
EMPLOYMENT AND EDUCATION

- 2020– Assistant Professor, Uppsala University, Sweden.
- 2025 SLMath, formerly MSRI, Research Membership, UC Berkeley, USA.
semester program - *Probability and Statistics of Discrete Structures*.
- 2021 Simons-Berkeley Research Fellowship, UC Berkeley, USA.
semester program - *Computational Complexity of Statistical Inference*.
- 2019–2020 Heilbronn Research Fellow, Bristol University, UK
- 2019–2019 Postdoc working with Prof. Dan Král', Masaryk University, Brno, Czech Republic.
- 2017–2019 Postdoc working with Docent Cecilia Holmgren, Uppsala University, Sweden.
- 2015–2017 Heilbronn Research Fellow, Bristol University, UK.
- 2011–2016 *Doctor of Philosophy*, Oxford University, UK.
Thesis ***Modularity of Networks***,
Supervisor: Prof. Colin McDiarmid
Contains papers 4. and 10.
★ Corcoran Prize for the best thesis in the Oxford Statistics Department 2015-2016.
- 2004–2010 *Bachelor of Philosophy in Mathematics*, Australian National University, Australia.
First Class Honours, 92%.
- Thesis ***Degree Sequences of Random Bipartite Graphs***,
Supervisors: Prof. Brendan McKay, Dr. Judy-Anne Osborn.

SCHOLARSHIPS AND AWARDS

- 2021 Simons-Berkeley Research Fellowship.
- 2017 Corcoran Prize for the best thesis Oxford Statistics Department 2015-2016.
- 2016 G-Research second prize for Oxford thesis in quantitative methods ~£5000.
- 2014 Half Blue, Kayaking, Oxford University.
- 2014 Balliol College 750th Anniversary Science Prize, Oxford.
- 2011-2015 Statistics Department Teaching Bursary, DPhil Scholarship, Oxford University.
- 2011 J. Crawford Prize for best female thesis in the Sciences, Australian National University.
- 2004-2010 National Undergraduate Scholarship, Australian National University
- 2004 Best Student Seminar, Advanced Physics I, Australian National University
- 2003,4 A. L. Blakers memorial prize, Australian National Mathematics Summer School
- 2003 Australian Students Prize and Ipswich Youth of the Year, Australia.

PUBLICATIONS AND SUBMITTED MANUSCRIPTS

23. **Fast and accurate algorithms to calculate expected modularity in probabilistic networks**,
with X. Shen, M. Magnani, C. Rohner, *preprint*, [arXiv:2408.07161](https://arxiv.org/abs/2408.07161).
22. **Modularity of nearly complete graphs and bipartite graphs**,
with C. McDiarmid, *preprint*, [arXiv:2311.06875](https://arxiv.org/abs/2311.06875).
21. **Universal lower bound for community structure of sparse graphs**,
with V. Agdur and N. Kamčev, *preprint*, [arXiv:2307.07271](https://arxiv.org/abs/2307.07271).
20. **Convergence laws for random Mallows permutations**,
with T. Muller and T. Verstraaten, *preprint*, [arXiv:2302.10148](https://arxiv.org/abs/2302.10148).

