14th National Congress of the Australian Institute of Physics

Adelaide University, South Australia
December 10 - 15, 2000

Driving Technology Through Discovery, Understanding and Innovation

Congress Handbook

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General Information

1. Congress Accommodation

Hotels

Stamford Plaza Adelaide
150 North Terrace, Adelaide
Tel: 8461 1111
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Adelaide Paringa Motel
15 Hindley Street, Adelaide
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46 Pennington Terrace, North Adelaide
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Fax: 8267 4694

Royal Adelaide Hospital Residential Wing
North Terrace, Adelaide
Tel: 8222 5169
Fax: n/a

AINSE/NUPP

Kerr Grant
Chairperson: Brian Robson

Dr Stuart Tovey, University of Melbourne
Neutrino oscillations search in the NOMAD experiment

Dr Kevin Varvell, University of Sydney
Coherent meson production in the NOMAD experiment

Mr Frederic Bonnet, University of Adelaide
Revealing nonperturbutive physics in Lattice QCD

A/Prof Chris Hamer, University of NSW
Quantum Monte Carlo methods in Hamiltonia lattice gauge theory

AMPQC

Bonython Hall

Prof Gerard Milburn, The University of Queensland
Quantum phase transitions in an ion trap

Prof Victor Flambaum, University of New South Wales
Do fundamental constants vary with time and distance?

Dr Victor Karaganov, Flinders University
Superelastic scattering of electrons from laser excited alkali atoms

CMP

Bragg Theatre
Chairperson: John Liesegang

Prof James Williams, The Australian National University
From fundemental solid state physics to innovative semiconductor devices

A/Prof Steven Prawer
Diamonds and blue lasers

A/Prof Philip Smith, University of Newcastle
The dissociative chemisorption of silane on the SI(111)7x7 surface

Medical Physics

North Dining
Chairperson: Eva Bezak

Mr Jeremy Booth, Royal Adelaide Hospital
The effect of variable fractional doses on rectum complications

Dr Plamen Ch. Ivanov, Boston University
Fractal and multifractal approaches to human heartbeat dynamics

Mr Gullin Liu, Department of Medical Physics, Royal Adelaide Hospital
Linear accelerator mechanical radiation ISO centre assesment with an EP

Dr Gil Vella, University of Sydney
The effect of arterial perfusion on the measured ultrasound induced heating in a fetal skull bone phantom

Dr Michael Jackson, Royal Prince Alfred Hospital
Australian National Proton Facility

12:30 pm – 2:00 pm LUNCH

AINSE/NUPP

Kerr Grant
Chairperson: Robert Delbourgo

Dr Paul Coddington, Adelaide University
Cluster computing for the Lattice QCD simulations

Dr Vadim Guzey, University of Adelaide
On the role of delta (1232) in DIS on polarized He-3 and the extraction of neutron spin structure function g1n (x,Q2)

Miss Rachel Butt, Australian National University
The effect of target spin on fission fragment angular distributions

Dr Reza Hashemi-Nezhad, University of Sydney
Accelerator driven sub-critical nuclear assemblies; spallation neutron induced nuclear waste transmutation in lead and graphite neutron moderating environments

AMPQC

Bonython Hall

Mr Peter Riggs, Department of Defence
Quantum phenomena in terms of energy – momentum transfer

Mr Michael Bromley, Northern Territory University
Configuration interaction calculations of positronic atoms and ions

Dr Andrey Lugovskoy, University
Shake-up of a light atom in a collision with a hard wall

Mr Ben Travaglione, University of Queensland
Applying Kitaev's algorithm in an ion trap quantum computer

Prof Peter Drummond, University of Queensland
STIRAP in coupled atomic and molecular superchemistry

Mr Chanh Quoc Tran, University of Melbourne
X-ray extended-range technique for precision measurement of the x-ray mass attenuation coefficient and IM(F) for copper using synchrotron radiation

CMP

Bragg Theatre
Chairperson: Gerard Milburn

Prof Robert Clark, University of New South Wales
Australian US initiative to construct a silicon-based solid state quantum computer

Dr Robert Stamps, University of Western Australia
High frequency spin dynamics in magnetic heterostructures

Dr He Bi Sun, University of Queensland
Master Equation Approach to Probing Electron States

3:30 pm – 4:00 pm AFTERNOON TEA

3:30 pm – 6:00 pm AOS Poster Session 2, Games, Level 5

AMPQC

Bonython Hall

Mr Winfried Hensinger, The University of Queensland
Single atom phase space tunneling

Dr Howard Wiseman, Griffith University
Reducing the linewidth of an atom laser by feedback

Ms Jacinda Ginges, University of New South Wales
Calculation of parity nonconserving s-d transitions In Cs, Fr, Ra II, and Ba II

Dr Vladimir Dzuba, University of New South Wales
Atomic theory and test of the standard model

Dr Christopher Chantler, University of Melbourne
What is wrong with the fundamental constants of nature?

Dr David Paterson, University of Melbourne
High-accuracy absolute test of Quantum Electrodynamics for-helium-like and hydrogenic vanadium using the NIST electron-beam ion trap

Medical Physics

North Dining
Chairperson: Ian Maclean

Mr Setayesh Behin-Ain, Adelaide University
Enhanced Monte Carlo simulation techniques used in modeling early tumour detection

Dr Eva Bezak, Royal Adelaide Hospital
Monte Carlo simulations of proton energy deposition at the distal fall-off of the spread out Bragg peak in tissue

4:40 pm – 5:30 pm
Medical Physics Poster Session, Games, Level 5

STSP

Cinema, Level 5
Chairperson: Ray Morris

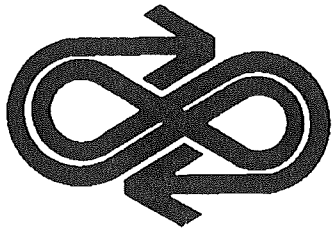
Dr Fred Menk, of Newcastle
Mapping the plasmapause using ULF waves

Dr Anthony Breed, Australian Antarctic Division
Polar patch studies above Casey, Antarctica

Prof Brian Fraser, University of Newcastle
Pc3-5 ULF wave observations from a triangular network of closely spaced magnetometers near Davis Station, Antarctica

Dr Pavlo Ponomarenko, University of Newcastle
Spectral structure of Pc3 ULF wave energy at high latitudes

Prof Brian Fraser, University of Newcastle
Southern hemisphere imaging riometer observations of impulsive transients in the high-latitude ionosphere



14th National Congress
of the
Australian Institute of Physics

Congress Abstracts and Posters Summaries

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14th [tional Congress of the Australian Institute of Physics

Adelaide University, South Australia: December 10 — 15, 2000

Driving Technology Through Discovery, Understanding and Innovation

AIP 2000 CONGRESS PROGRAM

AT A GLANCE

11:00 am — 12:30 pm CMP

Chairperson John Liesegang
Venue Bragg Theatre

11:00 am	412	Prof James Williams
11:35 am	413	A/Prof Steven Prawer
12:10 pm	414	A/Prof Philip Smith

11:00 am — 12:30 pm MEDICAL

Chairperson Eva Bezak
Venue North Dining

11:00 am	500	Mr Jeremy Booth
11:20 am	501	Dr Plamen Ch. Ivanov
11:40 am	502	Mr Guilin Liu
12:00 pm	503	Dr Gil Vella
12:20 pm	504	Dr Michael Jackson

11:00 am — 12:30 pm PLASMA2000

Chairperson Andrew Cheetham
Venue Rennie

11:00 am	700	Dr Alan Turnbull
11:30 am	701	Dr Boyd Blackwell
11:45 am	702	Mr Scott Collis
12:00 pm	703	Mr Fenton Glass
12:15 pm	704	Prof Robin Storer

11:00 am — 12:30 pm STSP

Chairperson TrevorHarris
Venue Cinema, Level 5

11:00 am	919	Dr Stuart Anderson
11:18 am	920	Dr Dan Meehan
11:36 am	921	Dr Didier Monselesan
11:54 am	922	Miss Larisa Lindsay
12:12 pm	923	Mr Brett Northey

2:00pm — 3:30 pm AINSE/NUPP

Chairperson Robert Delbourgo
Venue Kerr Grant

2:00 pm	044	Dr Paul Coddington
2:30 pm	045	Dr Vadim Guzey
2:50 pm	046	Miss Rachel Butt
3:10 pm	047	Dr Reza Hashemi-Nezhad

2:00 pm — 3:30 pm AMPQC

Chairperson
Venue Bonython Hall

2:00 pm	118	Mr Peter Riggs
2:15 pm	119	Mr Michael Bromley
2:30 pm	120	Dr Andrey Lugovskoy
2:45 pm	121	Mr Ben Travaglione
3:00 pm	122	Prof Peter Drummond
3:15 pm	123	Mr Chanh Quoc Tran

2:00 pm — 3:30 pm AOS

Chairperson Ken Baldwin
Venue Horace Lamb Theatre

2:00 pm	231	Professor Richard Powell
2:30 pm	232	Dr Howard Wiseman
2:45 pm	233	Mr Winfried Hensinger
3:00 pm	234	Prof Geoffrey Opat
3:15 pm	235	Prof John Love

2:00 pm — 3:30 pm CMP

Chairperson Gerard Milburn
Venue Bragg Theatre

2:00 pm	415	Prof Robert Clark
2:35 pm	416	Dr Robert Stamps
3:10 pm	417	Dr He Bi Sun

2:00 pm — 3:30 pm MEDICAL

Chairperson Gil Vella
Venue North Dining

2:00 pm	505	Miss Trang Tran
2:20 pm	506	Dr Bhaskar Mukherjee
2:40 pm	507	Dr Ian MacLean
3:00 pm	508	Dr Alfio Parisi

2:00pm — 3:30 pm STSP & PLASMA2000

Chairperson Brian Fraser
Venue Cinema, Level 5

2:00 pm	936	Prof Peter Robinson
2:30 pm	937	Prof Manfred Hellberg
2:45 pm	938	Dr Murray Sciffer
3:05 pm	939	Mr Phillip Webb

500 MP 14.12.00 11.00 am

The effect of variable fractional doses on rectum complications

Jeremy Booth and Sergei Zavgorodni
Physics and Mathematical Physics Department, The University of Adelaide and Medical Physics Department, Royal Adelaide Hospital

Patient positioning errors and organ motion during the course of a radiotherapy treatment will introduce uncertainty in the amount of radiation dose delivered to both the tumour and contiguous normal tissue. For prostate treatments the desired dose distribution is carefully planned to avoid excess dose to the rectum and bladder, while depositing toxic doses to the tumour. We investigate the effect of variable fractional doses to the rectum, on the probability of normal tissue (rectum) complication. The simulation uses published data for random patient movements, organ motion, and tissue sensitivities with the Lyman/Kutcher NTCP model.

501 MP 14.12.00 11.20 am

Fractal and Multifractal Approaches to Human Heartbeat Dynamics

Plamen Ch Ivanov

We focus on fluctuations in the time intervals between consecutive heartbeats. In conventional studies such fluctuations are often labeled as noise" to distinguish them from the true" signal of interest. We show that physiological fluctuations exhibit unexpected hidden structures often described by scaling laws. In particular, our studies indicate that when analized on different time scales the heartbeat fluctuations exhibit cascades of branching patterns with self-similar (fractal) properties, characterized by an universal functional form for the distributions and long-range power-law anticorrelations [Nature 383, 323 (1996)]. We find that these scaling features change during sleep and wake phases, and with pathological perturbations [Europhysics Lett.48, 594 (1999)I. Our recent results suggest that the healthy heartbeat is even more complex than previously suspected, since its fluctuations exhibit not only fractal, but multifractal behaviour, and require many exponents to characterize their scaling properties fully [Nature 399,461 (1999)]. These findings may lead to useful new diagnostic and prognostic tools [Phys. Rev. Lett. 81, 2388 (1998)]. They also support new modeling approaches; e.g. nonlinear stochastic feedback mechanisms may have relevance for neuroautonomic regulation of the heart and can generate complex dynamics, which successfully account for key characteristics of cardiac variability [Europhysics.Lett. 43, 36~3 (1998)].

502 MP 14.12.00 11.40 am

Linear accelerator mechanical/radiation isocentre assessment with an epid

Guilin Liu, Tim van Doorn and Eva Bezak
Physics and Mathematical Physics Department, The University of Adelaide, and Department of Medical Physics, Royal Adelaide Hospital, SA, 5000

An EPID (BIS 710) was used to assess mechanical and radiation isocenters for different collimator and gantry angles. Cross hair positions were determined and used to calculate the displacement of mechanical isocenter. The radiation field centre was calculated and compared with measured values to assess the displacement of radiation isocentre. The isocenters were shown to be determined from the with an accuracy of 0.3 mm. The study has demonstrated the feasibility of using the EPID to assess mechanical and radiation isocenters of a linear accelerator in a quick and efficient way with a higher degree of accuracy achieved.

503 MP 14.12.00 12.00 pm

The effect of arterial perfusion on the measured ultrasound induced heating in a fetal skull bone phantom.

