

CURRICULUM VITAE  
PLAMEN CHRISTOV IVANOV

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**EDUCATION:**

- Ph.D. in Biophysics, Boston University, Boston, 1998.
- M.S. in Physics (Solid State Physics), Sofia University, Bulgaria, 1988.
- M.S. in International Relations, Sofia University, Bulgaria, 1990.

**ACADEMIC APPOINTMENTS:**

- *Associate Professor* [2003-present]  
Institute of Solid State Physics, Condensed Matter Theory Group, Bulgarian Academy of Sciences, Sofia.
- *Research Associate* [1999-present]  
A joint appointment at Boston University, Center for Polymer Studies and at Harvard University/Harvard Medical School, Beth Israel Deaconess Medical Center, Margret and H.A. Rey Laboratory for Nonlinear Dynamics in Medicine.
- *Postdoctoral Scholar* [1998-1999]  
Harvard Medical School, Beth Israel Deaconess Medical Center, Laboratory for Nonlinear Dynamics in Medicine, and Boston University, Center for Polymer Studies.
- *Research Assistant* [1996-1998]  
Center for Polymer Studies, Boston University.
- *Teaching Assistant* [1993-1996]  
Physics Department, Boston University.
- *Teaching Assistant* [1991-1993]  
Physics Department, University of Rhode Island.
- *Research Assistant* [1989-1991]  
Condensed Matter Theory Group, Institute of Solid State Physics, Bulgarian Academy of Sciences, Sofia.

**MAJOR RESEARCH INTERESTS:**

- Methods of analysis and modeling of integrated biological and physiological systems and networks. Investigating multi-scale dynamical properties emerging from cellular level interactions.
- Synchronization between functional responses of cortical and subcortical centers under external stimuli, human motion and coordination. Developing networks of cortical-cortical synchronization and mapping them onto the anatomical structure of the brain. Graph theory and theory of random and scale-free networks.

- Nonlinear feedback mechanisms and multiplicative cascades in cardiac neuroautonomic regulation, the neural regulation of respiration and human locomotor activity. Pathways of dynamical interaction between these systems.
- Mechanical properties, vibrational waves and conductivity in one- and two-dimensional disordered solids; statistical properties and conductivity in DNA sequences and proteins.
- Mechanisms of mechanical contraction, excitation, wave propagation and spirals in myocardial cell tissue, and their impact on heart rate variability. Cellular automata approaches.
- Stochastic processes, long-range correlations, fractals and nonlinear dynamics in physical and biological systems. Critical phenomena and phase transitions.

## RESEARCH GRANTS:

- *Research Resource for Complex Physiologic Signals (P41 RR13622)*

Funded by: National Institute of Health / National Center for Research Resources

PI: Ary L. Goldberger (BIDMC, Harvard Medical School)

Co-PI: H. Eugene Stanley (Boston University), Roger Mark (M.I.T.)

Duration: 1999–2004      Support: \$5,000,000

Personal Role: Collaborator

Personal Contribution: Identification of program based on my research activities, and writing Section III of the proposal related to statistical analysis and modeling of multiple-component integrated physiologic systems. The other two sections of the proposal relate to data acquisition (M.I.T. group) and multichannel ambulatory recordings and analysis (BIDMC group).

- *Study of transport of mechanical waves and electrical conduction in DNA. Effect of long-range correlations (BFM2002-00183)*

Funded by: Spanish Ministerio de Ciencia y Tecnologia, Spain.

PI: P. Carpena (University of Malaga, Spain)

Duration: 2003–2005      Support: \$15,000

Personal Role: Collaborator

Personal Contribution: Identification of program based on my research activities and providing expertise on the effects of fractal correlations on the mechanical and conducting properties of low-dimensional disordered nanomaterials and biological macromolecules.

- *Correlations in DNA sequences and large-scale genome structure (BIO2002-04014-C02-02)*

Funded by: Spanish Ministerio de Ciencia y Tecnologia, Spain.

PI: Jose L. Oliver (Universidad de Granada, Spain)

Duration: 2002–2005      Support: \$120,000

Personal Role: Collaborator

Personal Contribution: Identification of program based on my research activities and providing expertise on the application of wavelet techniques to quantify genomic structures in DNA.

- *Circadian Role in Diurnal Pattern of Cardiovascular Risk (1R01HL-71972-01)*

Funded by: National Institute of Health/National Heart Lung and Blood Institute

PI: H. Eugene Stanley (Boston University)

Duration: 2002–2004      Support: \$200,000

Personal Role: Collaborator

Personal Contribution: Identification of program based on my research activities and writing the entire proposal.