19. **Modularity and partially observed graphs.**,
with C. McDiarmid, *preprint*, [arXiv:2112.13190](#).
- 2024+ 18. **From flip processes to dynamical systems on graphons**,
with F. Garbe, J. Hladký and M. Šileikis,
Annales de l'Institut Henri Poincaré, to appear, [arXiv:2201.12272](#).
- 2024 17. **A branching process with deletions and mergers that matches the threshold for hypercube percolation**,
with L. Eslava and S. Penington,
Annales de l'Institut Henri Poincaré, **60** 2 (2024) [doi](#) [arXiv:2104.04407](#).
- 2024 16. **Modularity and Graph Expansion**,
with B. Louf and C. McDiarmid,
Innovations in Theoretical Computer Science (ITCS 2024). [doi](#) [arXiv:2312.07521](#)
- 2023 15. **Finding large expanders in graphs: from topological minors to induced subgraphs**,
with B. Louf,
Electronic Journal of Combinatorics, **30** 1 (2023) [doi](#) [arXiv:2012.15722](#).
- 2023 14. **No additional tournaments are quasirandom-forcing**,
with R. Hancock, A. Kabela, D. Král', T. Martins, R. Parente and J. Volec,
European Journal of Combinatorics, **108** (2023) [doi](#) [arXiv:1912.04243](#).
- 2023 13. **Is it easier to count communities than find them?**,
with C. Rush, A. Wein and D. Yang,
Innovations in Theoretical Computer Science (ITCS 2023) [doi](#) [arXiv:2212.10872](#).
- 2022 12. **The modularity of random graphs on the hyperbolic plane**,
with J. Chellig and N. Fountoulakis,
Journal of Complex Networks, **10** 1 (2022) [doi](#) [arXiv:2104.01041](#).
- 2021 11. **Assigning times to minimise reachability in temporal graphs**,
with J. Enright, K. Meeks,
Journal of Computer and System Sciences, **115** (2021) [doi](#) [arXiv:1802.05905](#).
- 2020 10. **Modularity of Erdős-Rényi random graphs**,
with C. McDiarmid,
Random Structures & Algorithms, **57** 1 (2020) [doi](#) [arXiv:1808.02243](#).
- 2020 9. **Random tree recursions: which fixed points correspond to tangible sets of trees?**,
with M. Podder and T. Johnson,
Random Structures & Algorithms **56** 3 (2020) [doi](#) [arXiv:1808.03019](#).
- 2020 8. **The parameterised complexity of computing the maximum modularity of a graph**,
with K. Meeks,
Algorithmica **82** 8 (2020) [doi](#) [arXiv:1807.06965](#).
- 2020 7. **Embedding small digraphs and permutations in binary trees and split trees**,
with M. Albert, C. Holmgren, and T. Johansson,
Algorithmica **82** 3 (2020) [doi](#) [arXiv:1901.02328](#).
- 2019 6. **k -cuts on paths and some trees**,
with X. Cai, L. Devroye and C. Holmgren,
Electronic Journal of Probability **24** (2019) [doi](#) [arXiv:1804.03069](#).
- 2019 5. **Inversions in split trees and conditional Galton-Watson trees**,
with X. Cai, C. Holmgren, S. Janson and T. Johansson,
Combinatorics, Probability and Computing **28** 3 (2019) [doi](#) [arXiv:1709.00216](#).
- 2018 4. **Modularity of regular and treelike graphs**,
with C. McDiarmid,
Journal of Complex Networks **6** 4 (2018) [doi](#) [arXiv:1606.09101](#)
- 2017 3. **Guessing numbers of odd cycles**,
with R. Atkins and P. Rombach
Electronic Journal of Combinatorics **24** 1 (2017) [doi](#) [arXiv:1602.03586](#)

- 2016 2. **Degree sequences of random digraphs and bipartite graphs**,
with B. D. McKay
Journal of Combinatorics **7** 1 (2016) doi [arXiv:1302.2446](#)
- 2015 1. **Avoider-Enforcer Star Games**,
with A. Grzesik, M. Mikalački, Z. Nagy, A. Naor, and B. Patkós
Discrete Mathematics and Theoretical Computer Science **17** 1 (2015) doi [arXiv:1302.2555](#)

INVITED CONFERENCE TALKS

- May, 2025 Colloquia in Combinatorics, QMUL & LSE, United Kingdom, postponed from 2024.
- Nov, 2023 Barcelona Math Days, Catalan Mathematics Society.
- Aug, 2023 Workshop on Random Discrete Structures, EPFL, Switzerland.
- Jun, 2023 Session on Algorithms on Random Graphs, Applied Probability Society (APS) meeting, Nancy, France.
- Jun, 2023 Modeling Decisions for Artificial Intelligence (MDAI), Umeå, Sweden. (plenary)
- May, 2023 *Is it easier to count communities than find them?*, Machine Learning Day, Digital Futures, KTH, Sweden.
- Mar, 2023 *Is it easier to count communities than to find them?* Oberwolfach - Random Graphs: Combinatorics, Complex Networks and Disordered Systems, Germany.
- Nov, 2022 *Is it easier to count communities than find them?*, Workshop on Random Graphs, Bernoulli Institute, Groningen, Netherlands.
- Jun, 2022 *Partially observing graphs - when can we infer underlying community structure?*, Conference on Mathematics for Complex Data, KTH University, Stockholm, Sweden.
- May, 2022 *Partially observing graphs - when can we infer underlying community structure?*, Scottish Combinatorics Meeting, Glasgow University, UK - online.
- Mar, 2022 *Modularity and Edge-sampling*,
Bellairs workshop on Probability and Combinatorics, Holetown, Barbados.
- Feb, 2022 *Partially observed graphs: when can we infer community structure?*,
Dagstuhl Seminar: Logic and Random Discrete Structures, Germany - hybrid.
- Aug, 2021 *Modularity and Edge-sampling*,
Banff - BIRS : Random Graphs and Statistical Inference, Canada - online.
- Jun, 2021 *A branching process with deletions and mergers that matches the threshold for hypercube percolation*,
Analysis of Algorithms Conference, Austria - online
- Nov, 2018 *Permutations in Random Trees*,
Dagstuhl Seminar: Genomics, Pattern Avoidance, and Statistical Mechanics, Germany.
- Apr, 2017 *Modularity of Random Graphs*,
Workshop on Random Graphs and Random Processes, Kings College London, UK.
- Mar, 2016 *Modularity of Random Graphs*, ICMS Complex Networks, Edinburgh, UK.

