain.
June 28

Ramasco, Jose J.
Social features of online networks: the strength of intermediary ties in online social media.
Agent-based models and complex techno-social systems, Zurich, Switzerland.
July 2-4

Bettencourt,João; López, Cristóbal; Hernández-García, Emilio
Mesoscale three-dimensional Lagrangian Coherent Structures.
Nonlinear processes in oceanic and atmospheric flows 2nd international workshop ICMAT-UAM, Madrid, Spain.
July 3-6

Serra, Llorenç
How robust are Majorana modes in multiband semiconductor wires?
ICN+T 2012. International Conference on Nanoscience and Technology, Paris, France.
July 23-27

Martínez-Llinàs, Jade; Colet, Pere
Synchronization in delayed mutually coupled optoelectronic oscillators.
Summer School "Nonlinear dynamics in Peyresq", Peyresq, France.
August 23-30

Brunner, D.; Cornelles Soriano, M.; Mirasso, C.; Fischer, I.
All optical Reservoir Computing with GByte/s rate.
European conference on Complex Systems (ECCS) 2012.
September 3-7

Oppo, G.-L.; Paulau, P.V.; McIntyre, C.; Noblet, Y.; Radwell, N.; Firth, W.J.; Colet, P.; Ackemann, T.
Locking of Laser Cavity Solitons.
Photon 12, Durham, UK.
September 3-6

Daniele Vilone; Jose J. Ramasco; Angel Sánchez; Maxi San Miguel
On the irrationality of consensus in heterogeneous networks.
European Conference on Complex Systems 2012 (CODYM Workshop), Brussels, Belgium .
September 4

Ackemann, T.; Noblet, Y.; Paulau, P.V.; McIntyre, C.; Colet, P.; Firth, W.J.; Oppo, G.-L.
Dynamics of single and coupled laser cavity solitons in a VCSEL with frequency-selective feedback.
International Workshop on Nonlinear Dynamics in Semiconductor Lasers, Berlin, Germany.
September 12-October 1

Kato, H. ; Cuellar, C. A. ; Delgado-Lezama, R. ; Rudomin, P. ; Jiménez, I. ; Manjarrez, E. ; Mirasso, C. R.
Modeling of spontaneous zero-lag and propagating synchronization in cat spinal cord.
12th Granada Seminar, Spain.
September 17-21

F. Galve, G. L. Giorgi and R. Zambrini
Quantum discord of two qubits: maximally correlated states and sufficiency of perfect measurements.
Workshop de Información Cuántica en España, Madrid, Spain.
September 17-19

Zambrini, Roberta
From classical to quantum synchronization.
Workshop de Información Cuántica en España , Madrid, Spain.
September 17-19

Soriano, Miguel C.; Brunner, Daniel; Ortín, Silvia; Mirasso, Claudio R.; Larger, Laurent; Fischer, Ingo; Pesquera, Luis
A Novel Photonics Approach To Unconventional Information Processing.
CLEO Focus meeting at ECOC 2012, Amsterdam, Netherlands.
September 19

Matias, Fernanda S. ; Gollo, Leonardo L. ; Carelli, Pedro V. ; Copelli, Mauro; Mirasso, Claudio R.
Anticipated Synchronization Between Neuronal Populations.
12th Granada Seminars: Physics, Computation, and the Mind - Advances and Challenges at Interfaces, Spain.
September 20

Porte, Xavier; Brunner, Daniel; Soriano, Miguel C.; Fischer, Ingo
Real-time intensity and frequency dynamics of semiconductor lasers subject to delayed optical feedback.
EOS Annual Meeting 2012.
September 25-28

Sintes, T.; Sánchez, P.A.; Cerdà, J.J.; Holm, C.
Optimal Ring Size in Magnetic Filaments.
Conference on Computational Physics (CCP 2012) Kobe.
October 14-18

Gollo, Leonardo L.; Kinouchi, Osame; Copelli, Mauro
Towards a statistical mechanics of neurons: The excitable-wave mean-field approximation.
FisEs12
October 19

