TURKISH NONLINEAR SCIENCE

WORKING GROUP

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XIV. International Symposium on

"Disorder Systems: Theory and Its Applications"

21 – 25 August 2014
Karaburun - İzmir - Turkey

Sponsors
Celal Bayar University
Karaburun Municipality
Turkish Nonlinear Science Working Group

Programme & Abstract Booklet

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SYMPOSIUM PROGRAMME

21 August 2014 – Thursday

14.00-18.00 Registration
Welcome Meeting and Assignment Member of Workshops

22 August 2014 – Friday

09.00-11.00 Registration
11.00-13.00 Workshop Meetings
13.00-14.30 Symposium Lunch

15.00-17.00 Workshop - I: "Mesoscopic Systems and Quantum Chaos"
Coordinator: **Hasan Tatlıpınar**, *Yıldız Technical University, İstanbul, Turkey*

17.00-17.30 **Opening**
17.30-18.10 *"Quantum Liquids"*
Hasan Tatlıpınar, *Yıldız Technical University, İstanbul, Turkey*

18.10-18.20 Coffee break

18.20-19.00 *"Nonlinear Hydrodynamics of the Atmosphere and Ocean, with Examples from Sea Straits"* **Emin Özsoy, Adil Sözer, Özgür Gürses, Murat Gündüz, Gianmaria Sannino,** *Middle East Technical University, Ankara, Turkey*

19.30-21.30 Symposium Dinner

23 August 2014 – Saturday

11.00-13.00 Workshop - II: "Highlight Trends in Statistics-I"
Coordinator: **G. Çiğdem Yalçın**, *İstanbul University, İstanbul, Turkey*

13.00-14.30 Symposium Lunch

15.00-15:40 *"New Anarchy in Simulation World and Gezipark"*
K. Gediz Akdeniz, *Düzensiz Sistemler Institute, Turkey*

15.40-16.20 *"A Geophysical Investigation via the Fractal Dimension of Islands"*
Halil Çon, Amaç Aslan, Kerem Gergin, Seyhan Sıvacı, G. Çiğdem Yalçın,
İstanbul University, İstanbul, Turkey

16.20-16.30 Coffee break

16.30-17.10 *"Unwell Outcomes of Achievement-Oriented Life Style"*
Necip Kutlu, Yeşim Solakoğlu, Beste Ölçgen, Şüheda Alpay, Hasan Kazdağlı, Taner Özel, *Celal Bayar University, Manisa, Turkey*

17.10-17.50 *"Heart Rate Variability Analysis on Anesthetized And Anti-Arrhythmic Injected Mice"*
Hasan Kazdağlı, Şüheda Alpay, Hasan Fehmi Özel, Tamer Zeren, Mustafa Özbek,
Celal Bayar University, Manisa, Turkey

17.50-18.00 Coffee break

18.00-18.40 *"Entropy, Chaos and Phase Transitions in Mesoscopic Stochastic and Disordered Neural Populations "*
R. Murat Demirer, *Gelişim University, İstanbul, Turkey*

19.00-20.00 Mayor of Mordoğan Municipality Cocktail

24 August 2014 – Sunday

11.00-13.00 Workshop - III: "Highlight Trends in Statistics-II "
Coordinator: **G. Çiğdem Yalçın**, *İstanbul University, İstanbul, Turkey*

13.00-14.30 Symposium Lunch

15.00-17.00 Workshop - IV:"Complexity in Medicalphysics -I"
Coordinator: **R. Murat Demirer**, *Gelişim University, Istanbul,Turkey*

17.00-19.00 Workshop - V:“Complexity in Medicalphysics -II”
Coordinator: **Tamer Zeren**, *Celal Bayar University, Manisa, Turkey*

19.00-19.30 The results of the Workshop Meetings

19.30-21.30 Symposium Dinner

25 August 2014 - Monday
11.00-13.00 Closing Remarks

Contact: Assist Prof. Dr. G. Çiğdem Yalçın
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ABSTRACTS

Quantum Liquids

Hasan Tatlıpınar

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Let consider N particle neutral atomic systems. If the density of the systems enough low and temperature enough high systems can be taken as a neutral gas systems. Interaction between particles can be defined by binary potentials and this system well studied by kinetic theory of gases. When density increased and temperature decreased strong particle correlations become dominant in interactions and systems phase changes to liquid and then solid phase by first order phase transitions. This classical behavior doesn't work only for the Helium atom isotopes namely ^{3}He and ^{4}He because of the zero-point quantum effects. Symmetry properties of Many body wave function and statistical character of the quantum system leads ^{3}He obey Fermi-Dirac statistic, and ^{4}He obey Bose-Einstein statistic. Apart from He isotopes conduction electrons in metals, semiconductors and some other Fermi and Boson systems also called as quantum liquids. In this presentation quantum liquids studies such as Fermi liquids , Landau Theory , historically summarized and new approaches are discussed.

