Michael Schnabel

Harris School of Public Policy
The University of Chicago
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EMPLOYMENT

01/2015 - University of Chicago, Chicago, IL, USA
Research Associate (Assistant Professor), Harris School of Public Policy
Developing models of collective decision making in complex social networks.
Identifying optimal interaction network topologies for group decision making.

06/2013 - 12/2014 Kellogg School of Management and
Northwestern Institute on Complex Systems (NICO), Evanston, IL, USA
Research Assistant Professor, Managerial Economics and Decision Sciences

2010 - 2013 Northwestern University, Evanston, IL, USA
PS-OC Postdoctoral Fellow, Departments of Physics and Applied Mathematics.
Inference of gene interaction networks from microarrays of cancer cell lines.

2009 - 2010 Max-Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
Postdoctoral Researcher, Department of Nonlinear Dynamics.
Modeling development and information processing in primary visual cortex.
Analysis of V1 optical imaging recordings and natural images.

EDUCATION

PhD (Dr. rer. nat.) Physics, University of Göttingen (Germany) 2008
• Thesis Topic: Neuroscience, Self Organization
("*A Symmetry of the Visual World in the Architecture of the Visual Cortex*.")
• Advisors: Prof. Fred Wolf, Prof. Theo Geisel

MSc (Diplom) Physics, University of Regensburg (Germany) 1999
• Thesis Topic: Quantum Field Theory, High Energy Physics
("*Random Matrix Models in two-dimensional Lattice Gauge QED*")
• Advisors: Prof. Tilo Wettig, Prof. Andreas Schäfer

BSc (Vordiplom) Physics, University of Frankfurt/Main (Germany) 1996

PUBLICATIONS

• *Stock fluctuations are correlated and amplified across networks of interlocking directorates*.
S.Saavedra, L.Gilarranz, R.Rohr, **M.Schnabel**, B.Uzzi and J.Bascompte
EPJ Data Science (2014)
• *Dynamic Transcription Factor Networks in Epithelial-Mesenchymal Transition in Breast Cancer Models.*
A. Siletz, **M. Schnabel**, E. Kniazeva, A. J. Schumacher, S. Shin, J. S. Jeruss and L. D. Shea
PLOS ONE (2013)
• *Response to Comment on "Universality in the Evolution of Orientation Columns in the Visual Cortex"*.
W. Keil, M. Kaschube, **M. Schnabel**, Z. F. Kisvárday, S. Löwel, D. M. Coppola, L.W. White, and F. Wolf

Science 336(6080):413 (2012)

- *Universality in the Evolution of Orientation Columns in the Visual Cortex.*
  *M. Kaschube, **M. Schnabel**, S. Löwel, D. M. Coppola, L. E. White, and F. Wolf*
  Science 330:1113–1116 (2010)
- *Inter-areal coordination of columnar architectures during visual cortical development.*
  *M. Kaschube, **M. Schnabel**, F. Wolf, and S. Löwel*
  Proceedings of the National Academy of Sciences. 106, 17205 (2009)
- *Pinwheel stability, pattern selection and the geometry of visual space.*
  ***M. Schnabel**, M. Kaschube and F. Wolf*
  q-bio > arXiv.org:0801.3832 (2008)
- *Self-Organization and the Selection of Pinwheel Density in Visual Cortical Development.*
  *M. Kaschube, **M. Schnabel** and F. Wolf*
  New Journal of Physics 10, 015009 (2008)
- *Random Waves in the Brain: Symmetries and Defect Generation in the Visual Cortex.*
  ***M. Schnabel**, M. Kaschube, S. Löwel, and F. Wolf*
  The European Physical Journal - Special Topics 145, 137-157 (2007)
- *Fake symmetry transitions in lattice Dirac spectra.*
  ***M. Schnabel** and T. Wettig*
  *Physics Review **D** 62, 34501 (2000)*

CONFERENCE ABSTRACTS (SELECTION)

- *Opinion Formation on Networks: Topology my predict more than we think.*
  M. Schnabel and D. Diermeier
  Annual Meeting of the German Physical Society (DPG) (2017)

- *Charting and Exploring the Opinion Space of generic Spin Models on arbitrary Network Topologies.*
  M. Schnabel and D. Diermeier
  International Conference on Computational Social Science (IC2S2) (2016)

