

Dr. Michael T. Gastner

CONTACT INFORMATION

Hungarian Academy of Sciences
Research Centre for Natural Sciences
Institute of Technical Physics and Materials
Science
P.O. Box 49, H-1525 Budapest, Hungary

Phone: +36 1 429 0292
Mobile: +36 70 558 4516
Email: mgastner@gmail.com
WWW: <http://www2.imperial.ac.uk/~mgastner>

ACADEMIC POSITIONS

since November 2013: Institute of Technical Physics and Materials Science, Hungarian Academy of Sciences, Budapest

FP7 Marie Curie Fellow of the European Commission (experienced researcher)

September 2012 – October 2013: Lecturer in the Department of Engineering Mathematics, University of Bristol, UK

Independent research, PhD project supervision, lecturer for under- and postgraduate courses.

December 2009 – August 2012: Mathematics Department, Imperial College London, UK
Imperial College Junior Research Fellow

May 2008 – November 2009: Institute for Chemistry and Biology of the Marine Environment, Carl von Ossietzky Universität, Oldenburg, Germany
Computational Science Fellow of the Volkswagen Foundation

January 2008 – May 2008: Department of Computer Science, University of New Mexico, Albuquerque, NM, USA
Visiting Postdoctoral Researcher

October 2005 – May 2008: Santa Fe Institute, Santa Fe, NM, USA
Postdoctoral Fellow

QUALIFICATIONS

September 2001 – August 2005: University of Michigan, Ann Arbor, MI, USA

PhD, Physics (supported by Rackham Dissertation Grant)

Thesis: “Spatial distributions – density-equalizing maps, facility location, and two-dimensional networks”

September 2000 – August 2001: University of Michigan, Ann Arbor, MI, USA

Scholarship of the Max Kade Foundation (Physics Graduate Non-Degree Student)

October 1997 – July 2000: Albert-Ludwigs-Universität Freiburg, Freiburg i. Br., Germany

Vordiplom (Physics), average mark 1.0 (best possible mark on a scale from 1.0 to 6.0)

HONOURS AND AWARDS

- *FP7 Marie Curie Fellowship*
 - total support: €184,000
 - competitive intra-European fellowship for experienced researchers
- *Building Global Engagements in Research 2012-2013*
 - £3440 travel award
 - competitively awarded internal responsive mode funding at the University of Bristol
- *Imperial College Junior Research Fellowship 2009-2012*
 - total support: £122,000
 - independent fellowship
 - aims to select world-class early-career researchers
 - selection through a rigorous three-stage review process in open competition
- *Computational Science Fellowship of the German Volkswagen Foundation 2009*
 - total support: €201,000
 - supports junior researchers in theoretical and computer-based disciplines
 - selection by an international review panel

- *Postdoctoral Fellowship, Santa Fe Institute 2005-2008*
 - salary + \$12,000 research expenses
 - highly competitive fellowship
 - aims to “prepare fellows to be leaders in transdisciplinary science”
- *Rackham Dissertation Grant 2005*
 - tuition fees + monthly stipend
- *Wirt and Mary Cornwell Prize 2004*
 - \$10,000 cash award
 - awarded to PhD students who have “demonstrated greatest intellectual curiosity, given most promise of original study and creative work”
- *Max Kade Foundation Scholarship 2000-2001*
 - tuition fees + monthly stipend