Nonlinear Hydrodynamics of the Atmosphere and Ocean, with Examples from Sea Straits

Emin Özsoy[1], Adil Sözer[1], Özgür Gürses[1], Murat Gündüz[1], Gianmaria Sannino2,

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The fundamental physics of the nonlinear behavior of fluids is briefly recalled with a discussion on particular examples frequently observed in the atmosphere and the ocean. Cases of nonlinear systems at different levels of complexity, leading from simple to coupled and disordered systems are exemplified as essential elements of the climate system. The nonlinear behavior of such systems encumbers us with the 'predictability' problem, often a major obstacle in predicting the future states of these systems. Loss of predictability is more significant in nonlinear coupled systems of high degrees of freedom, affecting a wide range of scales extending from short-term to climatic. It is well known that sea straits constitute complex, high-energy physical environments with rapid currents, hydraulic transitions, stratification and turbulence, and are controlled strongly by geometric constraints, often creating multi-scale complex interactions influencing the states of the interconnected basins. The nearest well-known examples are the Bosphorus and Dardanelles Straits.

Models addressing different types and levels of complexity are often implied and have successfully been used.

New Anarchy in Simulation World and Gezipark

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According to Chaotic Awareness Simulation (CAS) theory, the Zuhur [1] also could be emergence by the disorder simulation of complex human systems. And such Zuhur unpredictably could transform all the elements of societies in non-scale invariant. Recently, we have indicated by CAS theory that in society dimension the İstanbul Gezipark protests is one of a good example to emergence Zuhur [2]. In [2], we have also considered how the reality of such Zuhur is confirmed by the last political events in Turkey and in Middle East.
In this talk, the CAS theory will be summarized. And it will be discussed that the Gezipark's Zuhur could be realized as the first "New Anarchy" event in simulation world.

[1] Akdeniz, K.G. Post-Physicist Manifesto, Istanbul: Istanbul University Sociology Journal, 3, p.15-18 (2007); Disorder in Complex Human System, Proceedings of the Conference in Honor of Murray Gell-

Mann's 80th Birthday Quantum Mechanics, Elementary Particles, Quantum Cosmology and Complexity, edited by H Fritzsch and K K Phua, World Scientific Publishing, p. 630-637 (2010). And related papers in www.gedizakdeniz.com.
[2] Akdeniz, K.G. Chaotic Awareness in Gezipark, ICCLS2013 , 17-19 December 2013 Ankara, Turkey. (As proceeding to be published in Springer).

A Geophysical Investigation via the Fractal Dimension of Islands

Halil Çon, Amaç Aslan, Kerem Gergin, Seyhan Sıvacı, G. Çiğdem Yalçın,

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The knowledge of fractal properties could lead us to predict some chaotic behaviours of dynamics in a system. In this presentation, we evaluate the fractal dimension of coastlines of Hawaii, Maui, Kauai, Molokai Kahoolawe, Oahu, Niihau and Lanai archipelago islands in US via plotting the phase space of the islands. We investigate the possibility of the relation between fractal dimensions and chaotic behaviours of common geophysical properties of the islands.

Unwell Outcomes of Achievement-Oriented Life Style

Necip Kutlu, Yeşim Solakoğlu, Beste Ölçgen, Şüheda Alpay, Hasan Kazdağlı, Taner Özel

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Anxiety levels of students who made into high rated Faculties such as Medical, Engineering, Law and Fundamental Sciences should be less than students who got into lower rated Faculties and also high rated Faculty students should have better self-expression skills and individual communication skills. Below-average and high ranking students experience same stres. Considering each other as competitors in the exams also weakens friendship relations. comparing State functions, anxiety and psychological state levels of these students was the aim of this study.We have done the research on 32 male and 60 female students at Psychometric and Psychomotor Testing and Assessment Center, Celal Bayar University, Manisa. Experts have evaluated sustained and selective attention, understanding the relationships of events and reasoning (nonverbal IQ) and emotional capabilities by applying psychological tests that indicate the status. Results of these tests have showed that the succesfull students have higher sustained and selective attention and IQ. When test results of all students evaluated, values were within the normal range, altought they were very critical. It was concluded that high expectation from the families and the close ones of the students who are in the exam period causes constant psychological anxiety. We believed that successful and smart students (with the high levels of IQ), they would may be weak in terms of emotional.Mothers and fathers have many

responsibilities. We should not push our children. A succesful student can turn into a failing one. A succesful student may struggle being at peace with himself. May turn out to be succesful but awful at communication and unaware of community. There should be limited amount stress. We should educate our children without overwhelming them. While educating our youth with the scientific methods we should also support them emotionally Otherwise they may shade into CEOs without family bonds, engineers lack of social life. Everything is double-sided. Every student must have social life and emotional aspects but also they must receive decent education.

