

Natalie Behague

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Education

- PhD**, Queen Mary University of London, UK Sep 2016 – Aug 2020
Supervisor: Robert Johnson
Title: Topics in Extremal and Probabilistic Combinatorics
- BA with MMath**, Trinity College, University of Cambridge, UK Oct 2012 – Jun 2016
Part IA: 2.1, Part IB: 1, Part II: 2.1, Part III: Distinction
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Employment

- University of Warwick**, UK Nov 2023 – Dec 2025
Postdoctoral Research Fellow, working with Richard Montgomery
- University of Victoria**, Canada Jan 2022 – Oct 2023
PIMS Postdoctoral Fellow, working with Natasha Morrison and Jonathan Noel
- Toronto Metropolitan University (formerly Ryerson)**, Canada Oct 2020 – Oct 2021
Postdoctoral Research Fellow, Graphs at Ryerson Research Group
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Publications

Published and Accepted

- [1] **2023** (with Anthony Bonato, Melissa A. Huggan, Rehan Malik, and Trent G. Marbach). “The iterated local transitivity model for hypergraphs”. In: *Discrete Appl. Math.* 337, pp. 106–119.
- [2] **2023** (with Tom Johnston, Shoham Letzter, Natasha Morrison, and Shannon Ogden). “The rainbow saturation number is linear”. In: *SIAM J. Discrete Math.* (accepted).
- [3] **2022** (with Robert Johnson). “Synchronizing times for k -sets in automata”. In: *Electron. J. Combin.* 29.3, P3.41.
- [4] **2022** (with Anthony Bonato, Melissa A. Huggan, Trent G. Marbach, and Brittany Pittman). “The localization capture time of a graph”. In: *Theoretical Computer Science* 911, pp. 80–91.
- [5] **2022** (with Trent G Marbach and Paweł Prałat). “Tight Bounds on Probabilistic Zero Forcing on Hypercubes and Grids”. In: *Electron. J. Combin.* 29.1, P1.3.
- [6] **2019**. “Semi-perfect 1-factorizations of the hypercube”. In: *Discrete Mathematics* 342.6, pp. 1696–1702.
- [7] **2018**. “Hypergraph saturation irregularities”. In: *Electron. J. Combin.* 25.2, P2.11.

Submitted

- [8] **2023** (with Joseph Hyde, Natasha Morrison, Jonathan A. Noel, and Ashna Wright). “An Approximate Counting Version of the Multidimensional Szemerédi Theorem”. URL: [arXiv:2311.13709](https://arxiv.org/abs/2311.13709).
 - [9] **2023** (with Natasha Morrison and Jonathan A. Noel). “Common pairs of graphs”. URL: [arXiv:2208.02045](https://arxiv.org/abs/2208.02045).
 - [10] **2023** (with Akina Kuperus, Natasha Morrison, and Ashna Wright). “Improved bounds for cross-Sperner systems”. URL: [arXiv:2302.02516](https://arxiv.org/abs/2302.02516).
 - [11] **2023** (with Natasha Morrison and Jonathan A. Noel). “Off-Diagonal Commonality of Graphs via Entropy”. URL: [arXiv:2307.03788](https://arxiv.org/abs/2307.03788).
 - [12] **2023** (with Gabriel Crudele, Jonathan A. Noel, and Lina M. Simbaqueba). “Sidorenko-Type Inequalities for Pairs of Trees”. URL: [arXiv:2305.16542](https://arxiv.org/abs/2305.16542).
 - [13] **2022** (with Trent G. Marbach, Paweł Prałat, and Andrzej Ruciński). “Subgraph games in the semi-random graph process and its generalization to hypergraphs”. URL: [arXiv:2105.07034](https://arxiv.org/abs/2105.07034).
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Awards and Funding

PIMS Postdoctoral Fellowship , University of Victoria	2022 – 2023
EPSRC Doctoral Studentship , Queen Mary University of London	2016 – 2020
Clay Mathematics Institute Funding US\$1,120 (~£940) to support conference travel	Jul 2022
QMUL Postgraduate Research Fund £400 to support conference travel	Jun 2019
London Mathematical Society Funding £100 to support conference travel	Jun 2019
School of Mathematical Sciences Presentation Prize , QMUL	Apr 2019
Ann Cook Poster Presentation Prize , QMUL	Apr 2018
Undergraduate Summer Research Scholarship , Trinity College, Cambridge (£2000) Supervisor: Dr. Stuart Martin Title: The Representation Theory of the Symmetric Group	Jul – Sep 2015
Senior Scholar , Trinity College, University of Cambridge	Jul 2014

Talks

Invited Conference Talks

IBL60 (in honour of Imre Leader's 60th birthday), University of Cambridge	Sep 2023
CanADAM (Combinatorics and Algebra minisymposium), University of Winnipeg	Jun 2023
Moscow Conference on Combinatorics and Applications, MIPT	Jul 2021
Open University Winter Combinatorics Meeting	Feb 2019

