

Curriculum Vitae

Nikolaus Rajewsky, PhD

Born in Germany on June 21, 1968
Max-Delbrück-Center for Molecular Medicine
Department of Systems Biology
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Research Interests:

Systems Biology. Bioinformatics and Comparative Functional Genomics. Computational modeling of gene expression. Decoding of gene regulatory networks. Transcriptional regulations. Translational regulation. Small RNAs.

Research Experience:

since 2008 Scientific Director of the Berlin Institute for Medical Systems Biology
since 2008 Global Distinguished Professor of Biology at New York University
since 2006 Full Professor for Systems Biology (Director of Bioinformatics, W3) at the Max-Delbrück-Center for Molecular Medicine/Charité, Berlin-Buch, Germany
since 2006 Coordinator (Chair) of „Stoffwechselerkrankungen, Genetik, Genomik und Bioinformatik“ at the Max-Delbrück-Center.
since 2006 Visiting Scholar at New York University
2003-2006 New York University, Center for Comparative Functional Genomics. Department of Biology Assistant Professor of Biology & Mathematics (tenure-Track, associated with the Courant Institute of Mathematical Sciences): Identification and characterization of microRNA targets (post-transcriptional control), Cross-species comparisons of transcriptional regulatory networks, Identification of co-regulated genes based on whole-genome expression data
2002-2003 Rockefeller University, PostDoc (with Prof. E.D. Siggia) Combinatorial regulation of gene expression in Drosophila and human/mouse, microarray data analysis.
1999-2002 Rockefeller University, PostDoc (with Prof. E.D. Siggia): Identification and characterization of regulatory elements in the genome, cross-species comparisons with application to prokaryotic genomes and human/mouse.
1998-1999 Rutgers University (New Jersey), PostDoc (with Prof. J.L. Lebowitz): Exact solutions for one-dimensional probabilistic models for non-equilibrium systems
Autumn 1998 Technion, Haifa: Mathematical solution of a many species model
1994-1997 University of Cologne, Germany: Statistical mechanics, phase transitions, driven diffusive systems, self-organized criticality, non-linear dynamics, exact solutions, quantum spin chains

Education:

1995 – 1997 PhD thesis “Exact results for one-dimensional stochastic processes” under guidance of Prof. M. Schreckenberg and Prof. J. Zittartz
1991 – 1996 Masters in piano playing (“Künstlerische Reifeprüfung“) from the Folkwanghochschule Essen (Germany)
1994 – 1995 University of Cologne, Germany. Diploma thesis under guidance of Prof. D.E. Wolf
1988 – 1993 University of Cologne, Germany. Study of mathematics and physics

Grants, Fellowships

2008	7.5 Million Euros from the German Ministry of Science (BMBF) and ~4 Million Euros from the Berlin Senate for starting the Berlin Institute for Medical Systems Biology
2007 – 2010	NIH ModEncode grant (Co-PI)
2005 – 2006	NIH R21 “Function and evolution of microRNAs”, R21 HG003971-01, two years, project costs \$391,250 (PI: Nikolaus Rajewsky, Co-PI: Fabio Piano)
2005 – 2009	associated PI (together with M.Laessig (Cologne, Germany)), “Evolution of non-coding DNA”, funding approved by the “Deutsche Forschungsgemeinschaft” (part of a newly founded SFB 680). Total award for four years \$320,000 (shared equally between both PI’s)
2003 – 2004	Whitehead NYU Junior Faculty Fellow (\$20,000)
1999 – 2002	Postdoctoral Fellowship, Rockefeller University
1998 – 1999	Postdoctoral Scholarship of the Deutsche Forschungsgemeinschaft (Germany)

Awards and Honors:

