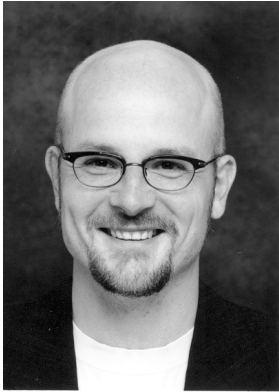


Curriculum Vitae



Prof. Dr. Dirk Brockmann

Associate Professor

Department of Engineering Sciences and Applied Mathematics,
McCormick School of Engineering and Applied Science &
Northwestern Institute on Complex Systems (NICO)

Northwestern University
2145 Sheridan Rd
Evanston, IL 60208
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Professional Appointments:

- 8/2009-present** Affiliate Faculty Member
The Transportation Center
Northwestern University, Evanston, IL USA
- 12/2008-present** Faculty Member
Northwestern Institute for Complex Systems (NICO)
Northwestern University, IL, USA
- 9/2008-present** Associate Professor
Department of Engineering Sciences and Applied Mathematics
McCormick School of Engineering and Applied Science
Northwestern University, IL, USA
- 6/2008-9/2008** Visiting Associate Professor
Department of Engineering Sciences and Applied Mathematics
McCormick School of Engineering and Applied Science
Northwestern University, IL, USA
- 7/2007-6/2008** Adjunct Associate Professor
Department of Engineering Sciences and Applied Mathematics
McCormick School of Engineering and Applied Science
Northwestern University, IL, USA
- 1/2006-7/2007** Group Leader, Complex Dynamics Group
Department of Nonlinear Dynamics
Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
- 9-10/2003** Visiting Scientist
Kavli Institute for Theoretical Physics
University of Santa Barbara, CA, USA
- 2003-2005** Postdoctoral Researcher
Department of Nonlinear Dynamics
Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany

Education:

- 2003** PhD (Dr. rer. nat.) in Theoretical Physics, Georg August University, Göttingen
- 1996-2003** PhD Program, Department of Nonlinear Dynamics, Max-Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
- 1995** Diplom in Physics, Institute for Theoretical Physics, Georg August University, Göttingen
- 1990-1995** Undergraduate and graduate studies of Physics and Mathematics, Georg August University, Göttingen, Germany
- 1988-1990** Undergraduate Studies, Duke University, Durham, NC, USA

Selected Publications:

- ▶ D. Brockmann, *Human Mobility and Spatial Disease Dynamics*, in *Reviews of Nonlinear Dynamics and Complexity*, H. G. Schuster (ed.), Wiley-VCH, (2009).
- ▶ D. Brockmann, *A physicist enthuses about criticality in biological development*, *Nature*, 451, 111 (2008)
- ▶ D. Brockmann, *Wie Netzwerke kleinzukriegen sind*, *Physik Journal*, 10 (2008)
- ▶ D. Brockmann, *Der Weg ist das Ziel*, *Physik Journal*, 7, 20 (2008)
- ▶ D. Brockmann & F. Theis, *Money Circulation, Trackable Items, and the Emergence of Universal Human Mobility Patterns*, *IEEE Pervasive Computing*, Oct.-Dec., 78-85 (2008).
- ▶ D. Brockmann, *Anomalous diffusion and the structure of human transportation networks*, *European Physical Journal-Special Topics*, 157, 173-189 (2008)
- ▶ D. Brockmann, *Money circulation science*, in *Anomalous Transport: Foundations and Applications*, R. Klages et al. (eds.), Wiley-VCH (2008).
- ▶ V. Belik & D. Brockmann, *Accelerating random walks by disorder*, *New Journal of Physics*. 9:54, (2007).
- ▶ D. Brockmann & L. Hufnagel, *The Scaling Laws of Human Travel - A Message From George*, in *Nonlinear Modeling in Ecology, Epidemiology and Genetics*, B. Blasius (ed.), Lecture Notes in Complex Systems, World Scientific, Singapore, (2007).
- ▶ D. Brockmann, L. Hufnagel and T. Geisel, *The scaling laws of human travel*, *Nature* 439, 462, (2006).
- ▶ D. Brockmann, L. Hufnagel & T. Geisel, *Dynamics of Modern Epidemics*, in *SARS: A Case Study in Emerging Infections*, A. McLean, R. May, J. Pattison, R. Weiss (eds.), Oxford University Press, (2005).
- ▶ L. Hufnagel, D. Brockmann and T. Geisel, *Forecast and control of epidemics in a globalized world*, *Proc Natl Acad Sci USA* 101, 15124, (2004).
- ▶ D. Brockmann & T. Geisel, *Particle Dispersion on Rapidly Folding Random Hetero-Polymers*, *Phys. Rev. Lett.*, 91:048303, (2003).
- ▶ D. Brockmann & T. Geisel, *Lévy Flights in Inhomogeneous Media*, *Phys. Rev. Lett.*, 90:170601, (2003).
- ▶ D. Brockmann & I.M. Sokolov, *Lévy Flights in External Force Fields: From Models to Equations*, *Chem. Phys.*, 284:409-421, (2002).
- ▶ D. Brockmann & T. Geisel, *The ecology of gaze shifts*, *Neurocomputing*, 32-33:643-650, (2000).
- ▶ D. Brockmann & T. Geisel, *The Lévy-flight Nature of Gaze Shifts*, in *Proceedings of the 27th Göttingen Neurobiology Conference*, N. Elsner, U. Eysel (eds.), Thieme, Stuttgart, (1999).
- ▶ M. Riesenhuber, H.-U. Bauer, D. Brockmann & T. Geisel, *Breaking Rotational Symmetry in a Self-Organizing Map Model for Orientation Map Development*, *Neural Computation*, 10:717-730, (1998).