#### **EDITORIAL BOARDS:**

- Editor of Fluctuation and Noise Letters (FNL) [2000-2002]:  
<http://journals.wspc.com.sg/fnl/fnl.html>

#### **SERVE AS REVIEWER FOR THE FOLLOWING JOURNALS:**

- 1) Physical Review Letters; 2) Physical Review E; 3) European Journal of Physics B; 4) Fractals; 5) Journal of Geophysical Research:Solid Earth; 6) Physica A; 7) Circulation; 8) Medical and Biological Engineering and Computing; 9) IEEE - Transactions of Biomedical Engineering; 10) Chaos; 11) Gene; 12) Heart and Circulatory Physiology.

#### **CONFERENCE ORGANIZATION:**

- Program committee member: Conference on Fluctuations and Noise in Biological, Biophysical, and Biomedical Systems, 1-4 June 2003, Santa Fe, New Mexico, USA.  
<http://www.spie.org/Conferences/Calls/03/fn/conferences>
- Symposium and Focused Session organizer: Statistical Physics Approaches to Physiology under Health and Disease, American Physical Society March Meeting, Montreal, 2004.
- Program committee member: SPIE 2004 Second International Symposium on Fluctuations and Noise: Conference on Fluctuations and Noise in Biological, Biophysical, and Biomedical Systems, 26-28 May 2004, Canary Islands, Spain.

#### **DIRECTING RESEARCH ACTIVITY:**

- Ph.D. graduate students:  
Physics Department, Boston University:  
Chung Lo, Kun Hu, Zhi Chen, Pradeep Kumar  
Facultad de Ciencias, Universidad Nationale Educacion Distancia, Madrid, Spain:  
Miguel Casa  
Department of Engineering, Cambridge University, UK:  
Ainslie Yuen  
Physics Department, Bar-Ilan University, Israel:  
Roman Karasik, Nir Sapir
- Postdoctoral fellows:  
Physics Department, Boston University:  
Dr. Y. Ashkenazy, Dr. V. Frohlinde-Schulte, Dr. J. Kantelhardt, Dr. B. Podobnik.

**PATENT:** "Multi-parametric characterization of heart rate variability: a method for diagnosis of congestive heart failure", Provisional Application filed August 15, 2000, Community Technology Fund, Boston University.

**AWARDS and HONORS:**

- NSF Travel Award for participation in StatPhys21, Merida, Mexico [July 2001].
- Top score on the competition for automated detection of sleep apnea from heart rate recordings. Project presented in collaboration with J.E. Mietus, C.-K. Peng, and A.L. Goldberger at Computers in Cardiology, M.I.T., Cambridge [September 2000].
- Invitation for a public lecture presentation organized by Dai-ichi Pharmaceutical Co., Tokyo [November 1999].
- Harvard University Postdoctoral Fellowship [1998-1999].
- California Institute of Technology/Sloan Foundation Fellowship - selected in top 4 out of more than 80 candidates [June 1998].
- NSF Young Scientist Travel Award for participation in StatPhys20, Paris [July 1998].
- Sofia University Gold Medal for Scholarship [May 1988].
- Bulgarian Ministry of Education M.Sc. Scholarship, Sofia University [1985–1988].

**CITATIONS:** Above 630 by 1 November 2003.

**MEMBERSHIP IN PROFESSIONAL SOCIETIES:**

- American Physical Society [1996–present]
- Bulgarian Physical Society [1988–present]