Sánchez, David; Lim, Jong Soo; López, Rosa
Spintronic Fluctuation Relations.
FisEs'12, XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 20

Nicola, Ernesto M. ; O'Maoileidigh, D. ; Hudspeth, A. J.
Relating the ear's minuscule amplifiers to their environment.
FisEs12
October 20

Brunner, D. ; Cornelles Soriano, M. : Larger, L. ; Appeltant, L. ; Fischer, I.
Information processing utilizing delay systems.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

Kato, Hideyuki; Ikeguchi, Tohru
Spike Timing-Dependent Plasticity in Sparse Recurrent Neural Networks.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

P. Parra-Rivas, D. Gomila, M. A. Matías & P. Colet
Effects of a defect and drift on dissipative solitons.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 22-26

Cornelles Soriano, Miguel; Van der Sande, Guy; Fischer, Ingo; Mirasso, Claudio
Synchronization Without Correlation.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 24

Hernández-García, Emilio; Komin, Niki; Murza, Adrián C. ; Toral, Raúl
Heterogeneity effects on the synchronization and entrainment of coupled circadian oscillators.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 24

Patriarca, M. ; Postnova, S. ; Braun, H. A. ; Hernández-García, E. ; Toral, R.
Modelling the homeostatic regulation of the sleep-wake cycle: role of diversity.
NOLTA2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 24

Matias, Fernanda S. ; Carelli, Pedro V. ; Mirasso, Claudio R. ; Copelli, Mauro
Inhibitory Feedback Loop Induces Anticipated Synchronization in Neuronal Networks.
NOLTA 2012, International Symposium on Nonlinear Theory and its Applications, Palma de Mallorca, Spain.
October 25-25

Fleurquin, Pablo; Ramasco, José J. ; Eguíluz, Víctor M.
Systemic propagation of delays in the US airport network.
The Second SESAR Innovation Days, Braunschweig, Germany.
November 27-29

Carro, Adrián; Toral, Raúl; San Miguel, Maxi
Stochastic resonance in an agent-based herding model.
IV Workshop de econosociofisica, University of Zaragoza, Spain.
November 28-30

Lafuerza, Luis F. ; Toral, Raúl
On the effect of heterogeneity in stochastic agent-based models.
IV Workshop de econosociofísica, Zaragoza, Spain.
November 29

a.6.3 Poster presentations

Carro, Adrián; Toral, Raúl; San Miguel, Maxi
The role of noise and initial conditions in the asymptotic solution of the Deffuant et al. model.
DPG Spring Meeting 2012 of the Condensed Matter Section.
March 25-30

Appeltant, L.; Soriano, M.C.; Van der Sande, G.; Danckaert, J.; Massar, S.; Dambre, J.; Schrauwen, B.; Mirasso, C. R.; Fischer, I.
Computing using delayed feedback systems: towards photonics.
SPIE 2012 Photonics Europe, Brussels, Belgium.
April 16-19

J. Bettencourt C. López; E. Hernández-García
Oceanic three-dimensional Lagrangian Coherent Structures in the Benguela ocean region.
Annual Assembly European Geosciences Union Vienna.
April 22-27

F. Galve, D. Zueco and L. A. Pachon
Bringing entanglement to the high temperature limit.
Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons, Turin, Italy.
May 21-25

Tugrul, M.; Hernández-García, E.; Eguíluz, V. M.; Keller-Schmidt, S.; Klemm, K.
Branching models with distributed ages for macroevolution.
International Conference on Delayed Complex Systems 2012, Palma de Mallorca, Spain.
June 4

Oliver, N.; Soriano, M. C.; Fischer, I.; Sukow, D. W.
Dynamics of semiconductor lasers with delayed feedback and its application for fast random bit generation.
International conference on Delayed Complex Systems 2012, Palma de Mallorca, Spain.
June 4

Porte, Xavier; Brunner, Daniel; Soriano, Miguel C.; Fischer, Ingo
Dynamics of semiconductor lasers with delayed optical feedback: novel techniques and insights.
International Conference on Delayed Complex Systems.
June 4

López, Rosa; Lim, Jong Soo; Sánchez, David
Fluctuation relations for spintronics.
XXIII SITGES CONFERENCE on Statistical Mechanics, Sitges, Spain.
June 4-8

Hicke, K.; Porte, X.; Fischer, I.
Zero-lag synchronization and its loss in a delay-coupled laser system.
International Conference on Delayed Complex Systems 2012, Palma de Mallorca, Spain.
June 5

Fernández-Gracia, Juan
Link-based social dynamics in complex networks: time evolution and heterogeneous asymptotic states.
DPG Spring Meeting 2012 of the Condensed Matter Section.
June 27

Hernández-García, E.; Bettencourt, J. H.; López, C.

