

EMPLOYMENT

-
- Physics Department, Williams College
Assistant Professor of Physics Williamstown, MA
Jul 2020–
 - Department of Mathematics, Massachusetts Institute of Technology
Instructor in Applied Mathematics Cambridge, MA
Jul 2017–Jun 2020
 - Department of Physics and Astronomy, University of Pennsylvania
Postdoctoral Fellow Philadelphia, PA
Apr 2016–Sep 2017
 - Max Planck Institute for Dynamics and Self-Organization
Scientist Göttingen, Germany
Doctoral student Feb 2016–Apr 2016
Oct 2012–Feb 2016
 - ETH Zürich
Research assistant Zürich, Switzerland
Mar 2012–Jun 2012

EDUCATION

-
- Dr. rer. nat. (University of Göttingen, “summa cum laude”)
“Leaf Venation Networks” advised by Eleni Katifori, Max Planck Institute for Dynamics and Self-Organization, Göttingen Feb 2016
 - MSc ETH (“with distinction”, 6.0/6.0)
“Twisted Twining Genera in Mathieu Moonshine” advised by Matthias Gaberdiel, ETH Zürich Mar 2012
 - BSc ETH (5.61/6.0)
ETH Zürich Oct 2010

REFEREED ARTICLES

-
- **H. Ronellenfitsch** and E. Katifori. “Phenotypes of Vascular Flow Networks”. *Physical Review Letters* 123.24 (Dec. 2019), 248101. DOI: [10.1103/PhysRevLett.123.248101](https://doi.org/10.1103/PhysRevLett.123.248101). arXiv: [1707.03074](https://arxiv.org/abs/1707.03074).
 - **H. Ronellenfitsch** and J. Dunkel. “Chiral Topological Phases in Designed Mechanical Networks”. *Frontiers in Physics* 7.178 (Nov. 2019), 1–8. DOI: [10.3389/fphy.2019.00178](https://doi.org/10.3389/fphy.2019.00178). arXiv: [1907.02054](https://arxiv.org/abs/1907.02054).
 - **H. Ronellenfitsch**, N. Stoop, J. Yu, A. Forrow, and J. Dunkel. “Inverse design of discrete mechanical metamaterials”. *Physical Review Materials* 3.9 (Sept. 2019), 095201. DOI: [10.1103/PhysRevMaterials.3.095201](https://doi.org/10.1103/PhysRevMaterials.3.095201). arXiv: [1802.07214](https://arxiv.org/abs/1802.07214).
 - J. Strake, F. Kaiser, F. Basiri, **H. Ronellenfitsch**, and D. Witthaut. “Non-local impact of link failures in linear flow networks”. *New Journal of Physics* 21 (May 2019), 053009. DOI: [10.1088/1367-2630/ab13ba](https://doi.org/10.1088/1367-2630/ab13ba). arXiv: [1811.08683](https://arxiv.org/abs/1811.08683).
 - J. W. Rocks*, **H. Ronellenfitsch***, A. J. Liu, S. R. Nagel, and E. Katifori. “Limits of multifunctionality in tunable networks”. *Proceedings of the National Academy of Sciences* 111 (Jan. 2019), 201806790. DOI: [10.1073/pnas.1806790116](https://doi.org/10.1073/pnas.1806790116). arXiv: [1805.00504](https://arxiv.org/abs/1805.00504).
 - **H. Ronellenfitsch**, J. Dunkel, and M. Wilczek. “Optimal Noise-Canceling Networks”. *Physical Review Letters* 121.20 (Nov. 2018), 208301. DOI: [10.1103/PhysRevLett.121.208301](https://doi.org/10.1103/PhysRevLett.121.208301). arXiv: [1807.08376v2](https://arxiv.org/abs/1807.08376v2).
 - F. G. Woodhouse, **H. Ronellenfitsch**, and J. Dunkel. “Autonomous Actuation of Zero Modes in Mechanical Networks Far from Equilibrium”. *Physical Review Letters* 121.17 (Oct. 2018), 178001. DOI: [10.1103/PhysRevLett.121.178001](https://doi.org/10.1103/PhysRevLett.121.178001). arXiv: [1805.07728](https://arxiv.org/abs/1805.07728).

