CURRICULUM VITAE

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EMPLOYMENT

- **January 2005** – Postdoctoral Research Associate, Biomedical Engineering, Boston University. **Advisor: James J. Collins.**
- **January 2002 – December 2004**, Postdoctoral Research Associate, Department of Pathology, Northwestern University, Feinberg School of Medicine. **Advisors: Zoltán N. Oltvai and Albert-László Barabási.**
- **January 2000 – December 2001**, Graduate Research Assistant, Center for Neurodynamics, University of Missouri - St. Louis.
- **August 1997 – December 1999**, Graduate Teaching Assistant, Department of Physics and Astronomy, University of Missouri – St.Louis.
- **October 1996 - May 1997**, Graduate Teaching Assistant, Department of Physics, Babes-Bolyai University of Cluj-Napoca, Romania.

EDUCATION

- **Ph.D. in Physics, University of Missouri – St. Louis and Rolla; January 2002. Advisor: Dr. Frank Moss**
  - Research carried out at the Center for Neurodynamics, University of Missouri - St. Louis.
  - Dissertation title: Spatiotemporal Dynamics of Noisy Excitable Systems: Application to Cultured Human Glial Cell Networks.
- **M. S. in Physics, University of Missouri - St. Louis; May 1999.**
- **M. S. in Magnetism, Babes-Bolyai University of Cluj, Romania; June 1997. Advisor: Dr. Zoltán Néda**
  - Dissertation title: Stochastic Resonance in the Two-Dimensional Ising Model.
- **B. S. in Physics Education, Babes-Bolyai University of Cluj, Romania; July 1996. Advisors: Dr. Lavinia Cociu** (Babes-Bolyai University)
  Dr. László Béla Kiss (József Attila University of Szeged, Hungary)
  - Diploma thesis title: Effects of Noise on Physical Systems. Defense: July 1996.

PEER-REVIEWED PUBLICATIONS IN SCIENTIFIC JOURNALS

1. **G. Balázsi**, A.-L. Barabási, and Z. N. Oltvai, Topological units of environmental signal processing in the transcriptional-regulatory network of *Escherichia coli* , *Proc. Nat. Acad. Sci., USA*, **102**(22), 7841-7846 (2005).
2. **G. Balázsi**, and Z. N. Oltvai, Sensing Your Surroundings: How Transcription-Regulatory Networks of the Cell Discern Environmental Signals, Invited Perspective, *Sci STKE* **2005**(282), pe20 (2005).
3. X. Tong, J. W. Campbell, **G. Balázsi**, K. A. Kay, B. L. Wanner, S. Y. Gerdes, and Z. N. Oltvai, Genome-scale identification of conditionally essential genes in E. coli by DNA microarrays, *Biochem. Biophys. Res. Commun.* **322**(1), 347-354 (2004).
4. S. Y. Gerdes, M. D. Scholle, J. W. Campbell, **G. Balázsi**, E. Ravasz, M. D. Daugherty, A. L. Somera, N. C. Kyrpides, I. Anderson, M. S. Gelfand, A. Bhattacharya, V. Kapatral, M. D'Souza, M. V. Baev, F. Mseeh, M. Y. Fonstein, R. Overbeek, A.-L. Barabási, Z. N. Oltvai, and A. L. Osterman, Experimental Determination and System-Level Analysis of Essential Genes in Escherichia coli MG1655, *J. Bact.* **185**(19), 5673-5684 (2003).
5. A. Ordemann, **G. Balázsi**, and F. Moss, Pattern formation and stochastic motion of the zooplankton Daphnia in a light field, *Physica A* **325**, 260-266 (2003). Selected for publication by the online journal *Physics of Life*, August 2003: http://www.physicsoflife.com/index.html.
6. **G. Balázsi**, K. A. Kay, A.-L. Barabási and Z. N. Oltvai, Spurious spatial periodicity of co-expression in microarray data due to printing design, *Nucl. Acids Res.* **31**(15), 4425-4433 (2003).
7. **G. Balázsi**, A. H. Cornell-Bell, A. Neiman and F. Moss, Increased phase synchronization of spontaneous calcium oscillations in epileptic human versus normal rat astrocyte cultures, *Chaos* **13**(2), 515-518 (2003). Selected for publication by the *Virtual Journal of Biological Physics Research*, May 15, 2003: http://www.vjbio.org.
8. I. Karsai and **G. Balázsi**, Regulation of Construction Behavior of Social Wasps. *J. Theor. Biol.* **218**, 549 (2002). Press coverage, *New Scientist* November 3, 2002: http://www.newscientist.com/news/news.jsp?id=ns99992984.
9. **G. Balázsi**, A. H. Cornell-Bell, A. Neiman and F. Moss, Synchronization of Hyperexcitable Systems with Phase-Repulsive Coupling. *Phys. Rev. E* **64**, 041912 (2001).
10. **G. Balázsi**, L. B. Kish and F. Moss, Spatiotemporal Stochastic Resonance and its consequences in neural model systems. *Chaos* **11**(3), 563-569 (2001).
11. **G. Balázsi** and L. B. Kish, From Stochastic Resonance to Brain Waves. *Physics Letters A*, **265**, 304-316 (2000).