- *Do orientation preference maps arise from hexagonal retinal ganglion cell?*
  M. Schottdorf, W. Keil, **M. Schnabel**, D. Coppola, S. Löwel, L. White, M. Kaschube & F. Wolf
  Computational and Systems Neuroscience (COSYNE) (2013)
- *A shortest path tree approach for inferring and exploring gene networks.*
  ***M. Schnabel**, D. Grady, C.Thiemann, A.E. Motter, W. Kath and D. Brockmann*
  SIAM conference on the Life Sciences, (2012)
- *Active self-organization of disordered arrangements of orientation preference in cortical networks.*
  *J. Weidinger, W. Keil, D. Tsigankov, **M. Schnabel**, M. Kaschube*
  Computational and Systems Neuroscience (COSYNE), (2012)
- *A shortest path tree approach to infer interactions from correlations.*
  ***M. Schnabel**, D. Grady, A. E. Motter, W. Kath and D. Brockmann*
  NetSci conference, (2012)
- *Network analysis and dynamical modeling of cancer cells.*
  ***M. Schnabel**, N. Yungster, D. Brockmann, A. E. Motter, W. Kath*
  SIAM conference on Dynamical Systems, (2011)
- *Quantifying signatures of collinearity and cocircularity in natural images and in orientation maps.*
  ***M. Schnabel**, M. Kaschube, L. White, F. Wolf*
  Society for Neuroscience Abstracts, (2009)
- *Pattern selection, pinwheel stability and the geometry of visual space.*
  ***M. Schnabel**, M. Kaschube, L. White, F. Wolf*
  Computational Neuroscience Meeting (CNS), (2009)

- *Emergence of hyper-hexagonal patterns in orientation map models of reduced rotation symmetry.*
  F. Wolf, W. Keil, S. Löwel, ***M. Schnabel***
  Society for Neuroscience Abstracts, (2007)
- *Pinwheel stability, pattern selection and the geometry of visual space.*
  M. Schnabel*, M. Kaschube, L. White, D. Coppola, F. Wolf*
  Society for Neuroscience Abstracts, (2007)
- *Signatures of shift-twist symmetry in natural images and orientation maps.*
  M. Schnabel*, M. Kaschube, L. White, D. Coppola, S. Löwel, F. Wolf*
  FENS Abstracts, (2006)
- *Shift-twist Symmetry in natural images and orientation maps.*
  M. Schnabel*, M. Kaschube, L. White, D. Coppola, S. Löwel, F. Wolf*
  Society for Neuroscience Abstracts, (2005)
- *Signatures of shift-twist symmetry in the layout of orientation preference maps.*
  M. Schnabel*, M. Kaschube, L. White, D. Coppola, S. Löwel, F. Wolf*
  Society for Neuroscience Abstracts, (2004)
- *The ticklish spots of cortical orientation maps.*
  M. Schnabel*, M. Kaschube, S. Löwel, H. Dinse, F. Wolf*
  Proceedings of the 29th Göttingen Neurobiology Conference, (2003)
- *Universal fine structure of orientation pinwheels.*
  M. Schnabel*, T. Geisel, F. Wolf*
  Verhandlungen der Deutschen Physikalischen Gesellschaft, (2002)

TALKS (SELECTION)

2017	*Frankfurt University, Theoretical Physics Dept., Frankfurt, Germany*
2014	*Max-Planck Institute for Self-Organization, Göttingen, Germany*
2012	*Northwestern Institute on Complex Systems, Evanston, IL, USA*
2011	*Northwestern University, Dept. of Applied Mathematics. Evanston, IL, USA*
2009	*Max-Planck-Institute for Brain Research, Frankfurt/Main, Germany*
2009	*Northwestern Institute on Complex Systems, Evanston, IL, USA*
2008	*Kavli Institute for Theoretical Physics, Santa Barbara, USA*
2007	*Max-Planck-Institute for Biological Cybernetics, Tübingen, Germany*
2006	*Bernstein Center for Computational Neuroscience, Berlin, Germany*
2006	*Japan-Germany Symposium on Computational Neuroscience, RIKEN, Tokyo*
2004	*Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany*
2004	*Institut de Neurosciences Cognitives de la Méditerranée, Marseille, France*
2004	*Weizmann Institute of Science, Rehovot, Israel*
2004	*Ruhr University Bochum, Germany*

RESEARCH INTERESTS / SKILLS

Quantitative modeling of complex systems, self-organization and collective behavior in biological and social systems, statistical mechanics, collective decision making, network inference and graphical models, information flow in complex networks, computational neuroscience, information theory, machine learning.