**LANGUAGES:** English, German, Russian and Bulgarian

## PRESS REVIEWS:

- Physicswatch: "Researchers reveal prime predictability", **CERN Courier: International Journal of High-Energy Physics**, IoP Magazines, vol. 43, No.4, 2003.  
<http://www.cerncourier.com/main/article/43/4/8>
- Philip Ball: "Prime numbers not so random? A kind of order may be buried in the occurrence of indivisible numbers." **Nature Science Update**, 24 March, 2003.  
<http://www.nature.com/nsu/030317/030317-13.html>
- **Nature Research Highlights**: "In brief: Disorderly conduct. Investigating the effects of correlated disorder on extended-state conduction", 29 August, 2002.  
(<http://www.nature.com/plink/highlights/6901-3.html>)
- Taylor McNeil: "Bring on the sandman: Boston University physicists find odd patterns in sleep", **The Bostonia Magazine**, Number 2, p.31-32, Summer 2002.
- Michael Brooks: "Snooze control: Why sleep is a game of chance", story and cover page in **New Scientist**, vol.173, N.2331, p.38-40, February 23, 2002.  
(<http://archive.newscientist.com/archive.jsp?id=23315000>)
- Cover selection for the Proceedings of the National Academy of Sciences of the USA 2002; vol. 99[supl 1]: 2466-2472.
- Randy Atkins: "Mysterious Ways of the Heart: New Understanding May Lead to Earlier Diagnoses". **Physics Central**, February 21, 2001  
(<http://www.physicscentral.com/news/news-01-4.html>)  
Media of the American Physics Society (<http://www.aps.org>) and **Reports of the American Institute of Physics**  
(<http://www.aip.org/isns/reports/2001/008.html>)
- Jens Thomas: "A Different Beat: You may be dreamy while you're asleep, but your heart is being rigorously policed", **New Scientist**, N.2215, p.8, December 4, 1999. Featured also on **Complexity Digest** 1999. (<http://www.comdig.org/ComDig99b5/>)
- Stefan Greschik: "Das Gesetz in Chaos", Science Section, **Sueddeutsche Zeitung**, N.152, p. V2/10, July 6, 1999.
- "Multifractality in human heartbeat dynamics", Math in the Media, **Media of the American Mathematical Society**, July 1999.  
(<http://www.ams.org/new-in-math/note-archive.html>)
- "Revealing the Complex Patterns of Cardiac Disease", **Science Daily Magazine**, June 1999. (<http://www.sciencedaily.com/releases/1999/06/990604081236.htm>)  
the **Boston University News Release**, June 2, 1999.
- Taylor McNeil: "A Heartbeat Away: The Hidden Difference in Healthy and Unhealthy Hearts", **The Bostonia Magazine**, June 30, 1999.
- David Ehrenstein: "Separating the good hearts from the bad". **Physical Review Focus**, September 15, 1998.  
(selections from Physical Review Letters: <http://focus.aps.org/v2/st12.html>)
- M.Buchanan: "Fascinating Rhythm", **New Scientist**, N.157, p.20, January 3, 1998.
- S. Goetinck: "They got the beat: researchers pinpoint a hidden pattern in apparently erratic rhythm of heart", **Dallas Morning News**, Discoveries Section, September 30, 1996.
- I. Peterson: "Detecting a sound heartbeat", **Science News**, vol.150, p.196, 1996. Featured also on **ScienceNewsOnline**, September 28, 1996.

## LIST OF PUBLICATIONS

1. I. Gochev, N.B. Ivanov, P.Ch. Ivanov. "A new approach to calculation of energy of  $s=1/2$  Heisenberg antiferromagnet using variational Gutzwiller wave function".  
Int. J. Mod. Phys. B, 1988;1:1037–1042.
2. I. Gochev and P.Ch. Ivanov. "On the trial wave functions in the theory of low-dimensional antiferromagnets". Proceedings of the International Conference on "Strongly correlated electron systems", Dubna, USSR, 1989;464-470.
3. A.V. Chubukov, K.I. Ivanova, P.Ch. Ivanov, E.R. Korutcheva. "Quantum ferrimagnets".  
Journal of Physics: Condensed Matter, 1991; 3:2665–2677.
4. N.B. Ivanov and P.Ch. Ivanov. "Frustrated two-dimensional quantum Heisenberg antiferromagnet at low temperatures".  
Physical Review B, 1992; 46: 8206-8213.
5. H.A. Makse, G.W. Davies, S. Havlin, P.Ch. Ivanov, P. King, H.E. Stanley. "Long-range correlations in permeability fluctuations in porous rock".  
Physical Review E, 1996; 54:3129–3134.
6. H.A. Makse, S. Havlin, P.Ch. Ivanov, P. King, S. Prakash, H.E. Stanley. "Pattern formation in sedimentary rocks: connectivity, permeability and spatial correlations".  
Physica A, 1996;233:587–605.
7. P.Ch. Ivanov, M.G. Rosenblum, C-K Peng, J. Mietus, S. Havlin, H.E. Stanley, A.L. Goldberger. "Scaling behaviour of heartbeat intervals obtained by wavelet-based time-series analysis".  
Nature, 1996; 383:323–327.
8. S. Havlin, S.V. Buldyrev, A.L. Goldberger, P.Ch. Ivanov, C.-K. Peng, H.E. Stanley, G.M. Viswanathan, "Scaling properties of DNA sequences and heartbeat rate," in *The Physics of Complex Systems* [Proceedings of the International School of Physics "Enrico Fermi," Course CXXXIV], edited by F. Mallamace and H. E. Stanley (IOS Press, Amsterdam, 1997), pp. 445–472.
9. P.Ch. Ivanov, M.G. Rosenblum, C-K Peng, J. Mietus, S. Havlin, H.E. Stanley, A.L. Goldberger. "Scaling and universality in heart rate variability distributions".  
Physica A, 1998; 249:587–593.
10. P.Ch. Ivanov, L.A.N. Amaral, A.L. Goldberger, H. E. Stanley. "Stochastic feedback and the regulation of biological rhythms".  
Europhysics Letters, 1998; 43:363–368.
11. L.A.N. Amaral, A.L. Goldberger, P.Ch. Ivanov, H. E. Stanley. "Scale-independent measures and pathologic cardiac dynamics".  
Physical Review Letters, 1998; 81:2388–2391.
12. L.A.N. Amaral, A.L. Goldberger, P.Ch. Ivanov, H.E. Stanley. "Modeling heart rate variability by stochastic feedback".  
Comp. Phys. Comm. 121-122, 126-128 (1999).
13. P.Ch. Ivanov, M.G. Rosenblum, L.A.N. Amaral, Z.R. Struzik, S. Havlin, A.L. Goldberger, H.E. Stanley. "Multifractality in human heartbeat dynamics".  
Nature, 1999; 399:461–465.
14. H.E. Stanley, L.A.N. Amaral, A.L. Goldberger, S. Havlin, P.Ch. Ivanov, C.-K. Peng. "Statistical physics in physiology: monofractal and multifractal approaches".  
Physica A, 1999; 270:309-324.
15. P.Ch. Ivanov, A. Bunde, L.A.N. Amaral, S. Havlin, J. Fritsch-Yelle, R.M. Baevsky, H.E. Stanley, A.L. Goldberger. "Sleep-wake differences in scaling behavior of the human heartbeat: analysis of terrestrial and long-term space flight data".  
Europhysics Letters, 1999; 48:594-600.