Keywords: Psychometri, Neurophysiology, Stress, Exam Period, Anxiety

Heart Rate Variability Analysis on Anesthetized And Anti-Arrhythmic Injected Mice

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Objective: The analysis of heart rate variability (HRV) is recognized as an important tool to evaluate the autonomic nervous system functions related to the heart. Basicly, HRV reflects minimal heart rhythms changes which might be a sign of an important upcoming heart rhytm pathology as so called arrhythmias. In this study, we evaluated HRV analysis from Na-Pentobarbital anestesied mice before and after injections of different drugs used for arrhytmia therapy. Method: Swiss albino mice were used as laboratory animals. Following anesthesia, Saline (Control), The anti-arrhytmic drugs,

Quinidine, D-Sotalol, and Amiodarone, were intraperitonally enjected. ECG records (Sampling frequency: 4000 Hz Software: Power-Lab, Australia) from spontaneously breathing mice and the related tachogram of R-R intervals were obtained, as the initial step of analysis. Followingly, “R-R” interval was resampled with 10 Hz. Finally, Power Spectrum Densities (PSD) from the curve of re-samples heart rate changes (HRV) were calculated (Kubios Software, University of Eastern, Finland): The frequency bands were selected to be consisted with literature as: VLF: 0,00-0,15 Hz, LF: 0,15-1,5 Hz, HF: 1,5-5 Hz. Proportional weight (%) of power spectrum densities (PSD) were documented. Statistical comparements was made using Paired T-Test. Results: In control group, mice anesthetized with Na-Pentobarbital and recieved only Saline, no change in PSD of the defined frequency bands were detected in HRV. After Quinidine injection, when post-drug compared to pre-drug, VLF band decreased ($p<0,005$) whereas LF band and LF/HF rate was increased but there were no statistically significant change in the HF band. By Comparing pre and post-drug conditions in D-Sotalol group decreases in VLF, LF bands and LF/HF rate ($p<0,001$), and increase in HF band ($p<0,05$) were found. Amiodarone caused an increase in HF band ($p<0,05$), but it decreased in VLF, LF bands and LF/HF rate ($p<0,05$). Discussion and Conclusion: D-Sotalol and Amiodarone, which both have Class III anti-arrhythmics activity, showed similar effect namely the HF band consistent with breathing frequency was elevated. But, Quinidine (Class I) did not effect breathing depended component, however it increased LF band and LF/HF rate. As the conclusion, "Anti-arrhythmics may modulate the autonomic nervous system functions with different ways. So possible interactions between the autonomic nervous system and anti-arrhythmics drugs might be important for a succesfull therary of heart rithm disturbances.
Keywords: Heart Rate Variability (HRV), Mice, Antiarrhythmics, ECG, PSD

Entropy, Chaos and Phase Transitions in Mesoscopic Stochastic and Disordered Neural Populations

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Mesoscopic Populations of the Brain Dynamics are characterized by highly heterogeneous connectivity, and this disorder was related to measured properties of the brain network. I focus on a mesoscopic level whch is in the middle scale between the microscopic functions of the neuron and macroscopic functions of brain systems. My talk is to mathematically analyze the role of these disordered connectivities on a mesoscopic level properties of neuronal networks in both space and phase space. I analyze large-scale behaviors of neural populations at mesoscopic level including, for entropy relevance to chaos, and phase transitions among multiple populations. We propose a dynamical systems measure approach in order to address the qualitative nature of the solutions of EEG and apply the methodology to show how multiple neural populations are affected by disorderlevels. We identify phase transitions upon changes in delays, connectivity patterns and dispersion, and particularly focus on the emergence of non-equilibrium states involving synchronized oscillations.

WORKSHOPS

"Mesoscopic Systems and Quantum Chaos"

"Highlight Trends in Statistics - I and II"

"Complexity in Medicalphysics –I and II"