TURKISH NONLINEAR SCIENCE

WORKING GROUP

www.nonlinearscience.org

XI. International Symposium on "Disorder Systems: Theory and Its Applications"

23-29 August 2011
Karaburun - İzmir - Turkey

Sponsors
Celal Bayar University
Karaburun Municipality
Turkish Nonlinear Science Working Group

Programme & Abstract Booklet

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SYMPOSIUM PROGRAMME

23 August 2011 – Tuesday

14.00-18.00	Registration Welcome Meeting and Assignment Member of Workshops

24 August 2011 – Wednesday

09.00-11.00	Registration
11.00-13.00	Workshop Meetings
13.00-14.30	Symposium Lunch
15.45-16.00	Opening
16.00-17.00	"*Self Organised Criticality"* **Gunnar Pruessner**, *Imperial College London,UK*
17.00-18.00	*"Normal and Anomalous Diffusion in Nonlinear Fokker-Planck Equations"* **Evaldo M. F. Curado**, *Brazilian Center for Physics Research,Rio de Jenario,Brazil and Laboratoire APC, Université Paris Diderot, Paris, France*
18.00-20.00	Mayor of Karaburun Municipality Cocktail

25 August 2011 – Thursday

11.00-13.00	Workshop Meetings
13.00-14.30	Symposium Lunch
15.00-17.30	Workshop Meetings
17.30-18.00	Coffee break
18.00-19.00	"*Nonlinear Quantum Systems"* **Hasan Tatlıpınar**, *Yıldız Technical University, İstanbul, Turkey*
19.00-20.00	*"Optimization of the Properties of $LiNbO_3$ Crystal by High Temperature Heat-Treatment"* **Damla Bulut,** *Yıldız Technical University, İstanbul, Turkey*

26 August 2011 – Friday

11.00-13.00	Workshop Meetings
13.00-14.30	Symposium Lunch
15.00-17.30	Workshop Meetings
17.30-18.00	Coffee break
18.00-19.00	*"Twinned and Oriented Structure Relations in Shape Memory Alloys"* **Osman Adıgüzel**, *Fırat University, Elazığ, Turkey*
19.00-20.00	*"A New Hypothesis About Human Evolution"* **Oktay Kaynak,** *Urla, Turkey*
20.30-	Symposium Party

27 August 2011 - Saturday

11.00-13.00	Workshop Meetings
13.00-14.30	Symposium Lunch
15.00-16.00	Workshop Meetings
16.00-16.30	Coffee break
16.30-17.30	*"Complexity in Heterodoxy"* **K.Gediz Akdeniz**, *İstanbul University, Turkey*
17.30-18.30	*"Basic Notion on Complex Systems"* **Evaldo M. F. Curado**, *Brazilian Center for Physics Research,Rio de Jenario,Brazil and Laboratoire APC, Université Paris Diderot, Paris, France*
18.30-19.30	"*Lake of Transparency on Social Networks"* **G.Reza Jafari**, *Shahid Beheshti University, Tehran, Iran*

28 August 2011 – Sunday

11.00-13.00	Workshop:*"Complexity in Medicalphysics"* Coordinator: **Tamer Zeren,** *Celal Bayar University, Turkey*
13.00-14.30	Symposium Lunch
15.00-16.00	*"Complexity of Multilingual İnformation Retrieval : Skills in Specialized İndexing Languages"* **Omar Larouk,** *ENSSIB-ELICO, University of Lyon, France*

16:00-16.30 Coffee break
16.30-17.30 *"The Mean Field Theory of the Contact Process Revisited"*
Gunnar Pruessner , *Imperial College London,UK*
17.30-18.30 *"Quantum Philosophy"*
Haluk Berkmen , *IAEA (Retired)*

29 August 2011 – Monday

10.00-12.30 Trip - Karaburun Peninsula
13.00-14.30 Symposium Lunch
14.30-16.30 Closing Remarks

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ABSTRACTS

Self Organised Criticality

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Self Organised Criticality, for more than a decade the most popular subject within Complexity, or even within Statistical Mechanics, was expected to be found everywhere, explaining not only earthquakes and forest fires, but hospital waiting times, wars and consciousness. A lot of its early success can be understood by the particular way it was presented and introduced in other fields.