Coherent Structures in Three-Dimensional Flows.
2nd International Workshop on "Nonlinear Processes in Oceanic and Atmospheric Flows", Madrid, Spain.
July 3-6

López, C.; Hernández-Carrasco, I.; Rossi, V.; Sudre, J.; Hernández-García, E.; Garçon, V.
Reduction of biological production due to vigorous horizontal mixing in the Benguela upwelling system.
2nd International Workshop on "Nonlinear Processes in Oceanic and Atmospheric Flows", Madrid, Spain.
July 3-6

Daniele Vilone; Jose J. Ramasco; Angel Sánchez; Maxi San Miguel.
Rational and irrational dynamics are both needed to reach consensus in random topologies.
International Workshop on Agent-Based Models and Complex Techno-Social Systems; Zurich, Switzerland.
July 3

Serra, Llorenç; Sánchez, David
Magnetic field asymmetric thermopower of mesoscopic conductors.
ICN+T 2012, International Conference on Nanoscience and Technology, Paris, France.
July 23-27

López, Rosa; Lim, Jong Soo; Sanchez, David
Higher-order fluctuation relations for spintronic devices.
ICPS 2012, Zurich, Switzerland.
July 29-August 3

Tuzón, Paula; Ramasco, José J.; Eguíluz, Víctor M.; San Miguel, Maxi
Complex contagion in networks.
Epidemics on Networks 2012, Girona, Spain.
September 5-7

López, Rosa; Lim, Jong Soo; Sánchez, David
Fluctuation Relations for Spintronics.
Trends in Nanotechnology: TNT2012, Madrid, Spain.
September 10-14

Gollo, Leonardo L.; Mirasso, Claudio; Eguíluz, Víctor M.
Signal integration shapes the dynamics and enhances the dynamic range of neuronal networks.
12th Granada Seminar, Spain.
September 17-21

Fernández Lafuerza, Luis; Toral, Raúl
On the effect of heterogeneity in stochastic interacting-particle systems.
FisEs12.
October 18

Cornelles Soriano, Miguel; Nguimdo, Romain Modeste; Colet, Pere
Delay identification in semiconductor lasers with optical feedback.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-20

E. Hernández-García, I. Hernández-Carrasco, V. Rossi, V. Garcon, C. López.
Biological production and plankton dynamics in a turbulent ocean upwelling system.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-18

Martínez-Llinàs, Jade; Colet, Pere
Synchronization in delayed mutually coupled optoelectronic oscillators.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18

Zamora-Munt, Jordi; Matías, Manuel A.; Colet, Pere
Synchronization transitions in a growing complex network of Stuart-Landau oscillators.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-20

Tuzón, Paula; Ramasco, José J.; Eguíluz, Víctor M.; San Miguel, Maxi.
Modelling information diffusion from empirical data.
FISES'12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-20

Lim, Jong Soo; López, Rosa; Sánchez, David
Magnetoasymmetric transport in a quantum dot Aharonov-Bohm interferometer.
FisEs '12, Palma de Mallorca, Spain.
October 18-20

Carro, Adrián; Toral, Raúl; San Miguel, Maxi
The role of noise and initial conditions in the asymptotic solution of a continuous opinion dynamics model.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-20

Carro, Adrián; Toral, Raúl; San Miguel, Maxi
Stochastic resonance in an agent-based herding model.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18-20

Gomila, Damià; Jacobo, Adrián; Matías, Manuel A.; Colet, Pere
Logical Operations with Localized Structures.
XVIII Congreso de Física Estadística FisEs 2012, Palma de Mallorca, Spain.
October 18-20