2008	First prize from the „Deutsche Gesellschaft für Gentherapie“
2008	Anniversary Prize of the German Gesellschaft for Biochemistry
2008	IUBMB (International Union for Biochemistry and Molecular Biology): Medal for outstanding contributions
2007-	Member of various European Commission Study Sections (“Systems Biology”, “small RNAs and Cancer”, ...)
2007-	Editorial Board “Bioinformatics”
2007-	Editor of “Developmental Biology”
2006-	Member, Editorial Board of the journal “BMC Systems Biology”
2006-	Member, Program Committee of ISMB 2006 (Systems Biology and Transcriptomics)
2005	ad-hoc member NIH GCAT study section
2003	ad-hoc member NIH GCAT study section
2004-2007	Editor of the “Journal of Statistical Mechanics: Theory and Experiment
2003-2007	Associated Editor of the journal “Bioinformatics”
2003-	Moderator for the “Quantitative Biology Archive” http://arxiv.org/archive/q-bio

Press Releases:

My recent work has been mentioned or discussed in “The Scientist” (19, pg 14-16, 2005 and Oct 2006), “Nature” (435, pg 991, 2005; 440, pg 966, 2006; ‘news and views’ 455 pg 44-45, 2008; 455 ‘Making the paper’ 2008; ‘News’ 454, pg 562 (2008)), “Science” (310, pg 767, 2005), “Cell” (‘leading edge preview’, 134, 560-562, 2008), “Nature Reviews Genetics” (‘research highlight’, 2008), “Nature Methods” (‘research highlight’, 2008), “Frankfurter Allgemeine Zeitung” (7/6/2005, 8/6/2008), and others.

Meetings organized:

Organizer of an annual international Conference “Berlin Summer Meeting: Computational and Experimental Molecular Biology Meet” (2008-)

Co-organizer of the “European Science Foundation (ESF) Exploratory Workshop”, Basel, October 2007

One of two primary organizers of a 3 month workshop “Evolution of molecular networks”, funded & approved. 2007, KITP, UCSB, Santa Barbara, <http://www.kitp.ucsb.edu/activities/auto2/?id=370>

Note: The KITP series of meetings has an outstanding history of bringing together top people from computational fields and experimental biology. This particular meeting was initiated by M. Laessig (Cologne, Germany) and myself. We subsequently invited the following biologists to join the organizing committee: E. Davidson, T. Ohta, S. Small.

Co-chair of the conference “Bio-molecular networks: structure, evolution and function” (Organizer: Sergei Maslov (Stonybrook), Sept. 2005, Montauk, New York

Co-Organizer of a meeting “microRNAs and their targets” (with Tom Tuschl, The Rockefeller University), New York Academy of Sciences, Feb 2005

Meeting organizer “Evolution and Robustness” (with A. Sengupta, Rutgers), New York Academy of Sciences, 2004

Member of the committee for the “Systems Biology Discussion group”, New York Academy of Sciences 2004

Referee for Cell, Nature, Nature Methods, Nature Genetics, Nature Biotechnology, PLoS, ISMB, Nucleic Acids Research, Genome Biology, Genome Research, BMC Bioinformatics, BMC Genomics, PNAS, J.Stat. Phys., J. Phys. A, Phys. Rev. E, and others.

Participation in advising underrepresented graduate students in science, organized by the “New England Board of Higher Education”, Whitehead Institute, Cambridge.

Selected Invited Presentations:

