Fiona Skerman: CV & publications

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Employment and Education

2020– Assistant Professor, Uppsala University, Sweden.

2021 Fall 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
⋆ 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

22. **Modularity and Graph Expansion**,
with B. Louf and C. McDiarmid,
Innovations in Theoretical Computer Science (ITCS 2024), accepted. arXiv:2312.07521

21. **Modularity of nearly complete graphs and bipartite graphs**,
with C. McDiarmid, *preprint*, arXiv:2311.06875.

20. **Universal lower bound for community structure of sparse graphs**,
with V. Agdur and N. Kamčev, *preprint*, arXiv:2307.07271.

19. **Convergence laws for random Mallows permutations**,
with T. Muller and T. Verstraaten, *preprint*, arXiv:2302.10148.

18. **Modularity and edge sampling**,
with C. McDiarmid, *preprint*, arXiv:2112.13190.

2023+ 17. **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.

2023+	16.	**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, to appear*, arXiv:2104.04407.
2023	15.	**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.
2023	14.	**Finding large expanders in graphs: from topological minors to induced subgraphs**, with B. Louf, *Electronic Journal of Combinatorics*, **30** 1 (2023) arXiv:2012.15722.
2023	13.	**No additional tournaments are quasirandom-forcing**, with R. Hancock, A. Kabela, D. Kral, T. Martins, R. Parente and J. Volec, *European Journal of Combinatorics*, **108** (2023) arXiv:1912.04243.
2022	12.	**The modularity of random graphs on the hyperbolic plane**, with J. Chellig and N. Fountoulakis, *Journal of Complex Networks,* **10** 1 (2022) 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 *Dicrete Mathematics and Theoretical Computer Science* **17** 1 (2015) link arXiv:1302.2555

Invited Conference Talks

May, 2024	Colloquia in Combinatorics, QMUL & LSE, United Kingdom.
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 worksop 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

Feb, 2024	*Computational Complexity of Statistical Inference program* at 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 Cominatorics*, 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, *National Mathematics Summer School* (NeMeSiS), 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, *National Mathematics Summer School* (NeMeSiS), Australia
2010	Talk: *Soccer, Bucky Balls & Euler Number*, Australian National University Math Day