Gomila, Damià; Colet, Pere; Walgraef, Daniel; Ackemann, Thorsten
Patterns and Domain Walls in Generalized Swift-Hohenberg Dynamics.
XVIII Congreso de Física Estadística FisEs 2012, Palma de Mallorca, Spain.
October 18-20

Manzano, Gonzalo; Galve, Fernando; Giorgi, Gianluca; Colet, Pere; Hernández-García, Emilio; Zambrini, Roberta
Synchronization and quantum correlations in networks.
XVIII Congreso de Física Estadística FISES'12, Palma de Mallorca, Spain .
October 18-20

Parra-Rivas, Pedro; Gomila, Damià; Matías, Manuel A.; Colet, Pere
Effects of a defect and drift on dissipative solitons.
XVIII Congreso de Física Estadística,

FisEs 2012, IFISC (UIB-CSIC), Palma de Mallorca, Spain.
October 18-20

Víctor Rodríguez, Mario Cosenza
Amplitude death in globally coupled chaotic systems with delay.
FisEs '12 XVIII Congreso de Física Estadística,. Palma de Mallorca, Spain.
October 18-20

Daniele Vilone; Jose J. Ramasco; Angel Sánchez; Maxi San Miguel.
On the irrationality of consensus in heterogeneous networks.
XVIII Congreso de Física Estadística (FisEs), Palma de Mallorca, Spain.
October 18-20

Colet, Pere; Nguimdo, Romain Modeste; Chembo, Yanne Kouomou; Larger, Laurent
Phase Noise Performance of Double-Loop Optoelectronic Microwave Oscillators.
XVIII Congreso de Física Estadística FISES'12, Palma de Mallorca, Spain.
October 18-20

Tugores, María Antonia; Colet, Pere
Grid computing for statistical and non-linear physics.
XVIII Congreso de Física Estadística FISES'12, Palma de Mallorca, Spain.
October 18-20

Colet, Pere; Paulau, Pavel V.; McIntyre, Craig; Noblet, Yoann; Radwell, N.; Firth, William J.; Ackemann, Thorsten; Oppo, Gian-Luca
Adler synchronization of spatial laser solitons pinned by defects.
XVIII Congreso de Física Estadística FISES'12, Palma de Mallorca, Spain.
October 18-20

López, C.; Bettencourt, J.H.; Hernández-García, E.
Lagrangian Coherent Structures in three-dimensiona flows.
FisEs'2012, XVIII Reunión de Física Estadística, Palma de Mallorca, Spain.
October 18-20

Cerdà, J.J.; Sánchez P.; Sintes T.
Phase diagram of a single magnetic filament in bulk, an approach via numerical simulations and theory.
FISES 2012, XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 18

Nicola, E.M.; N.W. Goehring; P. Khuc Trong; J.S. Bois; D. Chowdhury; A.A. Hyman; S.W. Grill
A reaction-diffusion system to model symmetry-breaking in the C. elegans worm.
FisEs12.
October 18-20

Fernández Lafuerza, Luis; Toral Raúl
Role of delay in the stochastic birth and death process.
FisEs12.
October 19

Martínez García, Ricardo; Calabrese, Justin M.; López, Cristóbal
A non local spatial model for savannas.
FisEs'12.
October 19

Martínez García, Ricardo; Calabrese, Justin M.; López, Cristóbal
A long range interaction model for foragers.
FisEs'12.
October 19

Fernández-Gracia, Juan
Link-based social dynamics in complex networks: time evolution and heterogeneous asymptotic states.
FisEs '12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 19

Matías, Fernanda S.; Gollo, Leonardo L.; Carelli, Pedro V.; Copelli, Mauro; Mirasso, Claudio R.
Inhibitory Synaptic Conductances Mediate Transition From Delayed Synchronization to Anticipated Synchronization Between Neuronal Populations.
FisEs'12 XVIII Congreso de Física Estadística, Palma de Mallorca, Spain.
October 19