- ▶ H.-U. Bauer, D. Brockmann & T. Geisel, *Analysis of Ocular Dominance Pattern Formation in a High-Dimensional Self-Organizing-Map Model*, *Network*, 8:17-33, (1997).
- ▶ D. Brockmann, M. Riesenhuber, H.-U. Bauer & T. Geisel, *Conditions for the Joint Emergence of Orientation and Ocular Dominance in a High-Dimensional Self-Organizing map*, in J. Bower (ed.), *Proceedings to the CNS 97*, (1997).
- ▶ D. Brockmann, H.-U. Bauer, M. Riesenhuber & T. Geisel, *SOM-Model for the Development of Oriented Receptive Fields and Orientation Maps from Non-Oriented ON-Center OFF-Center inputs*, in W. Gerstner, A. Germond, M. Hasler, and J.-D. Nicoud (eds.), *Artificial Neural Networks - ICANN'97*, (1997).
- ▶ H.-U. Bauer, M. Riesenhuber, D. Brockmann & T. Geisel, *Analysis of SOM-based models for the development of visual maps*, in L. P. Oy (ed.), *Proceedings to the WSOM '97*, Helsinki University of Technology, (1997).

General Readership Publications:

- ▶ D. Brockmann, *Auf den Spuren des Geldes - Neue Wege für Modelle zur geographischen Seuchenausbreitung*. Univadis, (2006).
- ▶ D. Brockmann, *Modelle zur geographischen Seuchenausbreitung*, *Flug- und Reisemedizin*, 13:11-12, (2006).

Presentations:

Plenary and keynote lectures

- ▶ Keynote Lecture UBS Global Event, Zurich, April 2008
- ▶ Keynote Lecture, IdeaFestival 2007 -3 days of events and a dizzying array of extraordinary thinkers. www.ideafestival.com, Louisville, Kentucky. Sept. 2007
- ▶ 59th Annual Meeting of the Germany Society of Hygiene and Microbiology, Sept. 2007.
- ▶ XLAB Science Festival, Göttingen, Dec. 2006 (popular scientific).
- ▶ Plenary Lecture, Dynamics Days Europe 2006, Greece, Sept. 2006.
- ▶ Keynote Lecture, Le Vitrine del CNR - *l'uomo e la scienza antiche e nuove teorie*, Rome, March 2006 (popular scientific).
- ▶ Physik am Samstagvormittag - *Physik der Naturkatastrophen*, Bayreuth, Feb. 2006 (popular scientific).
- ▶ Keynote Lecture, Schladminger Gesundheitstage *Pandemie - Muss sich Österreich fürchten?*, Schladming, Austria, Sept. 2005.
- ▶ Keynote Lecture, 7. Kongress Medizin und Mobilität - Deutsche Gesellschaft für Luft- und Reisemedizin, Cologne, *Dynamik moderner Pandemien*, June 2005.