- L. Papadopoulos, P. Blinder, **H. Ronellenfitsch**, F. Klimm, E. Katifori, D. Kleinfeld, and D. S. Bassett. “Comparing two classes of biological distribution systems using network analysis”. *PLOS Computational Biology* 14.9 (Sept. 2018), e1006428. DOI: [10.1371/journal.pcbi.1006428](https://doi.org/10.1371/journal.pcbi.1006428). arXiv: [1612.08058](https://arxiv.org/abs/1612.08058).
- J. Hörsch, **H. Ronellenfitsch**, D. Witthaut, and T. Brown. “Linear optimal power flow using cycle flows”. *Electric Power Systems Research* 158 (May 2018), 126–135. DOI: [10.1016/j.epsr.2017.12.034](https://doi.org/10.1016/j.epsr.2017.12.034). arXiv: [1704.01881](https://arxiv.org/abs/1704.01881).
- **H. Ronellenfitsch**, D. Manik, J. Horsch, T. Brown, and D. Witthaut. “Dual Theory of Transmission Line Outages”. *IEEE Transactions on Power Systems* 32.5 (Sept. 2017), 4060–4068. DOI: [10.1109/TPWRS.2017.2658022](https://doi.org/10.1109/TPWRS.2017.2658022). arXiv: [1606.07276](https://arxiv.org/abs/1606.07276).
- J. Gräwer, **H. Ronellenfitsch**, M. G. Mazza, and E. Katifori. “Trophallaxis-inspired model for distributed transport between randomly interacting agents”. *Physical Review E* 96.2 (Aug. 2017), 022111. DOI: [10.1103/PhysRevE.96.022111](https://doi.org/10.1103/PhysRevE.96.022111). arXiv: [1607.06055](https://arxiv.org/abs/1607.06055).
- **H. Ronellenfitsch**, M. Timme, and D. Witthaut. “A Dual Method for Computing Power Transfer Distribution Factors”. *IEEE Transactions on Power Systems* 32.2 (Mar. 2017), 1007–1015. DOI: [10.1109/TPWRS.2016.2589464](https://doi.org/10.1109/TPWRS.2016.2589464). arXiv: [1510.04645](https://arxiv.org/abs/1510.04645).
- D. Manik, M. Rohden, **H. Ronellenfitsch**, X. Zhang, S. Hallerberg, D. Witthaut, and M. Timme. “Network susceptibilities: Theory and applications”. *Physical Review E* 95.1 (Jan. 2017), 012319. DOI: [10.1103/PhysRevE.95.012319](https://doi.org/10.1103/PhysRevE.95.012319). arXiv: [1609.04310](https://arxiv.org/abs/1609.04310).
- **H. Ronellenfitsch** and E. Katifori. “Global Optimization, Local Adaptation, and the Role of Growth in Distribution Networks”. *Physical Review Letters* 117.13 (Sept. 2016), 138301. DOI: [10.1103/PhysRevLett.117.138301](https://doi.org/10.1103/PhysRevLett.117.138301). arXiv: [1606.00331](https://arxiv.org/abs/1606.00331).
- **H. Ronellenfitsch**, J. Lasser, D. C. Daly, and E. Katifori. “Topological Phenotypes Constitute a New Dimension in the Phenotypic Space of Leaf Venation Networks”. *PLOS Computational Biology* 11.12 (Dec. 2015), e1004680. DOI: [10.1371/journal.pcbi.1004680](https://doi.org/10.1371/journal.pcbi.1004680). arXiv: [1507.04487](https://arxiv.org/abs/1507.04487).
- **H. Ronellenfitsch**, J. Liesche, K. H. Jensen, N. M. Holbrook, A. Schulz, and E. Katifori. “Scaling of phloem structure and optimality of photoassimilate transport in conifer needles”. *Proceedings of the Royal Society B: Biological Sciences* 282.1801 (Jan. 2015), 20141863–20141863. DOI: [10.1098/rspb.2014.1863](https://doi.org/10.1098/rspb.2014.1863). arXiv: [1412.1272](https://arxiv.org/abs/1412.1272).
- M. R. Gaberdiel, D. Persson, **H. Ronellenfitsch**, and R. Volpatto. “Generalized Mathieu Moonshine”. *Communications in Number Theory and Physics* 7.1 (2013), 145–223. DOI: [10.4310/CNTP.2013.v7.n1.a5](https://doi.org/10.4310/CNTP.2013.v7.n1.a5). arXiv: [1211.7074](https://arxiv.org/abs/1211.7074).

PREPRINTS

- **H. Ronellenfitsch**. “Optimal elastic networks and the natural design of plant leaves” (June 2020). arXiv: [2006.01532](https://arxiv.org/abs/2006.01532).
- **H. Ronellenfitsch** and J. Dunkel. “Spectral Design of Active Mechanical and Electrical Metamaterials” (Mar. 2020). arXiv: [2003.09634](https://arxiv.org/abs/2003.09634).
- T. Kotwal, **H. Ronellenfitsch**, F. Moseley, and J. Dunkel. “Active topoelectrical circuits” (Mar. 2019). arXiv: [1903.10130](https://arxiv.org/abs/1903.10130).