Tugores, Antònia; Colet, Pere
Efficient file management.
Ibergrid 2012 - iberian grid conference, Lisbon, Portugal.
November 7-9

Tugores, Antònia; Colet, Pere
Integration of Web4Grid with intranet at CSIC.
IBERGRID 2012 - Iberian Grid conference, Lisbon, Portugal.
November 7-9

Fleurquin, Pablo; Ramasco, José J.; Eguíluz Víctor M.
Systemic propagation of delays in the US airport network.
The Second SESAR Innovation Days, Braunschweig, Germany.
November 27-29

Pineda, M.; Toral, R.; Hernández-García, E.
Effects of noise on the Hegselmann-Krause model for continuous opinion dynamics.
MEDYFINOL 2012: XVII Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics, Santiago de Chile.
December 3-7

a.6.4 Seminar talks in other research centers

Zambrini, Roberta
Quantum synchronization.
Finite Systems department at Max Planck Institute for the Physics of Complex Systems, Dresden, German).
January 25

Daniele Vilone
Chaos and Unpredictability in Evolutionary Dynamics.
Seminar held at Consiglio Nazionale delle Ricerche (CNR) - IENI Institute, Milan, Italy.
February 10

Sánchez, David
Asymmetric thermopower in mesoscopic conductors.
Seminar presented at the University of Geneva.
April 11

San Miguel, Maxi
Modelling problems of social consensus.
Seminar IFIMAR, Mar del Plata, Argentina.
April 12

Perez-Serrano, Antonio
Exploring Laser Dynamics Using a Travelling Wave Model.
WIAS Institute, Berlin.
April 12

Cerdà J.J.; Sánchez P. ; Sintes. T.
Theory and simulations applied to the understanding of magnetic systems: ferrofluilds, shifted dipole particles, and magnetic filaments.
Dpto. Física , Universidad de Granada, Spain.
April 12

Sánchez, David
Spintronic Fluctuation Relations.
Seminar presented at the University of Regensburg, Germany.
May 8

Colet, Pere
Scientific Computing at IFISC.
Reunión de computación científica de altas prestaciones organizada por IBM. Santiago de Compostela, Spain.
June 18

Zambrini, Roberta
Quantum synchronization.
University College, Cork, Ireland.
July 9

Toral, Raúl
Role of heterogeneity and delay in interacting-particle systems.
Seminar at the Physics Department of Lehigh University.
July 1

P.Parra-Rivas; D.Gomila; M.A.Matías; P.Colet
Dissipative soliton excitability mediated by a spatial inhomogeneity and drift.
Applied Physics Research Group (APHY), Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium.
October 31

Toral, Raúl
Heterogeneity in stochastic interacting-particle systems.
Invited seminar at Department of Physics, Humboldt University of Berlin, Germany.
October 31

Zamora-Munt, Jordi
Emergence of collective dynamics controlled by the system size in star networks.
Seminar in the framework of the Catalan Network for the Study of Complex Systems. Universitat de Barcelona, Spain.
November 5

Mirasso, Claudio R.
Dynamics and synchronization of delay-coupled systems: from lasers to neurons.
Instituto de Física Teórica, UNESP, Sao Paulo, Brasil.
December 11

Mirasso, Claudio R; Soriano, Miguel C.; Brunner, Daniel; Fischer, Ingo
Mimicking the brain with delay-coupled systems: from electronic circuits to laser systems.
Instituto Nacional de Pesquisas Espaciais, Sao Paulo, Brasil.
December 12

Claudio R. Mirasso
A novel model for the coherent perception.
Departamento de Física, Universidad de Buenos Aires, Argentina.
December 17

Mirasso, Claudio R.; Soriano, Miguel C.; Brunner, Daniel; Fischer, Ingo
Mimicking the brain with delay-coupled systems: from electronic circuits to laser systems.
Centro de Investigaciones Ópticas de La Plata, Argentina.
December 19

a.8. Press & Media

Titles are hyperlinked to the corresponding PDF file, or to the audio/video clip

a.8.1 Written Media

La tesi doctoral d´ Antonio Pérez fa una passa endavant cap als ordinadors del futur amb un nou model de làser de semiconductor d´anell.
Nota informativa UIB.
January 9