PUBLICATIONS

- **Michael T. Gastner** and César Ducruet
The distribution function of vessel calls and port connectivity in the global cargo ship network
to appear in C. Ducruet (ed.): *Maritime networks: Spatial structures and time dynamics* (Routledge, London).
- **Michael T. Gastner**
The complex network of cargo shipping and its importance in marine bioinvasion
to appear in *Topologica*, vol. 3.
- **Michael T. Gastner**
The Ising chain constrained to an even or odd number of positive spins
Journal of Statistical Mechanics, P03004 (2015), DOI 10.1088/1742-5468/2015/03/P03004
- **Michael T. Gastner** and César Ducruet
How heavy-tailed is the distribution of global cargo ship traffic?
to appear in the Proceedings of the 3rd International Workshop on Complex Networks and their Applications.
- **Michael T. Gastner**, Nikolitsa Markou, Gunnar Pruessner, Moez Draief
Opinion formation models on a gradient
PLoS ONE, vol. 9, e114088 (2014), DOI 10.1371/journal.pone.0114088
- Vsevolod Salnikov, Daniel Schien, Hyejin Youn, Renaud Lambiotte and **Michael T. Gastner**
The geography and carbon footprint of mobile phone use in Cote d’Ivoire
EPJ Data Science, vol. 3, p. 3 (2014), DOI 10.1140/epjds21
- Hanno Seebens, **Michael T. Gastner** and Bernd Blasius
The risk of marine bioinvasion caused by global shipping
Ecology Letters, vol. 16, pp. 782–790 (2013), DOI 10.1111/ele.12111
- **Michael T. Gastner** and Beáta Oborny
The geometry of percolation fronts in two-dimensional lattices with spatially varying densities
New Journal of Physics, vol. 14, p. 103019 (2012), DOI 10.1088/1367-2630/14/10/103019
- **Michael T. Gastner**
Scaling and entropy in p-median facility location along a line
Physical Review E, vol. 84, p. 036112 (2011), DOI 10.1103/PhysRevE.84.036112
- **Michael T. Gastner**, Beata Oborny, Alexey B. Ryabov and Bernd Blasius
Changes in the gradient percolation transition caused by an Allee effect
Physical Review Letters, vol. 106, p. 128103 (2011), DOI 10.1103/PhysRevLett.106.128103
- Pablo Kaluza, Andrea Kölzsch, **Michael T. Gastner** and Bernd Blasius
The complex network of global cargo ship movements
Journal of the Royal Society Interface, vol. 7, pp. 1093–1103 (2010), DOI 10.1098/rsif.2009.0495
- **Michael T. Gastner**
Traffic flow in a spatial network model
in A. A. Minai, D. Braha and Y. Bar-Yam (eds.): *Unifying Themes in Complex Systems*, vol. 6: Proceedings of the 6th International Conference on Complex Systems, Springer, Berlin (2010), DOI 10.1007/978-3-540-85081-6_40

- **Michael T. Gastner**, Beata Oborny, D. K. Zimmermann and Gunnar Pruessner
Transition from connected to fragmented vegetation across an environmental gradient: scaling laws in ecotone geometry
The American Naturalist, vol. 174, pp. E23–E39 (2009), DOI 10.1086/599292
- Hyejin Youn, **Michael T. Gastner** and Hawoong Jeong
Inefficiency in networks with multiple sources and sinks
in Jie Zhou (ed.): Complex Sciences, vol. 4, part 1. Springer, Berlin (2009), DOI 10.1007/978-3-642-02466-5_32
- Hyejin Youn, **Michael T. Gastner** and Hawoong Jeong
The price of anarchy in transportation networks: efficiency and optimality control
Physical Review Letters, vol. 101, p. 128701 (2008), DOI 10.1103/PhysRevLett.101.128701
- **Michael T. Gastner**
Shape and efficiency in growing spatial distribution networks
Proceedings of the Second European Conference on Complex Systems (2006)
- **Michael T. Gastner** and M. E. J. Newman
Optimal design of spatial distribution networks
Physical Review E, vol. 74, p. 016117 (2006), DOI 10.1103/PhysRevE.74.016117
- **Michael T. Gastner** and M. E. J. Newman
Shape and efficiency in spatial distribution networks
Journal of Statistical Mechanics, P01015 (2006), DOI 10.1088/1742-5468/2006/01/P01015
- **Michael T. Gastner** and M. E. J. Newman
The spatial structure of networks
European Physical Journal B, vol. 49, pp. 247–252 (2006), DOI 10.1140/epjb/e2006-00046-8
- **Michael T. Gastner**
Spatial distributions: density-equalizing map projections, facility location, and two-dimensional networks, Ph.D. thesis, University of Michigan, Ann Arbor (2005)
- **Michael T. Gastner** and M. E. J. Newman
Density-equalizing map projections: Diffusion-based algorithm and applications
Proceedings of the 8th International Conference on GeoComputation (2005)
- **M. T. Gastner**, C. R. Shalizi and M. E. J. Newman
Maps and cartograms of the 2004 US presidential election results
Advances in Complex Systems, vol. 8, pp. 117–123 (2005), DOI 10.1142/S0219525905000397
- **Michael T. Gastner** and M. E. J. Newman
Diffusion-based method for producing density-equalizing maps
Proc. Nat. Acad. Sci. USA, vol. 101, pp. 7499–7504 (2004), DOI 10.1073/pnas.0400280101

INVITED
PRESENTATIONS IN
LAST 5 YEARS

- May 2015* *How to find communities in networks*
Biological Physics Seminar, Eötvös Loránd University, Budapest, Hungary.
- Apr 2015* *How to find communities in networks*
Informatics Seminar, University of Kyoto, Japan.
- Mar 2015* *How to find communities in networks*
Evolutionary Zoology seminar, University of Debrecen, Hungary.
- Oct 2014* *The complex network of cargo ship movements and its importance in marine bioinvasion*
LINK-group seminar, Semmelweis University, Budapest, Hungary.
- Oct 2014* *Network formation and decision making*
Department of Business Administration, Universität Zürich, Switzerland.
- Jun 2014* *The complex network of cargo shipping and its importance in marine bioinvasion*
International Workshop on Maritime Networks in Space and Time,
Institut des Systèmes Complexes, Paris, France.
- Mar 2014* *Gradient percolation – an introduction and recent developments*
Nyíregyházi Főiskola Matematika és Informatika Intézet, Nyíregyháza, Hungary
- Sep 2013* *The complex network of cargo shipping and its importance in marine bioinvasion*
International Workshop on Phase Transition, Critical Phenomena and Related Topics
in Complex Networks, Hokkaido University, Sapporo, Japan.