G.J. Vella, School of Biomedical Sciences, The University of Sydney, NSW
V.F. Humphrey, School of Physics, University of Bath, Bath. UK
F.A.Duck, Medical Physics Department, Royal United Hospital Bath, Bath. UK

This study uses a phantom model to simulate the cooling effect of variations of blood flow on the ultrasonic heating of skull bone in a human fetus.

504 MP 14.12.00 12.20 pm

Australian National Proton Facility

Michael Jackson
Royal Prince Alfred Hospital, Camperdown NSW 2050

Proton therapy has been in use since 1954 and over 25,000 patients have been treated worldwide. Until recently most patients were treated at physics research facilities and apart from the Harvard Cyclotron Laboratory and some low energy machines for eye treatment, only small numbers of patients were treated in each centre and conditions were less than optimal. Limited beam time and lack of support facilities restricted the type of patient treated and conventional fractionation could not be used.

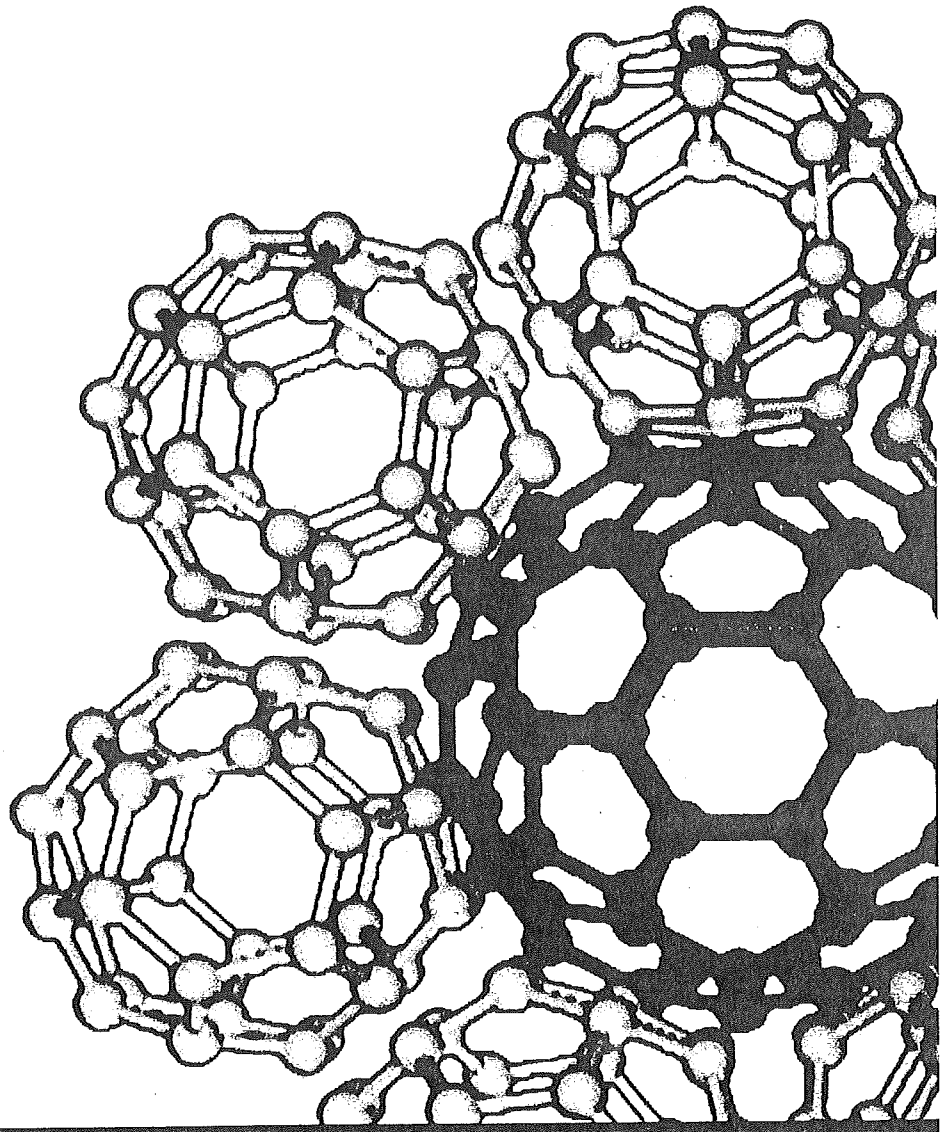
The initial clinical experience was mainly with small tumours and other lesions close to critical organs. Large numbers of eye tumours have also been treated. Protons have a well-defined role in these situations and are now being used in the treatment of more common cancers.

Since the development of hospital-based facilities, such as the one in Loma Linda in California, over 2,500 patients with prostate cancer have been treated using a simple technique which gives results at least as good as radical surgery, external beam radiotherapy or

MARCH MEETING 2001

BULLETIN

OF THE AMERICAN PHYSICAL SOCIETY



March 12–16, 2001
Seattle, WA
Volume 46, No. 1
PART I
Includes sessions for Monday, March 12 and Tuesday, March 13

SESSION A23: CORRELATIONS AND ANTI-CORRELATIONS IN BIOLOGY AND MEDICINE
Monday morning, 12 March 2001; Room 606, Washington State Convention Center at 8:00
Sonya Bahar, University of Missouri-St. Louis, presiding

Invited Papers

8:00
A23 1 Long and Short Range Correlations in Healthy and Pathologic Human Cardiac Processes
ARMIN BUNDE, *Inst. f. Theor. Physik III, Justus-Liebig-Universitaet Giessen*

Healthy sleep consists of several stages: deep sleep, light sleep and REM sleep. In this talk, recent work on the characterization of heart-rates in the three stages by long-range correlations is presented. Only in REM sleep, long-range correlations reminiscent to the wake phase occur, and the heart-rates show multifractal behaviour. In contrast, in non-REM phases, the heart-rates are uncorrelated above the typical breathing cycle time, pointing to a random regulation of the heartbeat during non-REM sleep. In deep sleep, the heart-rates show simple multifractal behaviour.

Contributed Papers

8:36
A23 2 Beyond Fractals and 1/f Noise: Multifractal Analysis of Complex Physiological Time Series PLAMEN CH. IVANOV, *Center for Polymer Studies, Boston University and Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* LUIS A.N. AMARAL, *Center for Polymer Studies, Boston University and Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* YOSEF ASHKENAZY, *Center for Polymer Studies, Boston University, Boston, MA 02215* H. EUGENE STANLEY, *Center for Polymer Studies, Boston University, Boston, MA 02215* ARY L. GOLDBERGER, *Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* JEFFREY M. HAUSDORFF, *Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* MITSURU YONEYAMA, *Yokohama Research Center, Mitsubishi Chemical Corporation, Yokohama, Japan* KUNIHARU ARAI, *Yokohama Research Center, Mitsubishi Chemical Corporation, Yokohama, Japan* We investigate time series with 1/f-like spectra generated by two physiologic control systems — the human heartbeat and human gait. We show that physiological fluctuations exhibit unexpected "hidden" structures often described by scaling laws. In particular, our studies indicate that when analyzed on different time scales the heartbeat fluctuations exhibit cascades of branching patterns with self-similar (fractal) properties, characterized by long-range power-law anticorrelations. We find that these scaling features change during sleep and wake phases, and with pathological perturbations. Further, by means of a new wavelet-based technique, we find evidence of multifractality in the healthy human heartbeat even under resting conditions, and show that the multifractal character and nonlinear properties of the healthy heart are encoded in the Fourier phases. We uncover a loss of multifractality for a life-threatening condition, congestive heart failure. In contrast to the heartbeat, we find that the interstride interval time series of healthy human gait, a voluntary process under neural regulation, is described by a single fractal dimension (such as classical 1/f noise) indicating monofractal behavior. Thus our approach can help distinguish physiological and physical signals with comparable frequency spectra and two-point correlations, and guide modeling of their control mechanisms.

8:48
A23 3 Spatio-temporal variability in ventricular fibrillation
HAROLD M. HASTINGS, *Hofstra University* STEVEN J. EVANS, *Beth Israel Medical Center* FLAVIO H. FENTON, *Hofstra University* ALAN GARFINKEL, *UCLA* It is widely believed that reentrant ventricular tachycardia arises when a spiral wave of activation takes over and drives the ventricle at a rate significantly faster than sinus rhythm, and that ventricular fibrillation (VF), a spatio-temporally disorganized form of cardiac activity leading to sudden cardiac death, arises when this spiral breaks down into multiple offspring. Many authors have found that VF displays significant spatial and temporal organization. The purpose of this research is to quantify time scales and temporal and spatial variability in VF. Surface electrograms were obtained from a stable canine model of VF (cf. Nwasokwa and Bodenheimer, Am. J. Physiol. 253, H643 (1987)). These electrograms were analyzed to identify activation times to an accuracy of 1 ms (cf. Garfinkel et al., J. Clin. Invest. 99, 305 (1997)), yielded eighteen usable series, each containing over 1024 intervactivation intervals, two or three from widely spaced sites per episode of VF, 7 total episodes in 4 animals. Spatial and long-term (60 - 120 sec) temporal variability were analyzed and compared by ANOVA techniques (Evans et al., Proc. Royal Soc. B265, 2167 (1998)). In 6 of 7 episodes, spatial variability among sites was statistically more significant than variability between the first and second halves of each series. More recently, Fourier analysis of these series found three distinct scaling regions, with power law dynamics in each and break points of ca. 1 sec and 4 sec. Finally, there was significant variability in the fraction of "short" interactivation intervals (lasting < 60 of 125 ms) among sites. Together these results suggest variability in physiological properties among sites and consequent variability in spiral wave dynamics among sites.

Invited Papers

9:00
A23 4 Biocomplexity and biosimplicity in paddlefish electroreceptors and crayfish mechanoreceptors.*
FRANK MOSS, *Center for Neurodynamics, University of Missouri at St. Louis*

The paddlefish, *Polyodon spathula*, perceives its world through an array of electroreceptor organs spread over its rostrum [1]. We find long-range anti-correlations in the fluctuations of sequences of time intervals between neural action potentials recorded from spontaneously firing electroreceptor afferents. Long range correlations are an indication of dynamical complexity. In contrast, spontaneous discharges from mechanoreceptor afferents in the crayfish tailfan lack long range correlations altogether. Serving as a control, discharges generated by a simple Hodgkin-Huxley-type model with a noisy membrane potential also lack long-range correlations. We interpret these findings as an indication of the relative complexity of the electroreceptor organ [2] compared with the much more primitive and simple mechanoreceptor. [1] D. Russell, L. Wilkens, and F. Moss, Nature **402**, 219 (1999). [2] A. Neiman and D. Russell, Phys. Rev. Lett. in press.

*Supported by Office of Naval Research and Alexander von Humboldt Foundation.

Contributed Papers

SESSION A24: CMR I: PHASE SEPARATION I
Monday morning, 12 March 2001
Room 607, Washington State Convention Center at 8:00
Sang-Wook Cheong, Rutgers University and Lucent Technologies, presiding

9:36
A23 5 Magnitude and Sign Correlations in Heartbeat Fluctuations YOSEF ASHKENAZY, *Center for Polymer Studies and Department of Physics, Boston University, Boston, MA 02215* PLAMEN CH. IVANOV, *Center for Polymer Studies, Boston University and Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* SHLOMO HAVLIN, *Dept. of Physics and Gonda Goldschmied Center, Bar-Ilan University, Ramat-Gan, Israel* CHUNG -K. PENG, *Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* ARY L. GOLDBERGER, *Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215* H. EUGENE STANLEY, *Center for Polymer Studies and Department of Physics, Boston University, Boston, MA 02215* We propose an approach for analyzing signals with long-range correlations by decomposing the signal increment series into magnitude and sign series and analyzing their scaling properties. We show that signals with identical long-range correlations can exhibit different time organization for the magnitude and sign. We find that the magnitude series relates to the nonlinear properties of the original time series, while the sign series relates to the linear properties. We apply our approach to the heartbeat interval series and find that the magnitude series is long-range correlated, while the sign series is anticorrelated and that both magnitude and sign series may have clinical applications.

Contributed Papers

8:00
A24 1 XAFS determination of local environment about Sr and La in CMR material, $La_{1-x}Sr_xMnO_3$ TOMOHIRO SHIBATA, BRUCE BUNKER, *Department of Physics, University of Notre Dame, Notre Dame IN 46556* PETER SCHIFFER, *Department of Physics, Pennsylvania State University, University Park, PA 16802* JOHN MITCHELL, *Materials Science Division, Argonne National Laboratory, Argonne IL 60439* Sr doped lanthanum manganites $La_{1-x}Sr_xMnO_3$ show colossal magnetoresistance effects that strongly depend on alloy composition. Many recent studies show the existence of charge, orbital, and spin ordering, and a number of anomalies have been observed in transport or magnetic properties. These properties have been generally been explained assuming that the sample composition is homogeneous through the entire sample. However, there is always the possibility for the non-random distribution of La and Sr atoms among the allowed sites with possible tendencies towards ordering or phase separation of the La and Sr atoms. Here we report XAFS studies of Sr K-edge and La K-edge to determine the local coordination of Sr around Sr and La atoms as a function of alloy composition. Our results do indeed indicate non-random site occupation for the Sr and La ions, and also show interesting anomalies in local lattice distortion as a function of alloy composition.

