

## CURRICULUM VITAE

### Zoltán Toroczkai

Professor of Physics &  
Concurrent Professor of Computer Science and Engineering;  
Department of Physics, 225 Nieuwland Science Hall,  
University of Notre Dame, Notre Dame, Indiana 46556  
Ph: (574) 631-2618 Fax: (574) 631-5952  
Email: [toro@nd.edu](mailto:toro@nd.edu) URL: <http://www.nd.edu/~toro/>  
Citizenship: U.S.

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### EDUCATION:

- 1997 Ph.D. (Physics). Virginia Polytechnic Institute and State University, Blacksburg, VA, USA, (May).
- 1992 Diploma de Licenșă (M.Sc., Physics). Babeș-Bolyai University, Cluj-Napoca, Romania, (June).

### PROFESSIONAL EXPERIENCE:

- 2011– Professor of Physics, University of Notre Dame (UND)
- 2011– Concurrent Professor of Computer Science & Eng., UND
- 2011– Co-Director, Interdiscipl. Center for Network Sci. & Applications (iCeNSA), UND
- 2007–11 Founding Director, iCeNSA.
- 2006–11 Associate Professor of Physics, UND
- 2004–06 Deputy Director, Center for Nonlinear Studies, Los Alamos Natl Lab (LANL)
- 2002–06 Technical Staff Member, Complex Systems Group, LANL
- 2000–02 Director Funded Postdoctoral Fellow, LANL
- 1998–00 Postdoctoral Research Associate, University of Maryland at College Park
- 1997–98 Postdoctoral Research Associate, Virginia Tech

### AWARDS, HONORS and FELLOWSHIPS:

- 2012 Elected Fellow of the American Physical Society
- 2009 Research Fellow, Alfréd Rényi Institute of Mathematics, Marie Curie Host Fellowships for Transfer of Knowledge, Hungarian Bioinformatics Program.
- 2005 Invited Speaker, U.S. Frontiers of Engineering Symposium of the Natl. Academy of Engineering, GE Global Res. Center, Niskayuna, NY, 22-24 Sep
- 2000-02 Director's Postdoctoral Fellowship Award, Los Alamos National Laboratory
- 1999 Special Merit Award, MRSEC Education Outreach Progr., Univ. of Maryland
- 1996 C.H. Wan Scholarship for academic excellence in physics, Virginia Tech
- 1992-94 MHB Research Fellowship Award, Eötvös University, Hungary

- 1992 Erdélyi Múzeum Egyesület and the Dept of Education of Hungary Scholarship  
1989 Special Prize, “Traian Lalescu” Natl. probl. solving compet. Physics, Romania

### MEMBERSHIPS and BOARDS

- American Physical Society, Elected Fellow, 2012.
- Society for Industrial and Applied Mathematics, 2014.
- Editorial Advisory Board, Chaos: An Interdisciplinary Journal of Nonlinear Science (AIP), 2012–2018.
- External Advisory Board, Network Science Institute (NetSI), Northeastern University, Oct 26, 2017.

### EDITOR SERVICES

- 2012-2018, Editorial Advisory Board, Chaos: An Interdisciplinary Journal of Nonlinear Science (AIP).
- 2012-2014. Editorial Board, *European Physical Journal B*
- 2012-2015. Editorial Board, *Scientific Reports*, Nature Publishing Group
- 2012-present. Associate Editor, *Network Science*, Cambridge University Press
- 2006-11. Editorial Board, *Journal of Economic Interaction and Coordination*, Springer
- CHAOS, Special Focus Issue on *Optimization in Networks*, June 2007 (guest editor)
- Lecture Notes in Physics Series, volume on *Complex Networks*, Eds. E. Ben-Naim, Z. Toroczkai and H. Frauenfelder, Springer-Verlag, 2004 (editor).
- CHAOS, Special Focus Issue on *Active Chaotic Flow*, June 2002 (guest editor)

### REGULAR REFEREEING SERVICES

**Journals:** Advances in Complex Systems, Cerebral Cortex, Chaos, Communications Physics (Nature), Drug Discovery Today, Europhysics Letters, European Physical Journal B, European Physical Journal Special Topics (ST), Frontiers in Neuroscience, IET-Systems Biology, Journal of Applied Physics, Journal of Economic Interaction and Coordination, Journal of Experimental Algorithmics, Journal of Fluid Mechanics, Journal of Physics A: Math. and Gen., Journal of Statistical Mechanics: Theory and Experiment, Journal of the American Society for Information Science and Technology Journal of Theoretical Biology, Lecture Notes in Physics, Microfluidics, Nature, Nature Communications, Nature Physics, New Journal of Physics Physics of Fluids, Physics Today, PLoS Computational Biology, PLoS ONE, Proc. Natl. Acad. Sci. USA, Physica A, Physica D, Physica Scripta, Physical Review, Physical Review Letters, Physics Letters A, Science, Science Advances, Scientific Reports, Surface Science.

**Reviewer for Grant Proposals:** National Science Foundation (NSF) USA; National Institutes of Health (NIH) USA; Defense Threat Reduction Agency (DTRA); NASA; Los Alamos Natl. Lab.; The Research Corporation; the Swedish Research Council; The French National Research Agency (ANR), Hungarian Scientific Research Fund (OTKA).

Books: Lynn Margulis and Dorion Sagan, *Dazzle Gradually*, Chelsea Green Publishing (2007), back-cover blurb; Oxford UP and MIT Press; Olaf Sporns, *Networks of the Brain*, The MIT Press, 2011.

Published book reviews: Z. Toroczkai, *Physics Today*, **63**(2), 47 (2010); Book: Complexity: A guided tour. Author: Melanie Mitchell. Oxford U. Press, New York, 2009. Z. Toroczkai, *Physics Today*, **55**, 70 (2017); Book: Network Science. Author: Albert-László Barabási. Cambridge U. Press, 2016.

#### CONFERENCE ORGANIZER and PROGRAM COMMITTEES

- Workshop on Non-conventional Approaches to Hard Optimization (NAHO), Co-organizer. ICCAD'17, Nov 13-17, 2017, Irvine, CA, USA.
- Advanced Study Group 2013/2014: *Co-evolution: A proving ground for non-equilibrium statistical mechanics*. Program Committee Member. Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany.
- American Physical Society (APS) March Meeting, Boston, Feb 27 - Mar 2, 2012. Focus session organizer and chair.
- NetSci 2011: The International School and Conference on Network Science Budapest, 6-10 June, 2011.
- NetSci 2010: International Workshop and Conference on Network Science, MIT and Northeastern University in Cambridge and Boston, Massachusetts USA. May 10-14, 2010.
- NetSci 2009: International Workshop and Conference on *Network Science*, Venice, Istituto Veneto di Scienze Lettere ed Arti, Italy, 29 June - 03 July.
- NetSci 2008: International Workshop and Conference on *Network Science*, Norwich Research Park, UK, June 23-27, 2008.
- Network Seminar Series, Center for Complex Network Research, University of Notre Dame, Spring 2008.
- Condensed Matter Seminar Series, University of Notre Dame, Fall 2007, Spring 2008.
- NetSci 2007: International Workshop and Conference on *Network Science*, Queens, New York, May 19-25, 2007.
- CNLS 26th Annual International Conference on *Socio-Technical Systems: Bridging the Scales*, Los Alamos, New Mexico, Aug 14-18, 2006
- CNLS International Workshop on *Optimization in Complex Networks*, Los Alamos, New Mexico, June 19-22, 2006.
- CNLS International Workshop on *Collectives Formation and Specialization in Biological and Social Systems*, Santa Fe, New Mexico, April 20-22, 2005.
- LANL-IMA Workshop on *Agent based Modeling and Simulations*, Minnesota, November 3-6, 2003.
- CNLS 23rd Annual International Conference on *Networks: Structure, Dynamics, and Function*, Santa Fe, New Mexico, May 12-16, 2003 (over 350 participants).

