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Angelika Manhart

New York, October 10, 2018

Personal Information

Citizenship Austrian

Scientific Positions

Nov 2018 – **Postdoctoral researcher**, *Imperial College London*.
Mentor: Prof. Pierre Degond.

2016 – 2018 **Postdoctoral researcher**, *New York University*, Courant Institute.
Mentor: Prof. Alex Mogilner.

2011–2015 **PhD student in Biomathematics**, *University of Vienna*.
Supervisor: Prof. Christian Schmeiser.
Employment at:
- Radon Institute for Computational and Applied Mathematics
- Doctoral School *Dissipation and Dispersion in Nonlinear PDEs*
- WWTF Project *Modeling of Polarization and Motility of Leukocytes in 3D Environments*

Sum 2009 **Internship, *Department for Genetic Epidemiology***, *Medical University, Innsbruck*.

2006–2008 **Part-time work, *Department for Clinical Microbiology***, *AKH (General Hospital), Vienna*.

Education

Nov 2015 **PhD in Biomathematics**, *University of Vienna*.
Passed with distinction.

Nov 2011 **Master's degree in Mathematics (Magistra)**, *University of Vienna*.
Passed with distinction.

June 2011 **Bachelor's degree in Molecular Biology**, *University of Vienna*.
Passed with distinction.

June 2004 **Graduation at Bilingual (English/German) High School, Draschestraße, Vienna**.
Passed with distinction.

Scientific Interests

My research centers around formulating and analyzing mathematical models of cell biological phenomena. My research interests include:

Analysis Nonlinear partial differential equations, dynamical systems, bifurcations, asymptotic analysis, kinetic equations, long-time behavior, traveling waves

Modeling Alignment models, coarse-graining, multi-scale approaches, variational techniques

Data Analysis Image analysis, topological data analysis, data-driven modeling

Biology Cell migration, cytoskeletal fibers (actin, microtubules), pattern formation (swarming, myxobacteria, phase transitions), organelle positioning (nuclei in muscles, spindle)

Simulation Finite element, finite difference and finite volume methods, asymptotics-based schemes, simulating agent-based models

Publications & Preprints

Preprints

- S. Windner, A. Manhart, A. Brown, A. Mogilner and M. Baylies, *Cell size and nuclear scaling relationships in multinucleated muscle fibers* - under review at Dev Cell.
- A. Manhart, A. Icheva, C. Guerin, T. Klar, R. Boujemaa-Paterski, M. Thery, L. Blanchoin, A. Mogilner, *Reconstitution of the equilibrium state of dynamic actin networks* - unter review at eLife – *on bioRxiv*.

Publications

12. A. Manhart, *Counter-propagating wave patterns in a swarm model with memory*. J Math Biol. https://doi.org/10.1007/s00285-018-1287-x (2018).
11. P. Degond, A. Manhart, H. Yu, *An age-structured continuum model for myxobacteria*. Math Mod Meth Appl Sci 28(9):1737–1770 (2018).
10. A. Manhart, S. Windner, M. Baylies and A. Mogilner, *Mechanical positioning of multiple nuclei in muscle cells*. PLOS Comp Biol. 14(6):e1006208 (2018).
9. B. Hartl, I. Zeller, A. Manhart, B. Selitsch, C. Lass-Flörl and B. Willinger, *A retrospective assessment of four antigen assays for the detection of invasive candidiasis among high risk hospitalized patients*. Mycopathologia. 183(3):513-519 (2018).
8. A. Manhart and A. Mogilner, *Intracellular fluid mechanics: coupling cytoplasmic flow with active cytoskeletal gel*. Annual Review of Fluid Mechanics, 50:347-370 (2018)
7. P. Degond, A. Manhart, H. Yu, *A continuum model of nematic alignment of self-propelled particles*. DCDS B. 22(4):1295-1327 (2017).
6. S. Hirsch, A. Manhart, C. Schmeiser, *Mathematical modeling of myosin induced bistability of lamellipodial fragments*. J Math Biol. 74(1-2):1-22 (2017)
5. A. Manhart, D. Oelz, C. Schmeiser, N. Sfakianakis, *Numerical treatment of the Filament Based Lamellipodium Model (FBLM)*. In: Modeling Cellular Systems 141-159, Springer (2017).
4. A. Manhart and A. Mogilner, *Agent-based modeling: case study in cleavage furrow models*. Mol Bio Cell, 27:3379-84 (2016).
3. A. Manhart and C. Schmeiser, *Existence of and decay to equilibrium of the filament end density along the leading edge of the lamellipodium*. J Math Biol. 74(1-2):169-193 (2016).
2. A. Manhart, D. Oelz, C. Schmeiser, N. Sfakianakis, *An extended Filament Based Lamellipodium Model produces various moving cell shapes in the presence of chemotactic signals.*, J Theo Biol, 382:244-258 (2015)
1. M. Summerer, J. Horst, G. Erhart, H. Weißensteiner, S. Schönherr, D. Pacher, L. Forer, D. Horst, A. Manhart, B. Horst, T. Sanguansermsri, A. Kloss-Brandstätter, *Large-scale mitochondrial DNA analysis in Southeast Asia reveals evolutionary effects of cultural isolation in the multi-ethnic population of Myanmar*, BMC Evolut Biol, 14(1):17 (2014)