Invited External Seminar Talks

One World Combinatorics on Words Seminar	Oct 2022
Combinatorics Seminar, University of Bristol	Feb 2019, Apr 2021, Nov 2021
Graphs and Matroids Seminar via Matroid Union blog	Oct 2021
Combinatorics Study Group, QMUL	Oct 2021
Discrete Mathematics Seminar, TU Ilmenau	Jul 2021
Women in Combinatorics Virtual Colloquium	Feb 2021
Mathematical Sciences Seminar, Birkbeck University of London	Oct 2019
PhD Seminar on Combinatorics, Games and Optimisation, LSE	Oct 2019
Combinatorics Seminar, University of Warwick	Oct 2018
Combinatorics Seminar, University of Cambridge	Feb 2018

Select Other Talks

Workshop on Spanning Subgraphs in Graphs, University of Warwick	Jul 2023
Random Structures and Algorithms, Institute of European Culture Gniezno	Aug 2022
Young Researchers in Combinatorics workshop, ICMS	Jul 2022
British Combinatorial Conferences	Jul 2019, Jul 2021, Jul 2022
Cross-community Collaborations in Combinatorics workshop, BIRS	Jun 2022
CanADAM	May 2021
Workshop on Graph Theory & Combinatorics in Thuringia	Jul 2020
BYMAT (Bringing Young Mathematicians Together)	Dec 2020
Postgraduate Combinatorial Conferences, LSE / University of Oxford	Jun 2018, Jun 2019

Workshops

Workshop on Spanning Subgraphs in Graphs, University of Warwick	Jul 2023
Young Researchers in Combinatorics workshop, ICMS	Jul 2022
Cross-community Collaborations in Combinatorics workshop, BIRS	May 2022
Graduate Research Workshop in Combinatorics	Jun 2021
Workshop on Graph Theory & Combinatorics in Thuringia	Jul 2020

Teaching

Graph Theory – Masters course with 60 students lecturing, writing homework assignments and exams (shared with Candy Bowtell)	Autumn 2023
Matrix Algebra I – Second-year undergraduate course with 110 students lecturing, office hours, writing homework assignments and exams	Autumn 2022
Random Processes (running tutorials), Calculus I (running tutorials, marking)	Autumn 2019
Coding Theory (tutorial assistant, marking)	Spring 2019
Geometry I (running tutorials), Coding Theory (tutorial assistant, marking)	Spring 2018
Differential and Integral Analysis (tutorial assistant, marking)	Spring 2017

Outreach and Engagement

Imagining UVic , <i>The Catalan Numbers</i>	Oct 2022
Wrote and delivered 2 hour workshop for small group of girls aged 16–18.	
QMUL Girls in Maths Taster Days , <i>Graph Theory</i>	Mar 2019, 2020
Wrote and delivered 45 minute lecture to 140 girls aged 16–17.	
Royal Institution Mathematics Masterclasses , <i>Geometry in the 4th Dimension</i>	Feb 2019
Delivered a 2.5 hour masterclass for 90 children aged 16–17.	
LMS Newsletter Microthesis , <i>Hypergraph Saturation Irregularities</i>	Sept 2019
Invited to write exposition on part of my PhD work for the LMS newsletter.	
International Mathematical Olympiad , Coordinator	Jul 2019
Co-created a mark scheme, marked scripts and coordinated marks with team leaders.	
QMUL Year 11 Maths Summer Schools , <i>Codes and Ciphers</i>	2017, 2018, 2019
Wrote and helped to deliver three day extended research project.	
QMUL Year 11 Maths Summer Schools , <i>The Catalan Numbers</i>	2017, 2018, 2019
Wrote and delivered hour-long interactive class for 40 children aged 15–16.	
Winchester Mathematics Summer School , <i>Double Counting</i>	2018
Wrote and delivered hour-long interactive class for 30 children aged 16–17.	
UKMT Summer Schools (various) , <i>Modular Arithmetic/Graphs</i>	2013 – 2018
Wrote and delivered 1.5-hour interactive classes for groups of 20 to 30 children aged 13–16.	
UKMT Maths Circles , <i>The Catalan Numbers</i>	2016, 2018
Wrote and delivered 1.5-hour interactive classes for 30 children aged 13–15.	
UKMT Mentoring Scheme	2012 – 2020
Mentor for gifted schoolchildren aged 16–18, via email correspondence.	

Administrative Experience and Academic Service

Organiser for Early Career Mathematicians in Combinatorics workshop , ICMS	2024
Journal referee	2018 – present
For Journals of Combinatorial Theory A and B, SIAM Journal on Discrete Mathematics, Discrete Mathematics, the Electronic Journal of Combinatorics, and Mathematika.	
Queen Mary Internal Postgraduate Seminar (QuIPS) Organiser	2017–2018
Organised weekly seminar for mathematics postgraduates.	
Emmy Noether Society Treasurer	2014
Treasurer of student society to promote women in maths. As treasurer I secured an LMS Small Grant for Education for the society.	

Technical Skills

Programming Languages	Python (good), C, GAP, MATLAB (all previously good but rusty).
Professional Experience	Employed as a software developer at Metaswitch Networks for two months in each of 2013 and 2014. Designed, wrote and tested code for communications infrastructure such as routers. Was awarded a bonus and a paid scholarship to return for a second summer.