INVITED TALKS

- Dynamical Systems Seminar, Boston University, 28 Oct 2019: “Active topoelectrical circuits”
- APS March Meeting, 2019: “Designing active topological networks”
- LCDS Seminar, Brown University, 28 Jan 2019: “Optimality of Form and Function in Biology and Engineering”
- Deutsche Bahn AG, Frankfurt a. M., 22 Apr 2015: “Störungen in linearen Flussnetzwerken”

CONTRIBUTED TALKS AND POSTERS

- APS March Meeting, 2019: “Optimal noise-canceling networks”
- APS March Meeting, 2018: “Designing spectral bandgaps in phononic networks”
- APS March Meeting, 2017: “Global Optimization, Local Adaptation, and the Role of Growth in Distribution Networks”
- Start Talking Science, 2016: “How does nature produce efficient vein networks?” (popular science poster)
- STATPHYS26, 2016: “Dynamically adaptive transport networks on a growing medium”
- DPG Spring Meeting, 2015: “Topological Phenotypes in Leaf Vascular Networks” (poster)
- APS March Meeting, 2015: “Topological Phenotypes in Leaf Vascular Networks”
- DPG Spring Meeting, 2014: “Structure and Topology of Optimal Transport Networks in Plant Leaves”
- Dynamics Days Europe, 2013: “Physical properties of the phloem constrain size and shape of leaves”
- APS March Meeting, 2013: “Optimal Nutrient Uptake in Biological Transport Networks”

REVIEWS

- Reviewer for: *Nature*, *Physical Review Letters*, *Reviews of Modern Physics*, *IEEE Transactions on Power Systems*, *Science Advances*, *PLOS Computational Biology*, *Applied Network Science*, *Applied Materials Today*

COMMITTEE MEMBERSHIPS

- The 6th International Workshop on Complex Networks and their Applications, Lyon, France, 2017: Invited member of the program committee
- The 5th International Workshop on Complex Networks and their Applications, Milan, Italy, 2016: Invited member of the program committee

CLASSES TAUGHT

S 2020	teaching assistant 18.03 “Differential Equations” (Prof. Semyon Dyatlov, MIT)
F 2019	instructor 18.384 “Undergraduate Seminar in Physical Mathematics” (MIT)
S 2019	instructor 18.330 “Intro to Numerical Analysis” (MIT)
S 2019	guest lecturer 18.303 “Linear Partial Differential Equations: Analysis and Numerics” (Dr. Christopher Rackauckas, MIT)
F 2018	instructor 18.353 “Nonlinear Dynamics: Chaos” (MIT)
S 2018	teaching assistant 18.03 “Differential Equations” (Prof. Bjorn Poonen, MIT)
F 2017	instructor 18.353 “Nonlinear Dynamics: Chaos” (MIT)
2013	teaching assistant “Principles of Self-Organization in Biophysics” (Prof. Eleni Katifori, University of Göttingen)
2013	teaching assistant “Mathematical Methods of Physics” (Prof. Karl-Henning Rehren, University of Göttingen)
2010–2012	teaching assistant for undergraduate Linear Algebra, Numerical Methods, MATLAB (ETH Zürich)

MENTORING

2020	co-supervision of UROP student Sonia Reilly, “Optimization of oscillator networks under correlated fluctuating load” (MIT)
2018, 2019	co-supervision of summer student intern Tejas Kotwal, “Topology in active networks” (MIT)
2018	co-supervision of Undergradutate Research Opportunity student Josephine Yu, “Discrete optimization of bandgaps in spring networks” (MIT)
2014	supervision of Bachelor’s thesis “Investigation of optimisation models for the vascular network of dicotyledonous plant leaves” by Stephan Monecke (University of Göttingen)
2014	co-supervision of Bachelor’s thesis “Measuring the conductivity profile of a leaf vascular network” by Torsten Eckstein (University of Göttingen)

AWARDS, SCHOLARSHIPS, GRANTS

2017	MIT Applied Mathematics Instructorship (2+1 years)
2013	Max Planck Excellence Fellowship (2+1 years), IMPRS Physics of Biological and Complex Systems, Göttingen
2013, 2014, 2015	IMPRS Physics of Biological and Complex Systems Göttingen Travel Grant
2012	Willi Studer Prize for best ETH Master's diploma in Physics

SKILLS

- natural languages: German (native), English (fluent), French, Russian (basic knowledge)
- programming languages: Julia, Python, Mathematica, MATLAB (good knowledge); C (basic knowledge)
- computing: Oracle Grid Engine, git, scikit-learn, numpy, scipy, pandas