- Agent-based Modeling and Simulations Seminar Series, LANL, Los Alamos, February-November 2001.
- MIPKs International Workshop on *Chemical and Biological Activity in Flows*, Max-Planck Institute for Complex Systems, Dresden, Germany, Aug 26 - Sep 27, 2002.
- CNLS/TDO LANL Workshop on *Anomalous Distributions, Nonlinear Dynamical Systems, and Nonextensivity*, LANL, Los Alamos, New Mexico, Nov 4-8, 2002.
- CNLS-LANL International Workshop on *Active Chaotic Flow*, Los Alamos, New Mexico, May 2001.
- SIAM-DS01 Minisymposium on *Active Chaos in Environmental Flows*, Snowbird, Utah, May 2001.
- Dynamics Days, Fifteenth Annual Informal Workshop, Budapest, Hungary, Jun 1994.

## LEADERSHIP & MANAGEMENT:

Training: Group Management Development Course, 2004, Los Alamos National Laboratory.

### Experience:

- 1) Project Team Leader for the LDRD DR project S.P.I.N. at Los Alamos National Laboratory, involving 16 research staff, 3 postdoctoral associates and 2 GRA summer students, and a yearly budget of \$1.5Mill., 2003–05, for a total of \$4.5Mill.
- 2) Deputy Director for Center for Nonlinear Studies (CNLS) at Los Alamos National Laboratory, February 2004 - June 2006. In that period, CNLS had 23 laboratory affiliates, 5 office staff, its postdoctoral program has 24 postdocs, its summer GRA student program has about 16 students every summer, a visitor program of about 200 visitors/year, a conference program with one large-scale Annual Conference, and about 10-12 workshops every year. It also houses and maintains a large-scale cluster computing environment. Yearly research budget is about \$1.8-2.0Mill.
- 3) Founding Director and Director of Interdisciplinary Center for Network Research (iCeNSA), University of Notre Dame, 2007-2011. Co-director, 2011-present.

## PhD STUDENTS ADVISED

### At University of Notre Dame:

- Current graduate students (physics): Shubha Kharel, Sukhwan Chung, Benjamin Stortenbecker.
- Melinda Varga, 2012 – 2016, now at Bethe Israel Medical School, Harvard.
- Yihui (Ray) Ren, physics 2011 – 2015, now research staff at Brookhaven Natl Lab.
- Tanya Salyers, applied mathematics 2010 – 12 (May), now senior software engineer at Placed.com, previously at Point Inside, IMDb.
- Andrea Asztalos, physics 2006 – 10, now research staff at NCBI, NLM, NIH.
- Pu Wang, physics, 2006 – 10, postdoc at MIT, now faculty in China
- Hyunju Kim, physics, 2006 – 11, postdoc at Arizona State.

— Anthony Strathman, physics, 2007 – 2013 May, private company, industry.

At Los Alamos National Lab, summer graduate research program:

— Izabella Benczik (Eotvos University), 2002. Hasan Guclu (RPI), 2002 and 2003. Balázs Kozma (RPI), 2004. Eduardo Lopez (Boston U.) 2004. Sameet Sreenivasan (Boston U.) 2005.

UNDERGRADUATE MENTORSHIP (Notre Dame):

— James Cotter (physics major), Notre Dame  
— Dániel Barabási (neuroscience and physics major), now in graduate school, Harvard.  
— LaTianna Sturup, 2010 Summer physics REU, from Arizona State University.  
— Zhechao Zhou, 2008 Summer physics REU, project paper: *Heterogeneous Patterns in Human Communication*.

POSTDOCS MENTORED :

At Notre Dame:

— Ferenc Molnár, Nov. 1, 2017 – present  
— Szabolcs Horvát, 2012 – 2015, ELBE fellow at the Center for Systems Biology Dresden, Germany.  
— Saurav Pandit, 2010–2012, data scientist at Intent Media Inc..  
— Maria M. Ercsey-Ravasz, 2008–11, Marie-Curie Fellow and physics faculty at Babes-Bolyai University.  
— Sameet Sreenivasan, 2006–08, researcher at ARL, now Data Scientist, Clinical Analytics at Humana Inc.

At Los Alamos National Lab:

— Erica Camacho, 2004, now Associate Prof of Applied mathematics at Arizona State University.  
— Eduardo Lopez, 2004–2006, graduated from Boston University April 2005. Lecturer at Pembroke College Oxford.  
— Adilson Enio Motter, 2005–2007, Director Funded Postdoctoral Fellow. Now Prof. of Physics at Northwestern University.  
— Erzsébet Ravasz, 2004–2006, Director's Funded Postdoctoral Fellow. Junior faculty at Harvard Medical School, Beth Israel Deaconess Medical Center until 2015, now Prof. at Wooster College, Ohio.  
— Yeo-Jin Chung, 2005, went on to Prof. of Mathematics at Southern Methodist University.  
— Natali Gulbahce, 2005, now Senior Bioinformatics Scientist at Genomic Health inc.

## TEACHING:

- Computational Physics (PHYS 60050, CRN 19031), Grad course, Fall 2018.
- Statistical Mechanics (PHYS 70009, CRN 29563), Grad course, Spring 2018.
- Classical Mechanics (PHYS 70005, CRN 12433), Grad course, Fall 2017.
- Introduction to Network Science (PHYS 70152, CRN 27511), Grad course, Spring 2017.
- Classical Mechanics (PHYS 70005, CRN 12621), Grad course, Fall 2016.
- Introduction to Network Science (PHYS 70152, CRN 30192), Grad course, Spring 2016.
- Classical Mechanics (PHYS 70005, CRN 12759), Grad course, Fall 2015.
- Classical Mechanics (PHYS 70005, CRN 12870), Grad course, Fall 2014.
- Networks, Information & Physics (PHYS 80102, CRN 29780), Grad course, Spring 2014.
- Electromagnetism (PHYS 70006, CRN 20506), Graduate course, Spring 2013.
- Introduction to Biophysics (PHYS 70400, CRN 25901), Graduate, Spring 2013.
- Statistical Thermodynamics (PHYS 80002, CRN 15267), Graduate, Fall 2012.
- Introduction to Biophysics (PHYS 70400, CRN 28355), Graduate, Spring 2012.
- Statistical Thermodynamics (PHYS 80002, CRN 16295), Graduate, Fall 2011.
- Biophysics (PHYS 80401, CRN 28074), Graduate, Spring 2011.
- Introduction to Biophysics (PHYS 70400, CRN 18751), Graduate, Fall 2010.
- Statistical Thermodynamics (PHYS 80002, CRN 18752), Graduate, Fall 2010.
- Statistical Thermodynamics (PHYS 80002, CRN 20198), Graduate, Spring 2010.
- Electrodynamics (PHYS 80001, CRN 11958), Graduate course, Fall 2009.
- Electromagnetism (PHYS 70006, CRN 20636), Graduate course, Spring 2009.
- Electrodynamics (PHYS 80001, CRN 12038), Graduate course, Fall 2008.
- Condensed Matter Seminar (PHYS 83500, CRN 22421), Spring 2008.
- Biophysics Directed Readings (PHYS 46490, CRN 24295), Spring 2008.
- Electrodynamics (PHYS 80001, CRN 12192), Graduate course, Fall 2007.
- Condensed Matter Seminar (PHYS 83500, CRN 12197), Fall 2007.
- Electromagnetism (PHYS 70006, CRN 20735), Graduate course, Spring 2007.
- Physics II Laboratory (PHYS 31220, CRN 22227), Spring 2007.
- Electrodynamics (PHYS 80001, CRN 13139), Graduate course, Fall 2006.

