

ALICE C. SCHWARZE

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RESEARCH INTERESTS

Applied mathematics, dynamical systems, network theory, complex systems, mathematical biology, data science, robust system design, natural and artificial neural networks

ACADEMIC POSITIONS

SINCE 12/2021 Postdoctoral research affiliate at the Department of Mathematics at Dartmouth College
2019 – 2021 Postdoctoral research scholar at the Department of Biology at the University of Washington (UW) and Data Science Postdoctoral Fellow at the UW eScience Institute

EDUCATION

11/2019 DPhil (Mathematics) at the University of Oxford
Advisors: Mason A. Porter, Jonny Wray, Philip K. Maini
Thesis: “Robustness and entropy for dynamics on networks”
9/2014 M. Sc. (Theoretical Physics) at Technische Universität Berlin, grade¹ 1.1
Advisor: Eckehard Schöll
Thesis: “Controlling desynchronisation in complex network topologies by the balance of excitation and inhibition”
9/2012 B. Sc. (Physics) at Technische Universität Berlin, grade¹ 1.2
Advisor: Tobias Brandes
Thesis: “Theorie der kontinuierlichen Messung” (“Theory of continuous quantum measurement”)

LIST OF PUBLICATIONS

PEER-REVIEWED PUBLICATIONS:

- B. M. t’ Hart, . . . , **ACS**, . . . , B. Wyble: “Neuromatch Academy: a 3-week, online summer school in computational neuroscience” *Journal of Open Source Education* 5:49 (2022)
- **ACS**, M. A. Porter: “Motifs for processes on networks” *SIAM Journal on Applied Dynamical Systems*, 20(4), 2516–2557 (2021) [[17 Google Scholar citations](#)]
- G. Cantwell, Y. Liu, B. F. Maier, **ACS**, C. A. Serván, J. Snyder, G. St-Onge: “Thresholding normally distributed data creates complex networks” *Physical Review E*, 101 (6), 062302 (2020) [[18 Google Scholar citations](#)]

PREPRINTS AND PAPERS UNDER REVIEW:

- **ACS**, Sara M. Ichinaga, and B. W. Brunton: “Network inference via process motifs for lagged correlation in linear stochastic processes” *arXiv preprint arXiv:2208.08871* (2022)
- B. Boyacıoğlu, **ACS**, B. W. Brunton, and K. A. Morgansen: “Neural-inspired Measurement Observability” *arXiv preprint arXiv:2206.02361* (2022)
- **ACS**, P. S. Chodrow, M. A. Porter: “Observations on the distribution of log-minors of positive-definite matrices and their implications for sampling mean subsystem entropy” *arXiv preprint arXiv:1901.09456* (2019)

¹Grades given on a scale from 1 (best) to 5 (worst).

WORKSHOP PAPERS AND EXTENDED ABSTRACTS:

- U. Alvarez-Rodriguez, G. Bianconi, N. Przulj, M. Schich, **ACS**, L. Torres, and A. Wegner: “Unification of Higher-Order Models” in “Higher-Order Graph models: From Theoretical Foundations to Machine Learning”, Dagstuhl Reports (2021)
- M. Rosvall, R. Burkholz, T. LaRock, V. Latora, K.-J. Lee, G. Petri, L. Pretrovic, M. Schaub, **ACS**, and M. Starnini: “Learning and Model Selection in Higher-Order Networks” in “Higher-Order Graph models: From Theoretical Foundations to Machine Learning”, Dagstuhl Reports (2021)
- **ACS**, Jonny Wray, M. A. Porter: “A Motif-Based Approach to Processes on Networks: Process Motifs for the Differential Entropy of the Ornstein–Uhlenbeck Process”, IFAC (International Federation of Automatic Control) World Congress (2020)

TEACHING EXPERIENCE

| | |
|-------------|---|
| 2023 | Dartmouth College, Primary lecturer for undergraduate course “MATH3 Introduction to Calculus” |
| 2020 – 2021 | Neuromatch Academy Online Summer School on Computational Neuroscience, Content contributor (webpage) |
| 2020 | University of Washington, Department of Biology, Guest lecturer for the graduate course “BIO511 Topics in Mathematical Biology” (code repository) |
| 2018 | Santa Fe Institute, Complex Systems Summer School, Lecturer for tutorial on “Structural robustness of networks” (slides) |
| 2017 | University of Oxford, Mathematical Institute, Teaching assistant for third-year course on “Graph Theory Part B” |
| 2016 | University of Oxford, Doctoral Training Centre, Demonstrator for graduate course “Introduction to Systems Biology” |
| 2016 | University of Oxford, Doctoral Training Centre, Demonstrator for graduate course “Cells and Signalling” |