16. S. Havlin, S.V. Buldyrev, A. Bunde, A.L. Goldberger, P.Ch. Ivanov, C.-K. Peng, H.E. Stanley. "Scaling in nature: from DNA through heartbeats to weather". *Physica A*, 1999; 273:46-69.
17. S. Havlin, L.A.N. Amaral, Y. Ashkenazy, A.L. Goldberger, P.Ch. Ivanov, C.-K. Peng, H.E. Stanley. "Application of statistical physics to heartbeat diagnosis". *Physica A*, 1999; 274:99-110.
18. H.E. Stanley, L.A.N. Amaral, A.L. Goldberger, S. Havlin, P.Ch. Ivanov, C.-K. Peng. "Monofractal and multifractal approaches to complex biomedical signals" in *Stochastic and Chaotic Dynamics in the Lakes* [Proc. Int'l "Stochaos" Workshop, Ambleside, Cumbria, UK], edited by D. S. Broomhead, E. A. Luchinskaya, P. V. E. McClintock and T. Mullin (American Institute of Physics [AIP Conf. Proc. **502**], Melville New York, 2000), p. 133-145.
19. P.Ch. Ivanov, L.A.N. Amaral, A.L. Goldberger, S. Havlin, M.G. Rosenblum, Z. Struzik, H.E. Stanley. "Beyond 1/f: multifractality in human heartbeat dynamics" in *Unsolved Problems of Noise and Fluctuations* [UPoN'99: Second International Conference, Adelaide, Australia] edited by Derek Abbott and Laszlo B. Kish (American Institute of Physics [AIP Conf. Proc. **511**], Melville, New York, 2000), p. 273-281.
20. L.A.N. Amaral, P.Ch. Ivanov, S. Havlin, A.L. Goldberger, H.E. Stanley. "Multifractalidade do ritmo cardiaco". *Gazeta de Fisica (Sociedade Portuguesa de Fisica)* 1999; 22:5-9.
21. H.E. Stanley, L.A.N. Amaral, P. Gopikrishnan, P.Ch. Ivanov, T.H. Keitt, V. Plerou, "Scale invariance and universality: organizing principles in complex systems" *Physica A*, 2000; 281:60-68.
22. A.L. Goldberger, L.A.N. Amaral, L. Glass, J.M. Hausdorff, P.Ch. Ivanov, R.G. Mark, J.E. Mietus, G.B. Moody, C.-K. Peng, H.E. Stanley. "PhysioBank, PhysioToolkit, and PhysioNet: components of a new research resource for complex physiologic signals". *Circulation*, 2000; 101:e215.
23. B. Podobnik, P.Ch. Ivanov, Y. Lee, A. Chessa, H.E. Stanley. "Systems with correlations in the variance: generating power-law tails in probability distributions". *Europhysics Letters*, 2000; 50(6):711-717.
24. B. Podobnik, P.Ch. Ivanov, Y. Lee, and H.E. Stanley. "Scale-invariant truncated Lévy process". *Europhysics Letters*, 2000; 52:491-497.
25. Y. Ashkenazy, P.Ch. Ivanov, S. Havlin, C.-K. Peng, Y. Yamamoto, A.L. Goldberger, H.E. Stanley. "Decomposition of heartbeat time series: scaling analysis of the sign sequence". *Computers in Cardiology* 2000; 27:139-142.
26. V. Schulte-Frohlinde, Y. Ashkenazy, P.Ch. Ivanov, A. Morley-Davies, L. Glass, A.L. Goldberger, and H.E. Stanley. "Finding hidden patterns in complex ventricular ectopy". *Computers in Cardiology* 2000; 27:335-338.
27. M. Ballora, B. Pennycook, P.Ch. Ivanov, A.L. Goldberger, L. Glass. "Detection of obstructive sleep apnea through auditory display of heart rate variability". *Computers in Cardiology* 2000; 27:739-740
28. J.E. Mietus, C.-K. Peng, P.Ch. Ivanov, A.L. Goldberger. "Detection of obstructive sleep apnea from cardiac interbeat interval time series". *Computers in Cardiology* 2000; 27:753-756
29. Y. Ashkenazy, P.Ch. Ivanov, S. Havlin, C.-K. Peng, A.L. Goldberger, H.E. Stanley. "Magnitude and sign correlations in heartbeat fluctuations". *Physical Review Letters*, 2001; 86(9):1900-1903.

