

NATHANIEL WAGNER

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EDUCATION

Ph.D., **Hebrew University of Jerusalem, Dept. of Physics** - April 1992
M.Sc., **Hebrew University of Jerusalem, Dept. of Physics** - June 1984
Honors; Golda Meir Fellowship, 1984-1985.
B.A. in Physics / Mathematics, **Columbia University, NY** - May 1981
Phi Beta Kappa; Magna Cum Laude; Columbia College Physics Prize.

EXPERIENCE

Ben-Gurion University of the Negev, Dept. of Chemistry, Beer Sheva; 2006-present

Research groups of Prof. G. Ashkenasy, Prof. E. Tannenbaum, Prof. A. Pross:

- *Computer Simulations of Systems Chemistry, Catalytic Networks and Chemical Logic Gates*
- *Kinetics and Thermodynamics of Living Systems and Self-Replication*
- *Quasispecies, Evolutionary Dynamics, Origins of Metabolic Networks and Homochirality*

Instructor, Computer Lab (*Matlab, Mathematica, C*), Dept. of Communication Systems Engineering.

MBT - Israel Aircraft Industries, Yehud; **Space Systems**, 2002-2006; **Signal Processing**, 1989-1997

Algorithms / Simulations / R&D in: Satellite Orbits; GPS; Kalman Filters; Numerical Solutions of Differential Equations; Electrical Models for Satellites; Adaptive Filtering / Estimation for Navigation; Tracking Filter for Civilian Automotive Radar; FIR Filtering, Windowing and FFT; Radar Ground Clutter Interactive Simulation; Airborne Radar Waveform Optimization; Automatic Gain Control; Radar Target / Clutter Simulator; Antenna Analysis and Calibration.

Responsibilities include implementation / testing of algorithms and supervision of programming staff.

Environments: *Matlab, C, C++, Fortran, TeX*; under *DOS, Windows, VAX/VMS, UNIX*.

Manager of MBT *Matlab* Computer Forum.

College of Judea and Samaria, Ariel; Summer 2005

Instructor, Undergraduate Course in Signal Processing, Dept. of Electrical Engineering.

Silentium, Algorithms Group, Rehovot; 2001-2002

Algorithm Development: *Active Noise Control* – LMS Adaptive Filtering, Echo Cancellation, Acoustical Analysis, *MATLAB* GUI and Simulation, *MATLAB/C* Compilation, Fixed-Point Chip (ASIC) Design.

Sigma-One, Algorithms Group, Rehovot; 2000-2001

Algorithm Development: *Cellular Phone Location (E911)* – AOA (Angle of Arrival), TOA (Time of Arrival), *MATLAB* GUI and Simulation, Planning, Test Analysis.

Nexus Telocation Systems, DSP Group, Givatayim; 1998-2000

Algorithm Development: *Automatic Vehicle Location* - Angle of Arrival /Interferometric Direction Finding, Statistical Optimization, Spatial Filtering; *Spread Spectrum Wireless Communication* - Bit Rate Improvement, Error Coding.

Responsible for revision, testing, and implementation of Algorithms, Simulations, Data Acquisition, and Software for Vehicle Location, Base Stations, Chasing Unit.

Environments: *MATLAB, Simulink, C, C++*; under *Windows, Intel 960, Motorola 56000*.

Hebrew University, Racah Institute of Physics, Jerusalem; 1983-1989

Research for M.Sc. and Ph.D.: *Continuum Percolation of Conducting Particles Embedded in an Insulator*, under Prof. Isaac Balberg. Research included: computer simulations and physical models of the metal-insulator transition, and its conductivity, noise, threshold, cluster geometry, diffusion and statistical properties. Computer simulations used *Fortran* under *CDC - NOS / VE*.

Instructor / Teaching Assistant for courses in Thermodynamics, Properties of Matter, Statistical Physics, Modern Physics, Mechanics; Lab instructor for Intro and Advanced Physics Laboratories.

IBM Research, Yorktown Heights, NY; Summer 1985

Experiments / Computer simulations on the metal-insulator transition in thin metallic films.

IBM Data Systems, Poughkeepsie, NY; Summers 1982 & 1983

Participated in Artificial Intelligence research group. Work included: creation and implementation of a Full-Screen Editor for a Hardware Design Language, using *APL* under *IBM - VM / CMS*.

NASA / Goddard Institute for Space Studies, NY; Summer 1981

Participated in design of a radio telescope for Observatory in Chile, including: building electronic protection circuits, physical and mathematical modeling, specification testing, programming.

Columbia University, Nevis Laboratories, Irvington, NY; Summer 1979

Analyzed spark-chamber photographs from high-energy neutrino beam experiments.

PUBLICATIONS

Chemical and Light Triggering of Peptide Networks under Partial Thermodynamic Control, Z. Dadon, M. Samiappan, N. Wagner and G. Ashkenasy; *Chem. Commun. (in press, 2012)*.

Reaction Networks, Z. Dadon, N. Wagner, R. Cohen-Luria and G. Ashkenasy, book chapter in *Supramolecular Chemistry: From Molecules to Nanomaterials (Wiley, in press, 2012)*.

Peptide Based Computation: Switches, Gates and Simple Arithmetic, Z. Dadon, M. Samiappan, N. Wagner, N. Ashkenasy and G. Ashkenasy, book chapter in *Molecular and Biomolecular Information Processing (Wiley, in press, 2012)*.