Distinctions & Awards

Spring 2018 **Short-listed (Top 2) for Faculty Position at Johns Hopkins School of Medicine, Center for Cell Dynamics**, *Baltimore, USA*.

Spring 2018 **Short-listed (Top 2) for Faculty Position at University of British Columbia**, *Vancouver, Canada*.

Aug 2018 **Travel Award, Association for Women in Mathematics, NSF**, *880$*.

July 2018 **Travel Award, 13th World Congress in Computational Mechanics**, *New York, USA*, ∼1400$.

Nov 2015 **Passed with distinction: PhD in Biomathematics**, *University of Vienna*.

April 2014 **Group Prize for Best Presentation at the Graduate Modeling Camp 2014**, *Oxford, UK*.

Nov 2011 **Passed with distinction: Master's degree in Mathematics**, *University of Vienna*.

June 2011 **Passed with distinction: Bachelor's degree in Molecular Biology**, *University of Vienna*.

2010 **Scholarship for Extraordinary Achievements**, *University of Vienna*, 750€, Competing group ∼ 600 students.

2007 **Scholarship for Extraordinary Achievements**, *University of Vienna*, 750€, Competing group ∼ 600 students.

2006 **Scholarship for Extraordinary Achievements**, *University of Vienna*, 750€, Competing group ∼ 600 students.

Talks & Posters

In total I gave **more that 15 talks at international conferences, seminars and meetings and 3 poster presentations**.

Aug 2018 **Invited Talk,** ***"Mathematics of the Cell. Mechanical and Chemical Signaling across Scales"***, *BIRS*, Banff, Canada.

May 2018 **Invited Talk,** ***"Collective dynamics and self-organization in biological sciences"***, *ICMS*, Edinburgh, Scotland.

April 2018 **Invited Talk,** ***"Applied PDEs and kinetic equations: from physics to life sciences and beyond"***, *University of Vienna*, Vienna, Austria.

Dec 2017 **Invited Talk,** ***SIAM PDE, Minisymposium "Kinetic and mean-field models in socio-economics and life sciences"***, *Baltimore, USA*.

Nov 2017 **Invited Talk,** ***Meeting on Fly Research in the NY Area***, *Sloan Kettering Institute*, New York, USA.

Sept 2017 **Invited Talk,** ***INdAM Meeting "Mathematical Physics of Living Systems"***, Cortona, Italy.

Aug 2017 **Invited Talk,** ***Applied Mathematics, Modeling and Computational Science***, Waterloo, Canada.

May 2017 **Invited Talk,** ***American Mathematical Society Sectional Meeting***, New York, USA.

Aug 2015 **Invited Talk,** ***International Conference on Industrial and Applied Mathematics***, Beijing, China.

Sept 2014 **Invited Talk,** ***Mathematical Modeling in Biology and Physiology***, Vienna, Austria.

June 2014 **Talk,** ***European Conference of Mathematical and Theoretical Biology***, Göteborg, Sweden.

June 2014 **Poster,** ***Models and Methods in Kinetic Theory (Summer School)***, Porto Ercole, Italy.

Jan 2014 **Invited Talk,** ***Mathematical Modeling in Biology***, Graz, Austria.

Jan 2013 **Invited Talk,** ***SciComp2013: Software Frameworks for Challenging Computational Problems***, Crete, Greece.

Jun 2012 **Poster,** ***Models and Methods in Kinetic Theory (Summer School)***, Porto Ercole, Italy.

Sept 2012 **Poster,** ***Applied PDEs in Physics, Biology and Social Sciences***, Barcelona, Spain.