SEMINARS

- Mar, 2023 *When can we infer community structure in graphs?*, Complex Systems, CoSy, seminar, Uppsala, Sweden.
- Dec, 2022 *Is it easier to count communities than find them?*, Umeå Combinatorics Seminar, Sweden.
- Nov, 2022 *Is it easier to count communities than find them?*, TU Graz Combinatorics Seminar, Austria - online.
- Oct, 2022 *Is it easier to count communities than find them?*, Uppsala Combinatorics Seminar, Sweden.
- Apr, 2022 *Infanticide and incest: a branching process with deletions and mergers that matches the threshold for hypercube percolation*, Georgia Tech Combinatorics Seminar, US - online.
- Dec, 2021 *When can we infer community structure in graphs?*, Topos Institute, Berkeley, US.
- Dec, 2021 *When can we infer community structure in graphs?*, Simons Institute, Berkeley, US.
- Apr, 2021 *Modularity*, Data Analysis Department Seminar, Łódź University of Technology, Poland.
- Nov, 2020 *Edge-sampling and modularity*, Probability & Combinatorics Seminar, Uppsala, Sweden.

- Jun, 2020 *Branching processes with merges and hypercube percolation*, Combinatorial Mathematics Society of Australasia Seminar, online.
- Feb, 2020 *Edge-sampling and modularity*, Probl@b Seminar, University of Bath, Bath, UK.
- Jan, 2020 *Edge-sampling and modularity*, Combinatorics Seminar, University of Oxford, Oxford, UK.
- Jan, 2020 *Edge-sampling and modularity*, Combinatorics Seminar, University of Birmingham, UK.
- Jan, 2020 *Edge-sampling and modularity*, Probability Seminar, University of Bristol, Bristol, UK.
- Nov, 2019 *Random tree recursions: which fixed points correspond to tangible sets of trees?*, Czech Academy of Sciences, Prague, Czech Republic.
- Jun, 2019 *Community structure in Networks: limits of learning*, Uppsala University, Sweden.
- Jun, 2019 *Community structure in Networks: limits of learning*, Groningen Stochastics Seminar, NDL.
- Mar, 2019 *Modularity of Networks*, University of Bergen, Norway.
- Dec, 2018 *Guessing numbers of odd cycles*, Queen Mary Combinatorics Study Group, UK.
- Sep, 2018 *Introduction to Modularity*, Computer Science Reading Group, Glasgow University, UK.
- Apr, 2018 *Modularity of Random Graphs*, Stockholm University, Sweden.
- Mar, 2018 *Tree automata on Galton-Watson trees*, KTH, Stockholm, Sweden.
- Mar, 2017 *Modularity of Random Graphs*, Seminar, Lancaster University, UK.
- Jan, 2017 *Modularity of Random Graphs*, Seminar, Uppsala University, Sweden.
- Nov, 2016 *Modularity of Random Graphs*, Combinatorics Seminar, UNSW, Australia.
- Oct, 2016 *Modularity of Random Graphs*, Computer Science Seminar, Glasgow University, UK.
- Oct, 2016 *Modularity of Random Graphs*, Pure Math. Seminar, Royal Holloway, UK.
- May, 2016 *Modularity of Random Graphs*, Combinatorics Seminar, Birmingham University, UK.
- Mar, 2016 *Network Coding*, Information Theory Seminar, University of Bristol, UK.
- Nov, 2015 *Modularity of Random Graphs*, Combinatorics Seminar, University of Bristol, UK.
- Nov, 2014 *Modularity on Random Graphs*, Combinatorics Seminar, University of Warwick, UK.

