

# *TURKISH DISORDER SYSTEMS*

## *WORKING GROUP*

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

**24 - 31 August 2010  
Karaburun - İzmir - Turkey**

### **Sponsors**

Celal Bayar University  
Karaburun Municipality  
Turkish Disorder Systems Working Group

**Programme & Abstract Booklet**

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## **Sponsors**

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# *SYMPOSIUM PROGRAMME*

### **24 August 2010 – Tuesday**

14:00-18:00      Registration

### **25 August 2010 – Wednesday**

11:00-13:00      Wellcome Meeting and  
Assignment Member of Workshops

13:00-14:30      Symposium Lunch

15:00-17:00      Workshop Meetings

### **26 August 2010 – Thursday**

11:00-11:30      **Opening**

11:30-12:30      *"Fundamental Constants in Physics and their Time  
Dependence"*

**Harald Fritzsch** - Munich University, Germany

13:00-14:30      Symposium Lunch

15:00-16:00      *"Viscoelastic Properties of Networks"*

**Güngör Gündüz** - Orta Doğu Technical University,  
Ankara, Turkey

16:00-16:30      Coffee break

16:30-17:30      *"Dark Matter and Dark Energy"*

**Haşim Mutuş** - İstanbul University, Turkey

19:30-              Mayor of Karaburun Municipality Cocktail

## **27 August 2010 – Friday**

- 09:30-10:30    *"The Fractal Universe"*  
**Haluk Berkmen** - IAEA (Retired)
- 10:30-11:00    Coffee break
- 11:00-12:00    *"Structure of Cross-Correlation Matrix of Tehran Stock Market under Attack"*  
**Ali Namaki** - Tehran University, Iran
- 13:00-14:30    Symposium Lunch
- 15:00-17:00    Workshop: *"Chaotic Behaviors of Solitons"*  
Coordinator: **K.Gediz Akdeniz**  
İstanbul University, Turkey
- 17:00-18:00    *"Flavor Mixing, Neutrino Masses and Neutrino Oscillations"*  
**Harald Fritzsch** - Munich University, Germany
- 18:00-18:30    Coffee break
- 18:30-19:30    *"Simulation Theories in Social Systems"*  
**K.Gediz Akdeniz** - İstanbul University, Turkey
- 20:30-            Symposium Party

## **28 August 2010 - Saturday**

- 10:30-12:30    Workshop: *"Complexity in Medicalphysics"*  
Coordinator: **Tamer Zeren**  
Celal Bayar University, Manisa, Turkey  
*"Basic Signal Recording and Processing for Heart Rate Variability"*  
**Mustafa Özbek** - Celal Bayar University, Manisa, Turkey

- 13:00-14:30 Symposium Lunch
- 14:30-17:00 Workshop: *“Chaotic Behaviors of Solitons”*  
Coordinator: **K.Gediz Akdeniz**  
İstanbul University, Turkey
- 17:00-19:30 Workshop: *“Theory, Model and Complexity”*  
Coordinator: **Hasan Tatlıpınar**  
Yıldız Technical University, İstanbul, Turkey

### **29 August 2010 – Sunday**

- 09:30-10:30 *“The Instanton-Type Elliptic Solutions in Akdeniz-Dane Model”*  
**Cem Önem** - Trakya University, Edirne, Turkey
- 10:30-11:00 Coffee break
- 11:00-12:00 *“Complex Utopia and The Highlights in International Conference of the Utopian Studies Society, Poland-2010”*  
**K. Gediz Akdeniz** - İstanbul University, Turkey
- 13:00-14:30 Symposium Lunch
- 14:30-16:30 Workshop: *“Chaotic Behaviors of Solitons”*  
Coordinator: **K.Gediz Akdeniz**  
İstanbul University, Turkey
- 16:30-17:00 Coffee break
- 17:00-19:00 Workshop: *“Theory, Model and Complexity”*  
Coordinator: **Hasan Tatlıpınar**  
Yıldız Technical University, İstanbul, Turkey

### **30 August 2010 – Monday**

Karaburun Peninsula – Trip Day



**31 August 2010 – Tuesday**

10:30-12:30 Workshop: “*Complexity in Medicalphysics*”

Coordinator: **Tamer Zeren**

Celal Bayar University, Turkey

13:00-14:30 Symposium Lunch

14:30-16:30 **Closing Remarks**

**Contact:**

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# *ABSTRACTS*

## Flavor Mixing, Neutrino Masses and Neutrino Oscillations

Harald Fritzsch

*Physik-Department, Universitaet Muenchen  
fritzsch@mppmu.mpg.de*

In models with texture zeros in the fermion mass matrices the flavor mixing parameters are fixed by the ratios of the fermion masses. I will first discuss the success of such a model for the quarks and then apply the same idea to the leptons. Using the experimental values for the neutrino mixing angles, I can calculate the neutrino masses. They are very small - the mass of the third neutrino is only 0.05 eV. It will be very difficult to find an effect in the neutrinoless double beta decay. One prediction can soon be checked in the new reactor neutrino experiments, in particular the Daya Bay experiment in China.