Invited Papers

8:12
A24 2 The metal-insulator transition in CMR manganites: a strange kind of percolation.*
SIMON J. L. BILLINGE, *Michigan State University*

The nature of the metal-insulator (MI) transition in colossal magnetoresistant manganites is still the subject of lively debate. Of note recently is the observation that both the ferromagnetic metallic and the paramagnetic insulating states below and above the MI transition, resepectively, are quite inhomogeneous. In this picture, the sample microscopically phase separates into metallic and insulating domains. The metal-insulator transition can then be understood in the

tained by varying the annealing temperature and time and the layer thickness. The coercivity increases with the annealing temperature and time, due to the increase of average grain size, which according to TEM studies it was ranged from 3 to 15 nm. The amount of BN was found to control the intergrain interactions, which for higher concentrations lead to decoupling of the FePt grains. This work has been supported by NSF-DMR 9972035.

*Maria Daniil thanks the Alexandros Onasis Foundation for the Scholarship support.

15:54

S22 6 Textured FePt Nanoparticles for Perpendicular Magnetic Recording Y. HUANG, H. OKUMURA, G.C. HADJIPANAYIS, *Department of Physics and Astronomy, University of Delaware, Newark, DE 19716* DIETER WELLER, *Seagate Technology, Pittsburgh, PA 15203* CoPt and FePt nanoparticles embedded in different matrices (Ag, BN, C) have been studied intensively in the last few years for applications in high-density recording. In this study we have successfully made [001] textured FePt nanoparticles in a carbon matrix by depositing the films into heated substrates. The FePt/C films were prepared by sputtering from solid FePt and carbon targets alternatively onto Si [111] substrate under 5 mTorr Argon pressure. At ambient temperature, FePt and carbon form a multilayered structure with the disordered fcc structure which is magnetically soft. The formation and the ordering of the particles requires post annealing procedure at temperatures in the range of 550 to 750°C. As the temperature of the substrate increases, the microstructure of FePt films changes to a mixture of disordered fcc and ordered face centered tetragonal (fct) FePt nanoparticles. When the substrate temperature increases to higher than 500°C, the FePt particles start to orient in the direction perpendicular to the film. By varying the temperature of the substrate different degrees of [001] texture were obtained. The thickness of the layers is found to control the particle size. The small fraction of disordered fcc phase which is still present in the film can be transformed to the ordered fct phase by post-annealing at 700°C. Current research is focused on optimizing both the texture and the particle size distribution. Work supported by NSF-DMR 9972035 and Seagate

16:06

S22 7 An Integrated Magnetoresistive Read Head and an Inductive Write Head For Hard Disk Recording ANIMESH CHAKRABORTY, *Columbus State Community College* KEITH MOUNTFIELD, *ECE department, Carnegie Mellon University* SAMSUNG PROJECT COLLABORATION, The goal of this project was to design,fabricate and test a magnetoresistive(MR) Read and Inductive write Head capable of supporting a recording density in excess of 1.2 Gbits/in2. The shields of the MR read head was made from 2micron thick FeAlN, FeZrN. The poles of the inductive write head were 2microns of FealN or FeZrN. The defined read trackwidth was between 1.4 and 2 microns and the gap spacing, 0.3 microns. a transverse bias field was provided by means of a soft-adjacent-layer(SAL) of NiFeZr and a longitudinal field by means of FeMn or NiMn exchange tabs. The knowledge based advances were studies of the pole material FeZrN.

16:18

S22 8 Improving the hot-electron transfer ratio of the spin-valve transistor O.M.J. VAN 'T ERVE, R. JANSEN, R. VLUTTERS, S.D. KIM, P.S. ANIL KUMAR, J.C. LODDER, *Information Storage Technology Group, MESA+, University of Twente, 7500 AE Enschede, NL* The spin-valve transistor is a hot-electron device that exhibits a magnetocurrent of over 300 in small magnetic fields [1,2]. This makes it a potential candidate for magnetic sensor and memory applications, provided that the output (collector) current can be improved. Since increasing the input (emitter) current leads to undesirable heating, the objective is to increase the current transfer ratio (the ratio between emitter and collector current). In this contribution we report and discuss three routes to achieve this. First, the thicknesses of the magnetic layers in the spin valve are optimized for a larger transfer ratio. Second, an increase in transfer ratio is obtained by manipulation of the layer growth. Finally, it will be shown that a different combination of Schottky barrier materials (for example replacing Si/Pt by Si/Cu or Si/Au) leads to a large increase of the transfer ratio by a factor of 30. [1] R. Jansen et al, Phys. Rev. Lett. 85 (2000) 3277 [2] P.S. Anil Kumar et al, J. Magn. Magn. Mater. 214 (2000) L1

SESSION S23: NONLINEAR PHENOMENA AND PATTERN FORMATION

Wednesday afternoon, 14 March 2001
Room 606, Washington State Convention Center
Andrew Rutenberg, Dalhousie University, presiding

Contributed Papers

14:30

S23 1 From optical systems to cardiac tissues - control of spiral waves with spatial perturbations* PENG-YE WANG, PING XIE, *Laboratory of Optical Physics, Institute of Physics & Center for Condensed Matter Physics, Chinese Academy of Sciences, P.O. Box 603, Beijing 100080, China* Initially we use our unique spatial perturbation method to control patterns in nonlinear optical systems and lasers. This method has been proved to be very effective both theoretically and experimentally in optics. We now extend our method to control the spatiotemporal dynamics of cardiac tissues. It is numerically found, with a two-variable model, that the method can quickly eliminate spiral waves in cardiac tissues when the perturbation exceeds a certain level. Critical slowing down phenomenon of the control is investigated in detail.

*This research was supported by the National Natural Science Foundation of China.

14:42

S23 2 Complex Patterns of Abnormal Heartbeats VERENA SCHULTE-FROHLINDE, *Center for Polymer Studies, Boston University, Boston, MA 02215; Physics Department, Harvard University, Cambridge MA 02138* YOSEF ASHKENAZY, *Center for Polymer Studies, Boston University, Boston, MA 02215* PLAMEN CH. IVANOV, *Center for Polymer Studies, Boston University, Boston, MA 02215; Cardiovascular Division, Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA 02215* ARY L. GOLDBERGER, *Cardiovascular Division, Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA 02215* H. EUGENE STANLEY, *Center for Polymer Studies, Boston University, Boston, MA 02215* We analyze complex patterns of certain abnormal heartbeats in the normal heart rhythm. We show that some of the patterns can be described by a model of two oscillators with stochastic elements. We find that

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Institute of Physics ACADEMY OF SCIENCES OF THE CZECH REPUBLIC

CZ 182 21 Praha 8, Na Slovance 2

Prof. Plamen Ivanov
Center for Polymer Studies
Physics Department
Boston University
590 Commonwealth Ave.
Boston, MA 02215
USA

Prague, 28 November 2000

Dear Prof. Plamen Ivanov

It is a great pleasure for us to invite you as an outstanding expert in theoretical physics to participate in the conference:
NATO Advanced Research Workshop on Application of Physics in Economic Modelling,
taking place in Prague, Czech Republic, 8 to 10 February 2001,

Your arrival is expected on 7 February 2001. Your accomodation is arranged, together with all other participants, in Hotel Union, Ostrčilovo nám. 4, 128 00 Praha 2, for the whole duration of the conference.

Your accomodation and living expenses will be fully covered from the budget of the conference.

Yours sincerely

František Slanina
director of the conference

INSTITUTE OF PHYSICS
Academy of Sciences
of the Czech Republic
182 21 Prague 8, Na Slovance 2
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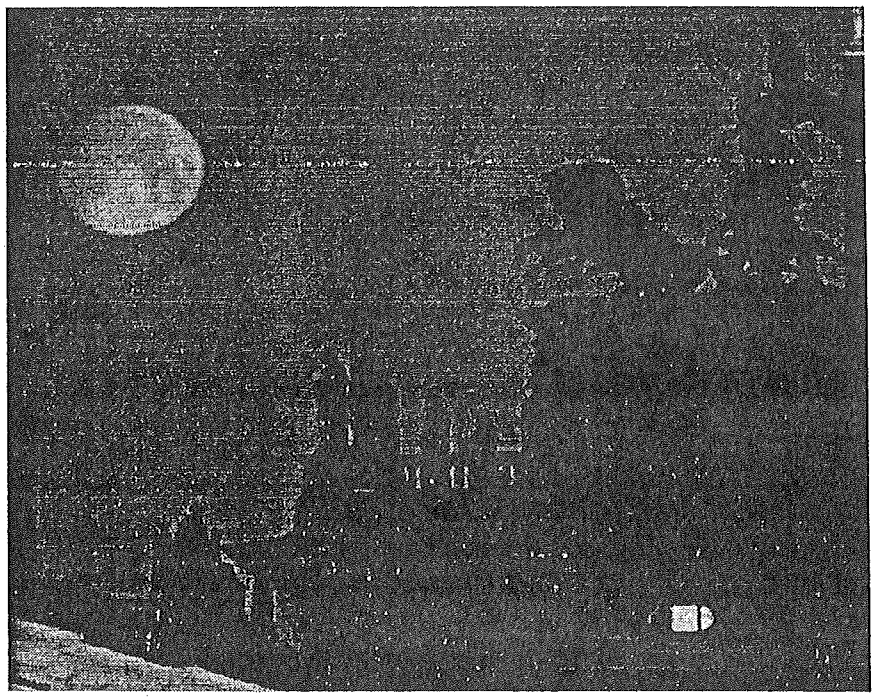
http: // www.fzu.cz

NATO Advanced Research Workshop on Application of Physics in Economic Modelling

February 8 - 10, 2001
Prague, Czech Republic



Topics

List of participants

(click on contribution title to see abstract, click on participant's name to send an e-mail)

1. Luis Amaral
   Scale invariance in the growth of human organizations

2. Erik Aurell
   Complexity problems in internet auctions -- lessons from a computer tournament

3. Peter Babinec
   Stochastic resonance in the stock market.

4. Emmanuel Bacry
   Modelling fluctuations of financial time series: from cascade process to stochastic volatility model

5. Jean-Philippe Bouchaud
   (Workshop director)

6. Andrea Capocci
   Satistical Analysis of The Stable Marriage Problem

7. Damien Challet
   Minority Game and stylized facts

8. Aleksei Chechkin
   Scaling Laws and High Variability of Ukranian Financial Market

9. Gianaurelio Cuniberti
   On clustering and interactions in a financial market

10. Albert Diaz-Guilera
    Computational approach to organizational design

11. Stanislaw Drozdz
    Quantifying dynamics of the financial correlations

12. Vasyl Gafiychuk
    Hierarchical organization of market with perfect competition

13. Irene Giardina
    On a universal mechanism for long ranged volatility correlations

14. Parameswaran Gopikrishnan
    Diffusion and Stock Price Fluctuations

15. Janusz Holyst
    Simple model of bank bankruptcies

16. Ondrej Hudak
    Test of normality distribution of rates on emerging markets.

17. Giulia Iori
    Interbank landing, reserve requirements and systemic risk

18. Plamen Ivanov
    Scale-invariant Truncated Levy Process: a Levy Stable Process with Long-range Correlations

19. Imre Janosi
    Modelling the BUX index by a novel second order stochastic differential equation

20. Neil Johnson
    Profit opportunities, crash prediction and risk minimization in artificial and real-world markets

21. Taisei Kaizoji
    Stock market Crash: An empirical study based on an interacting-agent hypothesis

22. Janos Kertesz
    Behavior modeling at the stock market

23. Miroslav Kotrla
    Dynamical scaling of evolving networks

24. Fabrizio Lillo
    Empirical properties of the variety of a financial portfolio and the single-index model

25. Thomas Lux
    Multi-agent models of Financial Markets and the Stylized Facts

26. Ricardo Mansilla
    Algoritmic Complexity in real and virtual markets.

27. Rosario N. Mantegna
    Levels of complexity in financial markets

28. Matteo Marsili
    Theory of stylized models of financial markets

29. Sergei Maslov
    Price fluctuations from the limit order book perspective - empirical facts and a simple model.

30. Lorenzo Matassini
    Booking financial markets

31. Joseph McCauley
    The Futility of Utility: how market dynamics marginalize Adam Smith

32. Esteban Moro
Macrodynamics of the Minority Game

33. Maciej Nowak
Random matrices and financial probabilistics

34. Matthias Otto
Finite arbitrage times and the volatility smile

35. Szilard Pafka
Testing the Risk Metrics Methodology on International and Hungarian Equity Portfolios

36. Yuri Pismak
Selforganization in a model of economic system with scale invariant interactions

37. Vasiliki Plerou
A Random Matrix Approach to Cross-Correlations in Financial Data

38. Marc Potters
Historical Option Pricing: Smile, Skew and Volatility Correlations

39. Marco Raberto
Agent based simulation of a financial market

40. Georg Reents
A New Stochastic Strategy for the Minority Game

41. Geoff Rodgers
Models for the size distribution of businesses in a price driven market

42. Bertrand Roehner
Two classes of speculative behavior

43. Michael Romanovsky
Time intervals distribution of stocks transactions and time correlation of stock indicies

44. Maurizio Serva
Predictable Events in Finance

45. Ingve Simonsen

46. Frantisek Slanina
Harms and benefits from social imitation

47. Sorin Solomon
Microscopic Simulation of the LLS Stock Market Model: Market Ecology, Pareto Wealth Distribution and Leptokurtic Returns