CONFERENCE TALKS AND PRESENTATIONS

- Mar, 2023 *Upp-Upp Meeting*, Dept. Statistics, Uppsala, Sweden.
- Jan, 2023 *Quasirandom-forcing tournaments*, Probabilistic Midwinter meeting, Umeå Univ. Sweden.
- Aug, 2022 *Incest and infanticide: a branching process with deletions and mergers that matches the threshold for hypercube percolation*, Random Structures and Algorithms, Gniezno, Poland.
- Jun, 2020 *Permutations in binary trees and split trees*, Haifa Graph workshop, online.
- Jul, 2019 *Modularity and edge sampling*, Random Structures and Algorithms, Zurich, Switzerland.
- Feb, 2019 *Random tree recursions: which fixed points correspond to tangible sets of trees?*, Winter Combinatorics meeting, Open University, UK.
- Jan, 2019 *Random tree recursions: which fixed points correspond to tangible sets of trees?*, Probabilistic Midwinter meeting, Umeå University, Sweden.
- Sep, 2018 *Permutations in binary trees and split trees*, Polish Combinatorics Conference, Bedlewo,
- Jun, 2018 *Permutations in binary trees and split trees*, Analysis of Algorithms, Uppsala, Sweden.
- Jun, 2018 *Permutations in binary trees and split trees*, Stochastic Processes, Gothenburg, Sweden.
- Aug, 2017 *Modularity of Random Graphs*, Random Structures and Algorithms, Gniezno, Poland.
- Jul, 2017 *Inversions in random labellings of trees*, British Combinatorial Conference, Glasgow.
- Jun, 2017 *Inversions in random labellings of trees*, Permutation Patterns, Reykjavik, Iceland.
- Jun, 2017 *Guessing numbers of odd cycles*, Graphs, Hypergraphs and Set Systems, Umea, Sweden.
- Jan, 2017 *Modularity of Random Graphs*, Probabilistic Midwinter meeting, Umea, Sweden
- Sep, 2016 *Guessing numbers of odd cycles*, Polish Combinatorics Conference, Bedlewo, Poland.
- Jun, 2016 *Modularity of Random Graphs*, Probabilistic Combinatorics Downunder, Australia.
- Jun, 2016 *Modularity of Random Graphs*, SIAM Conference on Discrete Math, Atlanta, USA.
- Jul, 2015 *Modularity of Networks*, British Combinatorial Conference, University of Warwick, UK.
- Apr, 2015 *Modularity of Networks*, Scottish Combinatorics Meeting, Glasgow, UK.
- Aug, 2013 *Modularity in random regular graphs*, Random Structures and Algorithms, Poznan, Poland.

- July, 2013 *Modularity, edge expansion and lattices*, poster Erdős Centennial, Budapest, Hungary.
- Aug, 2012 *Degree sequences in random bipartite graphs*, British Postgraduate Combinatorics Conference, University of Warwick, UK.

SELECTED WORKSHOPS AND CONFERENCES

- Dec, 2024 *Low-degree polynomial methods in average-case complexity*, the American Institute of Mathematics (AIM), USA.
- Feb, 2024 *Computational Complexity of Statistical Inference program*, Banff (BIRS), Canada.
- Apr, 2023 *McGill Probability and Combinatorics Workshop*, Bellairs Institute, Barbados.
- Mar, 2022 *McGill Probability and Combinatorics Workshop*, Bellairs Institute, Barbados.
- Apr, 2021 *Dagstuhl Seminar: Temporal Graphs: Structure, Algorithms, Applications*, online.
- Apr, 2019 *McGill Probability and Combinatorics Workshop*, Bellairs Institute, Barbados.
- Mar, 2018 *McGill Probability and Combinatorics Workshop*, Bellairs Institute, Barbados.
- Oct, 2017 *Dynamics on Random Graphs and Random Maps*, CIRM Marseille, France.
- May, 2017 *Techniques in Random Discrete Structures*, University of Athens, Greece.
- Dec, 2016 *Algorithms, Logic and Structure*, University of Warwick, UK.
- Aug, 2016 *Prague Discrete Summer School on Discrete Math.*, Czech Academy of Sciences.
- Jul, 2016 *Sao Paulo School of Algorithms Combinatorics and Optimization*, Brazil.
- Jul, 2015 *Regularity and Analytic Methods in Combinatorics*, University of Warwick, UK.
- Jul, 2014 *Extremal Combinatorics*, ICMS Edinburgh, UK.
- Feb, 2014 *French-British Workshop on Random Graphs*, Paris, France
- Jan, 2014 *Stochastic Activity Month: Probability and Graphs*, TU Eindhoven, Netherlands.
- Sep, 2013 *Phase Transition in Random Discrete Structures*, TU Graz, Austria
- Aug, 2013 *Random Graphs, Geometry and Asymptotic Structure*, Birmingham, UK
- Jul, 2013 *Cornell Probability School*, Cornell University, USA
- Jun, 2013 *School of Graph Theory SGT2013*, Oléron, France.
- Nov, 2012 *STAR Workshop on Random Graphs*, University of Utrecht, Netherlands
- Sep, 2012 *French-British Workshop on Analytic Combinatorics*, Oxford, UK
- Sep, 2012 *Polish Combinatorics Conference*, Bedlewo, Poland
- Aug, 2012 *4th Emlektabla Workshop on Positional Games*, Budapest, Hungary
- Mar, 2012 *Block Course: Extremal Combinatorics Random Discrete Structures*, Berlin, Germany