Taking stock more than twenty years later, what are the core findings and what the open questions? I will attempt to give a fair assessment of the state of affairs. The understanding of Self Organised Criticality has advanced very far, not only on the basis of numerical studies, but also using technically more demanding methods developed in Statistical Mechanics. A few robust models have been identified and studied in detail, some even solved analytically. A number of puzzling phenomena and tempting problems remain, which I will try to highlight.

Normal and Anomalous Diffusion in Nonlinear Fokker-Planck Equations

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Nonlinear Fokker-Planck equations are phenomenological equations that can be used to describe normal and anomalous diffusion. Mathematically, these equations can be derived directly from a master equation, by introducing generalized transition rates, or from the Langevin equation with a special kind of noise. The H theorem can be demonstrated for systems that follow these classes of nonlinear Fokker-Planck equations, in the presence of an external potential. For that, a relation involving terms of Fokker-Planck equations and general entropic forms may be obtained. At equilibrium, this relation is equivalent to the maximum-entropy principle. As a consequence, families of Fokker-Planck equations are related to a single type of entropy, and so, the correspondence between well-known entropic forms and their associated Fokker-Planck equations can be established. As an example where this formalism could be useful, we show that the overdamped motion of interacting particles can be associated with a nonlinear Fokker-Planck equation. We can find its stationary solution exactly, and associate a curious entropic form with this nonlinear Fokker-Planck equation, also satisfying the H-theorem. For sufficiently high values of a parameter, associated with the heatbath, the distribution of particles becomes Gaussian, so that the classical Boltzmann-Gibbs behavior is recovered. For intermediate values of this parameter, the system displays a mixed behavior that follows a novel type of thermostatistics, where the entropy is given by a linear combination of Tsallis and Boltzmann-Gibbs entropies.

Nonlinear Quantum Systems

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Linear quantum mechanic is a one century theory to explain physical lows in atomic world, it has great successes in new technology and it has chanced many philosophical explanation of classical point of view in natural and social sciences. But recently a lots of new physical macroscopic observations have no simple explanation in linear quantum mechanics such as superconductivity, superfluity, BEC, quantum entanglement ect. On the other hand macroscopic world shows nonlinear dynamical behavior and there are many efforts to do physical theories for nonlinear dynamical systems.

The main aim of this presentation is to define principle of nonlinear quantum mechanics and show how to explain in quantum mechanics macroscopic behavior of new phenomenon mentioned above.

Optimization of the Properties of $LiNbO_3$ Crystal by High Temperature Heat-Treatment

D. Bulut[1], M. H. Yükselici[1], A. Aşıkoğlu[1], D. Yu. Sugak[2], I. I. Syvorotka[2],T. O. Kret[2], I. M. Solskii[2]
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The change in refractive index of lithium niobate when exposed to intense light is known as photorefractive effect and can be used for holographic data storage. However, the destructive readout or erasure of the stored data during the readout process presents a serious problem for technological applications. In this work, we present a study to optimize the properties of lithium niobate crystal by heat-treatment at high temperatures, that is, the effect of heat-treatment on the time evolution of images recorded on the defect levels is discussed. Photorefractive $LiNbO_3$ single crystal of congruent composition was grown by Czochralski method. Plane samples of X, Y or Z cut were heat treated at between 400 and 1000^{o}C for one or two hour(s) under vacuum, H_2 or Ar atmospheres. Sub-band gap defect levels were studied by optical absorption spectroscopy. The optical absorption spectra for three X cut samples as-grown (a) and heat-treated for an hour at 800^{o}C (b) and 1000^{o}C (c) under vacuum are presented in Fig. 1.