TEACHING DEVELOPMENT PROGRAMS

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| 2022 – 2023 | “SIAM Project NExT Fellow” in the 2022 cohort of “Project New Experiences in Teaching” (Project NExT) of the Mathematical Association of America (webpage) |
| 2016 | Completion of the “Developing Learning and Teaching” (DLT) program at the University of Oxford (webpage) |

STUDENT MENTORING

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| 2022 – 2023 | Jessica Jiang, undergraduate research student Department of Mathematics at Dartmouth College Project title: “Robustness and dynamics on networks” |
| 2022 | Moitrish Majumdar, undergraduate thesis student Department of Mathematics at Dartmouth College Thesis title: “Dynamical systems on networks” |
| 2022 | Allison Zhuang, undergraduate research student Department of Mathematics at Dartmouth College Project title: “Random-graph models and robustness on networks” |
| 2020 – 2021 | Sara Ichinaga, undergraduate research student Department of Applied Mathematics at the University of Washington Project title: “Inference of neuronal networks from widefield calcium-imaging data” |

INITIATIVES RELATED TO INCREASING DIVERSITY, EQUITY, AND INCLUSION IN ACADEMIA

- SINCE 2022 **Co-creator and co-organizer** of the “**WiNS Pathways in Network Science**” career-talk series, in which well-established women researchers in network science reflect on their careers
- 2021 – 2022 **Creator and director of a mentored lightning-talk scheme** for the Women in Network Science satellite at Networks 2021, the Women in Network Science satellite and Diversify NetSci satellite at NetSci 2022, and the Women in Network Science showcase at Sunbelt 2022
- SINCE 2020 **Mentor for international students** who seek internships, degree programs, and post-doctoral positions in the EU, UK, and USA; former mentees include Samarth Mathur, who successfully applied for a research internship at the University of Toronto (Canada), and Yu Tian, who accepted a postdoc position at the Nordic Institute for Theoretical Physics (NORDITA, Sweden)
- SINCE 2020 **President of the Women in Network Science Society** ([webpage](#)); In this role, I have
- initiated and organized the election of the first WiNS executive committee
 - initiated the first NetSci conference satellite for WiNS
 - was lead organizer of the 2-day conference satellite “WiNS@Networks 2021” and co-lead organizer of the 2-day conference satellite “WiNS@NetSci 2022”
 - consulted for several academic programs on increasing the diversity of lists of invited speakers and lists of prize nominees
 - advised members of the WiNS executive committee on the creation of a book club, the coordination of several conference meet-ups, and the design and publication of a podcast series ([webpage](#)) and a video blog series ([webpage](#))
- SINCE 2020 **Host of the Women in Network Science Seminar** at the University of Washington ([webpage](#)) and Dartmouth College ([webpage](#)); the seminar has provided a platform for over 30 women and nonbinary researchers and aims to be a model for inclusive reimbursement practices by offering to reimburse child-care expenses for talks that are given outside a speakers’ typical office hours

WORKSHOP AND SESSION ORGANIZATION

- 2023 Lead organizer
- NetSci 2023 “Women in Network Science” satellite
- Co-organizer
- SIAM Dynamical Systems Minisymposium on “Women in Network Science”
 - Workshop on Contagion on Complex Social Systems at the University of Vermont
- 2022 Lead organizer
- NetSci 2022 “Women in Network Science & DiversifyNetSci” satellite
- Co-organizer
- SIAM Network Science Workshop 2022 ([webpage](#))
 - NetSci 2022 satellite on “HONS: Higher-order network science” ([webpage](#))
 - INSNA Sunbelt 2022 “Women in Network Science” session
 - JMM 2022 Special Session on “Mathematics of Complex Systems”

- 2021 Lead organizer
- Networks 2021 “DynaMo: Dynamics and Motifs” satellite ([webpage](#))
 - Networks 2021 “Women in Network Science” satellite ([webpage](#))
- Co-organizer
- SIAM Applications of Dynamical Systems 2021 “Dynamics of Influence and Representation in Social Systems” minisymposium ([webpage](#))