- Aug 2013 *The complex network of global cargo ship movements*
Seminar, London Mathematical Laboratory, London, UK.
- Nov 2012 *Shortest paths in networks, minimum-cost flows and the price of anarchy*
PhD school on networks and medical imaging, Namur Centre for Complex Systems,
University of Namur, Belgium.
- Oct 2012 *Gradient percolation*
Applied Nonlinear Mathematics seminar, University of Bristol, UK.
- Jul 2012 *The complex network of cargo ship movements*
Seminar, Complexity Program, Nanyang Technological University, Singapore.
- Mar 2012 *Gradient percolation, tree lines and the Allee effect*
Biological Physics seminar, Eötvös Loránd University, Budapest, Hungary.
- Mar 2012 *Spatial applications of complexity science and network theory*
Research seminar, Department of Engineering Mathematics, University of Bristol, UK.
- Feb 2012 *Gradient percolation*
Complex Systems and Modelling seminar, Institute for Chemistry and Biology of
the Marine Environment, Carl von Ossietzky Universität Oldenburg, Germany.
- Jan 2012 *Applications of spatial statistical physics to economic geography*
Research seminar, IMT Lucca, Italy.
- Dec 2011 *Gradient percolation, tree lines and the Allee effect*
Workshop on Complex Systems: Social and Biological Applications.
Universidade de São Paulo, Brazil.
- Jun 2011 *The complex network of cargo ship movements*
Seminar, Ecology and Evolution, Imperial College, Silwood Park, UK.
- May 2011 *The complex network of cargo ship movements*
Seminar, Centre for Mathematics and Physics in the Life Sciences and Experimental
Biology, University College London, UK.
- Feb 2011 *Models of bio-invasion mediated by the network of cargo ships*
Seminar, Icelab, Umeå universitet, Sweden.
- Jan 2011 *Scaling and entropy in facility locations*
International Workshop on Scaling in Complex Systems, Institute for Mathematical
Sciences, Imperial College, London, UK.
- Jan 2011 *Spatial networks: Should we revive quantitative geography?*
Networks Winter School, University of Warwick, UK.
- Oct 2010 *Understanding a networked world*
Imperial College Junior Research Fellow Conference, London, UK.
(Presentation also won prize for best poster.)
- Jun 2010 *The geography of transportation networks*
Workshop on Transportation networks in nature and technology, Institut des
Systèmes Complexes, Paris, France.
- Apr 2010 *The complex network of cargo ship movements*
Seminar, CABDyN Complexity Centre, University of Oxford, UK.
- Feb 2010 *The complex network of cargo ship movements*
Seminar, Complexity and Networks Programme, Imperial College, London, UK.

SELECTED MEDIA
COVERAGE

- ARD (German public television), “Wissen vor Acht”, 19 June 2014.
- Wadden monitoring in the spotlight, “Aliens from our own planet”, 4 Feb 2014.
- Science for Environment Policy, “Risks of invasion of alien marine species driven by global shipping”, 2013.
- Elements, “High-risk routes of sea invaders”, 24 June 2013.
- ZDF (German public television), documentary “Deutschland von oben 3: Fluss”, (beginning at minute 38:00), 3 June 2013.
- Le Monde, “Comment les espèces invasives débarquent en masse dans les ports de la planète”, 30 May 2013.
- ZDF, feature about bioinvasion on “logol!”, a news programme for children, 8 May 2013.
- Wall Street Journal, “Roving Sea Squirts, Mussels Threaten Top Asian Ports”, 7 May 2013.
- Der Spiegel, “Eingeschleppte Arten: Forscher kartieren Wege der Bioinvasoren”, 6 May 2013.