48. Didier Sornette
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49. H. Eugene Stanley
    Quantifying Fluctuations in Economic Systems by Adapting Methods of Statistical Physics

50. Rafal Weron
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51. Victor Yakovenko
    Statistical Mechanics of Money and Income

52. Yi-Cheng Zhang
    Matching with imperfect information

53. Karol Zyczkowski
    Wealth distribution & its time evolution: dynamical model of the market

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This list was created automatically on 2001-1-31, 18:39:36

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Key speakers
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Deadlines
Participation
Late-registration/Data-update/Abstract-submission form
Local information

Contact:

slanina@fzu.cz
bouchau@drecam.saclay.cea.fr

Main topics:

- Analysis of time series
- Phenomenology of the market
- Minority game
- Modelling economic data series

Key speakers:

Erik Aurell (Stockholm)
Complexity problems in internet auctions - lessons from a computer tournament

Jean-Philippe Bouchaud (Saclay)
A universal mechanism for long ranged volatility correlations

János Kertász (Budapest)
Behavior modeling at the stock market

Thomas Lux (Kiel)
Multi-agent models of Financial Markets and the Stylized Facts

Rosario Nunzio Mantegna (Palermo)
Levels of complexity in financial markets

Matteo Marsili (Trieste)
Theory of stylized models of financial markets

Marc Potters (Paris)
Recent advances in non-Gaussian option pricing

Bertrand Roehner (Paris)
Mechanisms of speculative trading

Didier Sornette (Nice)
Critical crashes

H. Eugene Stanley (Boston)
Quantifying Fluctuations in Economic Systems by Adapting Methods of Statistical Physics

Yi-Cheng Zhang (Fribourg)
Matching with imperfect information

Participation:

The number of participants is limited to 50 by a general directive of NATO Scientific affairs division.
You will find here the on-line form which can serve to several purposes.
Please use this form if you either
- are a key speaker or were invited by us before and want to register, or
- want to correct or update the information submitted previously, or
- want to submit a file containing the abstract of your contribution, or
- were not invited by us before, but want to do a late registration (see deadlines below).

If you have (pre)registered already, you will find the last version of the information you sent previously filled in this form, so that you do not need to type anything twice. You can update your registration data as many times as you wish, using this form.

Organization committee:

J.-P. Bouchaud (Paris) - NATO country director
M. Marsili (Trieste)

B. Roehner (Paris)
F. Slanina (Prague) - Partner country director

Deadlines:

Registration
(The deadline is over. However, we accept late registrations by those who are invited by us individually. For there may be some cancellations, other applicants may also make a late registration, but we cannot guarantee that they will be taken into consideration.) October 20, 2000

Deadline for abstract submission December 20, 2000

Organizers:

NATO Scientific & Environmental Affairs

Institute of Physics of the

Academy of Sciences of the Czech Republic,

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last updated 2000-12-19 by F. Slanina

ADELAIDE UNIVERSITY AUSTRALIA

Department of Electrical and Electronic Engineering

SEMINAR ANNOUNCEMENT

Wednesday, 29 August 2001, at 10:10 a.m.
in S112 Engineering South Building
Research Seminar

Application of Statistical Techniques to Scaling Features in Human Heartbeat Dynamics

Dr. Plamen Ch. Ivanov
Harvard University and Boston University (joint appointment)

Abstract:
We apply detrended fluctuation analysis and wavelet-based techniques to complex physiological signals. We illustrate these approaches on human heartbeat dynamics, using up to 24 hour long records, and show that intrinsic scale-invariant (fractal) properties can be revealed even when embedded in noisy, nonstationary time series. We present a physiologically motivated stochastic feedback mechanism to address the question of how the heart rhythm spontaneously self-regulates.

Biography:
M.S. in Physics (Solid State Physics), Sofia University, Bulgaria, 1988. M.S. in International Relations, Sofia University, Bulgaria, 1990. Ph.D. in Physics (Biophysics), Boston University, Boston, 1998. Postdoctoral position at Harvard University/Medical School, Boston, 1998-99. Currently a Research Associate holding a joint appointment at Boston University, Center for Polymer Studies, Boston and Harvard University /Harvard Medical School, Beth Israel Deaconess Medical Center, Laboratory for Nonlinear Dynamics in Medicine. Holds 40 publications in the fields of quantum magnetism, porous media, physiological signal analysis & modeling, and econophysics with 15 press and media reviews. Dr. Ivanov is on the editorial board of the prestigious Fluctuation and Noise Letters journal.

Jason, this is additional announcements for talks + seminars at places I was invited

Plamen

UNIVERSITA' di NAPOLI "FEDERICO II"
DIPARTIMENTO di SCIENZE FISICHE
Complesso Universitario di Monte S. Angelo
Via Cintia 80126 NAPOLI
Tel. (081) 676289 - Fax (081) 676352

AVVISO DI SEMINARIO

il **Dr. Plamen Ch. Ivanov**
della Boston University

martedì 18 settembre

terrà nell'aula 2G26 un seminario dal titolo:

Statistical Physics in Physiology: Scaling Analysis and Modeling of Heartbeat Dynamics

Prof. Antonio Coniglio

Napoli, 17 settembre 2001

WILH. ELM UND ELSE HERAE. -STIFTUNG

WE-Heraeus-Stiftung, Postfach 15 53, D-63405 Hanau

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Fax (06181) 92325-15
Internet www.we-heraeus-stiftung.de

Dr. Plamen Ivanov
Boston University
Center for Polymer Studies and
Department of Physics
590 Commonwealth Avenue
Boston, MA 02215
USA

Bearbeitung Jutta Lang
Durchwahl (06181) 92325-11
E-Mail lang@we-heraeus-stiftung.de

RI_Einl.doc

30 August 2001

Dear Dr. Ivanov,

Referring to the contact you had with the scientific organizers, Dr. Dr. Peter Tass (Forschungszentrum Jülich) and Prof. Dr. Arkady Pikovsky (Universität Potsdam) we are pleased to invite you to attend the seminar on

„Synchronization in Physics and Neurosciences".

It is supported and financed by the Wilhelm und Else Heraeus-Stiftung and, therefore, is announced as

265. WE-Heraeus-Seminar.

The meeting will take place at the "Physikzentrum Bad Honnef", located near Bonn/Germany, from

10 to 12 December 2001.

About 60 participants are expected, speakers included. The conference language will be English.

Please find enclosed an outline of the scope and aims of the meeting with a preliminary list of invited speakers. Both has been prepared by Prof. Pikovsky, who will also chair the seminar. Updated information is available at

http://www.stat.physik.uni-potsdam.de/~pikovsky/weh265.html.

The scientific organizers informed us that you have agreed to give an invited talk. There will be 30 minutes allotted for your contribution, including 5 – 10 minutes for discussion. Slide and overhead projector, video equipment (VHS) as well as a beamer for your laptop will be available.

Please fill in the prospected title of your talk in the corresponding line of the registration form. As we intend to circulate a collection of abstracts ahead of time you are kindly asked to send an **abstract** either as a **camera-ready printout** (not longer than one page which can be sized down to A5-format) together with your registration form or as an **e-mail attachment (WORD or PS or PDF file,** no MAC, no TEX/LATEX) to lang@we-heraeus-stiftung.de.

... / 2

For registration please fill in the enclosed form – nontransferable – and return it **by 1 October 2001** to

Mrs Jutta Lang, Wilhelm und Else Heraeus-Stiftung, Postfach 1553, D-63405 Hanau
or via fax no. +49 6181 9232515

The seminar is scheduled to start on Monday, 10 December 2001, 9:00 h and will end on Wednesday, 12 October 2001, after lunch. Arrival is planned for Sunday afternoon/evening (earlier arrival on request). The registration desk will be open on Sunday from 17:00 h to 21:00 h and on Monday morning. Departure will be on Wednesday afternoon or on Thursday morning if necessary.

The conference venue is the "Physikzentrum Bad Honnef", Hauptstrasse 5, D-53604 Bad Honnef. Please find enclosed a brochure on this house, which offers also some travel information. More information about the Physikzentrum is available at http://www.pbh.de/approach.htm.

The Wilhelm und Else Heraeus-Stiftung will cover your expenses for full board accommodation (beverages not included) and is also prepared to make a contribution towards your travel costs (economy class). Please make your reservations as soon as possible. We ask you, however, to use as economical a fare as you can find. In special cases the cheapest ticket may be completely covered. In order to enable us to calculate the budget of the seminar, we kindly ask you to inform us about the total amount of your estimated expenses.

Together with the scientific organizers we are looking forward to hearing from you soon. Once we have received your registration form we will send you further information, including program, abstracts and list of participants in due time.

Sincerely yours,

Wilhelm und Else Heraeus-Stiftung

E. Dreisigacker

Dr. Ernst Dreisigacker
Managing Director

Encls.

The Wilhelm und Else Heraeus-Stiftung (WE-Heraeus foundation) is a private institution which supports research and education in science, especially in physics. Among German physicists the foundation is recognized as the most important private funding institution in their field. Part of the activities of the foundation is carried out in close cooperation with The German Physical Society (Deutsche Physikalische Gesellschaft).

The Wilhelm und Else Heraeus-Stiftung regularly offers seminars to a limited number of participants from universities, research institutes and industry. The topics of the meetings cover the whole range of research in physics and its neighboring disciplines. Emphasis is put on lively discussion.

Detailed information about the foundation is available at http://www.we-heraeus-stiftung.de

265. WE-Heraeus-Seminar

Synchronization in physics and neurosciences

10 – 12 December 2001 at Physikzentrum Bad Honnef (Germany)

Scope and aims

Synchronization phenomena are attracting enormous interest in the physics community now (what can be seen, in particular, in introducing a special PACS rubrication). The number of papers on synchronization phenomena in complex systems, including theory, numerical and real experiments, is growing. The study is mainly pursued within a nonlinear dynamics framework, with applications to lasers, hydrodynamics, solid state physics. One of the most intriguing objects of the synchronization studies is the brain. Indeed, several synchronization patterns have been found in the neuronal activity, with promising applications to healing desynchronization methods.

The goal of the seminar is to bring together specialists in nonlinear dynamics, other fields of physics, as well as biophysicists and neuroscientists to discuss different aspects of this interdisciplinary field.

Preliminary list of invited speakers:

P. **Ashwin**, Exeter
H. **Bergman**, Jerusalem
H. **Braun**, Marburg
P. **Brown**, London
R. **Eckhorn**, Marburg
C. **Elger**, Bonn
A. **Engel**, Jülich
G. **Fink**, Jülich
H.J. **Freund**, Düsseldorf
T. **Geisel**, Göttingen
P. **Grassberger**, Jülich
H. **Haken**, Stuttgart
P. **Hänggi**, Augsburg
C. **Herrmann**, Leipzig
A. **Herz**, Berlin
P. **Ivanov**, Boston
J. **Kurths**, Potsdam
M. **Le Van Quyen**, Paris
R. **Llinas**, New York
Y. **Maistrenko**, Kiev
E. **Mosekilde**, Lyngby
A. **Neiman**, St. Louis
E. **Ott**, College Park
U. **Parlitz**, Göttingen
K. **Pawelzik**, Bremen
M. **Rosenblum**, Potsdam
N. **Rulkov**, La Jolla
S. **Salenius**, Hut
S. **Schiff**, Faifax
L. **Schimansky-Geier**, Berlin
T. **Schreiber**, Dresden
E.J. **Speckmann**, Münster
V. **Sturm**, Köln
J. **Volkmann**, Kiel
T. **Wichmann**, USA

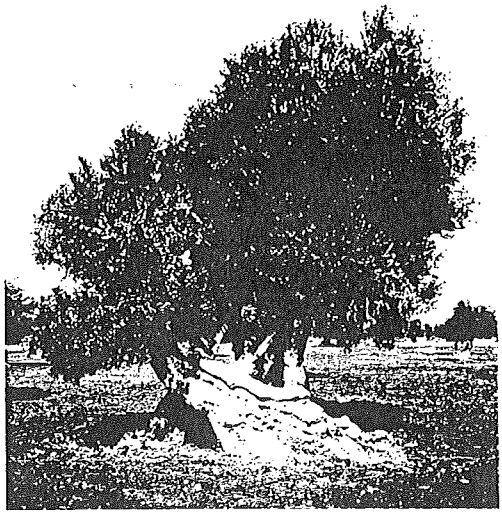
Please turn!