Sept 2011 **Talk,** ***Non-linear PDEs arising in Mathematical Biology***, *ICMS*, Edinburgh, Scotland.

Research Visits & Seminar Talks

Sept 2018 **Seminar Talk,** ***Math Department Colloquium***, *Rensselaer Polytechnic Institute*, New York, USA.

Sept 2018 **Collaboration with A. Lindsay**, *University of Notre Dame*, South Bend, USA.

Sept 2018 **Seminar Talk,** ***Applied Math Seminar***, *University of Notre Dame*, South Bend, USA.

March 2018 **Seminar Talk,** ***Computational Biology Colloquium***, *Courant Institute, NYU*, New York, USA.

2014–2017 **Collaboration with P. Degond**, *Imperial College, London, UK*, 4x1 week, 2 Seminar Talks.

Dec 2017 **Seminar Talk,** ***PDE Afternoon***, *Technical University of Vienna*, Vienna, Austria.

Nov 2016 **Seminar Talk,** ***Applied Mathematics Colloquium***, *Courant Institute, NYU*, New York, USA.

Sept 2016 **Visit of L. Berlyand**, *Penn State University, State Coll., USA*, 2 Seminar Talks.

May 2012 **Collaboration with N. Sfakianakis**, *Johannes Gutenberg University, Mainz, Germany*, 1 Seminar Talk.

Attended Programs, Summer Schools & Courses

June 2018 **Mathematical Research Communities.** ***Agent-based Modeling in Biological and Social Systems***, *AMS, Rhode Island, USA, 1 week*,
Content: Micro-macro descriptions, Topological Data Analysis.

June 2016 **Course.** ***VCell Short Course***, *University of Connecticut Health Center, Farmington, USA, 3 days*,
Content: The simulation platform VCell, deterministic reaction-diffusion-advection PDEs, stochastic reactions.

Sept 2014 **Summer School of the Doctoral School** ***Dissipation and Dispersion in Nonlinear PDEs***, *Weissensee, Austria, 1 week*,
Content: Courses on water waves, fractional differential operators, stochastic PDEs.

June 2014 **Summer School.** ***Models & Methods in Kinetic Theory***, *Porto Ercole, Italy, 1 week*,
Course examples: Boundary layers and internal layers in fluid dynamics and kinetic theories, Large-time behavior in Fokker-Planck equations.

Apr 2014 ***100th European Study Group with Industry***, *Oxford, UK, 1 week*,
Content: Modeling and analysis of filter design (Pall Corporation).

Apr 2014 ***Graduate Modeling Camp***, *Oxford, UK, 1 week*,
Content: Modeling, analysis and simulation of efficient airplane boarding.

June 2012 **Summer Schools.** ***Models and Methods in Kinetic Theory***, *Porto Ercole, Italy, 1 week*,
Course examples: Coagulation-Fragmentation Models, Statistical mechanics and dynamics of long-range interacting systems.

Sept 2009 **Summer School.** ***MathMods***, *Alba Adriatica, Italy, 2 weeks*,
Course examples: Structured population dynamics in ecology and epidemiology. The many sides of reaction-diffusion systems.

Communication Skills, Team Management & Personal Development

June 2018 ***Storytelling Workshop***, *NYU, New York, 3 days*,
Content: Make research accessible, adapt to different audiences, self-editing.

Mar 2018 ***Conflict Resolution Workshop***, *NYU Langone Health, New York, 1 day*,
Content: Conflicts in work/academia, conflict styles & solution strategies.

Spring 2017 ***Advanced Science Communication Workshop***, *Arthur L. Carter Journalism Institute, NYU, New York*, 5 weeks,
Content: Character sketches, writing styles, science book reviews.

Wint 2016 ***Basic Science Communication Workshop***, *Arthur L. Carter Journalism Institute, NYU, New York*, 5 weeks,
Content: Avoiding jargon, word choice, text structure.

Wint 2014 ***Presentation Techniques***, *DK Winter Workshop, Hernstein*, 1 day.

Teaching

In the list of teaching experiences below, I also included some less conventional teaching experiences (marked with *) that influenced my teaching style.

Winter 2017 **Mathematical Modeling with Differential Equations**, *College Bridge Course, New York Math Circle*, 5 weeks, Lecturer.
Audience: Gifted high school students and Math Circle instructors, 10 students
Responsibilities: Lecturing, designing course outline, material and homework questions.
Course Evaluation: 4.8 of 5.