OTHER ACADEMIC SERVICE

- SINCE 2022 Board member at the Network Science Society (“NetSci”, [webpage](#))
- SINCE 2022 Co-Organizer of the “Applied and Computational Mathematics” seminar at the Department of Mathematics at Dartmouth College ([webpage](#))
- SINCE 2022 Editor for “Advances in Complex Systems”, “Network Letters”
- 2021–2022 Chair of the special interest group on “Graphs and Networks — Theory and Applications” at the e-Science Institute of the University of Washington ([webpage](#))
- SINCE 2021 Reviewer at “Communications Physics”
- SINCE 2020 Reviewer at “Complex Networks”, “PLoS Computational Biology”, “PLoS ONE”, “IEEE Transactions on Network Science and Engineering”, and “Mathematical Medicine and Biology”
- SINCE 2019 Reviewer at “Nature Communications”
- SINCE 2018 Reviewer at “Physical Review E”, and “Chaos: An Interdisciplinary Journal for Nonlinear Science”

PRESENTATIONS AT CONFERENCES AND WORKSHOPS

- 2022 **ACS**: “Dynamics on and of networks — motif-based and mean-field approaches” presented at:
- University of Oxford Networks Seminar (invited talk)
 - Banff International Research Station (BIRS) Workshop on “Building Networks: Women in Complex & Nonlinear Systems” (invited talk)
- 2022 **ACS**: “Motifs and synchrony-asynchrony transitions in neuronal networks” presented at:
- SIAM Life Sciences 2022 (invited talk in minisymposium)
 - Dept. of Applied Mathematics, University of Colorado Boulder (invited talk)
- 2022 **ACS**, Peter J. Mucha: “Weighted co-evolving social networks of students and drinking behavior” presented at:
- Workshop on Contagion on Complex Social Systems at the University of Colorado, Boulder (contributed talk²)
 - Workshop on Choice Theory and Network Dynamics at the University of Vermont (invited talk)
 - Aspen Center for Physics Winter Conference on “The Dynamics of Social Interactions” (contributed talk²)

- 2021–2023 **ACS**, S. Ichinaga, B. W. Brunton: “Network inference via process motifs” (to be) presented at:
- SIAM Conference on Optimization 2023 (invited talk in minisymposium)
 - Sydney University Systems Neuroscience and Complexity Seminars (invited talk)
 - School of Mathematical Sciences, University of Nottingham (invited talk)
 - SIAM Workshop on Network Science 2022 (contributed talk)
 - Belgian Network Research Meeting (BENet) 2021 (keynote talk)
 - Colloquium at the Department of Mathematics at Dartmouth College (invited talk)
 - SIAM Conference on Applications of Dynamical Systems 2021 (invited talk in minisymposium)
 - Wolfram Centre for Mathematical Biology, University of Oxford (invited talk)
- 2021 **ACS** and S. Lehmann: “How to make friends and influence scientists: Informal methods of science communication?” presented at:
- Satellite of the Symposium of Young Network Scientists (SYNS) at Networks 2021
- 2020/21 **ACS**, M. A. Porter: “Motifs for processes on networks” presented at:
- Mathematical Institute, University of Oxford (invited talk, [video](#))
 - Data Analytics Group, University of Wuppertal (invited talk)
 - Satellite on “Multiscale & integrative complex networks” at the Conference on Complex Systems 2020 (invited talk)
 - Higher-order network science (HONS) Workshop at NetSci 2020 (invited talk, [video](#))
 - Workshop on Methods of Information Theory in Computational Neuroscience at the Annual Computational Neuroscience Meeting 2020 (contributed talk, [video](#))
 - SIAM Network Science Workshop 2020 (poster)
 - Dynamics Days Digital 2020 (poster)
- 2020 **ACS**: “Dynamics on networks” presented at:
- Diversify NetSci 2020 Showcase (1 of 2 showcase talks selected in competition)
- 2020 **ACS**, J. Wray, M. A. Porter: “Process Motifs for the Differential Entropy of the Ornstein–Uhlenbeck Process” presented at:
- IFAC World Congress (minisymposium talk)
 - NetSci (contributed talk)
- 2019 **ACS**, P. C. Chodrow, M. A. Porter: “Bounds on the Sampling Error of Mean Differential Entropy of Subgraphs” presented at:
- SIAM Workshop on Network Science (contributed talk)
- 2019 **ACS**, J. Wray, M. A. Porter: “Entropy and functional redundancy in biological networks” presented at:
- SIAM Conference on Applications of Dynamical Systems (contributed talk²)
 - Dept. of Biology, University of Washington (invited talk)
 - Dept. of Computing and Mathematical Sciences, California Institute of Technology (invited talk)