Center nnovative Technologies for Signal D ction and Processing
Centro di Tecnologie Innovative per la Rivelazione e l'Elaborazione del Segnale
Università di Bari

International Workshop

MODELLING BIO-MEDICAL SIGNALS

Bari, Physics Department, September 20-22, 2001



Invited Speakers

- Neri Accornero - Neurology Dept., Roma I University
- Gyan Bhanot - IBM and Princeton University
- Eytan Domany - Weizmann Institute
- Plamen Ch. Ivanov - C. P. S. Boston University & Harvard Medical School
- Bert Kappen - Nijmegen University
- Enzo Marinari - Physics Dept., Roma I
- Vito Quaranta - The Scripps Research Institute, La Jolla
- Ruedi Stoop - INI, ETH Zurich
- Malvin C. Teich - Boston University

Topics

Objective of the workshop is to gather some well known world-experts in the study of the physical modelling of biological phenomena to exchange ideas and advance new proposals for future researches in an informal and hopefully fruitful manner.
Emphasis will be given to innovative methodologies applied to the study of topics such as:

- Rhythms and synchronization in living systems
- Gene expression patterns
- Immune system
- Decision support systems in medical science

Organizing Committee

Leonardo Angelini - Physics Department
Roberto Bellotti - Physics Department
Antonio Federici - Department of Pharmacology and Physiology
Rocco Giuliani - Emergency and Transplants Department
Giuseppe Gonnella - Physics Department
Giuseppe Nardulli - Physics Department
Sebastiano Stramaglia - Physics Department

Information

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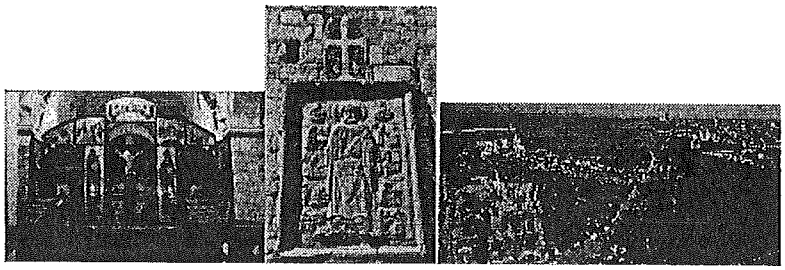
Center of Innovative Technologies for Signal Detection and Processing - Physics Department, University of Bari



International Workshop

MODELLING BIO-MEDICAL SIGNALS

Bari, September 20-21, 2001

- Announcement
- List of speakers
- Program
- Touristic Information

List of partecipants.

For further information Sebastiano.Stramaglia@bari.infn.it.

Organizing Committee

Leonardo Angelini	Physics Department, University of Bari, Italy
Roberto Bellotti	Physics Department, University of Bari, Italy
Antonio Federici	Department of Pharmacology and Physiology, University of Bari, Italy
Rocco Giuliani	Department 'Emergenza e Trapianti d'Organo', University of Bari, Italy
Giuseppe Gonnella	Physics Department, University of Bari, Italy
Giuseppe Nardulli	Physics Department, University of Bari, Italy
Sebastiano Stramaglia	Physics Department, University of Bari, Italy

List of speakers.

- Neri Accornero * (Neurology Dept., Roma I): 'Artificial neural networks in Neuroscience'.
- Armando Bazzani (Physics Dept., Bologna U.): 'Effect of noise on a class of energy based learning rules'.
- Alessandro Bertolino (Psychiatry Dept., Bari U.):'Pathophysiology of schizophrenia: fMRI and working memory'.
- Gyan Bhanot * (IBM and Princeton U.) :'The immune system. B-cell binding to Multivalent Antigen'.
- Michele Caselle (Physics Dept., Torino):'Finding regulatory sites from statistical analysis of oligonucleotide frequencies in the upstream region of Eukaryotes genes'.
- Giuseppe Cibelli (Human Physiology, Foggia U.): 'Regulation of Early Growth Response-1 Gene Expression and Signaling Mechanisms in Neuronal Cells: Physiological Stimulation and Stress'
- Francesco De Carlo (Bari University): 'Application of ANN to electrophysiological analysis of neurological diseases'.
- Eytan Domany * (Weizmann Institute, Israel):'Coupled two way clustering and the analysis of DNA microarray data'.
- Carmelo Giacovazzo * (Bari U. & IRMEC-CNR) 'Phasing proteins: experimental loss of information and its recovery'.
- Plamen Ch. Ivanov * (Center for Polymer Studies, Boston U. & Harvard Medical School, Harvard U.):'Modeling and analysis of cardiac dynamics, human gait and sleep'.
- Bert Kappen * (Nijmegen U., The Netherlands):'The cluster variation method for approximate reasoning in medical diagnosis'.
- Gianluca Lattanzi (SISSA, Trieste): 'The physics of motor

proteins'.

- Klaus Lehnertz * (Neurophysics Group, Dept. of Epileptology, Medical Center University of Bonn) 'Analysis of EEG data'
- Carmela Marangi (Bari University): 'Clustering mtDNA sequences for human evolution studies'.
- Enzo Marinari * (Physics Dept., Roma I): 'Dynamics of sequence alignment'.
- Cristian Micheletti * (SISSA, Italy): 'Geometrical aspects in protein folding'.
- Luca Peliti * (Physics Dept., Napoli) 'Modelling ecological networks'.
- Vito Quaranta * (The Scripps Research Institute):'Molecular Signatures of Invasive Cancer: Gene Profiling With DNA Microarray Chips'.
- Ruedi Stoop * (INI, ETH Zurich, CH):'Biological neural networks'.
- Giorgio Turchetti (Physics Dept., Bologna):'Stochastic model for aging in Immune System'.
- G. Perchiazzi (Dip. Emergenze e Trapianti d'organo):' Monitoring respiratory mechanics using artificial neural networks'.
- A. Vena (Dip. Emergenze e Trapianti d'organo):'Computer analysis of acoustic respiratory signals'.
- A. Zenzola (Dip. Scienze Neurologiche):'Wavelet analysis of heart period and arterial pressure rhythms, in head-down bosy position'.
- E. Conte (Dip. Farmacologia e Fisiologia Umana):'Determination of correlation dimension, Lyapunov spectrum and Kolmogorov entropy in Chaos analysis of time series data simultaneously measured on ECG, respiratory movements and arterial pressure of normal subjects in different experimental conditions'.

(* denotes invited speaker)

Date: Tue, 12 Jun 2001 1 43:04 +0200 (MEST)
From: Francesco Mallamace <Francesco.Mallamace@unime. >
To: Plamen Ch. Ivanov <plamen@argento.bu.edu>
Subject: Merida

[The following text is in the "iso-8859-1" character set.]
[Your display is set for the "US-ASCII" character set.]
[Some characters may be displayed incorrectly.]

Dear Dr. Ivanov,

On behalf of the Scientific and Organizing Commitees of the Conference on "Scaling Concepts and Commplex Systems", that will be held in Merida (Mexico) next July, I am happy to inform you that your contribution has been selected as an oral talk. As soon as possible (the end of this week) you will receive the related preliminary program.

Please send me (and to the Congress Secretary Dr. Jacqueline Quintana) information on your travel plane, arrival and departure dates and in particular confirmation on your participation with a talk.

Your sincerely,
Francesco Mallamace

Francesco Mallamace
Dipartimento di Fisica
UniversitÁ di Messina
Villaggio S. Agata c.p. 55, 98166 Messina, Italy
phone: +0039-090-6765016 (direct); +0039-090-6765120 (lab.);
fax: +0039-090-395004
"

%%%

Date: Thu, 14 Jun 2001 20:41:10 -0700
From: SCCS Postmaster <merida@varea.ifisicacu.unam.mx>
To: plamen@argento.bu.edu
Subject: Reminder of registration

[The following text is in the "iso-8859-1" character set.]
[Your display is set for the "US-ASCII" character set.]
[Some characters may be displayed incorrectly.]

Dear Dr. Palmen Ch. Ivanov:

We have information about you in the database of the Scaling Concepts and Complex Systems meeting, Merida July 9-14, 2001. Today we will publish on our web page the rooming list of those participants who specified a valid method of payment (bank transfer or credit card).

We ask you to please confirm the following points:

1. Your attendance to the meeting
2. If you are planning to stay at the conference hotel
3. Your definitive arrival and departure dates
4. The method of payment of your registration and/or hotel

Right now we have the following information about your participation in the meeting:

Organization
Boston University and Harvard University Medical School

Topic
Non-linear dynamics, chaos, turbulence and chaotic dynamics

Title of your contribution
From 1/f Noise to Multifractal Cascades in Human Heartbeat and Gait Dynamics

Type of registration fee

Type of accommodation

Method of payment
Card holderÇs name (if this does not appears it means that the information about your credit is missing or incomplete)

Arrival date
7/9/01 1000
Departure date

Also we want to inform you that the timetable of the meeting will be available within next week in our web page.

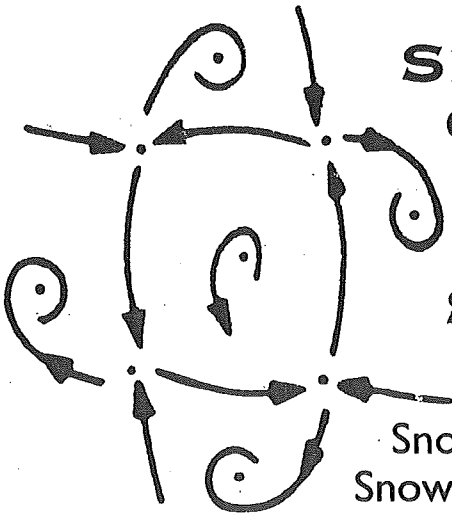
http://varea.ifisicacu.unam.mx/merida.htm

We thank you your attention to this message.

Best regards,

Jacqueline Quintana
Conference Secretariat

Final Program and Abstracts



SIXTH SIAM CONFERENCE ON APPLICATIONS OF DYNAMICAL SYSTEMS

May 20-24, 2001
Snowbird Ski and Summer Resort
Snowbird, Utah

Sponsored by the SIAM Activity Group on Dynamical Systems

The application of dynamical systems theory to areas outside of mathematics has proven to be an exciting and fruitful endeavor. These applications are highly diverse and interdisciplinary, ranging over such fields as Physics, Biology and Ecology, Engineering, Finance, Industrial Mathematics, Chemistry, Biochemistry and Genetics. This conference strives to achieve a good mixture of applications and the mathematics that informs them. The goals of the meeting are a cross-fertilization between the different fields of the applications, and increased communication between the mathematicians who build the theory and the scientists who use it.

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Philadelphia, PA 19104-2688
Telephone: 215-382-9800 Fax: 215-386-7999
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Monday, May 21

MS14

Dynamics and Control of Manufacturing Processes

10:00 AM-12:00 PM

Room: Magpie A/B

A small literature base and preliminary research indicate that manufacturing lines show chaotic behavior under certain circumstances and that dynamical systems ideas and control might be used to optimize many different manufacturing flow problems. The minisymposium will bring together researchers from industry, operations research and dynamical systems. The three major topics covered include i) the simulation and control of supply chains, ii) extensions of the bucket brigade algorithms and iii) nonlinearities in production systems. Issues covered will be the stability of control algorithms and the integration of simulation, finance models and control algorithms in an expert system.

Organizer: Dieter Armbruster
Arizona State University

10:00-10:25 Dynamics and Control of Supply Chains
Dieter Armbruster, Arizona State University

10:30-10:55 An Integrated Simulation Tool for Supply Chain Modeling
Karl Kempf, Intel Corporation

11:00-11:25 Optimal Regimes for Bucket Brigades Production Lines
Leonid Bunimovich, Georgia Institute of Technology

11:30-11:55 Chaos and Complexity in a Simple Model of Production Dynamics
Arkady Pikovsky and Ines Katzorke, University of Potsdam, Germany

Monday, May 21

MS15

Long-Range Correlations in Dynamics and Biology

10:00 AM-12:00 PM

Room: Golden Cliff

Long- and short-range correlations are a general feature of many biological time series, whether a neural spike train or a sequence of human heartbeats. While short-range correlations appear to be a general feature of many biological data sets, long-range correlations have been implicated as predictors of disease states such as fibrillation or seizure. Long-range correlations have also been investigated in DNA sequences, and may be characteristic of certain multiple-oscillator neural systems. This mini-symposium will address both the dynamical foundations of long-range correlations and the most recent experimental advances in the study of correlations in biology and medicine.