Winter 2017 ***Access 2017 - Artist and Scientist Collaborations**, *New York Hall of Science (Science Museum)*, 3 months, Project Mathematician.
Audience: Children and teenagers, several groups of 10-20.
Responsibilities: Together with the game developers *Gigantic Mechanic* and the choreographer *Kate Siccio* designing a physical game & dance to convey the concepts of mathematical modeling using the example of a zombie epidemic and cell movement.

Summer Term 2017 **Numerical Analysis**, *New York University*, 15 weeks, Lecturer.
Audience: Undergraduate students in Mathematics and Economics, 20 students.
Responsibilities: Lecturing, course design, material selection, homework questions, exam design and marking, co-ordination of Teaching Assistant and grader.
Course Evaluation: 4.6 of 5.

Sept 2016 **EMBO Practical Course *Modeling Cellular Processes in Space and Time***, *Porquerolles, France*, 1 week, Teaching Assistant.
Audience: Graduate students and Post-docs in mathematics, biology and physics.
Responsibilities: Facilitation, assistant to Prof. Mogilner.

Sept 2015 ***Facilitator at training *Gender Issues in East Africa*, (JAMBO project)**, *Rome, Italy*, 2 weeks, Nonformal education.
Audience: NGO workers from Italy, France and Austria.
Responsibilities: Designing and conducting activities.

April 2015 ***Facilitator at training *Project Management and Gender Issues*, (JAMBO project)**, *Kampala, Uganda*, 2 weeks, Nonformal education.
Audience: NGO workers from Kenya, Uganda and Tanzania.
Responsibilities: Designing and conducting activities.

Summer Term 2015 **Mathematics for Molecular Biologists**, *University of Vienna*, 15 weeks, Exercise Classes.
Audience: Undergraduate students of Molecular Biology, 2 groups of 25 students each.
Responsibilities: Designing and grading exercises and exams, conducting the exercise classes.
Course Evaluation: 4.7 of 5.

Summer Term 2011 **Mathematics for Molecular Biologists**, *University of Vienna*, Teaching Assistant.
Audience: Undergraduate students of Molecular Biology.
Responsibilities: Grading exams.

Peer-Review Activity

Journals Molecular Biology of the Cell, Bulletin of Mathematical Biology, AMS Mathematical Reviews, AIMS Biophysics

Science Communication, Public Engagement & Outreach

Aug 2018 **Introduction to Modeling**, *Center for Mathematical Talent, NYU, New York*, 2 part lecture, Highschool students.

2017 – **Science Illustrator of *Cooper Square Review***, *(Carter Journalism Institute)*, New York.

Apr 2018 **Modeling Talk**, *HTL Leberstrasse, Vienna*, Highschool students.

Apr 2018 **Modeling Talk**, *cSplash, CIMS, NYU*, Highschool students.

Apr 2018 **Panel Discussion: Artist and Science Conversation**, *NY Hall of Science*, New York, Science museum audience.

Wint 2017 **Access 2017 - Artist and Scientist Collaborations**, *NY Hall of Science (Science Museum)*, Project Mathematician, see Teaching for details.

2017 **Author of two science texts on *Cooper Square Review***, *(Carter Journalism Inst.)*, New York,
Essay: *How to Tame Infinity*
Book Review: *When America Met Darwin*.

Social & Cultural Engagement

2016– **Member of Post-doc Council, NYU, New York**.

2013–2015 **Editor in Chief of the intercultural magazine *Das Fenster***, *(Verein Grenzenlos)*.

2011–2015 **Part-time work at *Grenzenlos-Interkultureller Austausch***, *Vienna*, Co-ordination of volunteering programs to Africa.

Sept 2015 **Facilitator at training *Gender Issues in East Africa*, (JAMBO project)**, *Rome, Italy*, 2 weeks, see Teaching.

April 2015 **Facilitator at training *Project Management and Gender Issues*, (JAMBO project)**, *Kampala, Uganda*, 2 weeks, see Teaching.

2008 **Voluntary Social Year**, *Kabale, Uganda*, 12 months,
Fair-trade development, Multimedia, Management.

2002-2003 **Students Exchange**, *Nambour, Australia*, 12 months.

Programming & Software Skills

Languages Matlab, Python, Visual Basic

Software VCell, Cytosim, FreeFEM

Other ImageJ, Maple, R, Gimp, Inkscape

Languages

Fluent German & English

Basic Italian, French & Rukiga