PROGRAMMING SKILLS

Python, C/C++, Matlab, Mathematica, R, UNIX/Linux, shell scripting, MySQL, Java, NetLogo, Processing

SUMMER SCHOOLS / WORKSHOPS / INTERNSHIPS

2013 KITP, Santa Barbara, USA: Workshop "***New Quantitative Approaches to Morphogenesis.***" (Thomas Lecuit, Ewa Paluch, Joel Rothman, Boris Shraiman)

2008 KITP, Santa Barbara, USA: Workshop "***Anatomy, Development, and Evolution of the Brain.***" (K. Kosik, A. Koulakov, G. Lemke, S. Solla, S. Wang)

2004 Weizmann Inst., Israel: Dept of Physics of Complex Systems: "***Workshop on Nodal Domains.***" (U. Smilansky, G. Foltin)

2003 Ecole d'été de Phys. Théorique, Les Houches, France "***Methods and Models in Neurophysics.***" (C. Chow, B. Gutkin, D. Hansel, C. Meunier, I. Segev)

2002 Peyresq, France: Euro-workshop on "***Non-equilibrium in Physics and Biology.***" (A. Buka, P. Coullet, L. Kramer)

2001 KITP, Santa Barbara, USA: "***Dynamics of Neural Networks.***" (D. Kleinfeld, S. Seung and M. Tsodyks)

2000 MPI for Complex Systems, Dresden, Germany: "***Problems in Systems Neuroscience.***" (L. van Hemmen and T. Sejnowski)

2000 Leibniz Institute for Neurobiology, Magdeburg, Germany (3 weeks internship in the group of S. Löwel, assisting experiments and writing code for data analysis.)

TEACHING / TUTORING

2012 - 2014 Leading the NICO reading group on complex systems at Northwestern University.

2008 - 2009 Master's thesis co-supervisor of Ghazaleh Afshar at MPIDS Göttingen, Germany.

2006 - 2007 Diploma thesis co-supervisor of Wolfgang Keil at MPIDS Göttingen, Germany.

2006 Organized a seminar on pattern formation in physics and biology for graduate students at the MPIDS and Univ. Göttingen.

2005 Organized a seminar on stochastic processes for graduate students at the MPIDS and Univ. Göttingen.

2004 Tutor of Klaus Wunderlich, student in the neuroscience program who did a lab-rotation at the MPIDS.

2004 Tutor of Min Huang, student in the neuroscience program who did a lab-rotation at the MPIDS and later on decided to do her PhD at the MPIDS.

2004 Tutoring the class "Non-linear Dynamics", Univ. Göttingen, Germany.

2003 Tutoring the class "Quantum Mechanics", Univ. Göttingen, Germany.

2002 Tutoring the class "Thermodynamics and Statistical Mechanics", Univ. Göttingen, Germany.

MEMBERSHIPS

- *Germany Physical Society*
- Society for Industrial and Applied Mathematics (SIAM)
- Society for Neuroscience

LANGUAGES

English, German (native), French (native), Italian (basic)

REFERENCES

- *Prof. Daniel Diermeier, PhD, Provost*
  Office of the Provost
  University of Chicago
  5801, South Ellis Ave, Chicago, IL 60637, USA
  Phone: +177-702-8810, email: ddiermeier@uchicago.edu

- *Prof. William L. Kath, PhD*
  Engineering Sciences and Applied Mathematics
  McCormick School of Engineering
  Northwestern University
  2145 Sheridan Road, Evanston, Illinois 60208-3125, USA
  Phone: +1 847-491-8784, email: kath@northwestern.edu

- *Prof. Dr. Theo Geisel, Director*
  Max-Planck-Institute for Dynamics and Self-Organization
  Department of Nonlinear Dynamics
  Am Faßberg 17, 37077 Göttingen, Germany
  Phone: +49 551-5176-400, email: geisel@nld.ds.mpg.de

- *Prof. Leonard E. White, PhD*
  Duke Institute for Brain Sciences
  Levine Science Research
  Durham, NC 27708, USA
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