Organizer: Sonya Bahar
University of Missouri, St. Louis

10:00-10:25 Integrated Approach to Assessment of Long Range Correlation in Time Series Data: Foundation and Practice
Mingzhou Ding, Florida Atlantic University

10:30-10:55 Fractal and Multifractal Approaches in Physiology: Applications to Heartbeat Dynamics and Human Gait
Plamen C. Ivanov, Boston University

11:00-11:25 Heart Rhythm During REM and non-REM Sleep: Characterization by Long-Range Correlations and Multifractality
Jorg-Hermann Peter and Thomas Penzel, Philipps-Universität, Marburg, Germany; *Jan W. Kantelhardt* and Armin Bunde, University of Giessen, Germany; Plamen C. Ivanov, Boston University; and Shlomo Havlin, Bar-Ilan University, Israel

11:30-11:55 Long-Range Temporal Anti-Correlations in Paddlefish Electroreceptors
Armin Bunde and Jan W. Kantelhardt, University of Giessen, Germany; and *Sonya Bahar*, Frank Moss, David F. Russell, and Alexander Neiman, University of Missouri, St. Louis

Monday, May 21

MS16

Digital Communication Devices Based on Nonlinear Dynamics and Chaos

10:00 AM-12:00 PM

Room: Wasatch A/B

At present, digital communication is carried out mainly by transmitters and receivers operating in the so-called linear regime. The option of creating transmitters and receivers operating in the nonlinear/chaotic regime has arisen recently. Research in nonlinear digital communication devices is already at the stage where precise technical questions are being answered. This minisymposium will describe research directions in this area as well as some of the answers that are already known in three subareas, namely, radio-frequency chaotic pulse position modulation, optimal chaotic CDMA spread spectrum sequences and optical communication with semiconductor lasers operating in the chaotic regime.

Organizer: John E. Lavery
Army Research Office

10:00-10:25 Research Directions in Chaotic Digital Communication Devices
Larry Larson, University of California, San Diego; and John E. Lavery, Army Research Office

10:30-10:55 Chaotic Pulse Position Modulation: A Robust Method of Communicating with Chaos
Lev Tsimring, H.D.I. Abarbanel, A.R. Volkovskii, Larry Larson, Nikolai F. Rulkov, and Mikhail M. Sushchik, University of California, San Diego; and Kung Yao, University of California, Los Angeles

11:00-11:25 Optimal Chaotic CDMA Spread Spectrum Sequences based on Ergodic Theory of Dynamical Systems
Kung Yao and C.C. Chen, University of California, Los Angeles

11:30-11:55 Optical Communications with Synchronized Semiconductor Laser Chaos
Jia Ming Liu, S. Tang, and H.F. Chen, University of California, Los Angeles

Monday, May 21

MS15
Long-Range Correlations in Dynamics and Biology

10:00 AM - 12:00 PM
Room: Golden Cliff

Long- and short-range correlations are a general feature of many biological time series, whether a neural spike train or a sequence of human heartbeats. While short-range correlations appear to be a general feature of many biological data sets, long-range correlations have been implicated as predictors of disease states such as fibrillation or seizure. Long-range correlations have also been investigated in DNA sequences, and may be characteristic of certain multiple-oscillator neural systems. This Mini-Symposium will address both the dynamical foundations of long-range correlations and the most recent experimental advances in the study of correlations in biology and medicine.

Organizer: Sonya Bahar
University of Missouri, St. Louis

10:00-10:25 Integrated Approach to Assessment of Long Range Correlation in Time Series Data: Foundation and Practice
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10:30-10:55 Fractal and Multifractal Approaches in Physiology: Applications to Heartbeat Dynamics and Human Gait
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Plamen C. Ivanov, Boston University; Armin Bunde and *Jan W. Kantelhardt*, University of Giessen, Germany; Thomas Penzel and Jorg-Hermann Peter, Philipps-Universität, Marburg, Germany; Shlomo Havlin, Bar-Ilan University, Israel

11:30-11:55 Long-Range Temporal Anti-Correlations in Paddlefish Electroreceptors
Frank Moss, Alexander Neiman, David F. Russell, and UPDATED *Sonya Bahar*, University of Missouri, St. Louis; Armin Bunde and Jan W. Kantelhardt, University of Giessen, Germany

Please note: Due to a software error, the author names for the papers above may not be listed in the correct order, and do not necessarily match the order specified on the original submission. SIAM is aware of the problem and is in the process of fixing it. Thank you for your understanding

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3:00 PM - 5:00 PM Concurrent Sessions	CP1 Dynamics of Convection and Rotating Flows	Ballroom I
	CP2 Topics in Fluid Transport	Ballroom II
	CP3 Dynamics of Spatio-temporal Systems	Ballroom III
	CP4 Fluid Dynamics: Theory and Simulation	Magpie A/B
	CP5 Nonlinear Dynamics and Fluids	Golden Cliff
	CP6 Bifurcation Analysis: Numerics, Noisy Systems, and Biological Models	Wasatch A/B
	CP7 Mechanics, Materials, and Stability	White Pine
	CP8 Topics in Pattern Formation	Superior A
	CP9 Continuation, Shadowing and Floquet Multipliers	Superior B
	CP10 Bifurcations in Discontinuous, Coupled and Noisy Systems	Maybird
5:00 PM - 7:30 PM	Dinner Break	Attendees on their Own
7:30 PM - 9:00 PM	Crawford Prize and Moser Lecture Martin Golubitsky, *University of Houston.*	Ballroom
Monday, May 21		
7:30 AM - 4:00 PM	Registration	Ballroom Lobby
8:30 AM - 9:30 AM	IP3 Small-World Networks Steven H. Strogatz, *Cornell University.*	Ballroom
9:30 AM - 10:00 AM	Coffee Break	Ballroom Lobby
10:00 AM - 12:00 PM Concurrent Sessions	MS11 Pattern Formation in Nature and in the Laboratory	Ballroom I
	MS12 Stability of Nonlinear Waves	Ballroom II
	MS13 Frequency Locking in Spatially Extended Systems	Ballroom III
	MS14 Dynamics and Control of Manufacturing Processes	Magpie A/B
	MS15 Long-Range Correlations in Dynamics and Biology	Golden Cliff
	MS16 Digital Communication Devices Based on Nonlinear Dynamics and Chaos	Wasatch A/B
	MS17 Propulsion at Low Reynolds Number	White Pine
	MS18 Nonlinear Dynamics in Neural Systems	Superior A
	MS19 The Dynamics of Polynomial Diffeomorphisms	Superior B
	MS20 Mechanisms for Intermittency and Bursting	Maybird
12:00 PM - 1:30 PM	Lunch (attendees on their own)	Attendees on their Own
1:30 PM - 2:30 PM	IP4 Singularities in Fluid Interfaces: Cones, Wedges and Jets Daniel P. Lathrop, *University of Maryland, College Park.*	Ballroom
2:30 PM - 3:00 PM	Coffee Break	Ballroom Lobby

unstable behavior.

Dieter Armbruster
Arizona State University
Department of Mathematics
dieter@math.la.asu.edu

MS14

Optimal Regimes for Bucket Brigades Production Lines

We show that only stable fixed points provide the maximal production rates in bucket brigades production lines with constant velocities of workers. All other regimes (periodic, eventually periodic or quasiperiodic) correspond to suboptimal production rates.

Leonid Bunimovich
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Georgia Tech
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MS14

An Integrated Simulation Tool for Supply Chain Modeling

Refinement of our knowledge of how to control Semiconductor Supply Networks requires modeling and simulation given that the actual entities are far too complex to directly subject to experimentation. This means modeling the physical flow (materials), the financial flow (cash), and the decision flow (data and information). This paper describes an overall Semiconductor Supply Network simulation architecture that includes all of these elements. We discuss modeling, simulation, control and validation of the supply chain.

Karl Kempf
Intel Corporation
karl.g.kempf@intel.com

MS14

Chaos and Complexity in a Simple Model of Production Dynamics

We consider complex dynamical behavior in a simple model of production dynamics, based on the Wiendahl's funnel approach. In the case of continuous order flow a model of three parallel funnels reduces to the one-dimensional Bernoulli-type map, and demonstrates strong chaotic properties. The optimization of production costs is possible with the OGY method of chaos control. The dynamics changes drastically in the case of discrete order flow: although there is no chaos, the process demonstrates decaying correlations and high complexity. We discuss different dynamical properties of this dynamics between order and chaos.

Arkady Pikovsky, Ines Katzorke
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ines@stat.physik.uni-potsdam.de

MS15

Long-Range Temporal Anti-Correlations in Paddlefish Electroreceptors

The paddlefish perceives its world through an array of electroreceptor organs spread over its rostrum. Using Detrended-Fluctuation Analysis (DFA) we find long-range anti-correlations in sequences of time intervals between neural action potentials recorded from spontaneously firing electroreceptor afferents. In contrast, sponta-neous discharges from mechanoreceptor afferents in the crayfish tailfan lack long-range correlations altogether. We interpret this finding as a consequence of the higher complexity of the electroreceptor organ compared with the much more simple mechanoreceptor.

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Sonya Bahar, Frank Moss, David F. Russell
Center for Neurodynamics
Univ. of Missouri at St.Louis
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drussell@admiral.umsl.edu

MS15

Integrated Approach to Assessment of Long Range Correlation in Time Series Data: Foundation and Practice

To assess whether a given time series can be modeled by a stochastic process possessing long range correlation one usually applies one of two types of analysis methods: the spectral method and the random walk analysis. The first objective of this work is to show that each one of these methods used alone can be susceptible to producing false results. We thus advocate an integrated approach which requires the use of both methods in a consistent fashion. We provide the theoretical foundation of this approach and illustrate the main ideas using examples. The second objective relates to the observation of long range anticorrelation (Hurst exponent a¡1/2) in real world time series data. The very peculiar nature of such processes is emphasized in light of the stringent condition under which such processes can occur. Using examples we discuss the possible factors that could contribute to the false claim of long range anti-correlations and demonstrate the particular importance of the integrated approach in this case.

Mingzhou Ding
Florida Atlantic University
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MS15

Fractal and Multifractal Approaches in Physiology: Applications to Heartbeat Dynamics and Human Gait

We investigate time series generated by two physiologic control systems — the human heartbeat and human gait. We focus on fluctuations in the time intervals between consecutive heartbeats and in the interstride interval time series of healthy human gait. In conventional studies such

fluctuations are often labeled as "noise" to distinguish them from the "true" signal of interest. We show that physiological fluctuations exhibit unexpected hidden structures often described by scaling laws. In particular, our studies indicate that when analized on different time scales the heartbeat fluctuations exhibit cascades of branching patterns with self-similar (fractal) properties, characterized by an universal functional form for the distributions and long-range power-law anticorrelations [Nature 383, 323 (1996)]. We find that these scaling features change with pathological perturbations, and during sleep and wake phases [Phys. Rev. Lett. 81, 2388 (1998); Europhysics Lett. 48, 594 (1999)]. We find evidence of multifractality in the healthy human heartbeat even under resting conditions, and show that the multifractal character and nonlinear properties of the healthy heart are encoded in the Fourier phases [Nature 399, 461 (1999)]. Further, we uncover a loss of multifractality for a life-threatening condition, congestive heart failure. In contrast to the heartbeat, we find that the interstride interval time series of healthy human gait, a voluntary process under neural regulation, is described by a single fractal dimension (such as classical 1/f noise) indicating monofractal behavior. Thus our approach can help distinguish physiological and physical signals with comparable frequency spectra and two-point correlations, and guide modeling of their control mechanisms

Plamen C. Ivanov
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MS15

Heart Rhythm During REM and non-REM Sleep: Characterization by Long-Range Correlations and Multifractality

Healthy sleep consists of several stages: deep, light, and REM sleep. Using the Detrended Fluctuation Analysis we study correlations of heart rates separated by n beats and their multifractal properties. We find that long-range correlations and multifractality are present only in the REM stage. In the non-REM stages, the heart rates are uncorrelated above the typical breathing cycle time and exhibit no multifractality in deep sleep. These findings can be used to distinguish between REM and non-REM sleep.

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armin.bunde@theo.physik.uni-giessen.de

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Thomas Penzel, Jorg-Hermann Peter
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peter@mailer.uni-marburg.de

MS16

Research Directions in Chaotic Digital Communication Devices

The Multidisciplinary University Research Initiative "Digital Communication Devices Based on Nonlinear Dynamics and Chaos" led by the UCSD with participation by UCLA and Stanford U and supported by the Army Research Office is investigating chaotic digital communication at radio, microwave and optical frequencies. The research directions in this effort are small, lightweight, low-power chaotic transmitters and receivers with minimal circuitry, control of chaos in these devices, symbolic dynamics, propagation effects and generation of a general framework for designing chaotic digital communication devices.

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John E. Lavery
Computing and Information Sciences Division
Army Research Office
lavery@arl.aro.army.mil

MS16

Optical Communications with Synchronized Semiconductor Laser Chaos

A single-mode semiconductor laser with optical injection follows a period-doubling route to chaos, whereas one with delayed optoelectronic feedback follows a route of quasiperiodic pulsing to chaotic pulsing. For both systems, synchronization of two identical semiconductor lasers, one functioning as the transmitter and the other as the receiver, with unidirectional coupling has been numerically analyzed and experimentally accomplished. Successful demonstration of message encoding and decoding with synchronized laser chaos for both systems will be presented.

S. Tang
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stang@ee.ucla.edu

H.F. Chen, Jia Ming Liu
Electrical Engineering Dept
U California, Los Angeles
hfchen@ee.ucla.edu, liu@ee.ucla.edu

MS16

Chaotic Pulse Position Modulation: A Robust Method of Communicating with Chaos

We propose chaotic pulse position modulation (CPPM), a method of digital communication using pulse trains with chaotic inter-pulse intervals as a carrier. Binary information is modulated onto this carrier by a pulse position modulation method: each pulse is either left unchanged or delayed by a certain time, depending on whether '0' or '1' is being transmitted. We present analytical and experimental evaluation of CPPM bit error rates in the presence of channel degradation. It is shown that the CPPM performance is within the range that makes this communication method feasible for practical applications.