## SERVICE TO UNIVERSITY:

- Member of the Committee on Appointments and Promotions (CAP), Physics Department, 2012–14, 2016–17, 2017, 2018.
- Committee for Graduate Curriculum, 2017-2018
- Committee for Undergraduate Research, 2017-18.
- Chair of the search committee for Network Science hire in Physics, 2014.
- Committee on departmental (physics) vision.
- Faculty Search Committees in Condensed Matter, Network Science, Applied Mathematics and Statistics 2011, 2012, 2014, 2017.
- Co-Director, iCeNSA, 2011-present.

- Founding Director and Director, Interdiscipl. Ctr. for Network Science and Applications (iCeNSA) 2007–11.
- Coordinated iCeNSA center activities across campus, supported the Distinguished Speaker Series on Social Networks Fall 2009 - Spring 2010.
- Undergraduate Research Committee, Spring and Fall 2009
- Library Committee, 2009 – 14
- Strategic Planning Committee, Spring and Fall 2009
- Graduate Curriculum Committee, 2009 – 10
- Faculty Search Committee for Biophysics Position, Spring 2009.

## PUBLICATIONS

### PEER-REVIEWED JOURNAL ARTICLES

90. É. Czabarka, L.A. Székely, Z. Toroczkai, S. Walker. An algebraic Monte-Carlo algorithm for the Partition Adjacency Matrix realization problem. *submitted*, (2018) | <https://arxiv.org/abs/1708.08242>
89. B. Molnár, F. Molnár, M. Varga, Z. Toroczkai, M. Ercsey-Ravasz. A continuous-time Max-SAT solver with high analog performance *Nature Comm.*, in press (2018) | <https://arxiv.org/abs/1801.06620> [cs.CC, cs.AI]
88. R. Gamanut, H. Kennedy, Z. Toroczkai, M. Ercsey-Ravasz, D.C. Van Essen, K. Knoblauch and A. Burkhalter. The Mouse Cortical Connectome, Characterized by an Ultra-Dense Cortical Graph, Maintains Specificity by Distinct Connectivity Profiles. *Neuron*, **97**, 698–715 (2018).
87. P.L. Erdős, I. Miklós and Z. Toroczkai. New classes of degree sequences with fast mixing swap Markov chain sampling. *Comb. Prob. Comput.* **27**(2), 186-207 (2018). | <http://arxiv.org/abs/1601.08224> [cs.DM, math.CO]
86. X.Yin, B. Sedighi, M. Varga, M. Ercsey-Ravasz, Z. Toroczkai, X. S. Hu. Efficient Analog Circuits for Boolean Satisfiability. *IEEE Transactions on Very Large Scale Integration Systems (TVLSI)* **16**(1), 155–167 (2018) | <https://arxiv.org/abs/1606.07467> [cs.ET, cs.CC, physics.ins-det]
85. H.R. Noori, J. Schöttler, M. Ercsey-Ravasz, A. Cosa-Linan, M. Varga, Z. Toroczkai, and R. Spanagel. A Multi-scale Cerebral Neurochemical Connectome of the Rat Brain. *PLoS Biol.* **15**(7), e2002612 (2017).

84. Sz. Horvát, R. Gămănuț, M. Ercsey-Ravasz, L. Magrou, B. Gămănuț, D.C. Van Essen, A. Burkhalter, K. Knoblauch, Z. Toroczkai\* and H. Kennedy\*. Spatial embedding and wiring cost constrain the functional layout of the cortical network of rodents and primates. *PLoS Biology*, **14**(7), e1002512 (2016). \*: Corresponding authors. A professional accolade on this paper is by B. Finlay of Cornell U. published in: *PLoS Biol.* **14**(9), e1002556 (2016).
83. R. Sumi, M. Varga, Z. Toroczkai and M. Ercsey-Ravasz. Order-to-chaos transition in the hardness of random Boolean satisfiability problems. *Phys. Rev. E* **93**, 052211(2016). <http://arxiv.org/abs/1602.05152> [cs.CC, cond-mat.stat-mech]
82. C. Orsini, M. Mitrovic Dankulov, A. Jamakovic, P. Mahadevan, P. Colomer-de-Simon, A. Vahdat, K.E. Bassler, Z. Toroczkai, M. Boguna, G. Caldarelli, S. Fortunato, and D. Krioukov. Quantifying randomness in real networks. *Nature Comm.* **6**, 8627 (2015). <http://arxiv.org/abs/1505.07503> [physics.soc-ph]
81. K.E. Bassler, C.I. Del Genio, P.L. Erdős, I. Miklós, Z. Toroczkai. Exact sampling of graphs with prescribed degree correlations. *New J. Phys.* **17**, 083052 (2015). <http://arxiv.org/abs/1503.06725> [cs.DM, cond-mat.stat-mech, cs.DS, math.CO]
80. Sz. Horvát, É. Czabarka and Z. Toroczkai. Reducing Degeneracy in Maximum Entropy Models of Networks. *Phys. Rev. Lett.* **114**, 158701 (2015). <http://arxiv.org/abs/1407.0991> [cond-mat.stat-mech, physics.soc-ph]
79. P. L. Erdős, I. Miklós and Z. Toroczkai. A decomposition based proof for fast mixing of a Markov chain over balanced realizations of a joint degree matrix. *SIAM J. Discr. Math.* **29**, 481-499 (2015). <http://arxiv.org/abs/1307.5295> [math.CO, cs.DM]
78. Y. Ren, M. Ercsey-Ravasz, P. Wang, M.C. Gonzalez, Z. Toroczkai. Predicting flows in spatial networks using a radiation model based on temporal ranges. *Nature Communications* **5**, 5347 (2014) | doi:10.1038/ncomms6347 .
77. N. T. Markov, M. Ercsey-Ravasz, A.R. Ribeiro Gomes, C. Lamy, J. Vezoli, L. Magrou, P. Misery, A. Falchier, R. Quilodran, J. Sallet, M. A. Gariel, R. Gamanut, C. Huissoud, S. Clavagnier, P. Giroud, D. Sappey-Marinier, P. Barone, C. Dehay, Z. Toroczkai, K. Knoblauch, D. C. Van Essen, H. Kennedy. A weighted and directed interareal connectivity matrix for macaque cerebral cortex. *Cereb. Cortex* **24**(1), 17-36 (2014).
76. N.T. Markov, M. Ercsey-Ravasz, D.C. Van Essen, K. Knoblauch, Z. Toroczkai\*, H. Kennedy\*. Cortical high-density counter-stream architectures. *Science* **342**(6158), 1238406 (2013). | doi: 10.1126/science.1238406 . \*: Corresponding authors.
75. M. Ercsey-Ravasz, N.T. Markov, C. Lamy, D.C. Van Essen, K. Knoblauch, Z. Toroczkai\*, H. Kennedy\*. A predictive network model of cerebral cortical connectivity based on a distance rule. *Neuron* **80**(1), 184–197 (2013). \*: Corresponding authors.