Colloquia

- ▶ Center for Statistics, University of Göttingen, Göttingen, Juni 2008
- ▶ Center for Complex Network Research, Northeastern University, Boston, Jan. 2008
- ▶ MPI for Physics of Complex Systems Colloquium, Dresden, Dec. 2007
- ▶ Physics Colloquium, Humboldt University Berlin, October 2007
- ▶ Physics Colloquium, University of Bremen, Bremen, June 2007.
- ▶ University Clinic Lübeck, Lübeck, June 2007
- ▶ Santa Fe Institute, Santa Fe, May 2007
- ▶ The Zurich Physics Colloquium, Zurich, April 2007.
- ▶ Department of Engineering and Applied Mathematics, Northwestern University, March 2007.
- ▶ Physikalisches Kolloquium, Institut für Theoretische Physik, Universität Saarbrücken, Nov. 2006.

Invited lectures

- ▶ Workshop Is there a physics of Society, Santa Fe Institute, Santa Fe, USA, Jan. 2008
- ▶ EPSRC AMORPH Workshop Complex Networks in Biology, Leeds April 2008
- ▶ Hauptvortrag, Frühjahrstagung – Deutsche Physikalische Gesellschaft (DPG), Regensburg, March 2007.
- ▶ Hauptvortrag, Frühjahrstagung – Deutsche Physikalische Gesellschaft (DPG), Regensburg, March 2007.
- ▶ Workshop „Active Motion and Swarms“, Berlin, Dec. 2006.
- ▶ University Clinic Münster, Nov. 2006.
- ▶ Robert Koch Institute, Berlin, Nov. 2006.
- ▶ Institute of Physics, University of Potsdam, July 2006.
- ▶ 373. WE-Heraeus-Seminar - Anomalous Transport: Experimental Results and Theoretical Challenges, Bad Honnef, July 2006.
- ▶ School of Engineering, Computer Science and Mathematics, University of Exeter, UK, June 2006.
- ▶ Department of Zoology, Oxford University, UK, June 2006.
- ▶ AMORH Workshop „Networks, Epidemics and Evolution“, Royal Holloway University of London, UK, June 2006.
- ▶ Institut für Theoretische Physik, Göttingen, May 2006.
- ▶ Geophysikalisches Institut, Göttingen, April 2006.
- ▶ Advanced Course on Epidemiology of Infectious Diseases, Instituto Gulbenkian de Ciencia, Lissabon, Portugal, April 2006.
- ▶ Hauptvortrag, Frühjahrstagung – Deutsche Physikalische Gesellschaft (DPG), Dresden, March 2006.
- ▶ Hauptvortrag, Frühjahrstagung – Deutsche Physikalische Gesellschaft (DPG), Dresden, March 2006.
- ▶ Invited talk March Meeting – American Physical Society, Baltimore, USA, March 2006.
- ▶ Institut für Theoretische Physik, LMU, München, Nov. 2005.
- ▶ 360. WE-Heraeus Seminar "Nonlinear Dynamics of Complex Continua", Bayreuth, Oct. 2005.
- ▶ Physics of Life - From Single Molecules to Networks - Workshop in biological physics, Krogerup Højskole, Denmark, Aug. 2005.
- ▶ Institut für Theoretische Physik, Universität Bremen, Jan. 2005.
- ▶ Max-Planck-Institute for Mathematics in the Natural Sciences, Leipzig, June 2004.
- ▶ Kavli Institute for Theoretical Physics, Santa Barbara CA, USA, Aug. 2003.
- ▶ Institut für Theoretische Physik, Göttingen, April 2002.
- ▶ Humboldt Universität, Berlin, Nov. 2001.
- ▶ Institut für Theoretische Physik, Göttingen, Nov. 1999.