- Sep 2008: Invited Speaker, 13th Annual Meeting HUGO 2008, Hyderabad
- July 2008: Invited Speaker, 33rd FEBS Congress & 11th IUBMB Conferences, Athens
- June 2008: Invited Speaker, 4th International Conference GPBNM 2008, Moscow
- May 2008: Invited Speaker, 3rd Microsymposium on Small RNAs, IMBA, Vienna
- Apr 2008: Invited Speaker, Keystone Meeting on small RNAs, Whistler, Canada
- Feb 2008: IUBMB Jubilee Lecture, Nature Winter Symposium on regulatory RNAs, Miami
- Dec 2007: Invited Speaker, “Functional Genomics”, Tokyo (Ministry for Science)
- Oct 2007: Invited Speaker, “3rd Annual Meeting of the OTS”, Berlin
- Sep 2007: Invited Speaker, “Deutsche Bioinformatikkonferenz”, Potsdam
- Sep 2007: Invited Speaker, “Annual Meeting EASD 2007”, Amsterdam
- Aug 2007: Invited Speaker, “2007 Graduate Summer School on Bioinformatics of China”, Beijing
- Aug 2007: Invited Speaker, “Symposium on Evolution”, Shanghai
- Jul 2007: Invited Speaker, “Moscow Conference on Computational Molecular Biology”
- Jun 2007: Invited Speaker, “The world of small non-coding RNAs: from basic to applied science”, University of Rome
- May 2007: Invited Speaker, “2nd Microsymposium on Small RNAs”, IMBA, Vienna
- Apr 2007: Keynote Speaker, “RNAi World Congress”, Selected Biosciences, Philadelphia
- Feb 2007: Invited speaker, Keystone Meeting on microRNAs, Keystone, Colorado
- Dez 2006: Invited speaker, Bioinformatik Kolloquium, GSF München
- Nov 2006: Invited speaker, BCB – Berlin Centre for Genome based Bioinformatics (M. Vingron)
- Sep 2006: Invited seminar, Pasteur Institut, Paris (M. Vergassola)
- Jul 2006: Invited keynote speaker and program member of the “International Conference on Computational Systems Biology”, Shanghai, China
- Jul 2006: Invited speaker, Summer school (Computational Biology), UCSD (T. Hwa)
- Jun 2006: Invited speaker, International Conference “Bioinformatics”, Aarhus, Denmark (B. Lenhard)
- Jun 2006: Invited speaker, Annual 71st CSHL Symposium: Regulatory RNAs

May 2006: Invited speaker, Warsaw Workshop “Stochastic Models in Biological Sciences”, Poland
 Apr 2006: Invited seminar, Duke University (U. Ohler)
 Jan 2006: Invited speaker (short talk) at the Keystone meeting on RNAi, Vancouver (Mello, Zamore, Carrington)
 Nov 2006: Invited speaker, “ORFeome” meeting at Dana Farber Institute, Harvard
 Oct 2005: Keynote speaker, Workshop on Computational Biology, Imperial College, London (C. Schoulders)
 Oct 2005: Seminar CSHL Bioinformatics series (M. Zhang)
 Sep 2005: Invited speaker, international Japanese-German cancer workshop, Esse, Germany
 Sep 2005: Invited speaker, international summer school on small RNAs, Villars, Switzerland
