

Heather A Harrington

Mathematical Institute	Web: http://www.maths.ox.ac.uk/people/profiles/heather.harrington
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RESEARCH INTERESTS

Algebraic systems biology, dynamical systems, model identification, networks, topological data analysis

EMPLOYMENT AND AFFILIATIONS

2013–	Mathematical Institute, University of Oxford <i>Professor of Mathematics</i> (2020–) (6 months maternity leave in 2021) <i>Associate Professor</i> (2017–2020) (6 months maternity leave in 2017) <i>Research Fellow</i> (2013–)
2020–	Wellcome Centre for Human Genetics, University of Oxford <i>Associate Group Leader</i>
2010–2013	Theoretical Systems Biology, Imperial College London <i>Postdoctoral research associate</i> , Developing mathematical/statistical models and methods.

ACADEMIC RECORD

Oct 2010	PhD, Department of Mathematics Supervisors: Jaroslav Stark and Dorothy Buck Imperial College London
May 2006	BS, Applied Mathematics, <i>summa cum laude</i> University of Massachusetts Amherst

PRIZES

2020	Philip Leverhulme Prize in Mathematics and Statistics
2019	University of Cambridge Adams Prize: <i>Mathematics of Networks</i>
2018	London Mathematical Society Whitehead Prize

AWARDS AND FELLOWSHIPS

2023–2025	Royal Society University Research Fellowship Renewal	£355,536
2018–2022	Research Fellow in Mathematics and the Sciences, St John's College, Oxford	
2018–2021	Alan Turing Institute Fellowship	
2017–2022	Royal Society University Research Fellowship	£472,000
2013–2016	EPSRC Postdoctoral Fellowship	£344,000
2013–2016	Junior Research Fellowship, St Cross College	
2007–2010	NSF Graduate Research Fellowship (awarded based on research proposal)	\$126,000
2006–2009	Imperial College Deputy Rector's Award (ORS based on research proposal)	£35,000
2006	Finished in top five in Mathematics (ranking not released), Univ of Mass Amherst	
2005–2006	Student Leadership Award. 21 st Century Award. Univ of Mass Amherst	
2005–2006	Massachusetts Women in Public Higher Education Outstanding Achievement Award	
2005–2006	Goldwater Scholar (Barry M. Goldwater and Excellence in Education Program)	\$13,000

GRANTS

2022–2024	BB/X004244/1: Life and physical sciences interface: Topological underpinnings of data with application to biological sciences (to develop collaboration with EPFL)	£20,000
2018–2024	EPSRC grant: EP/R018472/1 New Approaches to Data Science Title: Application Driven Topological Data Analysis (PIs: Harrington & Tillmann)	£2,847,111
2022–2023	Royal Society Enhancement: UF150238, URF\R\211032 (20 month PDRA)	£166,602
2021–2023	Celgene/Bristol Myers Squibb: Topological Data Analysis of Single Cell Data	£265,866
2021–2023	UKRI Agile Research for COVID-19: EP/V050192/1 (CI, PI: J Knight)	£228,109
2021–2023	American Institute of Mathematics SQuaRE grant, <i>Ideals in Algebraic Systems Biology</i> (with Luis García-Puente, Elizabeth Gross, Nicolette Meshkat and Anne Shiu)	\$12,500
2020–2022	Royal Society Enhancement (PI) to fund one year postdoc and research visits	£94,657
2020–2022	Emerson Fund: TOPMAP Platform for predicting biomarkers for patient stratification and personalised treatment (PI)	\$248,107
2020–2022	EPSRC grant: EP/T001968/1 Capacity building in Africa via technology-driven research in algebraic and arithmetic geometry (CI, PI: B Szendroi)	£169,519
2019–2021	ATI/ DSTL grant: Topological Analysis of Maritime Data (CI, PI: P Skraba)	£257,495
2017–2020	RS Fellow - EPSRC grant: EP/R005125/1 (funding to hire DPhil student)	£266,958
2016 –	LMS Scheme 3 Grant: Applied Algebra and Geometry (CI)	£1,200
2016	Univ of Oxford EPSRC Block Grant (collaboration with GCHQ)	£33,000
2016	Univ of Oxford Emirates Award (partial funding for graduate studentship)	£40,000
2015–2019	American Institute of Mathematics SQuaRE grant, <i>Ideals in Biology</i> (with Luis Garcia-Puente, Elizabeth Gross, Nicolette Meshkat and Anne Shiu)	\$12,500
2015	Univ of Oxford Mathematical Institute Platform Grant (for mini-symposium)	£1,000
2015–2016	Univ of Oxford John Fell Fund award (funding to hire a one-year postdoc)	£55,000
2015	ATI grant, <i>Topological Data Analysis</i> (with Grindrod, Tillmann and Wolfe)	£12,000
2015	NIMS/SIAM travel award for early career researchers	\$ 1,500
2015	American Mathematical Society (AMS) MRC Travel Grant (Georgia Tech)	\$ 1,000
2015	AMS Joint Math Meetings special session organiser travel grant	\$ 1,200
2014–2016	Royal Society International Exchange Travel Grant to visit B Sturmfels (PI)	£12,000
2013	OCCAM short project award (partial funding for postdoc)	~ £10,000
2013	American Mathematical Society, Simons Travel Award	\$4,000
2012	Mini-sabbatical travel grant, Enhancing Diversity in Graduate Education	\$5,000
2007	Travel Grant, Enhancing Diversity in Graduate Education	\$1,750
2005	Research Travel Grant, Commonwealth (Honors) College, Univ of Mass Amherst	\$1,000
2005	Best poster award at AMS/MAA Joint Meetings	
2004	Nancy Sinclair Endowment Fund, Dept of Math, Univ of Mass Amherst	\$2,500
2004	Sheila R. Flynn Research Scholarship, Dept of Math, Univ of Mass Amherst	\$2,000