## Fundamental Constants in Physics and their Time Dependence

Harald Fritzsch

*Physik-Department, Universitaet Muenchen  
fritzsch@mppmu.mpg.de*

In the Standard Model of Particle Physics there are 32 fundamental constants. In the experiments these constants can be measured, but theoretically they are not understood. I will discuss these constants, which are mostly mass parameters. Astrophysical measurements indicate that the finestructure constant depends on time. Grand unification implies a time variation of the QCD scale. Thus the masses of the atomic nuclei and the magnetic moments of the nuclei will depend on time. I proposed an experiment, which is currently done by Prof. Haensch in Munich and his group. The first results indicate a time dependence of the QCD scale. I will discuss the theoretical implications.

## **Viscoelastic Properties of Networks**

Güngör Gündüz

*Middle East Technical University, Department of Chemical  
Engineering, Ankara, Turkey  
ggunduz@metu.edu*

Viscoelastic property can be attributed to a network. The deformation of a network, or the change of its shape or its internal structure changes its viscoelastic property. So the viscoelasticity of a network changes during its course of evolution. The scattering diagram of an evolving system can be taken as its network structure. The change in the direction of motion can be taken as elastic deformation, and the change in the vertical direction as viscous deformation. So it is possible to characterize a network by its storage and loss moduli. In this talk the viscoelastic properties of two different systems, (i) New York Stock Exchange, and (ii) a melody will be discussed.

## **The Fractal Universe**

Haluk Berkmen

*IAEA (Retired)*

*halukberkmen@yahoo.com*

This will be a visual presentation of the Fractal structure of nature, spanning from the micro to the macro dimensions of the known universe. It will be shown that the universe is composed of similar, but not identical, entities and systems, which exhibit fractal characteristics. Therefore, self-similar forms exist at all scales. This similarity is valid not only for non-living objects, but also for living beings and species. It is quite possible that this new way of assessing nature and the universe will eventually lead to a re-evaluation of Darwin's theory of evolution.

## **The Instanton-Type Elliptic Solutions in Akdeniz-Dane Model**

Cem Önem<sup>1</sup> and K.Gediz Akdeniz<sup>2</sup>

<sup>1</sup>*Trakya University, Science Faculty, Department of Physics,  
Edirne, Turkey*

<sup>2</sup>*Istanbul University, Science Faculty, Department of Physics,  
Vezneciler, Istanbul, Turkey  
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In this study, we obtained non-linear equation system for the two dimensional conformal invariant wave equation with Liouville term [1] via Euclidean Heisenberg Ansatz [2]. We shown that the elliptic solutions of this non-linear equation system with transformation of the dimensionless fields on the surface of the sphere verify instanton- type properties.

[1] Akdeniz ,K.,G.,Dane,C., “Instantons in a two - dimensional conformal invariant Model with a Liouville term” ,Letters in Mathematical Physics 9 ( 1985 ) 201-205 .0377-9017/85.15

[2]Heisenberg ,W . , 1954 , Zeits .F . Naturf .9A , 292 . ,

## **Structure of Cross-correlation Matrix of Tehran Stock Market under Attack**

A.Namaki<sup>1</sup>, G.R.Jafari<sup>2</sup> and R.Raei<sup>2</sup>

<sup>1</sup>*Faculty of Management ,University of Tehran ,PO Box 14819-57711,Tehran,Iran*

<sup>2</sup>*Department of Physics, Shahid Beheshti University ,G.C.,Tehran 19839,Iran*