 Aug 2005: Invited speaker, international summer school on Computational Biology, Max Planck Institute Berlin (M. Vingron)
 Aug 2005: Invited speaker, DIMACS workshop on support machines in Bioinf., Rutgers
 Jul 2005: Seminar, Columbia University (O. Hobert)
 Jun 2005: Seminar, Lawrence Berkeley National Lab (M. Eisen)
 Jun 2005: Seminar, UCSF (H: Li)
 Jun 2005: Invited speaker, Cambridge Healthtech Institute’s Annula RNAi conf., San Francisco
 Feb 2005: Seminar, Center for Theoretical Biophysics, UCSD, San Diego (T. Hwa)
 Feb 2005: Invited Speaker, KITP Workshop on Networks in Growth, Death and Aging (UCSB, B. Shraiman)
 Nov 2004: Seminar, Skirball Institute, NYU Medical School, New York
 Jul 2004: Seminar, Physics and Genetics, University of Cologne, Germany
 Jun 2004: Seminar, Institute for Cell Biology, Rome, Italy
 Jun 2004: Invited speaker RNA-2-day meeting in Rome, University “La Sapienza”, Italy (G. Macino)
 Apr 2004: Seminar, Biozentrum Basel, Switzerland
 Apr 2004: Seminar, Max-Delbrück-Centrum, Berlin Germany (W. Birchmeier)
 Mar 2004: Invited speaker Com- Biol. & Bioinf. meeting, New York Academy of Sciences
 Mar 2004: Invited speaker CSHL “Systems Biology: Genomic Approaches to Transc. Reg. Meeting”
 Mar 2004: Seminar, University of Rochester, Department of Biology
 Feb 2004: Seminar, Institute for Advanced Studies, Center for Systems Biology (A. Levine)
 Jan 2004: Seminar, State University of Ohio
 Dec 2003: Discussion group, International Statistical Mechanics Conference, Rutgers Univ.
 Nov 2003: Invited speaker Goetheburg Workshop on Systems Biology, Sweden
 Nov 2003: Invited speaker ICSB International Conference on Systems Biology, Washington St. Louis (E. Davidson)
 Aug 2003: Invited paper presentation IEEE International Conference on Bioinformatics, Stanford
 Apr 2003: Seminar, Dept. of Applied Mathematics, Columbia University, New York
 Feb 2003: Seminar, Courant Institute, New York
 Nov 2002: Invited Seminar, Workshop on Genomics, Torino, Italy
 Nov 2002: Invited speaker International Statistical Mechanics Conference, Rutgers University
 Oct 2002: Seminar, Dept. of Biology, Stony Brook, New York (J. Reinitz)
 Oct 2002: Seminar, Harvard Medical School, Boston
 Sep 2002: Seminar, Applied Mathematics Seminar at Rutgers University, New Jersey
 Sep 2002: Seminar, Max-Delbrück-Centrum, Berlin, Germany
 Sep 2002: Seminar, Dept. of Comput. Biology, Karolinska, Stockholm, Sweden
 Sep 2002: Seminar, Royal Institute of Technology, Stockholm Sweden (B. Lenhard)
 Aug 2002: Seminar, Max-Planck-Institute for Molecular Biology, Berlin, Germany
 Aug 2002: Seminar, Max Planck Institute for Solid State Physics, Golm, Germany

