

CURRICULUM VITAE. Wien, 17.11.2018

Peter Schuster, born March 7, 1941 in Wien, Austria,
married since Jan. 21, 1967 to Dr.Ingeborg Schuster,
maiden name: Sarang, born June 25, 1941 in Wien,
one son, Manfred Schuster, born Aug. 27, 1972 in Wien.

Schools: Volksschule and Realgymnasium in Wien,
Final examinations *summa cum laude*, in 1959.

University Education: Chemistry and Physics at Universität Wien,
Ph.D. Degree *sub auspiciis praesidentis*, in 1967.

Scientific Curriculum: Postdoctoral assistant with Prof. Manfred Eigen at the
Max Planck Institute of Physical Chemistry in Göttingen,
Germany during 1968 – 1969,
Habilitation in Theoretical Chemistry at Universität Wien in 1971,
Full professor of Theoretical Chemistry at Universität Wien,
Aug. 23, 1973 – Sept. 30, 2009,
Professor emeritus at Universität Wien, since Oct. 01, 2009,
Head of the Institute of Theoretical Chemistry at Universität Wien,
1973-1992 and 1996-2010,
Head of the Computer Center at Universität Wien, 1985-1991,
External Faculty Member of the Santa Fe Institute, Santa Fe, USA,
1991-2003 and 2004-2009,
External Professor Emeritus of the Santa Fe Institute, Santa Fe, USA,
since 2009,
Founding director of the Institute of Molecular Biotechnology in Jena,
Germany, 1992-1995,
Head of the Department of Molecular Evolutionary Biology at the
Institute of Molecular Biotechnology in Jena, Germany,
1992-1997,
External Member of the Faculty for Biology and Pharmacy at the
Friedrich-Schiller-Universität Jena, Germany, since 1995,
Vicepresident of the Austrian Academy of Sciences, 2000 – 2003,
President of the Austrian Academy of Sciences, 2006 – 2009,

Member of the Akademierat of the Austrian Academy of Sciences,
2011 – 2016,
Member of the Universitätsrat of the Technische Universität Wien,
2013 – 2018.

Visiting Professorships:

Department of Applied Mathematics, University of Waterloo,
Ontario (Canada), April 23 – June 2, 1979,
Santa Fe Institute, Santa Fe, New Mexico (U.S.A.),
Sep. 16 – Dec. 2, 1990.

Awards: Theodor Körner Förderungspreis 1971,
Jubiläumspreis of the “Chemisch-Physikalische Gesellschaft” 1971,
Erwin Schrödinger Award of the Austrian Academy of Sciences 1983,
Dr. Assen Zlatarov Award of the Bulgarian Academy of Sciences 1989,
Österreichisches Ehrenzeichen für Wissenschaft und Kunst 1993,
Philip-Morris-Forschungspreis 1995,
Josef-Loschmidt-Medal of the “Gesellschaft Österreichischer Chemiker”
1995,
Preis der Stadt Wien für Natur- und Technische Wissenschaften 1997,
Kardinal-Innitzer Würdigungspreis für Naturwissenschaften 1997,
Wilhelm-Exner-Medal of the “Österreichischer Gewerbeverein” 1999,
Bernhard Rensch Lecture of the Westfälische Wilhelms-Universität
Münster 2005,
Großes Silbernes Ehrenzeichen für Verdienste um das Land Wien, 2009,
Shneur Lifson Lecture of the Weizmann Institute of Science,
Rehovot 2013
Manfred Eigen Award Lecture of the Max Planck Institute for
Biophysical Chemistry, Göttingen, 2018,
Großer Kardinal-Innitzer Preis, 2018.

Elected Scientific Memberships:

Elected Member of the “Gesellschaft für Physikalische Biologie der
B.R.D.”, since March 28, 1980,
Corresponding Member of the Academie Européenne des Sciences, des
Arts et des Lettres, since March 31, 1983,

Corresponding Member of the Austrian Academy of Sciences
May 15, 1984 – May 12, 1992,
Member of the Austrian Academy of Sciences since May 12, 1992,
Member of the “Deutsche Akademie der Naturforscher Leopoldina”,
since June 22, 1993,
Senator and Adjunct for Austria, 1998 – 2001
Member of the “Präsidium”, 2001 – 2006,
Member of the “Sächsische Akademie der Wissenschaften zu Leipzig”,
March 11, 1994 – December 31, 1995,
Corresponding Member of the “Sächsische Akademie der
Wissenschaften zu Leipzig”, since January 1, 1996,
Extraordinary Member of the “Berlin-Brandenburgische Akademie der
Wissenschaften”, since Feb. 17, 1995,
Corresponding Member of the “Nordrhein-Westfälische Akademie der
Wissenschaften”, since March 3, 1999,
Member of the European Academy of Sciences and Arts, since 2004,
Foreign Associate of the National Academy of Sciences USA,
since April 28, 2009,
Member of the Academia Europaea (London), since May 2009,
Titular member of the International Academy of Philosophy of Sciences,
since November 19, 2009,
Member of the European Molecular Biology Organization (EMBO),
since April 2014.

