

TURKISH NONLINEAR SCIENCE

WORKING GROUP

www.nonlinearscience.org

**XV. International Symposium on
“Disorder Systems: Theory and Its Applications”**

**28 August - 1 September 2015
Karaburun - İzmir - Turkey**

Sponsors
Celal Bayar University
Şemsa Pozcu Organic
Turkish Nonlinear Science Working Group

Programme & Abstract Booklet

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WORKING GROUP*

**XV. International Symposium on “Disorder Systems:
Theory and Its Applications”**

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SYMPOSIUM PROGRAMME

**XV. International Symposium on “Disorder Systems:
Theory and Its Applications”
Symposium Program
28 August -1 September 2015
Konak Hotel, Karaburun, İzmir Turkey**

28 August 2015 – Friday

14.00-18.00 Registration

Welcome Meeting and Assignment Member of Workshops

29 August 2015 – Saturday

09.00-10.00 Registration

10.00-10.30 Opening

10.30-11.30 *“Fundamental Questions of Thermodynamics
and Statistical Mechanics”*

Hasan Tatlıpınar, *Yıldız Technical University, İstanbul,
Turkey*

11.30-12.30 *“New Anarchy and Complex Utopia”*

K. Gediz Akdeniz, *Disorder Systems Institute, Turkey*

12.30-14.00 Symposium Lunch

14.00-15.00 *“Light and Life: New Lighting Concept Based on
Quantum Technologies”*

Çetin Arıkan, *İstanbul University, İstanbul, Turkey*

15.00-16.00 *“An Introduction to Statistical Physics of
Complex Systems”*

G. Çiğdem Yalçın, *İstanbul University, İstanbul, Turkey*

16.00-19.30 Workshop meetings (I-II)

20.00-21.30 Symposium Dinner

30 August 2015 – Sunday

10.00-11.00 Workshop meetings

11:00-12:00 *“Determining Chaotic Behaviour of Seismic Waves Using Scale Index Method”*

Nazmi Yılmaz, Mahmut Akıllı and K. Gediz Akdeniz, Koç University, İstanbul, Turkey

12.30-14.00 Symposium Lunch

14.00-15.00 *“Understanding of Nonlinear Dynamics of Brain Disorders by Invariant Measures ”*

R. Murat Demirer, Üsküdar University, İstanbul, Turkey

15.00-15.30 *“Complex polymers”*

Nurseli Ademoglu, Merve Kurtay, Mine Taşar, Burcu Türkkan and G.Çiğdem Yalçın, İstanbul University, İstanbul, Turkey

15.30-16.00 Coffee Break

16.00-16.30 *“A Study on Perceptual Difference of Delayed Audio Samples”*

Bengi Derya Muşdal, Bahçeşehir University, İstanbul, Turkey

16.30-17.00 *“Epistemological Connections in Self Organizing: Metis ”*

Yağız Alp Tangün , Dokuz Eylül University, İzmir, Turkey

17.00-19.30 Workshop meetings (III – IV)

31 August 2015 – Monday

10.00-12:00

Workshop – I : *“Complex Behaviors of Utopia”*

Coordinator : **K. Gediz Akdeniz, Disorder Systems Institute, Turkey, Turkey**

Workshop – II : “*Open Problems of Thermodynamics and Statistical Mechanics*”

Coordinator : **Hasan Tatlıpınar**, *Yıldız Technical University, İstanbul, Turkey*

12:30-14:00: Lunch

15:00-17:00

Workshop – III : “*Nonlinear Dynamics of Brain Disorders*”

Coordinator : **R. Murat Demirer**, *Üsküdar University, İstanbul, Turkey*

Workshop – IV : “*Applications of Statistics Physics of Complex Systems*”