30. K. Hu, P.Ch. Ivanov, Z. Chen, P. Carpena, H.E. Stanley. "Effect of trends on detrended fluctuation analysis". *Physical Review E*, 2001; 64(1):011114(19).
31. L.A.N. Amaral, P.Ch. Ivanov, N. Aoyagi, I. Hidaka, S. Tomono, A.L. Goldberger, H.E. Stanley, Y. Yamamoto. "Behavioral-independent features of complex heartbeat dynamics". *Physical Review Letters*, 2001; 86(26):6026–6029.
32. P.Ch. Ivanov, B. Podobnik, Y. Lee, A. Chessa, H.E. Stanley. "Generating power-law tails in probability distributions" in *Modeling Complex Systems: Sixth Granada Lectures on Computational Physics*, eds. Pedro L. Garrido and Joaquin Marro (American Institute of Physics [AIP Conf. Proc. **574**], Melville, New York, 2001), p. 95-101.
33. P.Ch. Ivanov, B. Podobnik, Y. Lee, and H.E. Stanley, "Truncated Lévy process with scale-invariant behavior" *Physica A* **299**, 154–160 (2001).
34. V. Schulte-Frohlinde, Y. Ashkenazy, P.Ch. Ivanov, L. Glass, A.L. Goldberger, H.E. Stanley. "Noise effects on the complex patterns of abnormal heartbeats". *Physical Review Letters*, 2001; 87(6):068104(4).
35. P.Ch. Ivanov, L.A.N. Amaral, A.L. Goldberger, S. Havlin, M.G. Rosenblum, H.E. Stanley, Z. Struzik, "From  $1/f$  Noise to Multifractal Cascades in Heartbeat Dynamics". *Chaos*, 2001; 11:641-652.
36. P. Bernaola-Galvan, P.Ch. Ivanov, L.A.N. Amaral, H.E. Stanley. "Scale Invariance in the Nonstationarity of Human Heart Rate". *Physical Review Letters*, 2001; 87(16):168105(4).
37. B. Podobnik, K. Matia, A. Chessa, P.Ch. Ivanov, Y. Lee, H.E. Stanley. "Time evolution of stochastic processes with correlations in the variance: stability in power-law tails of distributions". *Physica A*, 2001; 300: 300-309.
38. J.M. Hausdorff, Y. Ashkenazy, C.-K. Peng, P.Ch. Ivanov, H.E. Stanley, A.L. Goldberger. "When human walking becomes random walking: fractal analysis and modeling of gait rhythm fluctuations". *Physica A*, 2001; 302(1-4): 138-147.
39. A.L. Goldberger, L.A.N. Amaral, J.M. Hausdorff, P.Ch. Ivanov, C.-K. Peng, H.E. Stanley. "Fractal dynamics in physiology: alterations with disease and aging". *PNAS*, 2002; 99 [suppl 1]:2466-2472.
40. C.-C. Lo, L.A.N. Amaral, S. Havlin, P.Ch. Ivanov, T. Penzel J.-H. Peter, H.E. Stanley, "Scale-free dynamics of awakenings during healthy human sleep". *Europhysics Letters*, 2002; 57(5): 625-631.
41. Z. Chen, P.Ch. Ivanov, K. Hu, H.E. Stanley. "Effect of nonstationarities on detrended fluctuation analysis". *Physical Review E*, 2002; 65: 041107(15).
42. P.Ch. Ivanov, P. Bernaola-Galvan, L.A.N. Amaral, H.E. Stanley. "Fractal Features in the Nonstationarity of Physiological Time Series" in "Emergent Nature", editor M. M. Novak (World Scientific, Singapore, 2002) [Proc. of the 7th International Multidisciplinary Conference on Complexity and Fractals in Nature, Granada, Spain, 17-20 March, 2002], p. 55-65.
43. J.W. Kantelhardt, Y. Ashkenazy, P.Ch. Ivanov, A. Bunde, S. Havlin, T. Penzel, J.-H. Peter, H.E. Stanley. "Characterization of sleep stages by correlations of heartbeat increments". *Physical Review E*, 2002; 65:051908(6).