Larry Larson
Dept of Electrical & Comp Engr
Univ of California, San Diego
larson@ece.ucsd.edu

E

Ebert, Ute, MS59, 10:00 Thu
Eckhardt, Bruno, MS30, 3:30 Tue
Elston, Tim, MS62, 4:00 Thu
Engelborghs, Koen, MS7, 11:30 Sun
Esedoglu, Selim, MS56, 11:30 Thu

F

Fahrenthold, Eric P., PP1, 11:30 Thu
Falcke, Martin, MS63, 3:00 Thu
Feng, Zhaosheng, CP19, 3:20 Mon
Feng, Zhilan, MS26, 3:00 Tue
Feudel, Fred, CP1, 4:20 Sun
Feudel, Ulrike, CP10, 4:20 Sun
Finn, John M., CP2, 4:20 Sun
Fonseca, Alexandre F., PP1, 4:20 Sun
Fraser, Andrew, MS45, 3:30 Wed
Friedman, Mark J., CP6, 4:20 Sun
Fujimoto, Koichi, PP1, 4:20 Sun
Fuks, Henryk, PP1, 4:20 Sun
Full, Robert, IP9, 8:30 Thu

G

Galan-Vioque, Jorge, CP9, 3:40 Sun
Galias, Zbigniew, CP39, 5:45 Wed
Gardner, Robert A., MS12, 11:00 Mon
Gavrielides, Athanasios, MS7, 11:00 Sun
Geddes, John B., CP25, 10:40 Tue
Georgieva, Anna V., CP29, 10:00 Tue
Gilmour, Isla, CP18, 4:20 Mon
Glass, Kristin, MS60, 11:30 Thu
Gluckman, Bruce, MS37, 11:00 Wed
Goldstein, Raymond E., MS44, 3:30 Wed
Gollub, Jerry P., IP1, 8:30 Sun
Golovin, Alexander A., CP36, 5:45 Wed
Golubitsky, Martin, MS11, 11:00 Mon
Gonzalez, Oscar, MS44, 4:00 Wed
Goodridge, Christopher L., CP3, 3:00 Sun
Goriely, Alain, MS44, 4:30 Wed
Green, Kirk, CP25, 10:20 Tue
Grinfeld, Michael, CP29, 11:20 Tue
Groves, Mark D., MS1, 10:00 Sun
Gruendler, Joseph R., MS9, 10:00 Sun
Gunaratne, Gemunu H., CP22, 10:40 Tue

H

Haberman, Richard, CP26, 11:00 Tue
Hagberg, Aric, MS13, 10:00 Mon
Haller, George, MS23, 5:00 Tue
Haller, George, MS50, 4:30 Wed
Hansel, David, MS18, 11:00 Mon
Haragus, Mariana, MS1, 11:30 Sun
Harlim, John, PP1, 11:30 Sun
Hashimoto, Koh, CP28, 10:20 Tue
Hasty, Jeff, MS62, 4:30 Thu
Hauser, John, MS36, 11:30 Wed
Haydn, Nicolai, MS2, 11:30 Sun
Henderson, Michael E., CP9, 3:20 Sun
Higuera, Maria, CP33, 5:45 Wed
Hjorth, Poul G., CP27, 10:00 Tue
Hogan, Stephen J., CP10, 3:20 Sun
Holm, Darryl, CP2, 3:00 Sun
Holmes, Phil, MS20, 11:30 Mon
Holmes, Phil, MS21, 3:30 Tue
Homer, Martin, PP1, 3:30 Tue
Homer, Martin, CP32, 5:45 Wed
Hoyle, Rebecca B., CP8, 3:20 Sun
Huang, Yuan Mao, CP29, 10:20 Tue
Huang, Qichang, PP1, 10:20 Tue
Huang, Yuan Mao, PP1, 10:20 Tue
Huber, Greg, MS17, 10:30 Mon
Humphries, Tony R., CP30, 11:20 Tue
Hundley, Doug, MS40, 11:00 Wed
Hunt, Brian R., MS2, 10:30 Sun

I

Ide, Kayo, MS23, 4:00 Tue
Iglesias, Pablo A., CP13, 3:20 Mon
Iranzo, Vicente, CP29, 11:00 Tue
Iron, David, MS61, 11:30 Thu
Ivanov, Plamen C., MS15, 10:30 Mon
Izhikevich, Eugene M., CP13, 3:40 Mon
Izhikevich, Eugene M., MS18, 11:30 Mon

J

Jackson, Russell K., CP12, 3:40 Mon
James, Matthew P., PP1, 3:40 Mon
Janmey, Paul A., MS6, 10:00 Sun
Jean-Michel, Jean M., CP25, 11:40 Tue
Jerger, Kristin, MS27, 3:00 Tue
Jiang, Miaohua, CP28, 11:20 Tue
Jolly, Michael S., MS41, 4:30 Wed
Jones, Christopher K., MS23, 4:30 Tue
Jones, Christopher K., MS12, 10:00 Mon
Jones, Stephanie R., MS55, 10:30 Thu
Jordan, Richard, MS71, 4:00 Thu
Josic, Kresimir, MS37, 10:30 Wed
Juel, Anne, MS30, 4:30 Tue
Julien, Keith A., CP11, 3:40 Mon
Jung, Peter, MS43, 3:30 Wed
Junge, Oliver, MS36, 10:30 Wed

K

Kalachev, Leonid V., CP37, 5:25 Wed
Kamien, Randall, MS70, 3:30 Thu
Kantelhardt, Jan W., MS15, 11:00 Mon
Kaper, Tasso J., MS61, 11:00 Thu
Kapitaniak, Tomasz, CP28, 11:40 Tue
Kapitula, Todd, MS12, 10:30 Mon
Karolyi, Gyorgy, MS23, 3:30 Tue
Kas, Josef A., MS6, 11:30 Sun
Katzorke, Ines, PP1, 11:30 Sun
Kempf, Karl, MS14, 10:30 Mon
Kennedy, Judy A., MS58, 11:30 Wed
Kennedy, Judy A., MS34, 10:30 Wed
Khibnik, Alexander I., CP33, 5:25 Wed
Kim, Jong-Won, CP3, 4:00 Sun
Kistner, Arnold, CP20, 4:00 Mon
Knobloch, Edgar, CP1, 4:00 Sun
Koehler, Stephan A., MS17, 11:00 Mon
Komarova, Natalia, MS56, 11:00 Thu
Kostelich, Eric J., CP39, 5:05 Wed
Kotani, Kiyoshi, PP1, 5:05 Wed
Kotov, Sergey R., CP18, 3:20 Mon
Kovacic, Gregor, CP25, 10:00 Tue
Kovacs, Zoltan, CP17, 3:20 Mon
Kowalczyk, Piotr, CP10, 4:00 Sun
Kramer, Peter R., MS47, 4:00 Wed
Krasny, Robert, MS50, 4:00 Wed
Krauskopf, Bernd, CP12, 3:00 Mon
Kresta, Suzanne, MS34, 11:00 Wed
Krishnaprasad, P S., MS35, 10:00 Mon
Kunec, Steve, PP1, 10:00 Mon
Kuperberg, Krystyna, MS58, 10:30 Wed
Kurths, Juergen, MS33, 10:00 Wed
Kurths, Juergen, MS53, 10:00 Thu
Kutz, J. Nathan, CP40, 5:05 Wed
Kutz, J. Nathan, MS59, 11:00 Thu
Kuznetsov, Leonid V., CP18, 3:00 Mon

Universität Potsdam
Institut für Linguistik / Allgemeine Sprachwissenschaft
Postfach 601553
D-14415 Potsdam

Dear Dr. Ivanov!

The University of Potsdam (near Germany's capital, Berlin) has won a grant for an interdisciplinary research group on "conflicting rules in cognitive systems", where psychologists, linguists and physicists are working together. Our division is devoted to measuring, analyzing, interpreting and modelling event-related brain potentials (ERP) in human language processing. One of the focuses of investigation in our group is the application of non-linear data analysis techniques and non-linear modelling. We are organizing a workshop on:

Analyzing and Modelling
Event-Related Brain Potentials:
Cognitive and Neural Approaches

Potsdam, November, 29 – December, 01, 2001.

We would like to invite you as an outstanding scientist in this field to participate in this workshop and to give an invited lecture. We shall cover your local expenses and partly reimburse your travelling expenses (up to 511 Euro). You will stay in the Western Park Hotel close to the Park of Sanssouci castle. You may find further informations about the workshop and the University of Potsdam at our web page:

`http://www.agnld.uni-potsdam.de/~graben/workshop2001.html`

Your presentation should be 25 minutes long. We also intend to have a focus issue of the workshop's outcomes in a refereed journal.

We look forward to see you in Potsdam. On behalf of the scientific organizers,

Sincerely yours

Peter beim Graben

Dr. Peter beim Graben

Date: Tue, 17 Jul 2001 (57:46 +0200
From: Birgit Nader <birgit@agnld.uni-potsdam.de>
X-Mailer: Mozilla 4.5 [de] (Win98; I)
X-Accept-Language: de
MIME-Version: 1.0
To: plamen@argento.bu.edu,
        "JKurths@agnld.uni-potsdam.de" <JKurths@agnld.uni-potsdam.de>
Subject: Invitation
Content-Type: text/plain; charset=iso-8859-1
Content-Transfer-Encoding: 8bit

Dear Prof. Ivanov,

The University of Potsdam (near Germany's capital, Berlin) has won a grant for an interdisciplinary research group on "conflicting rules in cognitive systems", where psychologists, linguists and physicists are working together. Our division is devoted to measuring, analyzing, interpreting and modelling event-related brain potentials (ERP) in human language processing. One of the focuses of ivestigation in our group is the application of non-linear data analysis techniques and non-linear modelling.

We are organizing a workshop on:

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     Event-Related Brain Potentials:
     Cognitive and Neural Approaches

     Potsdam, November, 29 -- December, 01, 2001,

We would like to invite you as an outstanding scientist in this field to participate in this workshop and to give an invited lecture.

We will cover your local expenses and partly reimburse your travelling expenses. We would be very happy if you could accept our invitation.

Please, be so kind to inform us rather soon about your decision. We shall also send you this invitation by postal mail upon your acceptance.

On behalf of the scientific organizers,

Sincerely yours,

J■rgen Kurths

Prof.Dr. Juergen Kurths Universitaet Potsdam
Institut fuer Physik Am Neuen Palais 10, PF 601553
Lehrstuhl Nichtlineare Dynamik D-14415 Potsdam
phone: (49-331)-977-1429 fax : (49-331)-977-1142
e-mail: juergen@agnld.Uni-Potsdam.de

FRACTAL 2002

http://www.kingston.ac.uk/fractal/

• **Dr. Miroslav M. Novak**, Chair

Dr P. Ch. Ivanov
Center for Polymer Studies, Physics Department
Boston University
590 Commonwealth Ave.
Boston
MA 02215
USA

September 6, 2001

Ref. number: 62518

Dear Dr Ivanov,

Your paper entitled ' Fractal Features in the Nonstationarity of Physiological Time Series' has now been reviewed. As a result, I am happy to ask you to present it at the Fractal 2002 Conference. Now, you need to prepare **two** hard copies of your paper, of up to 12 pages long, in camera-ready format, and send them to me. I would like to encourage you to use LaTeX to prepare your manuscript. The style files are available from the conference www site. If LaTeX is not an available option, you may use Word and its style file (also found at the conference web site). Please adhere to the formatting instructions very closely, pay attention to font selection, correct placing of equations, embed all the figures and check the usage of English; otherwise your submission may not be included in the proceedings. The publication deadlines are tight. To provide sufficient time for printing, please send your copy early, to reach me not later than **1 October 2001**. A published copy of the proceedings will be available at the conference.

If there are any referee's comments, relevant to your revision, I am enclosing them below. The final acceptance for the proceedings is conditional upon your ability to address those comments, when preparing your camera ready copy.

To promote your contribution and this series of conferences, the abstracts of accepted papers will appear on the www. Kindly send me via email, as soon as possible, the plain (ASCII) version of your paper's title, names of all the authors, and an abstract. Any mathematical expressions or special symbols should be avoided here.

To ensure that your paper will appear in the proceedings, your conference registration form, together with the registration fee, must be returned early, to reach me not later than **1 November 2001**. Otherwise, it will not be possible to include your paper in the proceedings. The conference registration as well as the hotel registration forms are available from the conference web site. The completed hotel accommodation form should be returned to me, not later than **11 January 2002**, if you wish to take advantage of the conference rates.

I look forward to meeting you in Granada next Spring.