Beta-Sheet Induced Chirogenesis in Polymerization of Oligopeptides, N. Wagner, B. Rubinov and G. Ashkenasy; *Chem. Phys. Chem.* **12**, 2771 (2011).

How Symmetry and Order Affect Logic Operations and Computation in Catalytic Chemical Networks, N. Wagner, S. Alesebi and G. Ashkenasy; *Journal of Computational and Theoretical Nanoscience* **8**, 471 (2011).

Building Logic into Peptide Networks: Bottom-Up and Top-Down, G. Ashkenasy, Z. Dadon, S. Alesebi, N. Wagner and N. Ashkenasy; *Israel Journal of Chemistry* **51**, 106 (2011).

The Nature of Stability in Replicating Systems, N. Wagner and A. Pross; *Entropy* **13**, 518 (2011).

Second Order Catalytic Quasispecies Yields Discontinuous Mean Fitness at Error Threshold, N. Wagner, E. Tannenbaum and G. Ashkenasy; *Physical Review Letters* **104**, 188101 (2010).

Selection Advantage of Metabolic over Non-metabolic Replicators: A Kinetic Analysis, N. Wagner, A. Pross and E. Tannenbaum; *BioSystems* **99**, 126 (2010).

Self-Replicating Amphiphilic Beta-Sheet Peptides, B. Rubinov, N. Wagner, H. Rapaport and G. Ashkenasy; *Angewandte Chemie Int. Ed.* **48**, 6683 (2009).

Symmetry and Order in Systems Chemistry, N. Wagner and G. Ashkenasy; *J. Chem. Physics* **130**, 164907 (2009).

Systems Chemistry, Logic Gates, Arithmetic Units and Network Motifs in Small Networks, N. Wagner and G. Ashkenasy; *Chemistry Eur. J.* **15**, 1765 (2009).

The Road to Non-enzymatic Molecular Networks, Z. Dadon, N. Wagner and G. Ashkenasy; *Angewandte Chemie Int. Ed.* **47**, 6128 (2008).

Monte-Carlo Results for Continuum Percolation in Low and High Dimensions, N. Wagner, I. Balberg and D. Klein; *Physical Review E* **74**, 011127 (2006).

AMOS2 Satellite Angular Velocity Estimation from a Single Sun Vector, N. Wagner; *Proceedings of the 46th Israel Annual Conference on Aerospace Sciences (March 2006)*.

Radar Waveform Optimization Using PRF Phase Diagrams, N. Wagner and C.A. Hartzstein; *(IAI internal, 1994)*.

Tunneling and Percolation Behavior in Granular Metals, I. Balberg, N. Wagner, Y. Goldstein and S.Z. Weisz; *MRS Symp. Proc.* **195**, 233 (1990).

Critical Behavior of the Electrical Resistance and its Noise in Inverted Random-Void Systems, I. Balberg, N. Wagner, D.W. Hearn and J.A. Ventura; *Physical Review Letters* **60**, 1887 (1988).

Computer Study of the Electrical Noise in High-Dimensional Percolating Systems, I. Balberg, N. Wagner, D.W. Hearn and J.A. Ventura; *Physical Review B* **37**, 3829 (1988).

Anomalous Diffusion and Continuum Percolation, N. Wagner and I. Balberg; *J. Statistical Physics* **49**, 369 (1987).

Excluded Volume and its Relation to the Onset of Percolation, I. Balberg, C.H. Anderson, S. Alexander and N. Wagner; *Physical Review B* **30**, 3933 (1984).

Percolation Thresholds in the Three-Dimensional Sticks System, I. Balberg, N. Binenbaum and N. Wagner; *Physical Review Letters* **52**, 1465 (1984).

PRESENTATIONS

Modeling and Simulation in Systems Chemistry; ESF - COST High-level Research Conference on Systems Chemistry III, Crete, October 2011.

Modeling Catalytic Networks: Relevance to the Origin of Life; Israel Society for Astrobiology and Origin of Life, Weizmann Institute, Rehovot, December 2010.

Second Order Quasispecies Yields First Order Phase Transition, Israel Biophysical Society Annual Meeting (Poster Session), Weizmann Institute, Rehovot, October 2010.

Simulation Tools for Probing Logic, Symmetry and Order in Systems Chemistry; COST - Recent Topics in Systems Chemistry: Molecular Replication and Computation, Dead Sea, May 2010.

Using Catalytic Reaction Networks to Model Systems Chemistry, Molecular Complexification and Evolutionary Dynamics; Physical Chemistry Seminar, Ben-Gurion University, Beer Sheva, January 2010.

Logic, Order and Symmetry in Catalytic Networks; American Chemical Society Fall 2009 National Meeting (Physical Chemistry Poster Session), Washington, D.C., August 2009.

Symmetry and Order in Catalytic Networks; Israel Society for Astrobiology and Origin of Life, Weizmann Institute, Rehovot, December 2008.

Symmetry and Order in Systems Chemistry; European Conference on Complex Systems, Hebrew University, Jerusalem, September 2008.

AMOS2 Satellite Angular Velocity Estimation from a Single Sun Vector; Israel Annual Conference on Aerospace Sciences, Technion, Haifa, March 2006.

THESES

Various Aspects of Continuum Percolation (Ph.D. thesis, in Hebrew, 1991).

Percolation of Conducting Sticks in an Insulating Matrix (Master's thesis, in Hebrew, June 1984).