Research in the media

2009: Predicting the spread of human H1N1 Influenza A (Swine flu) in the United States

Selected Television/Radio Coverage:

- ▶ **National Public Radio**, [Swine Flu Simulation Predicts 1,700 Cases By June](#) (May 1, 2009)
- ▶ **ABC7 Chicago**, [Technology is helping scientists predict where and how quickly infections can spread](#) (April 30, 2009)
- ▶ **Fox News Chicago**, [Worst-Case Model: 1,700 U.S. Flu Cases](#) (April 30, 2009)
- ▶ **Chicago Public Radio** [Projected Swine Flu in Chicago](#) (April 28, 2009)
- ▶ **CBS Chicago**, [Worst Case Scenario: Swine Flu Infects 121 In City](#) (April 29, 2009)

Selected Press Coverage:

- ▶ **The New York Times** (page 1), [Predicting the Flu With the Aid of \(George\) Washington](#) (May 4, 2009)

- ▶ LA Times, [Scientists see this flu strain as relatively mild](#) (April 30, 2009)
- ▶ Le Monde, [Les chemins du virus passent par les billets de 1 dollar sur Internet](#), (french - May 5, 2009)
- ▶ USA Today, ['Fate of this outbreak' may be determined this week](#), (May 5, 2009)
- ▶ Welt am Sonntag, [Kleine Geschichte der großen Unsicherheit](#), (May 3, 2009)
- ▶ The Chosun Ilbo, (Korea), [Spread of Dollar Bills 'Helps Predict Flu Path'](#) (May 5, 2009)
- ▶ LiveScience, ['Worst-Case' Scenario for Flu Estimated](#), (May 1, 2009)
- ▶ Chicagobreakingnews.com, [Study: 1,700 Americans could catch swine flu](#), (April 29, 2009)
- ▶ Medill Reports: Chicago, [Swine flu predictions are in](#), (April 30, 2009)

2006: The scaling laws of human travel

Selected Television/Radio Coverage:

- ▶ Google Current News, [Google's Top Searches](#) (Feb. 2006)
- ▶ ZDF heute nacht, [Der Weg des Virus](#) (Jan 26, 2006)
- ▶ hr3, [Abenteuer Erde, Seuchenausbreitung: Göttinger Forscher entwickeln Vorhersagemodell](#) (Oct 11, 2006)
- ▶ rbb OZON, [Prognose – Wie sich Epidemien ausbreiten](#) (Feb 15, 2006)
- ▶ 3sat nano, [Seuchen und Dollarnoten verbreiten sich ähnlich](#) (Mar 1, 2006)
- ▶ NDR Hallo Niedersachsen, [Wie sich Seuchen ausbreiten](#) (Feb 22, 2006)
- ▶ Spiegel Online, [Computer simulieren die Killerseuche](#) (Feb 21, 2006)

Selected Press Coverage:

- ▶ The New York Times, [Money-Circulation Science](#) (Dec 10, 2006)
- ▶ NBC News, [Circulation of money may predict pandemics](#) (Jan 25, 2006)
- ▶ The Guardian, [Money talks: tracking dollar bills helps explain how diseases spread](#) (Jan 26, 2006)
- ▶ New Scientist, [Banknote tracking helps model spread of disease](#) (Jan 25, 2006)
- ▶ ORF, [Mit Dollar-Noten der Seuchenverbreitung auf der Spur](#) (Jan 26, 2006)
- ▶ Voice of America, ["Where's George?" Goes from Web Diversion to Disease Research Tool](#) (radio interview - Jan 25, 2006)
- ▶ El Mundo, [Un juego de Internet aporta pistas para predecir la propagación de epidemias](#) (Jan 25, 2006)
- ▶ Membrana, [Полёты 1 доллара предсказывают характер всемирной эпидемии](#) (Jan 25, 2006)
- ▶ Terra, [Site rastreia notas de dólar e explica pandemias](#) (Jan 25, 2006)
- ▶ Science et Avenir, [Les pérégrinations d'un billet de banque utiles à l'épidémiologie](#) (Jan 26, 2006)
- ▶ 3sat, [Seuchen und Dollarnoten verbreiten sich ähnlich](#) (Feb 15, 2006)
- ▶ Deutschlandfunk, [Von Geldströmen und Pandemien](#) (Jan 26, 2006)
- ▶ Spiegel Online, [Seuchen Prognose - Forscher finden das Gesetz des Reisens](#) (Jan 26, 2006)
- ▶ Focus, [Viren reisen wie Dollarnoten](#) (Jan 26, 2006)
- ▶ Süddeutsche Zeitung, [Bewegte Erreger - Dollars und Viren - Die Wege von Geldnoten machen Epidemien berechenbar](#) (Jan 26, 2006)
- ▶ Frankfurter Allgemeine Zeitung, [Die Gesetze des Reisens](#) (Jan 26, 2006)
- ▶ Der Stern, [Dollars verraten Reisewege von Viren](#) (Jan 26, 2006)
- ▶ Die Welt, [Geldnoten zeigen Forschern Verbreitungswege von Erregern auf](#) (Jan 26, 2006)
- ▶ Das Handelsblatt, [Analyse der Reisewege von Geldscheinen erleichtert Seuchenprognose](#) (Jan 25, 2006)
- ▶ Spektrum der Wissenschaft, [Das Gesetz des Reisens](#) (pdf - Apr 2006)
- ▶ Ärztezeitung, [Markierte Dollarnoten erlauben Prognose von Seuchenausbreitung](#) (Jan 26, 2006)
- ▶ Informationsdienst Wissenschaft, [Auf den Spuren des Geldes: Durchbruch für die Vorhersage der Seuchenausbreitung](#) (Jan 25, 2006)

2004-05: The forecast of epidemics in globalized world

Selected Television/Radio Coverage:

- ▶ ZDF heute, news feature (Oct. 2004)
- ▶ RTL Aktuell, news feature (Oct 20, 2004)
- ▶ SAT.1 News, news feature (Oct 23, 2004)
- ▶ SAT.1 Planetopia, science program feature (Sep 26, 2005)
- ▶ WDR Q21, science program feature (Dec 14, 2004)
- ▶ WDR Quarks & Co., science program feature (Oct 2005)

Selected Press Coverage:

- ▶ Der Spiegel, [Wie eine Seuche die Welt überzieht](#) (Oct 19, 2004)
- ▶ Die Welt, [Neues Vorhersage-Modell für globale Seuchen](#) (Oct 20, 2004)
- ▶ Frankfurter Allgemeine Zeitung, [Vorhersagemodell über die Ausbreitung von Epidemien entwickelt](#) (Oct 19, 2004)
- ▶ Hamburger Abendblatt, [Modellrechnung für Seuchen](#) (Oct 20, 2004)
- ▶ GEO Magazin, [Mathematik: Mit SARS um die Welt](#) (Nov 7, 2004)
- ▶ Pro-Physik, [In 80 Tagen um die Welt: Epidemie-Vorhersagen auf der Basis von Flugpassagierströmen](#) (Oct 19, 2004)
- ▶ Vista Verde News, [Epidemien reisen per Flugzeug](#) (Oct 19, 2004)
- ▶ innovations-report, [In 80 Tagen um die Welt - wie sich Epidemien ausbreiten](#) (Oct 18, 2004)
- ▶ Informationsdienst Wissenschaft, [In 80 Tagen um die Welt: Epidemie-Vorhersagen auf der Basis von Flugpassagierströmen](#) (Oct 19, 2004)
- ▶ ScienceTicker, [Epidemien reisen per Flugzeug](#) (Oct 19, 2004)

Awards and Fellowships:

- ▶ Associate Student Government Faculty Honor Role 2008-2009
- ▶ Kavli Fellow, National Academy of Science, 2009

Memberships:

- ▶ German Physical Society
- ▶ American Physical Society
- ▶ Society of Industrial and Applied Mathematics