PRESENTATIONS AND TALKS (OVER 100 INVITED)

Colloquia and Keynote

Department of Applied Mathematics Colloquium, Brown University	Sep 2022
12th European Conference on Mathematical and Theoretical Biology (ECMTB/SMB), Heidelberg, Germany	Sept 2022
38th International Symposium on Computational Geometry (SoCG 2022), Berlin, Germany	June 2022
Department of Mathematics Colloquium, University of Warwick, UK (virtual)	May 2022
School of Mathematics Colloquium, Birmingham	Mar 2022
Pure Mathematics Colloquium, Durham, UK	Mar 2022

Heilbronn Annual Conference, Bristol, UK (virtual).	Sep 2021
SIAM Conference on Applications of Dynamical Systems, Portland, OR, USA (virtual).	May 2021
BMC/BAMC (BMC morning speaker), University of Glasgow, UK (virtual).	Apr 2021
Southeast Center for Mathematics and Biology, Georgia Tech (virtual)	Dec 2020
Joint ECMTB and SMB Conference, Germany (postponed, covid)	Aug 2020
Applied Mathematics Colloquium, UCLA, USA (postponed, covid)	Jun 2020
SIAM Conference on the Life Sciences, Garden Grove, CA, USA (cancelled, covid).	Jun 2020
BMC/BAMC (BMC morning speaker), University of Glasgow, UK (postponed, covid).	Apr 2020
Networks approaches for Healthcare Applications, Exeter, UK (cancelled, covid).	Mar 2020
Mathematics Colloquium, St Andrews University, UK.	Feb 2020
Pure Mathematics Colloquium, University of Leeds, UK.	Feb 2020
Mathematics Colloquium, TU Munich, Germany.	Feb 2020
Harvard Colloquium, Center for Mathematical Sciences and Applications (CMSA), USA.	Nov 2019
Higher Order Networks Conference 2019, Oxford, UK.	Sept 2019
SIAM Network Science Keynote 2019 (Snowbird Dynamical Systems) USA.	May 2019
Applied Mathematics Colloquium, University of Sheffield, UK.	Feb 2019
Complex Networks Conference, Cambridge, UK.	Dec 2018
Opening day for Topology and Geometry in Applications Semester, HITS, Germany.	Nov 2018
Connecticut Valley Colloquium, Mt Holyoke College, US	Nov 2018
Mathematics and Statistics Colloquium, University of Massachusetts Amherst, US	Nov 2018
Mathematics Department Colloquium, University of Bristol, UK.	Nov 2017
Women in Mathematics: Opportunities for the Future, Bristol, UK.	Nov 2017
LMS Popular Lectures, London and Birmingham, UK.	Jun, Sep 2016
CAM Colloquium, Cornell University. Ithaca, NY, USA.	Nov 2015
PROMYS Europe (outreach), University of Oxford, UK.	Aug 2015
Christ Church Annual Dodgson Lecture, University of Oxford, UK.	Jan 2015