74. H. Kennedy, K. Knoblauch and Z. Toroczkai. Why data coherence and quality is critical for understanding interareal cortical networks. *Neuroimage* **80**, 37–45 (2013) | doi:10.1016/j.neuroimage.2013.04.031.
73. N.T. Markov, M. Ercsey-Ravasz, C. Lamy, A.R. Ribeiro Gomes, L. Magrou, P. Misery, P. Giroud, P. Barone, C. Dehay, Z. Toroczkai, K. Knoblauch, D.C. Van Essen, H. Kennedy. The role of distance on the specificity of inter-areal connectivity in the macaque cerebral cortex. *Proc. Natl. Acad. Sci. USA*, **110**(13), 5187–5192 (2013).
72. C. Wang, O. Lizardo, D. Hachen, A. Strathman, Z. Toroczkai, and N. V. Chawla. A dyadic reciprocity index for repeated interaction networks. *Network Science* (CUP), **1**(01), 31–48 (2013).
71. M. Ercsey-Ravasz, and Z. Toroczkai. The Chaos within Sudoku. *Scientific Reports* **2**, 725 (2012) | doi:10.1038/srep00725
70. M. Ercsey-Ravasz, R. Lichtenwalter, N.V. Chawla and Z. Toroczkai. Range-limited Centrality Measures in Non-weighted and Weighted Complex Networks. *Phys. Rev. E* **85**, 066103 (2012).
69. M. Ercsey-Ravasz, Z. Toroczkai, Z. Lakner and J. Baranyi. Complexity of the International Agro-Food Trade Network and its Impact on Food Safety. *PLoS ONE* **7**(5), e37810 (2012).
68. H. Kim, C.I. Del Genio, K.E. Bassler and Z. Toroczkai. Constructing and sampling directed graphs with given degree sequences *New J. Phys.* **14**, 023012 (2012).
67. M. Ercsey-Ravasz and Z. Toroczkai. Optimization hardness as transient chaos in an analog approach to constraint satisfaction. *Nature Physics* **7**, 966-970 (2011), cover-page article. | doi:10.1038/nphys2105 .
66. N.T. Markov, P. Misery, A. Falchier, C. Lamy, J. Vezoli, R. Quilodran, P. Giroud, M.A. Gariel, M. Ercsey-Ravasz, L.J. Pilaz, C. Huisoud, P. Barone, C. Dehay, Z. Toroczkai, D.C. Van Essen, H. Kennedy, K. Knoblauch. Weight Consistency Specifies Regularities of Cortical Networks. *Cereb. Cortex* **21**, 1254-1272 (2011).
65. A. Asztalos and Z. Toroczkai. Network discovery by generalized random walks. *Europhysics Letters* **92**, 50008 (2010).
64. M. Ercsey-Ravasz and Z. Toroczkai. Centrality scaling in large networks. *Phys. Rev. Lett.* **105**, 038701 (2010).
63. C.I. Del Genio, H. Kim, Z. Toroczkai and K.E. Bassler. Efficient and exact sampling of simple graphs with given arbitrary degree sequence. *PLoS ONE* **5**(4), e10012 (2010), doi:10.1371/journal.pone.0010012

62. P. L. Erdős, I. Miklós, Zoltán Toroczkai. A simple Havel-Hakimi type algorithm to realize graphical degree sequences of directed graphs. *The Electronic Journal of Combinatorics* **17(1)**, R66 (2010).
61. H. Kim, Z. Toroczkai, I. Miklós, P.L. Erdős and L. Székely. Degree-based graph construction. *J. Phys. A: Math. Theor.* **42**, 392001 (2009). *Fast Track Communication*.
60. A.L. Pastore y Piontti, C.E. La Rocca, Z. Toroczkai, L.A. Braunstein, P.A. Macri and E.D. López. Using relaxational dynamics to reduce network congestion. *New J. Phys.* **10**, 093007 (2008).
59. Z. Toroczkai, B. Kozma, K.E. Bassler, N.W. Hengartner, G. Korniss. Gradient Networks, *J. Phys. A: Math. Theor.* **41**, 155103 (2008).
58. A.E. Motter, Z. Toroczkai. Introduction: Optimization in networks. *Chaos* **17**, 026101 (2007).
57. H. Guclu, G. Korniss, Z. Toroczkai. Extreme fluctuations in noisy task-completion landscapes on scale-free networks. *Chaos* **17**, 026104 (2007).
56. S. Sreenivasan, R. Cohen, E. Lopez, Z. Toroczkai, H.E. Stanley. Structural bottlenecks for communication in networks. *Phys.Rev.E.* **75**, 036105 (2007).
55. Z. Toroczkai, H. Guclu. Proximity networks and epidemics. *Physica A* **378**, 68 (2007).
54. B. Danila, Y. Yu, S. Earl, J.A. Marsh, Z. Toroczkai, K.E. Bassler. Congestion-gradient driven transport on complex networks. *Phys.Rev. E* **74**, 046114 (2006).
53. H. Guclu, G. Korniss, M.A. Novotny, Z. Toroczkai, Z. Racz. Synchronization landscapes in small-world-connected computer networks. *Phys.Rev.E.* **73**, 066115 (2006).
52. Z. Toroczkai and S. Eubank. Agent-based Modeling as a Decision Making Tool: How to Halt a Smallpox Epidemic. *Frontiers of Engineering, The National Academies*, pp. 99 (2005); reprinted as feature article in *The Bridge*, 35(4), 22 (2005).
51. Z. Toroczkai, K.E. Bassler. Network dynamics: Jamming is limited in scale-free systems. *Nature* **428**, 716 (2004).
50. S. Eubank, H. Guclu, V.S.A. Kumar, M. Marathe, A. Srinivasan, Z. Toroczkai, N. Wang. Modelling disease outbreaks in realistic urban social networks. *Nature* **429**, 180 (2004).
49. T. Tél, T. Nishikawa, A.E. Motter, C. Grebogi, Z. Toroczkai. Universality in active chaos. *Chaos* **14**, 72 (2004).
48. M. Anghel, Z. Toroczkai, K.E. Bassler, G. Korniss. Competition-driven network dynamics: Emergence of a scale-free leadership structure and collective efficiency. *Phys.Rev.Lett.* **92**, 058701 (2004).