DISSERTATION

1. **G. Balázsi**, Spatiotemporal Dynamics of Noisy Excitable Systems: Application to Cultured Human Glial Cell Networks. *Ph.D. Dissertation*, University of Missouri at Rolla, Rolla, Missouri, 2001.

PUBLICATIONS IN CONFERENCE PROCEEDING

1. **G. Balazsi**, A.-L. Barabasi, and Z. N. Oltvai, Topological units of environmental signal processing in the transcriptional-regulatory network of *Escherichia coli*, *Bull. Am. Phys. Soc.*, **50**(1), 502 (2005).
2. A. Ordemann, **G. Balázsi**, and F. Moss, Motions of Daphnia in a Light Field: Random Walks with a Zooplankton, *Nova Acta Leopoldina* **NF 88**, Nr. 332, 87-103 (Proc. German Academy of Natural Sciences, Halle, 2003).
3. **G. Balázsi**, and F. Moss, Stochastic Resonance: Examples from Sensory, Perceptive and Behavioral Neuroscience and Chemistry, *Nova Acta Leopoldina* **NF 88**, Nr. 332, 57-76 (Proc. German Academy of Natural Sciences, Halle, 2003).
4. A. Ordemann, **G. Balázsi**, E. Caspari, and F. Moss, Daphnia swarms: from single agent dynamics to collective vortex formation. *SPIE Proceedings Series* **5110**, 172-179 (2003).
5. **G. Balázsi**, A. Ordemann, and F. Moss, Stochastic Synchronization: Analogy with Systems Undergoing Phase Transition, *Proc. 3rd Int. Conf. on Unsolved Problems of Noise and Fluctuations in Physics, Biology, and High Technology (UPoN 2002)*, ed. S. M. Bezrukov; *AIP Conference Proceedings* **665**(1) 94-99 (2003).
6. **G. Balázsi**, K. Kay, and Z. N. Oltvai: Measured expression levels depend on the spatial gene arrangement on the microarray. *Bull. Am. Phys. Soc.*, **48**(1), 429 (2003).
7. **G. Balázsi**, A. H. Cornell-Bell, and F. Moss: Synchronization of FitzHugh-Nagumo Systems with Phase-Repulsive Coupling. *Bull. Am. Phys. Soc.* **47**(1), 445 (2002).
8. D. Pflugfelder, **G. Balazsi**, A. Ordemann and F. Moss: Modeling Circular Motion in Daphnia Swarms. *Bull. Am. Phys. Soc.* **47**(2), 826 (2002).
9. **G. Balazsi**, A. H. Cornell-Bell, A. Neiman and F. Moss, Statistical analysis of calcium oscillations in astrocyte cultures. *Bull. Am. Phys. Soc.* **46**(1), 1107 (2001).
10. **G. Balázsi**, F. Moss and L. B. Kiss, Spatiotemporal Stochastic Resonance and Its Consequences in a Neural System. *Proc. 2nd Int. Conf. on Unsolved Problems of Noise and Fluctuations (UPoN'99)*, eds. D. Abbott and L. Kish; *AIP Conference Proceedings* **511**,159-168 (2000).
11. **G. Balazsi**, A. H. Cornell-Bell, E. Simonotto, A. Neiman and F. Moss, Stochastic Synchronization Analysis of Cultured Human Glial Cells. *Bull. Am. Phys. Soc.* **45**(1), 475 (2000).
12. K. Loerincz, **G. Balazsi**, Z. Gingl and L. B. Kiss, Stochastic Resonance at Phase Noise, in: *Proc. First Int. Conf. Unsolved Problems of Noise (UPON '96) in Physics, Biology, Electronic Technology and Information Technology*. Eds.: Ch. R. Doering, L. B. Kiss, M. F. Shlesinger. World Scientific (1997).

PUBLICATIONS IN PREPARATION

1. I.J. Farkas, **G. Balázsi**, A.-L. Barabási, T. Vicsek, and Z. N. Oltvai, Motifs display distinct distribution in signal-specific transcriptional subnetworks (in preparation).

BOOK CHAPTERS

2. **G. Balázsi**, and Z. N. Oltvai, A Pitfall in Series of Microarrays: The Position of Probes Affects the Cross Correlation of Gene Expression Profiles. In: *Microarray Data Analysis: Methods and Applications* (2005, ed. by Michael J. Korenberg).