Coordinator : **G. Çiğdem Yalçın**, *İstanbul University, İstanbul, Turkey*

17.00-18.00 The results of the Workshop Meetings

1 September 2015 - Tuesday

11.00-13.00 Closing Remarks

Contact: Assist Prof. Dr. G. Çiğdem Yalçın

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ABSTRACTS

Fundamental Questions of Thermodynamics and Statistical Mechanics

Hasan Tatlıpınar

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Thermodynamic is one of the fundamental theory to explain behavior of matter. It is a phenomenological theory. This theory has many successful applications in science and engineering. On the other hand the aim of the statistical mechanics is starting from microscopic level behavior of matter to derive all thermodynamic quantities for the macroscopic equilibrium systems. To do this there are some approaches such as kinetic theory and ensemble theory. One starts from fundamental interactions and the other starts from probability theory to derive thermodynamics. To study the non-equilibrium systems which kind approaches is useful is a discussed question. The aim of the this presentation is to discuss such very well known fundamental questions once more and extend the discussions to the non-equilibrium systems.

New Anarchy and Complex Utopia

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Since, in today's simulation world the poststructuralist anarchism as "Principle of Reality" is also reconstructed, according to Chaotic Awareness Simulation (CAS) theory, the new anarchy as complex utopia is zuhured (emergence) in non-modern societies, particularly in Middle East [1]. In this talk we shortly present the complex utopia in CAS theory context. And it will be discussed that the Gezi Park could be realized as the first "New Anarchy" event in simulation world [2].

[1] Akdeniz, K.G. New Communitarianism Movements and Complex Utopia, Chaos Theory in Politics, Eds. Banerjee S., Erçetin Ş.; Tekin, A., Springer (2014).

<http://www.springer.com/physics/complexity/book/978-94-017-8690-4>

[2] Akdeniz, K.G. Chaotic Awareness in Gezi Park, Chaos, Complexity and Leadership 2013, Edts. Erçetin, Şefika Şule, Banerjee, Santo Springer (2014).

<http://www.springer.com/physics/complexity/book/978-3-319-09709-1?detailsPage=chapter&resultStart=21>

Light And Life: New Lighting Concept Based On Quantum Technologies

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Light that defeats the darkness from our life's, is an essential need for the mankind since the existence life. There have been countless breakthroughs in light sciences since the beginning of time. Through research and the use of various technologies, we have gained an understanding of the importance of light in all aspects of life. UNESCO proclaimed 2013 with a resolution that 2015 as the "International Year of Light and Light-based Technologies (IYL 2015)". 2014 Nobel Price was rewarded for inventing a new energy-efficient and environment-friendly light source – the blue light-emitting diode (LED).

In this review talk, I will try to shed 'light' on the understanding of the developments with a little history of light and will give the basic principles of semiconductor quantum devices leading to new lighting technologies.

An Introduction to Statistical Physics of Complex Systems

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In this talk we would like to discuss on theoretical work is based on new statistical physics research for complex systems. For this purpose we will pointed out our very recent work which is about incidence of q-statistics in rank distributions [1].

[1] G.Cigdem Yalcin, Alberto Robledo and Murray Gell-Mann, Incidence of q-statistics in rank distributions, Proceedings of the National Academy of Sciences, 111,14082-14087, (2014)

Determining Chaotic Behaviour of Seismic Waves Using Scale Index Method

N.Yılmaz, M. Akıllı* and K. G. Akdeniz**

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Scale index, a wavelet based method for determining non-periodicity, has recently been introduced and applied successfully to mathematical dynamical systems such as Henon map and Logistic map (1). In this work, the scale index method is used in order to determine non-periodicity, hence chaotic behaviour of local seismic wave activity. We used seismic wave data of the 23/10/2011 Van Earthquake and three other local earthquakes within 20 days of the main earthquake, recorded in two seismic monitoring stations (2). Scalogram graphs, scale index values and largest Lyapunov exponents were obtained for each seismic wave data. Scale index and largest Lyapunov exponent values are evaluated. The results show that scale index is an effective method to analyze chaotic behaviour of seismic waves.