47. I.J. Benczik, Z. Toroczkai, T. Tél. Advection of finite-size particles in open flows. *Phys.Rev.E* **67**, 036303 (2003).
46. I. Scheuring, T. Czárán, P. Szabó, G. Károlyi, Z. Toroczkai. Spatial models of prebiotic evolution: Soup before pizza? *Origins of Life and Evolution of the Biosphere* **33**, 319 (2003).
45. G. Korniss, M.A. Novotny, H. Guclu, Z. Toroczkai, P.A. Rikvold. Suppressing roughness of virtual times in parallel discrete-event simulations. *Science* **299**, 677 (2003).
44. I.Scheuring, G.Károlyi, Z. Toroczkai, T. Tél, Á. Péntek. Competing populations in flows with chaotic mixing. *Theor.Pop.Biol.* **63**(#2), 77 (2003).
43. J.M. Finn, J.D. Goette, Z. Toroczkai, M. Anghel, B.P. Wood. Estimation of entropies and dimensions by nonlinear symbolic time series analysis. *Chaos* **13**(#2), 444 (2003).
42. I.J. Benczik, Z. Toroczkai, T. Tél. Selective sensitivity of open chaotic flows on inertial tracer advection: Catching particles with a stick. *Phys.Rev.Lett.* **89**, 164501 (2002), cover-page article.
41. S. Das Sarma, P.P. Chatrathorn, Z. Toroczkai. Universality class of discrete solid-on-solid limited mobility nonequilibrium growth models for kinetic surface roughening. *Phys.Rev.E* **65**, 0366144 (2002).
40. Z. Toroczkai, T. Tél. Introduction: Active chaotic flow. *Chaos* **12**(#2), 372 (2002).
39. Z. Toroczkai. Topological classification of the Horton-Strahler index on binary trees. *Phys.Rev.E* **65**, 016130 (2002).
38. G. Korniss, M.A. Novotny, P.A. Rikvold, H. Guclu, Z. Toroczkai. Going through rough times: From non-equilibrium surface growth to algorithmic scalability. *Materials Research Society Symposium Proceedings, Statistical Mechanical Modelling in Materials Research*, Series **700**, 297 (2002).
37. G. Santoboni, T. Nishikawa, Z. Toroczkai, C. Grebogi. Autocatalytic reactions of phase distributed active particles. *Chaos* **12**(#2), 408 (2002).
36. M. Chertkov, I. Gabitov, P. Lushnikov, J. Moeser, and Z. Toroczkai. Pinning method of pulse confinement in optical fiber with random dispersion. *J.Opt.Soc.Am.B* **19**, 2538 (2002).
35. T. Nishikawa, Z. Toroczkai, C. Grebogi, T. Tél. Finite size effects on active chaotic advection. *Phys.Rev.E* **65**, 026216 (2002).
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32. Z. Toroczkai, G. Korniss. Comment on “Extremal-point densities of interface fluctuations in a quenched random medium”. *Phys.Rev.E* **64**, 048101 (2001).
31. T. Nishikawa, Z. Toroczkai, C. Grebogi. Advective coalescence in chaotic flows. *Phys. Rev.Lett* **87**, 038301(2001).
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29. G. Károlyi, Á. Péntek, I. Sheuring, T. Tél, Z. Toroczkai. Chaotic flow: the physics of species coexistence. *Proc. Natl. Acad. Sci. USA* **97**, 13661 (2000).
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23. Z. Toroczkai, E.D. Williams. Nanoscale fluctuations at solid surfaces. *Physics Today* **52**, 24 (1999).
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20. G. Károlyi, Á. Péntek, Z. Toroczkai, T. Tél, C. Grebogi. Chemical or biological activity in open chaotic flows. *Phys.Rev.E.* **59**, 5468 (1999).

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15. Z. Toroczkai. The Brownian vacancy driven walk. *Int. J. Mod. Phys. B* **11**, 3343 (1997).
14. Z. Toroczkai, R.K.P. Zia. Periodic one-dimensional hopping model with one mobile directional impurity. *J. Stat. Phys.* **87**, 545 (1997).
13. Z. Toroczkai, G. Károlyi, Á. Péntek, T. Tél, C. Grebogi, J.A. Yorke. Wada dye boundaries in open hydrodynamical flows. *Physica* **A239**, 235 (1997).
12. Á. Péntek, T. Tél, Z. Toroczkai. Transient chaotic mixing in open hydrodynamical flows. *Int. J. Bif. Chaos.* **6**, 2619 (1996).
11. Á. Péntek, J.B. Kadtko, Z. Toroczkai. Stabilizing chaotic vortex trajectories: An example of high dimensional control. *Phys. Lett.* **A224**, 85 (1996).
10. Z. Toroczkai, R.K.P. Zia. A model for electrophoresis of polymers with impurities: Exact distribution for a steady state. *Phys. Lett.* **A217**, 97 (1996).
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8. Á. Péntek, Z. Toroczkai, T. Tél, C. Grebogi, J.A. Yorke. Fractal boundaries in open hydrodynamical flows: Signatures of chaotic saddles. *Phys. Rev. E* **51**, 4076 (1995).
7. Á. Péntek, T. Tél, Z. Toroczkai. Chaotic advection in the velocity field of leapfrogging vortex pairs, *J. Phys. A: Math.Gen.* **28**, 2191 (1995).
6. Á. Péntek, T. Tél, Z. Toroczkai. Fractal tracer patterns in open hydrodynamical flows: The case of leapfrogging vortex pairs. *Fractals* **3**, 33 (1995).
5. Z. Toroczkai. Geometric method for stabilizing unstable periodic orbits. *Phys. Lett.* **A190**, 71 (1994).
4. Á. Péntek, Z. Toroczkai, D.H. Mayer, T. Tél. A generalized Kac model as a dynamical system. *Z. Naturforsch.* **49a**, 1212 (1994).

3. Z. Toroczkai, Á. Péntek. Detecting phase transitions in intermittent systems by using the thermodynamical formalism. *Z. Naturforsch.* **49a**, 1235 (1994).
2. Á. Péntek, Z. Toroczkai, D.H. Mayer, T. Tél. Kac Model from a dynamical system's point of view, *Phys. Rev. E* **49**, 2026 (1994).
1. Z. Toroczkai, Á. Péntek. Classification criterion for dynamical systems in intermittent chaos. *Phys. Rev. E* **48**, 136 (1993).

## EDITED BOOKS and JOURNAL ISSUES

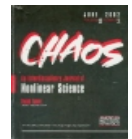
— **Complex Networks**, Lecture Notes in Physics **650**, Springer-Verlag, Eds. E. Ben-Naim, H. Frauenfelder, Z. Toroczkai, (2004), 520 pages, ISBN 3-540-22354-1.



— **Optimization in Networks**, Focus Issue, Eds. Adilson E. Motter, Z. Toroczkai, *CHAOS* **17**, No. 2, (2007). 17 articles.



— **Active Chaotic Flow**, Focus Issue, Eds. Z. Toroczkai, T. Tél *CHAOS* **12**, No. 2, (2002). 17 articles.



## PEER REVIEWED BOOK CHAPTERS:

5. K. Knoblauch, M. Ercsey-Ravasz, H. Kennedy and Z. Toroczkai. The Brain in Space. Chapter in the book “Micro-, meso- and macro-connectomics of the brain”, *The 22nd Colloque Médecine et Recherche of the Fondation Ipsen*, pp. 45–74. Neurosciences series, Fondation IPSEN, Paris, France. Eds. H. Kennedy, D.C. Van Essen, Y. Christen, Springer (2016).
4. N.T. Markov, M.M. Ercsey-Ravasz, M.-A. Gariel, C. Dehay, K. Knoblauch, Z. Toroczkai and H. Kennedy. The tribal networks of the cerebral cortex. In **Cerebral Plasticity**, eds: L.M. Chalupa, N. Berardi, M. Caleo, L. Galli-Resta, T. Pizzorusso, MIT Press, Cambridge MA, 275-290 (2011).
3. Z. Toroczkai, G. Korniss, M.A. Novotny and H. Guclu. Virtual Time-Horizon Control via Communication Network Design. In **Computational Complexity and Statistical Physics**, eds. A. Percus and G. Istrate, in press (Oxford University Press, 2006, pp. 249).