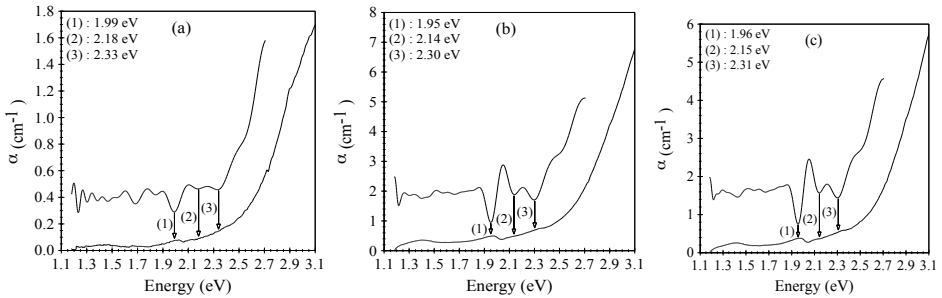

Figure 1. Optical absorption spectra for congruent $LiNbO_3$ crystal

The sub-band gap energy levels identified by the energy of the peak or shoulder are determined by the position of the minimums in the second derivative of each absorption spectrum. The wavy second derivative spectra are shown in the same plots.

Energy levels are red-shifted by 30-40 meV and tail-absorption increases as a result of heat-treatment. The results show that the image recorded on the heat-treated crystal decays with longer time constant under illumination compared to the hologram recorded on as-grown crystal.

Twinned and Oriented Structure Relations in Shape Memory Alloys

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Shape memory effect is based on martensitic transformation; and shape memory properties are closely related to the microstructures of the material. Twinning and reorientation processes can be considered as elementary processes activated during the transformation. These processes have great importance in shape memory behaviour. In particular, twinned and oriented structures occurring in cooling cycle affect the shape memory characteristics. Martensitic transformations occur with the cooperative movement of atoms by means of lattice invariant shears on cooling from high temperature parent phase.

The twinned martensite occurs as martensite variants, thermal manner and consists of lattice twins. Deformation of shape memory alloys in martensitic state proceeds through a martensite variant reorientation, and the twinned martensite variants turn into the reoriented single variants with deformation. The deformed material recovers the original shape on heating over the austenite finish temperature. Meanwhile, the material returns to the twinned martensite structures in one way (irreversible) shape memory effect on cooling below the martensite finish temperature, whereas the material returns to the reoriented martensite structure in two way (reversible) shape memory effect. Copper based alloys exhibit this property in metastable b - phase region, and B2 or DO3 –type ordered structures martensitically turn into the layered complex structures with lattice twinning mechanism, on cooling from high temperature. The twinning occurs as martensite variants with inhomogeneous invariant shears in two opposite directions, <110 > -type directions on the {110}-type plane of austenite matrix. In the present contribution, x-ray diffraction, transmission electron microscopy (TEM) and differential scanning calorimetry studies were carried out on two copper based ternary alloys.

A New Hypothesis About Human Evolution

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Being bipedal will be based on environmental changes and enlargement of the human brain will be explained by a new hypothesis focusing on the changing conditions of the embryo.

We aim to bring a new prospect to this topic and help Turkish paleontologists to discuss. 8-10 million years ago, there has been a geat change in climate, evironment and food resourses forcing the tree-dwelling primates to come down to the shallow waters in order to find food in Rift Valley. To be forced to find food from water only, for 4-5 million years explains the primate's standing on his feet, formation of fat layer of his skin to regulate heat, existence of hair on the head but not on the body.

At some point while he was becoming upright the embryo in the womb turned 180degrees over changing his position, completely different as of primates and other mamals. This started the enlargement of the skull. And each australopithecus started to have babies having bigger skulls than it's mother. This hypothesis can be tested by implanting a chimpanzee embryo into human womb and give it a birth. Because it grew in a human womb the new- born keeping his bodily features will have a bigger skull .

Last of all, what forced the human to be an intelligent being was not his becoming upright, but rather the factors that affected the embryo letting him to develop a larger skull, and therefore a larger brain.

Complexity in Heterodoxy

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In this presentation for the dynamic structure of complex systems we consider ordered simulations (Baudrillard type) as long range correlations and disordered simulations (Akdeniz type) as short range correlations. As an example Derwishian Heterodoksy will be critiqued by such a compleks system.