Key words: Scale Index, Wavelet, Lyapunov Exponent, Chaotic Behaviour, Scalogram,

[1] R. Benitez, V. J. Bolos, M. E. Ramires, Wavelet Based Tool for Studying Non-Periodicity, Journal of Computers & Mathematics with Applications, Vol. 60, 634-641, 2010

[2] Boğaziçi Üniversitesi Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Ulusal Deprem İzleme Merkezi, Deprem Sayısal Verileri.

Understanding of Nonlinear Dynamics of Brain Disorders by Invariant Measures

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Many brain disorders are likely caused by genetic factors. They are leading to dysfunction of neuronal mass synchronizations within and between larger macroscopic neural population and brain areas. Our goal is to map neural population dynamics of the brain by Hilbert and Fourier transforms and then leading to entropy estimates for obtaining biomarkers (invariants), to measure and band-pass filter of EEG amplitude and phase coupling patterns of electrical activity across time and space information flowing among neural populations, to analyze the highly nonlinear spatio-temporal dynamic structure of multichannel EEG and fMRI data and to understand how their interplay affect our unique cognitive and behavioral processes including perception, memory, learning, planning, emotion, and complex thoughts.

Keywords: Transfer Entropy, EEG, fMRI, Hilbert Transform

Complex Polymers

Nurseli Ademođlu, Merve Kurtay, Mine Tařar, Burcu Turkkan and G.Çiđdem Yalçın

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Recently the behavior of the electrical conductivity of polymethylmetacrylate (PMMA) thin films was examined with q -Gaussian analysis [1]. From that point, we will try to discuss examples on complex polymers for q -statistics which is a new statistical physics research for complex systems.

[1] G.Cigdem Yalcin. Yani Skarlatos, K.Gediz Akdeniz, q -Gaussian Analysis of the Electronic Behavior in Polymethylmetacrylate", Chaos, Solitons and Fractals, vol.57, pp.73-78, (2013).

A Study on Perceptual Difference of Delayed Audio Samples*

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Many factors play essential role on the perception of sound which arrives at human's ear. One of them is the time delay arising from a certain distance covered by the sound thus phase differences caused by delays on sound waves. Phase differences arising in sound waves create a complex sensation hampering the intelligibility of human perception caused by the quantity of time delays. Sound engineers encounter such delays in their working areas; the engineer recognizes the phase difference arising due to the distances of instruments to microphones during the recording of music and prevents time delays arising from the magnitude of distances during a performance held in concert halls by calculating time delays according to the positions of sound systems. The purpose of this thesis is to conduct research on the perceptive differences between sound engineers and general listeners concerning the sound examples with delays given in a variety of time periods. The audio samples have been formed on Digital Audio Workstation, which is commonly used by sound engineers, were listened by sound engineers and general listeners and the results were evaluated.

Keywords: Sound Technology, Sound Engineering, Delayed Audio, Perception, Psychology

* This study has been presented as Master's Thesis on May 26, 2015 with the consultancy of Assist. Prof. Dr. Rustu Murat Demirer and Assist. Prof. Dr. Yahya Burak Tamer at Bahcesehir University.

Epistemological Connections in Self-Organizing: Mêtis

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Knowledge only exist when the social movement which is unforeseeable and which includes disorder started. And it touches production of alternative life culture. Since necessity has realized; imagination, production and circumvolution of knowledge may hold political context as well as intellectual qualification. Also aforementioned knowledge may have political context due to its using in time and place.

During and after 2013 Gezipark protests in Turkey, never-before-seen local public agents has emerged. Some of them are volunteer activity should being read social solidarity and mutualization, others are activities of squad habitants involved directly the political attitude – but it isn't homogen. Within the context of presentation, aforementioned common point of two type activities is attitude which looked for a solution and been grassroots . Mêtis is one of results of experimental attitude. It is value of all humanity history so it involves knowledge descriptions which contacted the alternative life.

WORKSHOPS

I- “Complex Behaviors of Utopia”

II- “Open Problems of Thermodynamics and Statistical Mechanics”

III- “Nonlinear Dynamics of Brain Disorders”

IV- “Applications of Statistics Physics of Complex Systems”