2. Z. Toroczkai, M. Anghel, G. Korniss, K.E. Bassler. Effects of Inter-agent Communications on the Collective. In: **Collectives and the Design of Complex Systems**, eds.: K. Tumer and D.H. Wolpert, Springer-Verlag, 2004, pp. 185. LA-UR-03-0611.
1. G. Károlyi, Á. Péntek, T. Tél, and Z. Toroczkai. Chaotic tracer dynamics in open hydrodynamical flows, in **Nonlinear Dynamics, Chaotic and Complex Systems**, eds. E. Infeld, R. Zelazny, and A. Galkowski, (Cambridge University Press, Cambridge, 1997, pp. 24)

#### PEER REVIEWED PROCEEDINGS:

6. X. Yin, Z. Toroczkai, X. S. Hu. An Analog SAT Solver based on a Deterministic Dynamical System. 2017 IEEE/ACM International Conference on Computer-Aided Design (ICCAD). pp. 794–799 (2017).
5. B. Molnár, M. Ercsey-Ravasz and Z. Toroczkai. Continuous-time Neural Networks Without Local Traps for Solving Boolean Satisfiability. 13th International Workshop on Cellular Nanoscale Networks and their Applications. Book Editors: F. Corinto, G.E. Paziienza. Conference: 13th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA). Turin, ITALY. Aug. 29-31 (2012)
4. N. Markov, M. Ercsey-Ravasz, M. Gariel, J. Vezoli, R. Quilodran, A. Falchier, C. Huissoud, S. Clavagnier, J. Sallet, P. Giroud, C. Lamy, P. Misery, D. Sappey-Marinier, P. Barone, C. Dehay, K. Knoblauch, H. Kennedy, Z. Toroczkai, “Principles of inter-areal connections of the macaque cortex”, Proc. of the 5th French Conference on Computational Neuroscience, NeuroComp 2010 (Lyon, France), pp. 258-263, October 2010
3. G. Korniss, M.A. Novotny, Z. Toroczkai, and P.A. Rikvold. Non-equilibrium Surface Growth and Scalability of Parallel Algorithms for Large Asynchronous Systems, **Computer Simulation Studies in Condensed Matter Physics XIII**, eds. D.P. Landau, S.P. Lewis, and H.-B. Schuttler, **86** 183 (2001)
2. G. Károlyi, Á. Péntek, T. Tél, and Z. Toroczkai. Hydrodynamically driven chemical or biological activity in open flows, *Proceedings of the: British-Finnish-Hungarian Workshop on Refined Flow and Transport Modeling in Shallow Water Environment*, Budapest, Hungary, April, (1999).
1. Á. Péntek, J.B. Kadtko, and Z. Toroczkai. Controlling symmetric vortex configurations, *Proceedings of ANDM'97, AIP Conference*, No. 411, pp. 109 (American Institute of Physics Publishing, 1997)

#### Other PUBLICATIONS:

8. Z. Toroczkai. Egy születésnap margójára. A 90 éves Gábos Zoltán köszöntése. *Természet Világa* (in Hungarian), Nov (2014).

7. M. Ercsey-Ravasz and Z. Toroczkai. A döntéshozatal és a Sudoku káosza. *Természet Világa* (in Hungarian), pp. 122 (2013)/II .
6. Z. Toroczkai. “Complexity: A guided tour. Author: Melanie Mitchell, Oxford U. Press, New York, 2009” book review, *Physics Today*, **63**(2), 47 (2010).
5. Z. Toroczkai. Complex Networks, invited paper, *Los Alamos Science*, **29**, 24 (2005).
4. Á. Péntek and Z. Toroczkai. Éltető káosz a planktonok világában, (in Hungarian), *Korunk*, **XI/3**, 76 (2000).
3. Z. Toroczkai. Analytic results for hopping models with excluded volume constraint, *Ph.D. Dissertation* Virginia Tech, 1997. Advisor: Royce K.P. Zia.
2. Z. Toroczkai. Haosul intermitent. Tranzitii de fază (in romanian), *Diploma Thesis* Babeş-Bolyai University, Cluj, Romania, 1992.
1. Z. Toroczkai. Asymptotic behavior of discrete dynamical systems in chaos, *Studia Universitatis Babes-Bolyai, PHYSICA* 1, 73 (1990)

#### INVITED LECTURES and ADDRESSES:

- Corticity Workshop, Frankfurt, Germany, July 26-27, 2018. *Architectural Principles in the Mammalian Connectome*.
- CRCNS-NSF PI meeting, Berkeley, Jun 13-15, 2018. *Architectural Principles and Predictive Modeling of the Mammalian Connectome*.
- Cognitive Neuromorphic Engineering Workshop, Capo Caccia, Italy, April 23 May 05, 2018. *The brain in space*.
- Department of Biology and Physics Seminar, Wooster College, OH, Dec 7, 2017. *The brain in space*.
- International Conference on Computer-Aided Design (ICCAD’17), Nov 13-16, 2017. Workshop on Non-conventional Approaches to Hard Optimization (NAHO). *An analog approach to Boolean SAT and MaxSAT*.
- Statistical Physics Seminar, Facultatea de Fizica, Babes-Bolyai University, Romania. Aug 16, 2016. *Degree preserving growth and prime gap graphs*.
- DARPA Discover DSO Day, Arlington, VA, June 15, 2017. *Efficient analog systems for solving NP-hard problems*.
- 8th Conference on Complex Networks, CompleNet’17, Mar 21-24, Dubrovnik, Croatia. *The Physics of Inference*.
- Networks Seminar, Feb 15-18, 2017, University of Houston, TX, USA, *The Physics of Network Inference*.
- Physics Department Colloquium, Washington University in St.Louis, Oct 5, 2016, St Louis, MO, USA. *An analog approach to hard constraint satisfaction problems*.



- Future Directions in Network Science Workshop, Sep 29-30, 2016, Arlington, VA, USA. *Dynamics and Emergence: Emergent and Collective Phenomena in Complex Systems.*
- Seminar, Facultatea de Fizica, Babes-Bolyai University, Jun 23, 2016. *The physics of inference.*
- Seminars in Statistical Physics, Eötvös Lóránd Tudományegyetem (ELTE), Jun 10, 2016, Budapest, Hungary. *The physics of inference.*
- Defense Threat Reduction Agency (DTRA), May 13, 2016, Arlington, VA, USA. *Transportation Networks.*
- Workshop on: Critical and collective effects in graphs and networks, Apr 25 - 29, 2016, Moscow Inst of Physics and Technology, Moscow, Russia. Two invited talks: *The Physics of Inference* (at the workshop) and *Complex Networks: Architectures of Interaction* (public seminar at MIPT).
- Physics Colloquium, Illinois State University, Mar 29, 2016. *The Brain in Space.*
- American Physical Society (APS) March Meeting, Mar 13-18, 2016, Baltimore, MD, USA, *The Physics of Inference.*
- Network Science Institute Distinguished Speaker Series, Jan 25, 2016, Northeastern University, *What do Sudoku and turbulence have in common?*
- American Mathematical Society (AMS) Central Fall Sectional Meeting, Loyola University Chicago, Chicago, IL October 3-4, 2015. *Constrained Graph Construction Problems for Network Modeling.*
- SIAM Conference on Applications of Dynamical Systems, May 17-26, 2015, Snowbird, Utah. *The Brain in Space.*
- DARPA/AFOSR Graph-theoretic Research in Algorithms PHenomenology of Social Networks (GRAPHS) PI meeting, Arlington, VA, Mar 24-26, 2015. *Ensemble-Based Modeling of Large Graphs and its Applications to Social Networks.*
- SIAM Conference on Computational Science, Mar 14-18, 2015, Salt Lake City, Utah. *The Physical Brain.*
- Center for Nonlinear Studies (CNLS) Colloquium, Los Alamos National Laboratory, NM, Feb 10, 2015. *Opportunities for Nonlinear Sciences in the 21st Century*
- SCNARC Seminar, Rensselaer Polytechnic Institute and State University, NY, Jan 15, 2015. *What do Sudoku and turbulence have in common?*
- Center for Nonlinear Studies (CNLS) Colloquium, Los Alamos National Laboratory, NM, Nov 17, 2014. *What do Sudoku and turbulence have in common?*
- Journée scientifique Investissements d’Avenir de l’Université de Lyon, “La complexité: quels défis pour demain?”, Lyon, France, Nov 5, 2014. - Public lecture. *The Brain in Space and Time.*
- European Conference on Complex Systems (ECCS’14). Invited speaker for workshop “The Complex Brain”, Institute for Advanced Studies, Lucca, Italy, Sep 24, 2014. *A predictive model of the cortical network based on a distance rule.*
- DARPA/AFOSR Graph-theoretic Research in Algorithms PHenomenology of Social Networks (GRAPHS) PI meeting, Arlington, VA, July 21-24, 2014. *Ensemble-Based Mod-*