Memoria Ibergrid.
February 1

Los más influyentes de la red.
El Mundo. B@leópolis.
February 13

Un algoritmo matemático permite identificar los nodos más influyentes de una red compleja.
Nota informativa CSIC.
February 29

Un algoritmo matemático localiza los nodos más influyentes de una Red.
Notícia SINC. Servicio de Información y Noticias Científicas.
February 29

La UIB encenta l'Any de la Neurociència 2012 amb el Cicle Reptes i assoliments de la Neurociència Cognitiva.
Nota informativa UIB
February 29

Un algoritmo matemático permite identificar los nodos más influyentes de una red compleja.
Nota de prensa CSIC.
February 29

Reptes i èxit de la Neurociència cognitiva, a CaixaForum Palma.
Nota de Prensa CaixaForum.
March 1

El IFISC a tope con la complejidad.
Diario de Mallorca.
March 2

UIB i CSIC desenvolupen un sistema aplicable a un ús racional de les vacunes.

Diario de Mallorca. Suplement Universitat.
March 8

Cela Conde parla de la ment i del cervell.
Diario de Mallorca. Suplement Universitat.
March 8

Big Bang.
Diario de Mallorca. Suplemento La Almudaina.
March 11

Los economistas se equivocan al partir de la base de que el hombre es racional.
Diario de Mallorca.
March 12

Investigadors de l›IFISC (CSIC-UIB) i de la Universitat Rockefeller de Nova York desxifren els secrets que permeten a l›oïda amplificar sons molts dèbils.
Nota informativa UIB.
March 16

Científicos de Balears y de EEUU descifran los secretos del oído.
Ultima Hora.
March 17

Investigadors de la UIB i EUA desxifren els secrets de l›oïda.
Diari de Balears.
March 17

La música es bilateral activa los dos hemisferios.
El Mundo. B@leópolis.
March 20

«La música es bilateral activa los dos hemisferios».
Interview to Rodríguez-Fornells for the Conference Series «Explorant les Fronteres entre els Sabers V».
March 20

Els secrets de l'oïda, al descobert.
Diario de Mallorca. Suplemento Universitat.
March 22

Descifran los secretos que permiten al oído amplificar sonidos muy débiles.
Noticia SINC. (Servicio de Información y Noticias Científicas).
March 23

Hablando de Ciencia.
Diario de Mallorca. Suplemento La Almudaina.
March 25

La memoria no es fiable.
El Mundo. B@leópolis.
April 3

Expertos en buscarse la vida.
Diario de Mallorca.
April 8

Ciliadas, los altavoces de nuestro oído. El Mundo. B@leópolis.
April 10

La atención desplaza al dinero.
El Mundo. B@leópolis.
June 5

Investigadors de l´ IFISC estudien la sincronització de solitons en làsers de semiconductor.
Diario de Mallorca, Suplement Universitat.
June 7

L´IFISC renova el clúster de computació Nuredduna per millorar la potència de càlcul.
Diario de Mallorca.
June 14

Agenda Cultural. Correguda.
Diari de Balears.
June 18

Vehículos solares compiten en una carrera en la UIB.
Diario de Mallorca.
June 19

La UIB celebra la tercera cursa de cotxes solars.
Diari de Balears.
June 19

Los ‹Fórmula 1› solares.
El Mundo. B@leópolis.
June 19

Gran carrera de coches solares en la UIB.
Ultima Hora.
June 19

El magnetismo del electrón.
El Mundo. B@leópolis.
June 19

Els instituts, a la carrera de cotxes solars de la UIB.
Diario de Mallorca.
June 20

Fluctuacions de corrent per a dispositius nanoelectrónics.
Diario de Mallorca.
June 2

L´ IFISC celebra la primera Escola d´Estiu LINC.
Nota infomativa UIB.
September 7

L´ IFISC celebra la primera Escola d´ Estiu LINC.
Nota informativa UIB.
September 10

L´ IFISC coordina el projecte europeu EUNOIA sobre movilitat urbana.
Nota informativa UIB.
October 9