Collaborations with Corporate Enterprises and Government Agencies:

- ▶ Gesundheitsamt Frankfurt (Public Health Office, Frankfurt), context: global travel and pandemic containment
- ▶ Sozialministerium Hessen (Ministry of Social Affairs, Frankfurt, context: consulting of the Referat Seuchenschutz (epidemic containment unit)
- ▶ Fraport AG, Frankfurt (Frankfurt Airport Corporation), context: development of software tools for testing travel restrictions impacts
- ▶ Central European Bank, Frankfurt, context: dispersal of Euro bank notes within the European Union
- ▶ Abbott Diagnostics, Chicago, context: Migration of novel Asian Hepatitis B Virus (HBV) into the United States and the development of HBV containment strategies

Organization of Workshops and Symposia:

- ▶ Program Committee Member *Conference Engaging Data: First International Conference on Applications and Standards for Managing Electronic Information*, October 2009, MIT.
- ▶ Committee Member, *One Book One Northwestern* 2009-2010
- ▶ McCormick Global Ambassador to Germany, Northwestern University
- ▶ Symposium *Advances in Complex Networks: recent developments and applications*, Harnack Haus in Berlin funded by the Volkswagen Foundation, Sept. 2009
- ▶ Workshop *Epidemics in evolving networks*, MPI for physics of complex systems, Dresden, Dec. 2007
- ▶ Symposium *Non-linear transport phenomena in complex systems*, Spring Meeting of the German Physical Society, Regensburg, 2007

Reviewing:

- ▶ Nature
- ▶ Science
- ▶ Proc. Nat. Acad. Sci.
- ▶ PLoS Medicine
- ▶ PLoSOne
- ▶ Journal of the Royal Society Interface
- ▶ Phys. Rev. Lett.
- ▶ Phys. Rev. E
- ▶ Phys. Rev. B
- ▶ New Journal of Physics
- ▶ Dynamical Systems
- ▶ JStat
- ▶ Nonlinearity
- ▶ Bulletin of Mathematical Biology
- ▶ German Science Foundation
- ▶ Springer-Verlag
- ▶ Wiley-VCH
- ▶ Cambridge University Press

Teaching:

- ▶ **Fall 2008:** APPM 495-0: Mathematical Epidemiology
- ▶ **Winter 2008/09:** MATH 234-0: Multivariate Calculus
- ▶ **Spring 2009:** APPM 311-3: Complex Analysis
- ▶ **Winter 2009/10:** APPM 448-0: Numerical Methods for Random Processes
- ▶ **Spring 2010:** APPM 495-0: Stochastic Processes in Biological Systems
- ▶ **Spring 2010:** APPM 322-0: Applied Dynamical Systems

Current Theses Advisees

- ▶ Daniel Grady
- ▶ Olivia Woolley
- ▶ Vincent David
- ▶ Christian Thiemann
- ▶ Rafael Brune,
- ▶ Alejandro Morales-Gallardo

Former Theses Advisees:

- ▶ Johannes Broedel

- ▶ Benjamin Schwenker
- ▶ Vitaly Belik
- ▶ Steffen Arnrich

Synergistic Activities

- ▶ Member of *Nature Reader Advisory Panel, Nature* (since 2008)
- ▶ Contribution of video clips and computer simulations to Exhibition *Albert Einstein: Chief Engineer of the Universe*, Berlin, 16/5-30/9/2005
- ▶ Contribution of video clips and computer simulations to Exhibition *Evolution: Die Wege des Lebens*, German Museum of Hygiene, Dresden, 24/9/2005-13/7/2006
- ▶ Contribution of computer simulations to Special Exhibition *Computer.Medicine*, Heinz Nixdorf Museum, Paderborn, 24/10/2006-
- ▶ Contribution of illustration "Global Traffic" to BBC Focus Magazine, 6/2006
- ▶ Contribution of video clip "Global Human Mobility" to BBC Panorama television program 10/2005
- ▶ Contribution of multimedia material to BBC Horizon, television program, 4/2006