44. P. Carpena, P. Bernaola-Galván, P.Ch. Ivanov, H.E. Stanley. “Metal-insulator transition in chains with correlated disorder”. *Nature*, 2002; 418: 955-959; and 2003; 421 (6924): 764-764.
45. V. Schulte-Frohlinde, Y. Ashkenazy, A.L. Goldberger, P.Ch. Ivanov, M. Costa, A. Morley-Davies, H.E. Stanley, L. Glass. “Complex patterns of abnormal heartbeats”. *Physical Review E*, 2002; 66: 031901(12).
46. R. Karasik, N. Sapir, Y. Ashkenazy, P.Ch. Ivanov, I. Dvir, P. Lavie, S. Havlin. “Correlation differences in heartbeat fluctuations during rest and exercise”. *Physical Review E*, 2002; 66: 062902(4).
47. Y. Ashkenazy, J.M. Hausdorff, P.Ch. Ivanov, H.E. Stanley. “A stochastic model of human gait dynamics”. *Physica A*, 2002; 316: 662-670.
48. J.W. Kantelhardt, S. Havlin, P.Ch. Ivanov. “Modeling transient correlations in heartbeat dynamics during sleep”. *Europhysics Letters*, 2003; 62(2): 147-153.
49. B. Suki, A.M. Alencar, U. Frey, P.Ch. Ivanov, S.V. Buldyrev, A. Majumdar, H.E. Stanley, C.A. Dawson, G.S. Krenz, M. Mishima. “Fluctuations, noise and scaling in the cardiopulmonary system”. *Fluctuation and Noise Letters*, 2003; 3(1): R1-R25.
50. Y. Ashkenazy, S. Havlin, P.Ch. Ivanov, C-K. Peng, V. Schulte-Frohlinde, H.E. Stanley. “Magnitude and sign scaling in power-law correlated time series”. *Physica A*, 2003; 323: 19.
51. K. Ivanova, T.P. Ackerman, E.E. Clothiaux, P.Ch. Ivanov, H.E. Stanley, M. Ausloos. “Time correlations and 1/f behavior in backscattering radar reflectivity measurements from cirrus cloud ice fluctuations”. *J. Geophys. Res.*, 2003; 108(D9): 4268.
52. P.Ch. Ivanov, Y. Ashkenazy, J.W. Kantelhardt, H.E. Stanley. “Quantifying heartbeat dynamics by magnitude and sign correlations” in *Unsolved Problems of Noise and Fluctuations* [UPoN 2002: Third International Conference, Washington, USA] edited by S.M. Bezrukov (American Institute of Physics [AIP Conf. Proc. **665**], Melville, New York, 2003), p. 383-391.
53. P.Ch. Ivanov, P. Carpena, P. Bernaola-Galvan, H.E. Stanley. “Electronic delocalization in finite one-dimensional correlated-disordered Binary Solids” in *Unsolved Problems of Noise and Fluctuations* [UPoN 2002: Third International Conference, Washington, USA] edited by S.M. Bezrukov (American Institute of Physics [AIP Conf. Proc. **665**], Melville, New York, 2003), p. 606-613.
54. K. Hu, P.Ch. Ivanov, Z. Chen, M.F. Hilton, H.E. Stanley, S.A. Shea. “Novel multiscale regulation in human motor activity”, in *Fluctuations and Noise in Biological, Biophysical, and Biomedical Systems*, edited by S. M. Bezrukov, H. Frauenfelder and F. Moss, SPIE Proceedings, **5110**, p. 235-243 (2003).
55. Z. Chen, P.Ch. Ivanov, K. Hu, H.E. Stanley, V. Novak. “Synchronization patterns in cerebral blood flow and peripheral blood pressure under minor stroke”, in *Noise in Complex Systems and Stochastic Dynamics*, edited by L. Schimansky-Geier, D. Abbott, A. Neiman and C. Van den Broeck, SPIE Proceedings, **5114**, p. 498-506 (2003).
56. P. Kumar, P.Ch. Ivanov, H.E. Stanley. “Information entropy and correlations in prime numbers”. (submitted to *Physical Review E*, February 2003.)
57. C.-C. Lo, P.Ch. Ivanov, L.A.N. Amaral, T. Penzel, C. F. Vogelmeier, H. E. Stanley. “Asymmetric transitions in the dynamics of sleep” (to be submitted to *Physical Review Letters*)

58. P. Carpena, P. Bernaola-Galvan and P.Ch. Ivanov. "New class of level statistics in atomic chains with correlated disorder" (submitted to *Physical Review Letters*, November 2003.)
59. K. Hu, P.Ch. Ivanov, Z. Chen, M.F. Hilton, H.E Stanley, S.A. Shea. "Intrinsic Patterns of Human Activity: Scaling and Nonlinear Dynamics in Forearm Motion". (submitted to *PNAS*, November 2003.)
60. P.Ch. Ivanov *et al.* "Levels of Complexity in Scale-Invariant Neural Signals: Monofractality in Gait Dynamics, Multifractality in Heart Rate" (to be submitted)
61. M.A. Casa, J. Rubia and P.Ch. Ivanov. "Patterns of wave propagation and spiral attenuation in myocardial cell tissue". (in preparation)
62. P.Ch. Ivanov, Z. Chen, K. Hu, H.E. Stanley, V. Novak. "Vasomotor regulation of cerebral blood flow" (in preparation)