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We investigate the structure of a perturbed stock market, herein Tehran stock market in terms of correlation matrices. For the purpose of perturbing a stock market , two distinct methods are used, namely local and global perturbation .The former involves replacing a correlation coefficient of the cross-correlation matrix with one calculated from two Gaussian-distributed time series while the latter reconstructs the cross-correlation matrix just after replacing the original return series with Gaussian-distributed time series .The term 'global' means the overall effect of the replacement on other untouched returns. Through statistical analyses such as random matrix theory (RMT), network theory ,and the correlation coefficient distributions, We show that the global structure of a stock market is vulnerable to perturbations. However, apart from in the analysis of inverse participation ratios ( IPRs), the vulnerability becomes dull under a small-scale perturbation. This means that these analysis tools are inappropriate for monitoring the whole stock market due to the low sensitivity of a stock market to a small-scale perturbation. In addition, when going down to the structure of business sectors, we confirm that correlation-based business sectors are regrouped in terms of IPRs.



## **Simulation Theories in Social Systems**

K. Gediz Akdeniz

*İstanbul University, Department of Physics, İstanbul, Turkey*

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We are living in simulation world and the deconstruction begins everywhere. In this presentation we investigate the role of the order and disorder-type simulations to explain the social systems and human behaviors. For this purpose we consider Baudrillard's Simulation Theory and "Disorder Sensitive of Human Beings" Simulation Theory.

**Complex Utopia and The Highlights in International Conference  
of the Utopian Studies Society, Poland-2010**

K.Gediz Akdeniz

*İstanbul University, Department of Physics, İstanbul, Turkey*

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Since the world of human and whose life becomes more and more complex every day, complexity as the science of all science to understand world by giving up the traditional reductionist approaches is also taken into account in reteorization of the utopia.

In this talk I will define the key components of complex utopia with particular examples in which objects are interacted via disorder simulations.

Additionally the highlights presentations in International Conference of the Utopian Studies Society, Poland-2010 will be summarized.

## **Dark Matter and Dark Energy**

Haşim Mutuş

*İstanbul University, Department of Physics, Istanbul, Turkey*  
*hmutus@istanbul.edu.tr*

Contents of the universe from current observations are briefly summarised. Evidences for dark matter in galaxies and in clusters of galaxies are presented and possible candidates for what might dark matter be made of are speculated. The assumption of the existence of a dark energy causing the expansion of the universe to accelerate is discussed from theoretical and observational points of view.

## **Basic Signal Recording and Processing for Heart Rate Variability**

Mustafa Özbek

*Celal Bayar University, Turkey  
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The peak of the “R” wave on the electrocardiogram (ECG) may indicate the time of heart beat. The time interval between consecutive heartbeats is “the RR interval” and represents “a heart period (T)”. And, “ $1/T$ ” is termed as “the heart rate”. There are very small differences between consecutive RR intervals, physiologically (“normal”). But RR interval changes may also be pathophysiological (“abnormal”). The numerical analysis of time series of heart rate may be helpful to predict some dangerous heart. Therefore, the “Heart Rate Variability (HRV)” has been an interesting topic for physiologists and cardiologists. Mathematician and physicists have been interested in methods for time series analysis of heart rate, as well.

To assess the heart rate variability, the Fourier frequency spectrum analysis of “heart rate vs. time” have been widely used [1, 2]. Nonlinear methods have also been used to assess time-dependent heart rate variation [1, 2]. But, before the applications of these methods, RR interval measurements should be correctly / properly performed. In other words, the reliability of a given method to analyse heart rate variation "is closely related to" reliability of detection of the time of heart beat. And, the row data of RR intervals is an unevenly sampled time series, which is called RR tachogram; it must be converted into the evenly (regularly) sampled time series. This conversion procedure requires an interpolation of RR interval series (tachogram). The present study is a review on above mentioned

basic techniques of heart rate variability analysis; physiological basis of ECG waves will also be reviewed.

[1] Task Force of the European Society of Cardiology the North American Society of Pacing Electrophysiology (1996) Heart Rate Variability Standards of Measurement, Physiological Interpretation, and Clinical Use. *Circulation*;93:1043-1065

[2] U. Rajendra Acharya et al. (2006) Heart rate variability: a review. *Med Bio Eng Comput* 44:1031–1051

# WORKSHOPS

Workshop: *“Theory, Model and Complexity”*

Coordinator: **Hasan Tatlipinar**

Yildiz Technical University, Department of Physics,  
Istanbul, Turkey.

htatlipinar@gmail.com

Workshop: *“Chaotic Behaviors of Solitons”*

Coordinator: **K.Gediz Akdeniz**

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Workshop: *“Complexity in Medicalphysics”*

Coordinator: **Tamer Zeren**

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