- 2018 **ACS**, M. A. Porter, J. Wray: “Structural and functional redundancy in biological networks” presented at:
- the SIAM Network Science Workshop 2018 (contributed talk)
 - the SIAM Annual Meeting 2018 (contributed talk²)
 - CompleNet 2018 (lightning talk & poster)
 - Joint Mathematics Meeting 2018 (contributed talk in special session)
 - Dynamics Days 2018 (contributed talk²)
- 2017 **ACS**, M. A. Porter, J. Wray: “Structural robustness in function-specific protein-interaction networks” presented at:
- Symposium of Young Network Scientists 2017 (lightning talk²)
 - NetSci 2017 (poster²)
 - NetMed 2017 (contributed talk)
- 2016 **ACS**, M. A. Porter, J. Wray: “Redundancy, degeneracy, and robustness in protein-interaction networks” presented at:
- UK Workshop on Quantitative Systems Pharmacology 2016 (contributed talk²)
 - SIAM Network Science Workshop 2016 (contributed talk²)
 - SIAM Annual Meeting and Life Sciences Conference 2016 (poster)
 - 8th Internat. Conference on Discrete Models of Complex Systems (contributed talk)
 - Complenet 2016 (contributed talk)

OTHER WORKSHOP AND SCHOOL PARTICIPATION

- 2022 Banff International Research Station (BIRS) Workshop on “Building Networks: Women in Complex & Nonlinear Systems” (invited participant)
- 2022 University of Vermont, “Choice Theory and Network Dynamics” (invited participant)
- 2021 Leibniz Centre for Informatics, “Higher-Order Graph Models: From Theoretical Foundations to Machine Learning” (invited participant)
- 2021 University of Vermont, Winter Workshop on Complex Systems (CNWW)
- 2018 Santa Fe Institute (SFI), Complex Systems Summer School of the 2018
- 2017 Park City Mathematics Institute (PCMI), Summer School on Random Matrix Theory
- 2014 University of Crete, European Summer School on Mathematical Modelling of Complex Systems

FELLOWSHIPS, SCHOLARSHIPS, AND GRANTS

- 2021 Grant from the Azure Cloud Computing Research Sponsorship Program (\$13,500)
- 2020 Grant for Special Interest Group from the eScience Departmental Fund (\$5,000)
- 2020 Individual Postdoctoral Grant from the eScience Postdoctoral Research Fund (\$5,000)
- 2019 University of Washington Data Science Postdoctoral Fellowship (\$2,500)
- 2014 – 2019 Clarendon Scholarship of the University of Oxford (ca. £55,000)
- 2014 – 2019 Studentship of the Engineering and Physical Sciences Research Council (ca. £10,000)
- 2009 Scholarship of the German Academic Exchange Service (€2,000)
- 2008 – 2011 Scholarship of the German National Academic Foundation (ca. €25,000)

AWARDS AND PRIZES

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| 2019 | SIAM Student Travel Award for the SIAM Conference on Dynamical Systems 2019 |
| 2018 | Poster Slam Prize (best short presentation) at CompleNet 2018 |
| 2018 | SIAM Student Travel Award for the SIAM Annual Meeting 2018 |
| 2018 | Travel Award for Dynamics Days 2018 |
| 2017 | PCMI Scholarship for the PCMI Summer School on Random Matrix Theory |
| 2017 | SYNS Student Travel Award for NetSci 2017 |
| 2016 | SIAM Student Travel Award for the SIAM Network Science Workshop 2016 |
| 2015 | Public Engagement Award of the Oxford University Doctoral Training Centre (DTC) |

OTHER ACADEMIC EMPLOYMENT AND RESEARCH TRAINING

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| 2017 – 2019 | University of California, Los Angeles, Department of Mathematics, Visiting Graduate Researcher |
| 2011 – 2014 | Technische Universität Berlin, Collaborate Research Center 910 “Control of self-organising nonlinear systems: Theoretical methods and concepts of application, student research assistant |
| 2009 – 2011 | Technische Universität Berlin, Research Training Group 1558 “Nonequilibrium collective dynamics in condensed matter and biological system”, student research assistant |
| 2009 | Pennsylvania State University, Department of Physics, DAAD RISE Northamerica Intern |

OUTREACH ACTIVITIES

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| 2020 | Content Coordinator for the Neuroscience Outreach Network (webpage) |
| SINCE 2019 | Participating scientist at “Skype a Scientist” (webpage) |
| 2008 – 2014 | Instructor for Mathematics, Physics, and Neuroscience at Youth Camps organized by Mensa Germany |

MEDIA FEATURES

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| 2022 | Featured in “Introduction of SIAM Project NExT Fellows” in “SIAM News” (Dec. issue) |
| 2021 | Interview for “Too Lazy to Read the Paper” podcast with Sune Lehmann (audio/video) |
| 2021 | Interview for “Knitting Networks” podcast with Francisca Ortiz (audio) |
| 2016 | Interview for “Wide Open Air Exchange” podcast with Christine Gallagher (audio) |