Publications:

(i) Book Chapters, News and Views:

1. K. Chen and **N. Rajewsky**, *Deep conservation of microRNA-target relationships and 3' UTR motifs in vertebrates, flies and nematodes*, Cold Spring Harbor Symposia on Quantitative Biology, Vol. 72, Regulatory RNAs (2007)
2. D. Grün and **N. Rajewsky**, *Computational identification of microRNA targets*, in “microRNAs: From Basic Science to Disease Biology”, **Cambridge University Press** (2007)
3. **N. Rajewsky**, *L(ou)sy miRNA targets?*, **Nature Structural & Molecular Biology** 13, 754-5 (2006)

(ii) Peer-reviewed reviews:

4. K. Chen & **N. Rajewsky**, *The evolution of gene regulation by transcription factors and microRNAs*, **Nature Review Genetics** (invited) 38:1452-1456 (2007)
5. **N. Rajewsky**, *microRNA target predictions in animals*, **Nature Genetics** (invited) 38, 1452-6 (2006)

(iii) Peer-reviewed research papers:

6. M. Selbach, B. Schwanhäusser, N. Thierfelder, Z. Fang, R. Khanin, **N. Rajewsky**, *Widespread changes in protein synthesis induced by microRNAs*. **Nature**, 455(7209):58-63 (2008)
7. M. R. Friedlaender, W. Chen, C. Adamidi, J. Maaskola, R. Einspanier, S. Knespel, **N. Rajewsky**, *miRDeep: Discovering miRNAs from deep sequencing data*. **Nature Biotechnology**, 26:407-15 (2008)
8. S. B. Koralov, S. A. Muljo, G. R. Galler, A. Krek, T. Chakraborty, C. Kanellopoulou, K. Jensen, B. S. Cobb, M. Merkenschlager, **N. Rajewsky**, K. Rajewsky, *Dicer ablation affects antibody diversity and cell survival in the B lymphocyte lineage*, **Cell**, 132:860-74 (2008).
9. C. Xiao, D. Calado, G. Galler, T. Thai, H. Patterson, J. Wang, **N. Rajewsky**, T. Bender, K. Rajewsky, *miR-150 controls B Cell Differentiation by Targeting the Transcription Factor c-Myb*, **Cell** 131:146-159 (2007)
10. T.H. Thai, D.P. Calado, S. Casola, K.M. Ansel, C. Xiao, Y. Xue, A. Murphy, D. Friendewey, D. Valenzuela, J.L. Kutok, M. Schmidt-Supprian, **N. Rajewsky**, G. Yancopoulos, A. Rao, K. Rajewsky, *Regulation of the germinal center response by microRNA-155*, **Science**, 316(5824):604-8 (2007)
11. K. Chen & **N. Rajewsky**, *Natural selection on human microRNA binding sites inferred from SNP data*, **Nature Genetics** 38(12):1452-6 (2006)
12. S. Lall, D. Grün, A. Krek, K. Chen, P. Sood, T. Colombo, P. McMenamin, K. Gunsalus, L. Pachter, F. Piano & **N. Rajewsky** (equal contributions) *A genome wide map of conserved microRNA targets in C. elegans*, **Current Biology** 16, 460-71 (2006)
13. P. Sood, A. Krek, M. Zavolan, G. Macino, **N. Rajewsky**, *Cell type specific signatures of microRNAs on target mRNA expression*, **PNAS** 103:2746-51(2006)
14. J. Krützfeldt, **N. Rajewsky**, R. Braich, K.G. Rajeev, T. Tuschl, M. Manoharan and M. Stoffel, *Silencing of microRNAs in vivo with “antagomirs”*, **Nature** 438, 685-9 (2005)

15. S. Monticelli, K.-M. Ansel, C. Xiao, N.D. Socci, A.M. Krichevsky, T. Thai, **N. Rajewsky**, D.S. Marks, C. Sander, K. Rajewsky, A. Rao and K.S. Kosik, *microRNA profiling of the murine hematopoietic system*, **Genome Biology** 6:R71 (2005).

16. D. Grün Y.L. Wang, D. Langenberger, K.C. Gunsalus and **N. Rajewsky**, *microRNA target predictions across seven Drosophila species, and comparison to mammalian targets*, **PLoS Computational Biology**, 1:e13 (2005)

17. A. Krek, D. Grün, M.N. Poy, R. Wolf, L. Rosenberg, E. Epstein, Isabelle da Piedade, P. McMenamin, K.C. Gunsalus, M. Stoffel and **N. Rajewsky**, *Combinatorial microRNA target predictions*, **Nature Genetics**, 37 495-500 (2005)

Cited on the cover and recommended by the Faculty of 1000

RFAM (the “official” database for microRNAs) has linked their microRNAs to the target predictions presented in this paper.

18. M.N. Poy, L. Eliasson, J. Krützfeld, S. Kuewajima, X. Ma, P.E. MacDonald, S. Pfeffer, T. Tuschl, **N. Rajewsky**, P. Rorsman, M. Stoffel *A pancreatic islet-specific microRNA regulates insulin secretion*, **Nature**, 432 226-30 (2004)

Nature research highlight and recommended by the Faculty of 1000

19. M. Kraus, M. Alimzhanov, **N. Rajewsky** and K. Rajewsky *Survival of Resting Mature B Lymphocytes Depends on BCR Signaling via the IG α/β Heterodimer*, **Cell** 117, 787-800 (2004)

Recommended by the Faculty of 1000

20. **N. Rajewsky** (corresponding author) and N.D. Socci *Computational Identification of microRNA targets*, **Developmental Biology** 267, 529-35 (2004)

Recommended by the Faculty of 1000

21. M. Schroeder, M. Pearce, J. Fak, H. Fan, E. Emberly, **N. Rajewsky**, El Siggia, and dU. Gaul *Transcriptional Control in the Segmentation Gene Network of Drosophila*, **PLoS** 2:E271 (2004)

Recommended by the Faculty of 1000

22. N. Yannoutsos, V. Barreto, Z. Misulovin, W. Yu. **N. Rajewsky**, B.R. Peixoto, T. Eisenreich, and M.C. Nussenzweig, *A new cis-element that regulates gene expression by counteracting a distant silencer*, **Nature Immunology** 5, 443-50 (2004)

Cited on the cover and recommended by the Faculty of 1000.