Basic Notion on Complex Systems

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We will present some basic definitions, show some tools that have been used in the literature and discuss some examples, at an introductory level.

Lake of Transparency on Social Networks

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Social networks can be described as networks with complex topology which are expected to show power-law behavior, if they develop according to Barabasi-Albert model. This model assumes availability of nodes degree information for each new node introduced to system. However, in real social networks, the nodes do not have thorough information about the degree of other nodes. This could be because the information is not clear which maybe due to the cultural reasons or due to the reason that governments are not interested in clearness (censorship). Another important factor could be the media or advertising systems. They can make someone look more powerful than he is. In this work, we are controlling these in our model with the rate of information diffusion (r) smaller or larger than one (r = 1 represents the Barabasi-Albert model). Our initial results show how nodes with high degrees (deviation from Barabasi-Albert model) form when this rate is very small. In addition, when r>1 the scale-free networks changes to random ones. This shows the role of media which can vary the structure of the network. It highlights the expression that "information is the power".

Complexity of Multilingual Information Retrieval : Skills in Specialized Indexing Languages

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The objective of an information system monolingual or multilingual is a link between textual information (corpus) and a question of who should lead the user to a selection of some texts in the corpus in professional communication.

In a system of classical information retrieval, analysis where the document is a manual indexing of the characteristic features of a document are combined with elements of a documentary language (lexicon or thesaurus). The word of the language (or sign language) has its own existence. First, the word exists because it has a use for a certain type of people, talk about things. Thus, the population has more words to name what we call "véhicule=vehicle" may use multiple words like “voiture=car", "automobile=car", etc..

We talk about the terminology documentary when the word refers to a real object extra-linguistic. It would be necessary to distinguish information literacy from the methodology skills based digital documentary about the uses of computer and language proficiency of specialized languages (complexity, ambiguity, polysemy and contextuality of texts).
To design a language for specialized purposes, we used the systems of knowledge organization as (terminology, language documentary, thesaurus, controlled vocabulary, metadata, classifications, ontology, taxonomy, etc.) to suit the current needs of business and web development documentary.

In conclusion, within the complexity of the training techniques of documentary languages, taking into account the linguistic literature must include the prerequisite modules for computing, linguistics (syntax and semantics) and ending with the specialized translation.

The Mean Field Theory of the Contact Process Revisited

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For the last forty years, the directed percolation universality class has probably played the most prominent role in far from equilibrium phase transitions. Phenomena belonging to this universality class, such as the contact process, are best cast into a Langevin equation containing a rather peculiar noise term, whose variance is linear in the local field, which makes it difficult to analyse. The mean field theory of the contact process normally ignores this noise term.

In this talk, I will give an overview of ongoing work to solve exactly the Langevin equation of the random neighbour (or infinite range) contact process in a finite system. The aim is to reproduce known results without refering to the field theory and calculate universal amplitude ratios in closed form. While interesting in its own right, the methods applied might shed new light on absorbing state phase transitions in general, such as the role of conditional expectation values and finite size scaling, and elucidate the meaning of the noise correlator and how it might be possible to tackle this type of problem from a different angle.

Quantum Philosophy

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IAEA (Retired)

During the twentieth century a new conception of nature and a new understanding of reality became to take shape among the community of theoretical physicists. This new paradigm was based on the ideas of Albert Einstein who claimed that space and time is depending on the speed of the observer and also on the idea of Max Planck that energy is transmitted in discrete steps called “quanta”. The revolutionizing conceptions of the theory of Relativity and of the theory of Quantum Mechanics started to shake not only the principles of classical physics, but gradually started to transform the concrete sense of reality of the populations at large throughout the world.

We our now in the position to question the concepts of time, space, energy and matter which are essential in our understanding of what reality is. We are also able to discuss the validity of objectivity, causality, locality and positivism. In this visual talk all of these principles and preconceptions will be dissected and the philosophical basis of Quantum reality will be discussed. The Quantum mechanical reality goes far beyond the microscopic world of atoms and sub-atomic particles and can influence the very basis of our daily social life.