Süddeutsche Zeitung, “Einfallstore für fremde Arten”, 6 May 2013.
Stern, “Fremde Arten verbreiten sich an Riesenhäfen”, 6 May 2013.
SRF (Swiss Radio and Television), feature about bioinvasion on the prime time TV news show “Tagesschau”, 6 May 2013.
Die Welt, “Wo die Gefahr einer Bio-Invasion am größten ist”, 6 May 2013.
BBC News, “Scientists map global routes of ship-borne invasive species”, 5 May 2013.
Los Angeles Times, “Study of shipping routes maps delivery of invasive organisms”, 5 May 2013.
Wired, “Singapore and Hong Kong are most vulnerable to underwater invaders”, 5 May 2013.
666 ABC (Australian Broadcasting Corporation) Canberra, radio interview on “Breakfast with Ross Solly” about marine bioinvasion, 5 May 2013.
Yahoo! News, “Immigration from Mexico plummeted well before Arizona law” (interactive map), 25 June 2012.
News and Tribune, “STAWAR: Rat-running and runabouts”, Sep 2011.
Imperial College Podcast, July 2010.
Folha de S. Paulo, “Ecólogos mapeiam rotas globais de navios”, Jan 2010.
AFP, “Shipping map helps combat invasive species at sea”, Jan 2010.
Der Spiegel, “Weltkarte der Schifffahrt: Forscher finden Einfallstore tierischer Invasoren”, Jan 2010.
New Scientist, “Shipping map tracks marine aliens”, issue 2743, p. 5 (2010).
Scientific American, “Removing Roads and Traffic Lights Speeds Urban Travel”, Jan 2009.
The Atlantic, “Share the Road”, Dec 2008.
Phys.org, “Counterintuitive physics may help everyone drive home quicker”, 02 Oct 2008.
Nature, “Swollen with success”, vol. 455, p. 270 (2008).
The Economist, “Queuing conundrums”, 11 Sep 2008.
Nature, “The best is yet to come”, vol. 447, p. 39 (2007).
Congressional Quarterly, “This Is Your Country on a Blue State Binge”, 11 Dec 2006.
Esquire, “No. 019: The Number”, Oct 2006, p. 213.
Nature, “Cartography: A popular perspective”, vol. 439, p. 800 (2006).
Discover, “Gaseous America”, vol. 26, no. 9 (2005).
The Guardian, “The Altered States”, 16 Nov 2004.
Washington Post, “Election Map Makers, Exercising Some Latitude”, 13 Nov 2004.
CNN, Paula Zahn Now, 12 Nov 2004.
Science News, vol. 166, no. 9, p. 136 (2004).
Science, vol. 304, p. 1239 (2004).

MENTORING OF
 POSTGRADUATE
 STUDENTS

since 2013: I am supervising the PhD project *Inferring species interactions from time series* at the Centre for Complexity Sciences, University of Bristol.
2012: I supervised the MSc thesis *Constrained gravity models for network flows*, Imperial College London.
2012: I supervised the MSc thesis *Interface motion in stochastic majority voter model*, Imperial College London.
2011: I supervised the MSc thesis *Cartograms in Applied Mathematics*, Imperial College London.
2011: I supervised the MSc thesis *Percolation thresholds on correlated lattices and finite-size scaling* in Applied Mathematics, Imperial College London.
2006–2008: I worked with a visiting fellow at the Santa Fe Institute (PhD student at Korea Advanced Institute of Science and Technology) on her thesis project *The price of anarchy in transportation networks*.

TEACHING
 EXPERIENCE

October 2014: Three-week lecture course “Evolutionary Game Theory”, Department of Ecology and Theoretical Biology, Eötvös University Budapest, Hungary
January – May 2013: Lecture courses Engineering Mathematics 1 and 2, University of Bristol, UK. This is the foundations course for all first- and second-year engineering students. It is among the largest lecture courses at the university, attended by around 450 students each year.
December 2012: Lectures “Network flow algorithms”, Centre for Complexity Sciences, University of Bristol, UK.
November 2012: Lecture at the PhD school “Networks and medical imaging”, University of Namur, Belgium.

March 2012: Lecture: Stochastic spatial models in ecology, Imperial College London, UK.

March 2012: Lectures: Mathematics I for Civil Engineers, Imperial College London, UK.

October – December 2011: Lectures at the “Mathematics Taught Course Centre” (TCC).

- I taught the new MSc/PhD course “Networks: theory and applications”.
- The lectures were held at Imperial College and broadcast live to the Universities of Bath, Bristol, Oxford and Warwick.

January 2011: Lecture at the Networks Winter School, University of Warwick, UK.

June 2008: Lecture: Biological Modelling, ICBM Oldenburg, Germany.

July 2006: Lecture: SFI Graduate Workshop in Social Science, Santa Fe Institute, USA.

September 2001 – April 2003: Graduate Student Instructor, University of Michigan, USA

- Winter 2003: Introductory Mechanics and Sound Laboratory
- Winter 2002: Introductory Electricity and Light Laboratory
- Fall 2001: Elementary Laboratory II (Electricity and Magnetism)