- eling of Large Graphs and its Applications to Social Networks*, Annual Progress Report; also a second presentation *A predictive model of the cortical network based on a distance rule*.
- International Conference on Statistical Physics, Rhodes, Greece, Jul 7-14, 2014. *Maximum entropy network models and applications*.
  - SIAM Conference on Discrete Mathematics, Minneapolis, MN, Jun 16-19, 2014. *Constrained graph construction problems in network modeling*.
  - Stem Cell and Brain research Institute Colloquium, Bron, France, May 7th 2014. *What do Sudoku and turbulence have in common?*
  - Central European University Roundtable on *Network Science and Big Data*. Budapest, Hungary, Mar 13, 2014. Invited speaker. *Big Data and the Brain*.
  - Network Frontier Workshop, Northwestern University, Dec 4-6, 2013. *A Distance Rule Based Predictive Model of the Cortical Brain Network*.
  - DARPA/AFOSR Graph-theoretic Research in Algorithms PHenomenology of Social Networks (GRAPHS) meeting, Arlington, VA, Nov 12-13, 2013. *Ensemble-Based Modeling of Large Graphs and its Applications to Social Networks*
  - Discrete Mathematics Seminar, University of Notre Dame, Sep 26, 2013. *What do Sudoku and turbulence have in common?*
  - Applied Mathematics Colloquium, Illinois Institute of Technology, Chicago, Oct 25, 2013. *What do Sudoku and turbulence have in common?*
  - NetSci 2013. The International School and Conference on Network Science. Invited speaker for the satellite “Network Models in Cellular Regulation”, Jun 4, (2013), Copenhagen, Denmark. *Functional modularity from simultaneous adaptation to multiple constraints*.
  - SIAM Conference on Applications of Dynamical Systems, May 19-23, Snowbird, Utah, USA. Invited presentation. *Predicting Traffic Changes in the Wake of Geo-Localized Damages in Large-Scale Transportation Networks*.
  - Physics Department Colloquium, University of Notre Dame, January 30, 2013.
  - BECS Seminar, Department of Biomedical Engineering and Computational Science, Aalto University School of Science. May 28, 2012. *Modeling the functional interareal network of the primate cortex*.
  - First Aalto Science Factory: *Statistical Mechanics of Unsatisfiability and Glasses*. May 23-26, Mariehamn, Åland. Invited lecture. *An Analog Approach to Boolean Satisfiability*.
  - MAPCON12. Max-Planck Institut für Physik Komplexer Systeme, International Workshop: Mathematical Physics of Complex Networks: From Graph Theory to Biological Physics. Invited lecture. May 14 - 18, 2012, Dresden, Germany. *Degree-based construction and sampling of simple graphs*.
  - NetSci 2011. The International School and Conference on Network Science. Invited school lecturer, 6-10 Jun 2011, Budapest, Hungary. *A network science primer: theory, algorithms and applications*.
  - NetSci 2011. The International School and Conference on Network Science. Satellite

- Workshop: Spreading, Influencing, and Cascading in Social and Information Networks. Invited talk, 6-10 Jun 2011, Budapest, Hungary. *Assortativity from reciprocity in social networks*.
- McCormick-Colloquia Engineering Sciences and Applied Mathematics colloquium. Apr 25, 2011. *A continuous-time approach to constraint satisfaction: Optimization hardness as transient chaos*.
  - CCNR Seminar, Northeastern University, March 21, 2011. *Modeling the Functional Networks of the Primate Cortex*
  - Complex Driven Systems - From Statistical Physics to Life Sciences Conference, Oct 1-3, 2010, Virginia Tech, Blacksburg. *NP-completeness as analog chaos*.
  - SAMSI Complex Networks Opening Workshop, Aug. 29 - Sep 1, 2010, North Carolina. *Modeling functional networks of the primate cortex*.
  - Harvard University, Beth Israel Deaconess Medical Center, Center for Vascular Biology Research, June 21, 2010, Boston. *Modeling functional networks of the primate cortex*.
  - University of South Carolina, Mathematics Colloquium, Apr 22, 2010, Columbia. *An analog approach to k-SAT*.
  - Physical Chemistry Seminar, University of Notre Dame, March 18. *Heterogeneity of connection strengths and a distance rule specify cortical networks*.
  - Information Theory and Applications Workshop, Jan 01 – Feb 5, 2010, University of California San Diego: *Heterogeneity of connection strengths and a distance rule specify cortical networks*.
  - Defense Threat Reduction Agency Basic and Applied Sciences Workshop, Oct 26-30, 2009. *Understanding the fundamental principles underlying the survival and efficient recovery of robust multiscale techno-social networks following a WMD event*.
  - Virginia Tech, Physics Colloquium, Sep 25, 2009: *Emergence of Functional Modularity in Multi-tasking Networks*.
  - Virginia Tech, Neuroscience Interest Group (NSIG) seminar, Sep 24, 2009: *Heterogeneity of connection strengths and a distance rule specify cortical networks*.
  - Eötvös Loránd University Physics Department Seminar, Jun 17, 2009: *Emergence of Functional Modularity in Multitasking Networks*.
  - Alfréd Rényi Institute of Mathematics Seminars, May 20, 2009: *The interareal cortical network of the Macaque: a model*.
  - American Physical Society March Meeting, Mar 16–20, 2009, Pittsburgh, Pennsylvania, *Functional vs. Structural Modularity: do they imply each other?*
  - SIAM Conference on Computational Science and Engineering, Mar 2–6, 2009, Miami, Florida. *On Realizing All Simple Graphs with a Prescribed Degree Sequence*.
  - University of Houston, Bio-Network Group Seminars, Feb 27. *Gradient Networks as Energy Landscape Pathways of Chain-like Molecules*.
  - International Conference on Complex Networks: The Past 10 Years and Future, Dec 19-23, 2008, Seoul National University, Seoul, Korea. *Energy Landscape Networks of Chain-like Molecules*.

