

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 12/2019 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:

- 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)

PREPRINTS:

- **ACS**, M. A. Porter: "Motifs for processes on networks" arXiv preprint arXiv:2007.07447 (2020)
- **ACS**, P. C. 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)

EXTENDED ABSTRACTS AT CONFERENCES:

- **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)

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

PRESENTATIONS AT CONFERENCES AND WORKSHOPS

- 2020 **ACS**: “Dynamics on networks” presented at:
- Diversify NetSci 2020 Showcase (1 of 2 showcase presentations selected in competition)
- 2020 **ACS**, M. A. Porter: “Motifs for processes on networks” presented/to be presented at:
- Higher-order network science (HONS) Workshop at NetSci (invited talk, [video](#))
 - Workshop on Methods of Information Theory in Computational Neuroscience at the Annual Computational Neuroscience Meeting (contributed talk, [video](#))
 - SIAM Network Science Workshop (poster)
 - Dynamics Days Digital (poster)
- 2020 **ACS**, J. Wray, M. A. Porter: “Process Motifs for the Differential Entropy of the Ornstein–Uhlenbeck Process” presented at/ to be presented at:
- IFAC World Congress (minisymposium talk)
 - NetSci (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)
 - the University of Washington (invited talk)
 - California Institute of Technology (invited 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)
- 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),

²Presentation supported by a travel award from the conference organisation or an associated institution.

- SIAM Annual Meeting and Life Sciences Conference 2016 (poster),
- 8th International Conference on Discrete Models of Complex Systems (contributed talk),
- Complenet 2016 (contributed talk)

OTHER EMPLOYMENT AND RESEARCH TRAINING

SINCE 8/2020	University of Washington, eScience Institute, Head of the eScience Special Interest Group (SIG) on “Graphs and Networks - Theory and Applications”
2017 – 2019	University of California Los Angeles, Department of Mathematics, Visiting Graduate Researcher
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
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, Physics Department, DAAD RISE Northamerica Intern

TEACHING EXPERIENCE

2020	University of Washington, Organiser of the “Women in Network Science Seminar” ³ at the eScience Institute at the University of Washington
2020	Neuromatch Academy Online Summer School on Computational Neuroscience, Content contributor ⁴
2020	University of Washington, Department of Biology, Guest lecturer for the graduate course “Topics in Mathematical Biology” ⁵
2018	Santa Fe Institute, Complex Systems Summer School, Lecturer for tutorial on “Structural robustness of networks” ⁶
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 System Biology”
2016	University of Oxford, Doctoral Training Centre, Demonstrator for graduate course “Cells and Signalling”

³<https://aliceschwarze.gitlab.io/winsseminar>

⁴www.neuromatchacademy.org

⁵https://gitlab.com/aliceschwarze/bio551_lecture_material

⁶https://github.com/acuswarze/CSSS18_robustness_tutorial

FELLOWSHIPS, SCHOLARSHIPS, AND GRANTS

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

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)

SERVICE AND OUTREACH

SINCE 2020	Content Coordinator for the Neuroscience Outreach Network (NeurON) ⁷
SINCE 2019	Participating scientist at “Skype a Scientist” ⁸
SINCE 2008	Instructor for Mathematics, Physics, and Neuroscience at Youth Camps organised by Mensa Germany

⁷www.neuroscienceoutreach.org

⁸www.skypeascientist.com