Fueron físicos que exploraron con pasión la verdad de la naturaleza.
El Mundo. B@leópolis.
October 9

Existe un paralelismo entre los poetas y los físicos malditos.
Tam-Tam Press.
October 10

L´ IFISC coordina el projecte europeu EUNOIA sobre mobilitat urbana.
Diario de Mallorca. Suplement Universitat.
October 11

Ciudades con cabeza.
El Mundo. B@leópolis.
October 16

L´ IFISC reuneix 250 investigadors en el XVIII Congrés de Física Estadística.
Nota de Prensa UIB.
October 17

L´ IFISC reuneix més de 300 investigadors a l´ internacional Simposium on Nonlinear Theory and its

applications (NOLTA 2012).
Nota informativa UIB.
October 23

FISES 2012 reuneix 250 investigadors a la UIB.
Diario de Mallorca.
October 25

L´IFISC també organitza activitats a la Setmana de la Ciència.
Diario de Mallorca.
October 25

Los sistemas caóticos abren nuevas vías para entender el cerebro.
El Mundo. B@leópolis.
October 30

Cerebro y chocolate en la Semana de la Ciencia de la UIB.
El Mundo. B@leópolis.
November 6

Els grups de recerca de la UIB mostren els resultats del seu treball.
Diario de Mallorca.
November 8

Agenda Balear: Semana de la Ciencia en la UIB.
El Mundo.
November 13

L'IFISC obre les portes als instituts per la Setmana de la Ciència.
Diario de Mallorca.
November 15

Agenda Balear: Semana de la Ciencia en la UIB.
El Mundo.
November 20

Computación, "Deus ex machina".
El Mundo.
November 20

La Universitat s'obre als instituts per mostrar la recerca en física.
Diario de Mallorca.
November 21

Guardó Onda Cero.
Diari de Balears.
November 28

Banco de Alimentos, Toni Nadal y Dj Juan Campos reciben el premio Onda Cero.
Diario de Mallorca.
November 28

Fernández-Coca y Antoni Torrens, entre los II Premios Onda Cero.
El Mundo-El Día de Baleares.
November 28

Banco de Alimentos, Toni Nadal, Tomás Monserrat y dj Juan Campos, entre los II Premios Onda Cero.
Última Hora.
November 28

L'IFISC i el doctor Antonio Fernández Coca, guardonats en els Premis Onda Cero Mallorca 2012.
Nota Informativa UIB.
November 28

a.8.2 Radio and TV

Interview to Prof. Claudio Mirasso, Dr. Enric Munar and Luis Martínez for the Conference Series "Explorant les Fronteres entre els Sabers V".
IB3 Ràdio. "Balears fa Ciència" show.
March 3

Interview to Dr. Víctor M. Eguíluz.
Canal Extremadura."Principio de incertidumbre" show.
March 7

Interview to Dr. Rodríguez-Fornells for the Conference Series "Explorant les Fronteres ente els Sabers V".
Cadena SER. "A vivir que son dos días" show.
March 11

Interview to Dr. Camilo José Cela for the Conference Series "Explorant Les Fronteres entre els Saber V".
IB3 Ràdio. "Balears fa Ciència" show.
March 17

Interview to Dr. Enric Munar , Dr. Rodriguez Fornells and Dr. Maestú for the Conference Series "Explorant Les Fronteres entre els Sabers V".
IB3 Ràdio. "Balears fa Ciència" show.
March 24
IB3 Ràdio. "Balears fa Ciència" show.
March 31

Interview to Dr. Rosa López and Dr. Sonia Fernández-Vidal.
IB3 Ràdio. "Balears fa Ciència" show.
April 4

Interview to Prof. Huberman.
IB3 Ràdio.
June 2

Cursa de petits cotxes solars.
IB3 Televisió.
June 18

Tercera edición de la carrera de coches solares.
RTVE.
June 18

Interview to Prof. Claudio Mirasso.
IB3 Ràdio. "Balears fa Ciència" show.
November 3

Interview to Llorenç Serra.
IB Ràdio. "Balears fa Ciència" show.
November 10