23. E. Emberly & **N. Rajewsky** (equal contributions), and E.D. Siggia, *Conservation of Regulatory Elements between two species of Drosophila*, **BMC Bioinformatics** 4:57 (2003)

Recommended by the Faculty of 1000

24. M. Zavolan & **N. Rajewsky** (equal contributions, and corresponding authors), N.D. Socci and T. Gaasterland, *SMASHing, regulatory sites in DNA by human-mouse sequence comparisons* Proceedings **CSB2003**, 277-286 (2003)

Peer reviewed and selected for presentation at the IEEE conference on Bioinformatics (CSB2003)

25. E. Yang, E. v. Nimwegen, M. Zavolan, **N. Rajewsky**, Mark Schroeder, Marcelo Magnasco and James E. Darnell, *Decay rates of human mRNAs: correlation with functional characteristics and sequence attributes*, **Genome Research** 13, 1863-72 (2003)

26. **N. Rajewsky**, M. Vergassola, U. Gaul and E.D. Siggia, *Computational detection of genomic cis regulatory modules, applied to body patterning in the early Drosophila embryo*, **BMC Bioinformatics** 3:30 (2002)

Research highlight

27. **N. Rajewsky**, N.D. Socci, M. Zapotocky and E.D. Siggia, *The Evolution of DNA regulatory regions for proteo-gamma bacteria by interspecies-comparisons*, **Genome Research** 12 298-308 (2002)

28. E. van Nimwegen, M. Zavolan, **N. Rajewsky** and E.D. Siggia, *Probabilistic Clustering of Sequences, with applications to the discovery of transcription factor binding sites*, **PNAS** 99, 7323-8 (2002)

29. A. Claridge-Chang, H. Wijnen, F. Naef, C. Boothroyd, **N. Rajewsky** and M.W. Young, *Circadian Regulation of Gene Expression Systems in the Drosophila Head*, **Neuron** 32 657-671 (2001)

30. **N. Rajewsky**, T. Sasamoto and E.R. Speer, *Spatial particle condensation for an exclusion process on a ring*, **Physica A** 279, 123-142 (2000)

31. S. Lübeck, **N. Rajewsky** and D.E. Wolf, *A deterministic sandpile automaton revisited*, **European Physical Journal B**13, 715 (2000)

32. K. Mallick, S. Mallick and **N. Rajewsky**, *Exact solution of asymmetric exclusion process with 2nd and 3rd class particles*, **J. Phys. A: Math. Gen.** 32, 8399-8410 (1999)

33. M.R. Evans, **N. Rajewsky** and E.R. Speer, *Exact solution of a cellular automaton for traffic*, **J. Stat. Phys.** 95, 45-98 (1999)

34. **N. Rajewsky**, L. Santen, A. Schadschneider and M. Schreckenberg, *The Asymmetric Exclusion Process: Comparison of Update Procedures*, **J. Stat. Phys.** 92, 151-194 (1998)

35. **N. Rajewsky** and M. Schreckenberg, *Exact results for one dimensional stochastic cellular automata for different types of updates*, **Physica A** 245, 139-151 (1997)

36. **N. Rajewsky**, A. Schadschneider and M. Schreckenberg, *The asymmetric exclusion model with sequential update*, **J. Phys. A** 29, L305-L312 (1996)

37. **N. Rajewsky** and M. Schreckenberg, *A probabilistic cellular automaton for evolution*, **J. Phys. I France** 5, 1129-1139 (1995)

38. C. Lehner, **N. Rajewsky**, D.E. Wolf and J. Kertesz, *Anomalous roughening in three-dimensional polynuclear growth*, **Physica A** 164, 81-90 (1990)

39. D. Allen, A. Cumano. R. Dildrop, C. Kocks, K. Rajewsky, **N. Rajewsky**, J. Roes, F. Sablitzky and M. Siekevitz, *Timing, genetic requirements and functional consequences of somatic hypermutation during B-cell development*, **Immunol. Rev.** 96, 5-22 (1987)