Research Interests:

Theory of the hydrogen bond and intermolecular forces,
Kinetics of proton transfer reactions in aqueous solutions,
Nonlinear dynamics and theory of complex evolvable systems,
Theory of molecular evolution, *in silico* and *in vitro* studies on
RNA replication, selection, and optimization,
Structures and properties of RNA and proteins,
RNA sequence-structure mappings and neutral networks,
Analytic approximations for nonlinear differential equations in science,
Genetic regulatory networks and metabolic networks,
Theoretical and computational systems biology,
Analyzable models of molecular evolution.

Scientific Publications: About 380 papers, reviews, and essays in scientific journals
and 15 books, among them

The Hydrogen Bond – Recent Developments in Theory and Experiment. Vol.I, II and III. Eds. P.Schuster, G.Zundel, C.Sandorfy. North-Holland, Amsterdam 1976,

The Hypercycle – A Principle of Natural Self-Organization. M.Eigen, P.Schuster. Springer, Berlin 1979,

Stochastic Phenomena and Chaotic Behavior in Complex Systems. Ed. P.Schuster. Vol.21. of Springer Series in Synergetics, 1984,

The Molecular Quasi-Species. M.Eigen, J.McCaskill, P.Schuster. Adv. Chem. Phys. (Wiley) 75, 149-263 (1989),

Statistics of RNA Secondary Structures. W.Fontana, D.A.M.Konings, P.F.Stadler, P.Schuster. Biopolymers 33, 1389-1404 (1993),

Fast Folding and Comparison of RNA Secondary Structures. I.L.Hofacker, W.Fontana, P.F.Stadler, L.S.Bonhoeffer, M.Tacker, P.Schuster. Chemical Monthly 125, 167-188 (1994),

From Sequences to Shapes and Back: A Case Study in RNA Secondary Structures. P.Schuster, W.Fontana, P.F.Stadler, I.L.Hofacker. Proc.Roy.Soc.London B 255, 279-284 (1994),

How to Search for RNA Secondary Structures. Theoretical Concepts in Evolutionary Biotechnology. P.Schuster. J. of Biotechnology 41, 239-258 (1995),

Generic Properties of Combinatory Maps: Neutral Networks of RNA Secondary Structures. C.Reidys, P.F.Stadler, P.Schuster. Bull.Math.Biol. 59, 339-397 (1997),

Continuity in Evolution. On the Nature of Transitions. W.Fontana, P.Schuster. Science 280, 1451-1455 (1998),

Complete Suboptimal Folding of RNA and the Stability of Secondary Structures. S.Wuchty, W.Fontana, I.L.Hofacker, P.Schuster. Biopolymers 49, 145-165 (1999),

RNA Folding at Elementary Step Resolution. C.Flamm, W.Fontana, I.L.Hofacker, P.Schuster. RNA 6, 325-338 (2000),

Bifurcation Dynamics of Three-Dimensional Systems. P.E.Phillipson, P.Schuster. Int.J. Bifurcation and Chaos. 10, 1787-1804 (2001),

Replication and Mutation on Neutral Networks. C.Reidys, C.Forst, P.Schuster. Bull.Math.Biol. 63, 57-94 (2001),

Dynamics of Relaxation oscillations. P.E.Phillipson, P.Schuster. Int.J. Bifurcation and Chaos. 11, 1471-1482 (2001),

Bistability of Harmonically Forced Relaxation Oscillations.