#### BOOK CHAPTERS:

63. P.Ch. Ivanov, A.L. Goldberger, S. Havlin, C.-K Peng, M. G. Rosenblum, H. E. Stanley. "Wavelets in Medicine and Physiology" in "Wavelets in Physics", editor J.C. van den Berg (Cambridge University Press, Cambridge, 1998)
64. P.Ch. Ivanov, A.L. Goldberger, H.E. Stanley. "Fractal and Multifractal Approaches in Physiology", p. 218-257 in "The Science of Disasters: Climate Disruptions, Heart Attacks, and Market Crashes", editors A. Bunde, J. Kropp and H.-J. Schellnhuber (Springer Verlag, Berlin, 2002) pp. 219-257.
65. P.Ch. Ivanov and C.C. Lo. "Stochastic Approaches to Modeling of Physiological Rhythms" in "Modelling Biomedical Signals", editors G. Nardulli and S. Stramaglia (World Scientific, Singapore, 2002) pp. 28-50.
66. P.Ch. Ivanov. "Long-Range Dependence in Heartbeat Dynamics" in "Processes with Long-Range Correlations: Theory and Applications", [Lecture Notes in Physics **621**], editors G. Rangarajan and M. Ding (Springer Verlag, Berlin, 2003) pp. 339-368.

#### THESES:

67. P. Ch. Ivanov "Scaling Features in Human Heartbeat Dynamics" [Ph.D. Dissertation] (Boston University, Boston, MA, 1998). Thesis advisor Prof. H. Eugene Stanley.
68. P. Ch. Ivanov "Ground state energy of a low-dimensional quantum antiferromagnet" [M.S. Dissertation] (Sofia University, Sofia, 1988). Thesis advisor Prof. Ivan Gochev.

#### CONFERENCE PRESENTATIONS:

1. Helsinki University, Physics Dept., Finland, Oct. 1987 — invited presentation.
2. International Conference on Strongly Correlated Electron Systems, Dubna, USSR, July 1989 — poster.
3. International Conference on High-Temperature Superconductivity, Trieste, Italy, June 1990 — poster.

4. International Conference on Solid State Physics, Varna, Bulgaria, July 1991 — poster.
5. APS March Meeting, St. Luis, 1996 — contributed talk.
6. Gordon Conference on Fractals, New Hampshire, May 1996 — contributed talk.
7. International School of Physics "Enrico Fermi" Varena, Italy, July 1996 — contributed talk.
8. Bar-Ilan Conference on Frontiers in Condensed Matter Physics, Bar-Ilan Univ., Israel, April 1997 — poster.
9. 78-th Statistical Mechanics Conference, Rutgers Univ., New Jersey, Dec. 1997 — contributed talk.
10. APS March Meeting, Los Angeles, 1998 — contributed talk.
11. Probability and Statistics Seminar at the Department of Mathematics, Boston University, May, 1998 — invited talk.
12. Center for BioDynamics at Boston University, May, 1998 — invited talk.
13. 20th International Conference on Statistical Physics, Paris, July, 1998 — poster.
14. Center for Informatics and Computer Science, University of Amsterdam, August, 1998 — invited talk.
15. APS March Meeting, Atlanta, 1999 — contributed talk.
16. Physics Department, Marburg University, Germany, June 2, 1999 — invited talk.
17. International Conference on Facets of Universality in Complex Systems: Climate, Biodynamics and Stock Markets, Schloss Rauischholzhausen, Germany, June 7–11, 1999 — invited talk.
18. Meeting of the European Research Project on Sleep, denHaag, The Netherlands, June 12, 1999 — invited guest presentation.
19. Seminar of the Group for Nonlinear Dynamics, Physics Institute, Potsdam University, Germany, June 14, 1999 — invited talk.
20. 2nd International Conference on: Unsolved Problems of Noise (UPoN '99), Adelaide, Australia, 11-15th July 1999 — contributed talk.
21. University of New South Wales, Mathematics Department, Sydney, Australia, July 18, 1999 — invited talk.
22. Mitsubishi Chemical Corporation, Yokohama, Japan, November 11, 1999 — invited talk.
23. The University of Tokyo, Graduate School of Education, Tokyo, Japan, November 13, 1999 — invited talk.
24. Public presentation organized by Dai-ichi Pharmaceutical Co. "Statistical Physics Points-of-View on Heart Rate Variability", Tokyo, Japan, November 15, 1999 — plenary talk.
25. APS March Meeting, Minneapolis, 2000 — contributed talk.
26. Special Seminar at Minerva Center for the Physics of Mesoscopics, Fractals and Neural Networks, Department of Physics, Bar-Ilan University, Ramat-Gan, Israel, June 7, 2000 — invited talk.
27. Institute Seminar at the Institute of Solid State Physics, Bulgarian Academy of Sciences, Sofia, Bulgaria, June 19, 2000 — invited talk.