Sincerely yours,

School of Mathematics, Kingston University, Penrhyn Rd., Surrey KT1 2EE, England
Tel: +44 20 8547 7481, Fax: +44 20 8547 7497, novak@kingston.ac.uk

International Conference on

Long Range Dependent Stochastic Processes and their Applications

Indian Institute of Science, Bangalore, India

January 7 - 12, 2002

From: "Govindan Rangarajan" <rangaraj@math.iisc.ernet.in>
Organization: Department of Mathematics, Indian Institute
To: plamen@argento.bu.edu
Date: Tue, 31 Jul 2001 19:14:07 +0530
MIME-Version: 1.0
Content-type: text/plain; charset=US-ASCII
Content-transfer-encoding: 7BIT
Subject: Bangalore Conference
Reply-to: rangaraj@math.iisc.ernet.in
Message-ID: <3B67037F.15778.159D10F2@localhost>
X-Confirm-Reading-To: rangaraj@math.iisc.ernet.in
X-pmrqc: 1
Return-receipt-to: rangaraj@math.iisc.ernet.in
Priority: normal
X-mailer: Pegasus Mail for Win32 (v3.12c)

Dear Dr. Ivanov,

This is an update on the "International Conference on Long Range Dependent Stochastic Processes and their Applications" to be held at the Indian Institiute of Science, Bangalore, India from January 7-12, 2002. You had kindly agreed to give an invited talk at the Conference. I have enclosed below the latest list of invited speakers. Please ensure that your name is listed correctly. As you can see, there are speakers from many different areas of science and engineering. In fact, one of the main goals of the Conference is to catalyze interactions between these areas. Therefore, I request to make at least the initial part of your talk accessible to researchers from other areas. The duration of your talk will be notified later depending on the final number of invited speakers. A preliminary web site has been put up. The address is:

http://math.iisc.ernet.in/~rangaraj/conf2.htm

We plan to publish an edited volume / Proceedings of the Conference. We will let you know as soon as a publisher is finalized.

Accommodation for all invited speakers will be provided in the Institute Guest Houses. I urge you start planning your trip soon. It is very difficult to get air tickets (esp. the cheaper ones) to India during the period December to January. So it is best to reserve your tickets well in advance (at least 3 - 4 months in advance if possible). The actual purchase of the tickets can probably be done later. From September 2nd, Lufthansa is starting a direct service from Frankfurt to Bangalore. This flight would be convenient for those flying in from Europe and U.S. Otherwise, you have to change flights in Mumbai or New Delhi. It may be best to contact an Indian travel agent for the tickets. They will usually give you better deals. You can consult your Indian colleagues or Indian graduate students for names of such travel agents. Of course, you should also compare these prices with those available on Internet. You would need a visa to come to India. It is easiest to come on a tourist visa.

We plan to organize an one day sight seeing trip during the Conference. There will also be a cultural programme.

Please acknowledge recipt of this e-mail. Let

me know if you need any further clarifications.

- Rangarajan (Convener)

****

International Advisory Committee

V. Balakrishnan (IIT Madras)
J. Beran (Konstanz)
C. W. J. Granger (San Diego)
J. Klafter (Tel Aviv)
K. R. Parthasarathy (ISI, Delhi)
M. F. Shlesinger (ONR)
Ya. G. Sinai (Princeton)
M. Taqqu (Boston)
M. Teich (Boston)

****

Invited Speakers

Mathematical Aspects of Long Range Dependent (LRD) Processes

K. B. Athreya (Cornell)
G. K. Basak (Bristol)
T. Duncan (Kansas State)
P. Kokoszka (Utah State)
H. L. Koul (Michigan State)
F. Mainardi (Bologna)
G. Molchan (IIEPTMG, Moscow)
P. M. Robinson (London School of Economics)
Ya. G. Sinai (Princeton)
M. Taqqu (Boston)

Applications of LRD Processes in Physics

V. Balakrishnan (IIT, Madras)
E. Barkai (MIT)
M. Barma (TIFR, Mumbai)
A. Bulsara (Navy)
A. D. Gangal (Pune)
I. Kanter (Bar-Ilan)
J. Klafter (Tel Aviv)
Y-C. Lai (Arizona State)
R. Ramaswamy (JNU, Delhi)
H. G. Schuster (Kiel)
M. Shlesinger (ONR)

Applications of LRD Processes in Economics and Finance

R. L. Karandikar (ISI, Delhi)
A. Kirman (EHESS)
T. Lux (Kiel)
T. Mikosch (Copenhagen)
U. Muller (Olsen)
G. Silverberg (MERIT)
S. Solomon (Hebrew)
G. Teyssiere (EC, JRC. GREQAM)

P. Abry (ENS Lyon)
U. B. Desai (IIT, M[illegible]bai)
A. Erramilli (Qnetworx)
P. Flandrin (ENS Lyon)
A. Kumar (IISc, Bangalore)
V. Sharma (IISc, Bangalore)
K. Sigman (Columbia)
W. Willinger (AT&T Labs - Research)

Applications of LRD Processes in Biology

P. Chaudhuri (ISI, Calcutta)
Y. Chen (Neuroscience Institute)
P. Hanggi (Augsburg)
P. Ch. Ivanov (Boston)
K. Linkenkaer-Hansen (Biomag Lab)
A. Longtin (Ottawa)
H. Qian (Washington)
H. E. Stanley (Boston)
B. West (Army Research Office)
Y. Yamamoto (Tokyo)

Prof. Govindan Rangarajan

Department of Mathematics
Indian Institute of Science
Bangalore 560 012
INDIA

Tel (off): +91-80-3600373
(or): +91-80-3092709
Tel (res): +91-80-3344736
Fax : +91-80-3600683
(or): +91-80-3600373
WWW : http://144.16.74.129/~rangaraj/

Invited Speakers

The Conference is organized around 5 themes. Invited speakers are listed under these themes.

Note that a few speakers have not given their final confirmation yet.

Mathematical Aspects of Long Range Dependent (LRD) Processes

- G. K. Basak (Bristol)
- T. Duncan (Kansas State)
- P. Kokoszka (Utah State)
- H. L. Koul (Michigan State)
- F. Mainardi (Bologna)
- B. B. Mandelbrot (Yale)
- G. Molchan (IIEPTMG, Moscow)
- P. M. Robinson (London School of Economics)
- Ya. G. Sinai (Princeton)
- M. Taqqu (Boston)

Applications of LRD Processes in Physics

- V. Balakrishnan (IIT, Madras)
- E. Barkai (MIT)
- M. Barma (TIFR, Mumbai)
- A. Bulsara (SPAWAR, San Diego)
- A. D. Gangal (Pune)
- I. Kanter (Bar-Ilan)
- J. Klafter (Tel Aviv)
- Y-C. Lai (Arizona State)
- R. Ramaswamy (JNU, Delhi)
- H. G. Schuster (Kiel)
- M. Shlesinger (ONR)

Applications of LRD Processes in Economics and Finance

- R. L. Karandikar (ISI, Delhi)
- A. Kirman (EHESS)
- T. Lux (Kiel)
- T. Mikosch (Copenhagen)
- U. Muller (Olsen)
- G. Silverberg (MERIT)
- S. Solomon (Hebrew)
- G. Teyssiere (Brussels and GREQAM)

Applications of LRD Processes in Communications

- P. Abry (ENS Lyon)

- U. B. Desai (IIT, Mumbai)
- A. Erramilli (Qnetworx)
- P. Flandrin (ENS Lyon)
- A. Kumar (IISc, Bangalore)
- V. Sharma (IISc, Bangalore)
- K. Sigman (Columbia)
- W. Willinger (AT&T Labs - Research)

Applications of LRD Processes in Biology

- P. Chaudhuri (ISI, Calcutta)
- Y. Chen (Neuroscience Institute)
- P. Hanggi (Augsburg)
- P. Ch. Ivanov (Boston)
- K. Linkenkaer-Hansen (Biomag Lab)
- A. Longtin (Ottawa)
- H. Qian (Washington)
- H. E. Stanley (Boston)
- B. West (Army Research Office)
- Y. Yamamoto (Tokyo)

Deutsche Forschungsgemeinschaft

DFG, Kennedyallee 40, 53175 Bonn / Postanschrift: DFG, 53170 Bonn

Dienstgebäude
Kennedyallee 40
Bonn – Bad Godesberg

Telefon 0228/885-1
Telefax 0228/885-2777
E-Mail Postmaster@dfg.de
www http://www.dfg.de

Herrn Professor
Dr. Plamen Ch. Ivanov
Center for Polymer Studies
and Department of Physics
Boston University

Boston, Massachusetts 02215
USA

Bereich / Funktion / EMail	Geschäftszeichen	Direktwahl	Datum
Mathematik/Physik 2 Dr. Bernhard Nunner	SPP 1114	2327	14.02.2002

Dear Professor Ivanov,

I am referring to your correspondence with the Organizing Committee of the Colloquium of the Priority Program "Time Series Analysis and Digital Image Processing" which is supported by the Deutsche Forschungsgemeinschaft (DFG). You have kindly agreed to take part.

On behalf of the DFG I would like to invite you officially to participate in the scientific program of the Colloquium, which takes place February 28th until March 2nd 2002 at the Reisensburg castle in Günzburg.

The Deutsche Forschungsgemeinschaft will reimburse for your travel expenses according to German Federal travel cost regulations.

You are kindly asked to advance the money for your tickets and you will be reimbursed by us afterwards. DFG can refund economy air tickets only. Please keep all receipts (tickets) and send them with the enclosed travel claim form to:

Deutsche Forschungsgemeinschaft
- Reisekostenstelle -
Kennedyallee 40
D-53175 Bonn
Germany

within one year after the meeting. The Deutsche Forschungsgemeinschaft would appreciate if you could try to use the offers for reduced fares. Thank you.

I hope you have a pleasant and rewarding stay in Günzburg.

Yours sincerely,

(Bernhard Nunner)

Instituto de Biotecnología

UNIVERSIDAD DE GRANADA

CONFERENCIA

" WAVELET APPROACHES TO FRACTAL AND MULTIFRACTAL ANALYSIS OF BIOLOGICAL SERIES."

Dr. Plamen Ch. Ivanov
Boston University
USA

Miércoles, 11 de Septiembre de 2002
12 horas – Salón de Grados
Facultad de Ciencias

SEMINARIOS DEL DEPARTAMENTO DE FÍSICA FUNDAMENTAL

Aula 05
Facultad de Ciencias, UNED *

Viernes, 13 de septiembre de 2002, 11:30 horas:

Dr. Plamen Ch. Ivanov

Center for Polymer Studies, Boston University, USA

Metal-Insulator Transition in One-Dimensional Disordered Binary Solids with Long-range Correlations

We investigate the possibility that introducing long-range correlations in a disordered system may change the physical properties of the electron wave functions and may lead to a correlation-induced metal-insulator transition in 1-D disordered binary solids. We perform numerical simulations using a 1-D tight-binding model, and we find a critical value for the exponent characterizing the long-range correlations of the system above which, in the thermodynamic limit, the system behaves as a conductor within a broad energy band, and below which the system behaves as an insulator.

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* Facultad de Ciencias UNED: c/ Senda del Rey 9 (junto al Puente de los Franceses)
Información adicional sobre el seminario en los teléfonos 91 398 71 20/43

PHYSIOLOGY SEMINARS
PHYSIOLOGY PROGRAM
HARVARD SCHOOL OF PUBLIC HEALTH
BUILDING 1, ROOM 1301

Plamen Ch. Ivanov, Ph.D.
Center for Polymer Studies, Boston University
and
Laboratory for Nonlinear Dynamics in Medicine,
Harvard Medical School

"Long Memory and Scale Invariance in Physiologic Signals"

9:30AM
Building 1, Room 1301
Tuesday, May 6, 2003

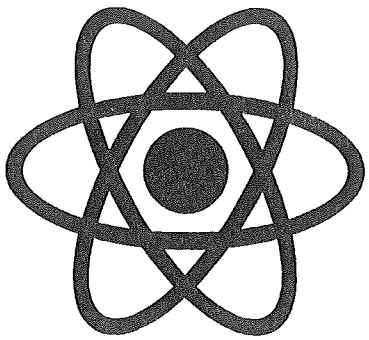
CIRCS SEMINAR

Tuesday
11/13

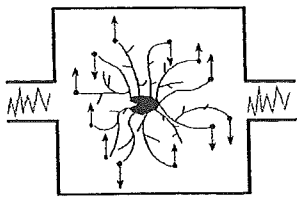
4:00 pm
114 DA

Dr. Plamen Ch. Ivanov
Center for Polymer Studies, Physics Dept., Boston University & Beth Israel Deaconess Medical Center, Harvard Medical School

"Application of Statistical Physics to Physiology: Scaling Features in Human Heartbeat Dynamics"



MINERVA CENTER
for the physics of
Mesoscopics, Fractals and Neural Networks



SPECIAL SEMINAR

Dr. Plamen Ivanov

Harvard Medical School
Harvard University

ירצה על:

"Scaling Features in Human Heartbeat Dynamics"

הסמינר יתקיים , אי"ה, ביום רביעי, ד' בסיוון תש"ס (7.6.00),
בשעה 14:00, בבנין פיסיקה החדש חדר 444.

חברי סגל וסטודנטים מוזמנים להשתתף

****

Department of physics, Bar Ilan University, Ramat-Gan 52900, Israel
Tel: 972-3-5318599 Fax: 971-3-5353523