INVITED TALKS

1. **G. Balázsi,** "Topological units of environmental signal processing in the transcriptional-regulatory network of *Escherichia coli*". Coupled60 Workshop, University of Houston (February 3-6, 2005).
2. **G. Balázsi,** "Position and function of three-node subgraphs in the transcriptional regulatory network of *Escherichia coli*". Department of Bioengineering Seminar, University of Illinois at Chicago (October 29, 2004).
3. **G. Balázsi,** "Positioning and function of network motifs in the transcriptional regulatory network of Escherichia coli", Applied Biosystems Laboratory, Department of Biomedical Engineering, Boston University (June 30, 2004).
4. **G. Balázsi**, "Over-represented network motifs and their role in noisy signal transduction". Department of Physics and Astronomy Colloquium Series, Univ. of Missouri at St. Louis (October 10, 2003).
5. **G. Balázsi**, "Log-Ratios of Gene Expression Depend on the Arrangement of Probes on the Microarray". Cambridge Healthtech Institute's Third Annual Meeting on Microarray Data Analysis, Baltimore, Maryland (September 21-23, 2003).
6. **G. Balázsi**, "Coupled Calcium Oscillations in Epileptic Astrocyte Cultures: a Cause or an Effect?" University of Chicago Computational Neuroscience Seminar Series, Chicago, Illinois (April 16, 2002).
7. **G. Balázsi**, F. Moss and L. B. Kiss, "Spatiotemporal Stochastic Resonance and Its Consequences in a Neural System". 2nd International Conference on Unsolved Problems of Noise and Fluctuations (UPoN'99), Adelaide, Australia (July 12, 1999).

TEACHING EXPERIENCE

- High school student teaching, Cluj, Romania, 1995-1996: Electricity and Magnetism, Modern Physics
- Physics laboratories and problem-solving discussions, Babes-Bolyai Univ. of Cluj, Romania, 1996-1997: Mechanics, Thermodynamics, Optics
- Physics laboratory practices and problem-solving discussions, Univ. of Missouri at St. Louis, 1997-1998: Physics 1011 & 1012 (Basic Physics). Excellent student reviews (provided upon request).
- Physics laboratory practices and problem-solving discussions, Univ. of Missouri at St. Louis, 1998-1999: Physics 2111 (Mechanics, and Thermodynamics). Excellent student reviews (provided upon request).
- Invited lecturer: *Noise in Physical and Biological Systems*, with 11 invited lecturers from the USA, Sweden and Hungary (Uppsala Univ., Sweden, 2000)

ORGANIZER/CHAIR OF CONFERENCE SESSIONS

- Session chair: Meeting of the American Physical Society, Los Angeles, March 21-25, 2005. Session J22, Biochemical and Genetic Networks
- Organizer: Noise and Complexity in Nonlinear Dynamic Systems, St. Louis, October 22-23, 2004. Mini-symposium in celebration of Prof. Frank Moss' 70^{th} birthday.

AWARDS AND FELLOWSHIPS

- December 2001, postdoctoral fellowship, awarded by the Alexander von Humboldt Foundation.
- November 2001, postdoctoral fellowship, awarded by the National Research Council – National Institutes of Health.
- January – December 2001, Dissertation Research Fellowship, awarded by the Graduate School at the University of Missouri - St. Louis.
- June-July 2000, Summer Research Fellowship, awarded by the Graduate School at the University of Missouri - St. Louis.
- July 1999, Best Paper Award, 2nd Int. Conf. On Unsolved Problems of Noise and fluctuations (UPoN'99), Adelaide, Australia, 11-15th July 1999.
- April 30, 1999, Graduate Teaching Assistant Award, offered by the Department of Physics and Astronomy at the University of Missouri - St. Louis.
- June-July 1998, Summer Research Fellowship, awarded by the Graduate School at the University of Missouri - St. Louis.

TRAINING

- Theoretical background: physics, mathematics, numerical analysis, neurobiology, computational neuroscience (University of Missouri – St. Louis, and Washington University, School of Medicine). Renormalization, correction and analysis of microarray data, simulation of biochemical reaction network dynamics, study of network topology (postdoctoral experience).
- Programming skills: Matlab, C, Perl, Java.
- Operating systems: Windows (XP/2000/ME/95/98), Linux (Red Hat), Unix (Solaris)
- Active participant at experiments: extracellular recording from neurons, microarray hybridization, fluorescent cell counting, continuous-flow bioreactor
- Languages: Hungarian (native), English (fluent), Romanian (fluent), German (intermediate), Spanish (beginner level)

REFERENCES

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