28. Sixth Granada Seminar on Modeling Complex Systems, Institute Carlos I for Theoretical and Computational Physics, Granada, Spain, September 4-10, 2000 — invited lecture.
29. Seminar at Departamento de Fisica Aplicada II, Universidad de Malaga, Malaga, Spain, September 8, 2000 — invited talk.
30. Seminar at Departamento de Fisica Fundamental, UNED, Madrid, Spain, September 12, 2000 — invited talk.
31. Workshop on Fractals in Biology, Santa Fe Institute, New Mexico, Nov.29-Dec.3, 2000 — invited talk.
32. Computational Physics Conference 2000, Brisbane, Australia, December 3, 2000 — opening plenary talk on Section Biophysics.
33. 14th National Congress of the Australian Institute of Physics, Adelaide University, South Australia, December 10-15, 2000; Section Medical Physics — invited talk.
34. NATO Advanced Research Workshop on Application of Physics in Economic Modelling, Prague, Czech Republic, February 8-10, 2001 — invited talk.
35. APS March Meeting, Seattle, 2001 — contributed talk.
36. Sixth SIAM Conference on Applications of Dynamical Systems, Focus Session on Long-Range Correlations in Dynamics and Biology, Snowbird, Utah, May 20-24, 2001 — invited talk.
37. Circadian, Neuroendocrine and Sleep Disorders Program, Brigham and Women's Hospital, Harvard Medical School, 221 Longwood Avenue, RFB-486, Boston, June 11, 2001 — invited talk.
38. Department of Electrical and Electronic Engineering, The University of Adelaide, Australia, August 29, 2001 — invited talk.
39. Dipartimento di Scienze Fisiche, Universita di Napoli "Federico II", Complesso universitario Monte S. Angelo, Italy, September 18, 2001 — invited talk.
40. International Workshop on Modelling Bio-medical Signals, Center of Innovative Technologies for Signal Detection and Processing, Physics Department, University of Bari, Italy, September 20-22, 2001 — plenary invited talk.
41. The Center for Interdisciplinary Research on Complex Systems (CIRCS) and Physics Department at Northeastern University, Boston, November 13, 2001 — invited talk.
42. International Workshop on Analyzing and Modelling Event-Related Brain Potentials: Cognitive and Neural Approaches, University of Potsdam, Potsdam, Germany, Nov. 29 - Dec. 01, 2001 — invited talk.
43. International Conference on Horizons in Complex Systems, University of Messina, Italy, Dec. 05 - Dec. 08, 2001 — invited talk.
44. WE-Heraeus-Seminar on Synchronization in Physics and Neurosciences, Physikzentrum Bad Honnef, Germany, Dec. 10 - Dec. 12, 2001 — invited talk.
45. International Conference on Long Range Dependent Stochastic Processes and their Applications, Indian Institute of Science, Bangalore, India, Jan. 7-12, 2002 — invited talk.
46. Human Sleep and Chronobiology Research Meetings, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Jan. 17, 2002 — invited talk.
47. 1st Annual Meeting of the DFG-Schwerpunktprogramm 1114, Reisenburg castle in Guenzburg, Germany, Feb. 25 - March 2, 2002 — invited talk.

48. International Conference on Theoretical Physics, Paris, France, July 20-27, 2002 — poster.
49. 7th Granada Seminar on Computational and Statistical Physics, Institute Carlos I, Granada, Spain, September 2-7, 2002 — invited talk.
50. Instituto de Biotecnología, Universidad de Granada, Granada, Spain, September 11, 2002 — invited lecture.
51. Departamento de Física Fundamental, Facultad de Ciencias, UNED, Madrid, Spain, September 13 and 17, 2002 - invited talks.
52. The Second Nikkei Econophysics Research Workshop and Symposium, Nikkei Headquarters, Tokyo, Japan, November 11-14, 2002 - invited talk.
53. International Workshop on Randomness and Complexity, Eilat, Israel, January 5-9, 2003 - invited talk.
54. Institute Seminar at the Institute of Solid State Physics, Bulgarian Academy of Sciences, Sofia, Bulgaria, April 8, 2003 — invited talk.
55. Physics Department, Sofia University, Bulgaria, April 10, 2003 — invited talk.
56. Harvard School of Public Health, Harvard Medical School, Boston, May 6, 2003 — invited talk.
57. SPIE's First International Symposium on Fluctuations and Noise, Santa Fe, New Mexico, USA, June 1-4, 2003 - invited talk.
58. Department of Statistics, The Ohio State University, Columbus, Ohio, 2 October 2003 – invited talk at the Statistics and Biostatistics Colloquium Series.

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