- P.E.Phillipson, P.Schuster. *Int.J. Bifurcation and Chaos.* 12, 1295-1307 (2002),
- Evolutionary Dynamics: Exploring the Interplay of Selection, Accident, Neutrality, and Function.* Eds. J. P. Crutchfield, P.Schuster. Oxford University Press, New York 2003,
- An Analytic Picture of Neuron Oscillation.* P.E.Phillipson, P.Schuster. *Int.J. Bifurcation and Chaos.* 14, 1539-1548 (2004),
- A Comparative Study of the Hodgkin-Huxley and Fitzhugh-Nagumo Models of Neuron Pulse Propagation.* P.E.Phillipson, P.Schuster. *Int.J. Bifurcation and Chaos.* 15, 3851-3866 (2005),
- Prediction of RNA Secondary Structures: From Theory to Models and Real Molecules.* P.Schuster. *Rep. Prog. Phys.* 69, 1419-1477 (2006),
- Structural Parameters Affecting the Kinetics of RNA Hairpin Formation.* J.H.A.Nagel, C.Flamm, I.L.Hofacker, K. Franke, M.H. de Smit, P.Schuster, C.W.A. Pleij. *Nucleic Acids Res.* 34, 3568-3576 (2006),
- A Generalized Model of the Repressilator.* S.Müller, J.Hofbauer, L.Endler, C.Flamm, S.Widder, P.Schuster. *J. Math. Biol.* 53, 905-937 (2006),
- Inverse Bifurcation Analysis: Application to Simple Gene Systems.* J.Lu, H.W.Engl, P.Schuster. *AMB – Algorithms for Molecular Biology* 1, Article No.11 (2006),
- Analytical Dynamics of Neuron Pulse Propagation.* P.E.Phillipson, P.Schuster. *Int. J. of Bifurcation and Chaos* 16, 3605-3616 (2006)
- Dynamic Patterns of Gene Regulation I: Simple Two Gene Systems.* S.Widder, J.Schicho, P.Schuster. *J. Theor. Biol.* 241, 395-419 (2007),
- Early Replicons: Origin and Evolution.* P.Schuster, P.F.Stadler. In: E.Domingo, C.Parrish, J.J.Holland, eds. *Origin and Evolution of Viruses.* Second Edition, pp. 1-41. Elsevier, San Diego 2007,
- Modeling in Biological Chemistry. From Biochemical Kinetics to Systems Biology.* P.Schuster. *Chemical Monthly* 139, 427-446 (2008),
- www.rnaworkbench.com : *A new Program for Analyzing RNA Interference.* R.Svobodová Vařeková, I.Bradáč, M.Plchút,

M.Škrdla, M.Wacenovský, H.Mahr, G.Mayer, H.Tanner, H. Brugger, J.Withalm, P.Lederer, H.Huber, G.Gierlinger, R. Graf, H.Tafer, I.Hofacker, P.Schuster, and M.Polčák. *Computer Methods and Programs in Biomedicine* 90, 89-94 (2008),
A Minimal and Self-Consistent in silico Cell Model Based on Macromolecular Interactions. C.Flamm, L.Endler, S.Müller, S.Widder, P.Schuster. *Phil.Trans.Roy.Soc.London B* 362, 1831-1839 (2008),
Modeling by Nonlinear Differential Equations: Dissipative and Conservative Processes. P. E. Phillipson and P. Schuster. World Scientific, Hackensack, NJ (2009),
Inverse Problems in Systems Biology. H.W.Engl, C.Flamm, P.Kügler, J.Lu, S.Müller, P.Schuster. *Inverse Problems* 25, 123014 (2009),
Mathematical Modeling of Evolution. Solved and Open Problems. P.Schuster. *Theory in Biosciences* 130, 71-89 (2011),
Quasispecies: From Theory to Experimental Systems. E.Domingo, P.Schuster, Eds. *Current Topics in Microbiology and Immunology*, Vol.392. Springer-Verlag, Berlin (2016),
Stochasticity in Processes. Fundamentals and Applications in Chemistry and Biology. P.Schuster. *Springer Series in Synergetics*. Springer-Verlag, Berlin (2016),
Some Mechanistic Requirements for Major Transitions. P.Schuster. *Phil. Trans. Roy. Soc. London B* 371, e20150439 (2016),
Increase in Complexity and Information Through Molecular Evolution. P.Schuster. *Entropy* 18, e397 (2016),
A Mathematical Model of Evolution. P.Schuster. *MATCH – Communications in Mathematical and in Computer Chemistry* 80, 547-585 (2018),
Molecular Evolution between Chemistry and Biology. The Interplay of Competition, Cooperation, and Mutation. P.Schuster. *European Biophysics Journal* 47, 403-426 (2018).

Editor of Scientific Journals and Series:

Springer Series in Synergetics (since 1984),
 Mathematical Ecology, Akademie-Verlag Berlin (1986-1991),
 Monatshefte für Chemie, Springer-Verlag Wien (1989-2010),

European Biophysics Journal, Springer-Verlag Berlin (1990-2000),
Artificial Life, MIT Press (since 1993),
Complexity (2002-2016),
Springer Series in Understanding Complex Systems (since 2004).

Advisory Editor of Scientific Journals and Series:

Chemical Physics Letters (1979-1986),
European Biophysics Journal (1974-1989),
Physik in unserer Zeit (1977-1999),
Monatshefte für Chemie (1978-1986, and since 2010),
Journal of Molecular Structure, THEOCHEM (1980-1986),
BioSystems (1980-2004),
Advances in Chemical Physics (1984-1996),
Journal of Theoretical Biology (1985-2005),
Origins of Life (1985-1991),
Acta Biotheoretica (since 1986),
Journal of Mathematical Chemistry (since 1991),
Complexity (1991-2001),
Molecular Diversity (since 1995),
Theory in Biosciences (since 1997).