- Max-Planck Institut für Physik Komplexer Systeme, International School and Workshop on “Dynamics of Inertial Particles: From Ocean and Atmosphere to Planets”, Sep 1–26, 2008. *Trapping inertial tracers in open chaotic flows.*
- Santa Fe Institute Working Group Workshop: Networks and Navigation, Aug 4-6, 2008, Santa Fe, NM.; 2 talks: *How to build all simple graphs or sample uniformly from those that realize a given degree sequence?* and *Graph structure induced bottlenecks in packet-switching networks.*
- Stem-cell and brain research institute, INSERM U846, Lyon, France, Colloquium, June 19, 2008. *Network Science: the challenge of connections.*
- Transylvanian Summer School Series: International Workshop on Stochastic Phenomena, Cluj Napoca, Romania, May 26-31, 2008. *Constructing All Simple Graphs Realizing a Degree Sequence.*
- Workshop on Interdisciplinary Biomedical Research, Notre Dame, Indiana, April 10-11, 2008. *Energy Landscape Networks and Protein Folding.*
- Center for Applied Mathematics Colloquium, Notre Dame, March 31, 2008. *On realizing all simple graphs with a given degree sequence.*
- CNET2007: Workshop on Complex Networks, Amares - Braga, Portugal, Dec 3-5, 2007. *3 Disconnected Pieces: Some Exact Results on Graphs.*
- European Conference on Complex Systems. Satellite Conference on Complex Networks: Dynamics and Topology Interplay, Dresden, Germany, Oct 4-5, 2007. *Topological Limits to Network Communication.*
- Transylvanian Summer School Series: International Workshop on Complex Systems and Networks, Sovata, Romania, Jul 15-20, 2007. *Topological Bottlenecks in Communication Networks.*
- NetSci2007: International Workshop and Conference on Network Science, Queens, New York, May 20-25, 2007. *Gradient Networks: A Tutorial.*
- DIMACS Workshop on Properties of Large Graphs: From Combinatorics to Statistical Physics and Back, 16-20 Oct 2006. *Gradient Networks: an Application to Protein Folding.*
- Workshop on New Directions in Complex Systems, Istanbul, Turkey, Sep 3-9, 2006. *Topological bottlenecks in network communication.*
- Social Networks & Complexity Workshop, Budapest, Hungary, Jul 31 - Aug 2, 2006. *Agent-based modeling and epidemics.*
- Loyola Marymount University, Department of Mathematics Colloquium, Jul 16-19, 2006. *Protein Folding and Conformation Networks.*
- Conference on Dynamics on Complex Networks and Applications, Max-Planck-Institut für Physik Komplexer Systeme, Dresden. Germany, Feb 6 - Mar 3, 2006. Network tutorial lectures (3 lectures) and a Colloquium.
- Conference on Applications of Methods of Stochastic Systems and Statistical Physics in Biology, University of Notre Dame, Oct 28-30, 2005. *Steric Constraint Networks and Protein Folding.*

- U.S. Frontiers of Engineering Symposium of the National Academy of Engineering, GE Global Research Center, Niskayuna, NY, Sep 22-24, 2005. *Agent-based Modeling as a Decision Making Tool*.
- 3rd International Conference on Statistical Physics, NEXT-SIGMAPHI, Kolymbari-Crete, Greece, Aug 13-18, 2005. *Protein Folding Networks and Levinthal's Paradox*.
- Department of Defense Workshop on Complex Behavior of Adaptive, Network-Centric Systems, University of Maryland, Jul, 2005. *Complex Networks: The Challenge of Interaction Topology*.
- Third SPIE International Symposium, Fluctuations and Noise, Austin, Texas, May 23-26, 2005. *Gradient-flow Networks*.
- CNLS Workshop on *Applications of Statistical Physics to Coding Theory*, Bishop's Lodge, Santa Fe, Jan 10-12, 2005. *Fat Tail Distributions And Efficiency Of Flow Processing On Complex Networks*.
- Condensed Matter Seminar, Physics Department, University of Notre Dame, Nov 2004. *How to Halt a Smallpox Epidemic?*
- Physics Department seminar, Boston University, Oct 2004.
- Rensselaer Polytechnic Institute, Troy, NY, Oct 2004 (colloquium).
- Conference on Complex Systems, Northwestern University, Oct 2004.
- Computational and Applied Mathematics Seminar, U.C. Irvine, September 2004.
- Eötvös University, Budapest, Hungary, July 2004 (colloquium).
- University of California at San Diego, May 2004.
- The University of Arizona, Tucson, AZ, March 2004 (colloquium).
- Conference on Growing Networks and Graphs in Statistical Physics, Finance, Biology and Social Systems, Midterm conference, COSIN, Rome, Italy, September 2003.
- Workshop on Collectives and the Design of Complex Systems, Stanford University, Palo Alto, California, August 2003.
- APS March Meeting, Austin, Texas, 2003.
- Eötvös University Physics Department Colloquium, Budapest, Hungary, December 2002 (colloquium).
- NASA workshop on Collectives and the Design of Complex Systems, NASA, Ames, August 2002.
- UCLA conference on Agent-based modeling in the social sciences, Lake Arrowhead, California, May 2002.
- EGS XXVII assembly meeting, Nice, France, April 2002.
- Northwestern University, Chemical Engineering Colloquium, February 2002.
- Santa Fe Institute Workshop on Mathematical Foundations of Distributed Intelligence, Santa Fe, New Mexico, January 2002.
- CNLS Statistical Physics Working Seminar Series, Fall, 2001 (3 lectures).
- Workshop on Computational complexity and Stat. Physics, Santa Fe, New Mexico, September 2001.
- P/T Colloquium, May 10, LANL, 2001.

- SIAM-DS01 Dynamical Systems meeting, Snowbird, Utah, 2001.
- Eötvös University, Budapest, Hungary, 2000 (colloquium).
- Rensselaer Polytechnic Institute, Troy, NY, 2000 (colloquium).
- Duke University, CNLS-CNCS Workshop Durham, NC, 2000.
- University of Virginia, Charlottesville, VA, 1999.
- University of Maryland at College Park, 1998 (2 lectures).
- Center for Nonlinear Studies, Los Alamos National Laboratory, 1998.
- XIIth International Congress of Mathematical Physics, Brisbane, Australia, 1997.

## POPULAR MEDIA :

- On pub 84: Primer paper by Barbara L. Finlay. Principles of Network Architecture Emerging from Comparisons of the Cerebral Cortex in Large and Small Brains. *PLoS Biol* **14**(9), e1002556 (2016) doi:10.1371/journal.pbio.1002556  
<https://phys.org/news/2016-07-neural-networks-larger-brains-susceptible.html>  
<https://www.sciencedaily.com/releases/2016/07/160721151222.htm>  
<http://neurosciencenews.com/neural-network-mental-health-4720/>  
<http://www.medicalnewstoday.com/articles/311844.php>  
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## PROFESSIONAL REFERENCES:

Adilson E. Motter, Charles E. and Emma H. Morrison Professor of Physics and Astronomy, Northwestern University, 2145 Sheridan Rd. Evanston, IL 60208 USA. Ph: +(847) 491-4611 Email: motter@northwestern.edu

Albert-László Barabási, Distinguished University Professor, Northeastern University, Physics Department 11th Floor, 177 Huntington Avenue Boston, MA 02115, Ph: + (617) 373 2355, Email: alb@neu.edu

Royce K.P. Zia, Emeritus Professor (PhD thesis advisor), Physics Department, Virginia Tech, Blacksburg, VA, 24061, Ph: + (540) 231 6712. Email: rkpzia@vt.edu

Mark E.J. Newman, Paul Dirac Collegiate Professor of Physics, Department of Physics, University of Michigan, Randall Laboratory, 450 Church Street Ann Arbor, MI 48109-1040, Ph: (734) 764-4437, Email: meijn@umich.edu

Sidney Redner, Professor, Santa Fe Institute, Ph: + (505) 946-2764, Email: redner@santafe.edu

Edward Ott, Distinguished University Professor, Institute for Research in Electronics and Applied Physics UMCP, College Park, MD 20742, Ph: (301)405-5033, Email: edott@umd.edu

Tamás Tél, Professor, Institute for Theoretical Physics Eötvös University P.O. Box 32, H-1518, Budapest, Hungary, Ph: +36-1-209-0555, ext. 6124, Email: tel@general.elte.hu

György Korniss, Professor, Department of Physics, Applied Physics, and Astronomy, Rensselaer Polytechnic Institute, 110 8th street, Troy, NY 12180-3590, Ph: (518) 276-2555, Email: korniss@rpi.edu

László Székely, Professor, Department of Mathematics, University of South Carolina, Columbia, SC 29208. Ph: + (803) 777 6262, Email: szekely@math.sc.edu