TEACHING AND ADMISSIONS

Uppsala University & WASP courses

- 2023 Lecturing, *PhD course on Complexity and Statistical Inference*.
- 2023 Tutorials, *Probability and Statistics I*.
- 2023 Lectures & Tutorials, *Structure in Noisy Networks*, WASP Community Building school.
- 2022 Lecturing, *Probability II*.
- 2022 Lecturing, *Modelling Complex Systems*.
- 2020 Lecturing, *Modelling Complex Systems*.

ALEA Young workshop

- 2019 Lecturing, *Phase transitions in Random Graphs* short course for PhD students and early career researchers at ALEA Young 2019 workshop in Caen, France.

Bristol University

- 2016 Lecturing, *Topics in discrete mathematics: Boolean Functions* (3rd/4th year).

Oxford University - Statistics Department

- 2011-4 Tutoring Assistant, *Applied Probability* (3rd year).
- 2012-4 Tutoring Assistant, *Statistical Lifetime Models* (3rd year).
- 2012 Tutoring Assistant, *Linear Programming* (2nd year).

Oxford University - Mathematical Institute

- 2014 Tutor, *Probabilistic Combinatorics* (3rd year).
- 2013 Tutoring Assistant, *Probabilistic Combinatorics* (3rd year).
- 2012 Tutor, *Graph Theory* (3rd year). Tutoring Assistant, *Combinatorics* (4th year).
- 2011-2 Tutoring Assistant, *Graph Theory* (3rd year).

Oxford University First Year Collegiate Classes

- 2014-5 St Hughes College, *Optimisation*.
- 2015 Hertford College, *Graph Theory*.
- 2014 St Edmunds Hall, *Probability Revision*.
- 2012 Somerville College, *Linear Algebra*.

Oxford University Undergraduate Admissions

- 2014-5 Assistant interviewer, St Hughes College.

Australian National University - Mathematics Department

- 2008, 2010 Tutor, *Mathematics and Applications Honours* (1st year)
- 2008 Tutor, *Mathematics and Applications 2 Honours* (1st year)
- 2008 Tutor, *Games, Graphs and Machines* (2nd year)

GRANTS

- 2021 Co-PI: WASP NEST on Learning in Networks (~2 mil EUR shared by four researchers).
- 2020 AI4Research Sabbatical awarded from Uppsala University (~40000 EUR).
- 2019 Travel grant from the Lisa and Carl-Gustav Esseens foundation Lisa och Carl-Gustav Esseens stiftelse (11000 SEK/1100 EUR).
- 2018 Part of working group led by Prof. David Sumpter to write the successful application for a new position at Uppsala University as part of the Wallenberg foundation Artificial Intelligence programme. Contribution: 1 page description of possible research problem 'fundamental limits of learning'.
- 2018 Travel grant from the Lisa and Carl-Gustav Esseens foundation Lisa och Carl-Gustav Esseens stiftelse (10000 SEK/1000 EUR).
- 2018 Travel grant (11000 SEK/1100 EUR) from Stiftelsen G S Magnusons fund awarded by the Royal Swedish Academy of Science.
- 2017 Heilbronn Collaboration Grant (2000 GBP).

RESEARCH VISITS (≥ 2 WEEKS)

- Jan-Mar, 2018 *Uppsala University*, Sweden visiting Cecilia Holmgren.
- Apr, 2017 *Courant Institute*, New York visiting Joel Spencer.
- Oct-Nov, 2014 *University of Warwick*, Coventry visiting Dan Král'.

OUTREACH/COMMUNITY MATHEMATICS AND SCIENCE

- 2024 Lecturer, course: *Logic on graphs* at the National Mathematics Summer School, Australia.
- 2020 Talk: *Community Structure in Networks- with an interlude on random graphs*, talk in Matrix (Maths Society) lunch series for undergraduate students, Bristol University, UK
- 2018 Talk: *Community Structure in Networks*, talk in the Matematikseminariet series for undergraduate students, Uppsala University, Sweden

- 2018 Talk: *Community Structure in Networks*, Uppsala University Maths Club, Sweden
- 2009-13, 2015 Tutor at the National Mathematics Summer School, Australia.
- 2010 Talk: *Soccer, Bucky Balls & Euler Number*, Australian National University Math Day