Invited talks: Department seminars

Topology, Geometry, and Data Analysis seminar, Ohio State University	Oct 2023
Kolchin Seminar, virtual	May 2022
Applied Algebraic Topology Research Network (AATRN)	May 2022
Centre of Systems Biology Dresden (CSBD) and Max Planck Institutes Symposium	Mar 2022
Mathematical Biology Seminar, Univ of Massachusetts, virtual	Feb 2022
SIAM Seminar on Applied Geometry and Algebra (SAGA), virtual	Feb 2022
Applied Algebra and Analysis Seminar , Braunschweig Germany (virtual)	Jan 2022
CRM Applied Math Seminar, Montreal, Canada	Nov 2020
Wolfson Mathematical Biology Seminar, University of Oxford, UK	Nov 2020
MRC Biostatistics Unit, University of Cambridge, UK	Oct 2019
Complex systems seminar, Queen Mary University of London, UK	Mar 2019
Systems Biology and Infectious Disease Seminar, University of Warwick, UK	Feb 2019
Applied Mathematics Seminar, Rutgers University, USA	Jan 2019
Biomathematics Seminar, Imperial College London, UK.	Jul 2018
String Theory Seminar, University of Oxford, UK.	Apr 2018
Mathematical Biology Seminar, University of Nottingham, UK.	Feb 2018
Complexity Seminar, University of Bath, UK.	Feb 2018
CCMI Mathematics Seminar, University of Cambridge, UK.	Feb 2017
Maths in the Life Sciences Seminar, University of Manchester, UK.	Dec 2016
Nonlinear Algebra Seminar, MPI Leipzig, Germany.	Nov 2016

Control Theory Seminar, University of Cambridge, UK.	May 2016
Junior Algebra and Representation Theory Seminar, University of Oxford, UK.	May 2016
Mathematical Biology Seminar, University of Kent, UK.	Mar 2016
Department of Mathematics, City University, London, UK.	Dec 2015
Systems Biology Seminar, Harvard Medical School, Boston, MA, USA.	Nov 2015
Applied Mathematics Seminar, Pomona College. Claremont, CA, USA.	Nov 2015
Applied Algebra Minisymposium, University of California, Berkeley, USA.	Nov 2015
Computational Biology Seminar, University of Tokyo, Tokyo, Japan.	Jul 2015
Pure and Applied Mathematics Seminar, National Autonomous University of Mexico.	May 2015
Biophysics Seminar, University of Oxford, UK.	Mar 2015
Mathematical Biology Seminar, University of Southampton, UK.	Mar 2015
Angiogenesis Seminar, University of Oxford, UK.	Feb 2015
Applied Algebra Seminar, University of California, Berkeley, USA.	Oct 2014
Mathematical Biology Seminar, University of Nottingham, UK.	Apr 2014
Symbolic Computation Seminar, North Carolina State, USA.	Sep 2013
Systems Biology, University of Tokyo, Tokyo, Japan.	Jan 2012

Invited talks: Workshops and Conferences

FoCM Computational Geometry and Topology, Sorbonne Université, Paris, France	Jun 2023
Joint Mathematics Meeting, Boston, USA	Jan 2023
Geometry, Topology and Statistics in Data Science, IHP, Paris, France	Oct 2022
Combinatorial, Computational, and Applied Algebraic Geometry, WA, USA	June 2022
Abram Gannibal Workshop, Chicheley Hall, Milton Keynes, UK	Feb 2022
Beetles21: Centre for Topological Data Analysis Conference, Liverpool, UK	Sep 2021
IHES 2022: Algebraic Techniques in Machine Learning and Artificial Intelligence	2022
WinCompTop Workshop, Berlin, Germany (cancelled, coronavirus)	Aug 2020
LMS Undergraduate Summer School, Swansea UK (cancelled, coronavirus)	Jul 2020
Computational Algebraic Geometry, FOCM, (postponed, coronavirus) Canada	Jun 2020
Computational Geometry & Topology, FOCM, (postponed, coronavirus) Canada	Jun 2020
Statistics for Topological and Discrete Data, EPFL, Switzerland	May 2020
Quantitative Systems Pharmacology Conference, Leiden (postponed, coronavirus)	Apr 2020
Royal Society meeting (cancelled, coronavirus)	Mar 2020
Emerson Collective Cancer Research Summit, Napa Valley (cancelled, coronavirus)	Mar 2020
Dynamics, randomness, and control in molecular and cellular networks, Harvard, USA	Nov 2019
IBM Workshop, University of Oxford, Oxford, UK	Oct 2019
AI@Conference, University of Oxford, Oxford, UK	Sep 2019
ICIAM Mini-symposium on Higher-order Networks, Valencia, Spain	Jul 2019
SIAM Dynamical Systems, Topology and Dynamics minisymposium, Snowbird Utah	May 2019
Women in Mathematics Day, Queen Mary University of London	Mar 2019
Symposium on Machine Learning and Dynamical Systems, Imperial College	Feb 2019
Joint Mathematics Meeting, Topological data analysis minisymposium	Jan 2019
Applied Algebraic Geometry in Applications, ICERM	Nov 2018
ICML, workshop on Geometry in Machine Learning, Sweden (cancelled due to visa problem)	Jul 2018
Multi-parameter persistent homology, Oaxaca Mexico (cancelled due to visa problem)	Jul 2018
Linking Topology to Algebraic Geometry and Statistics, MPI Leipzig	Feb 2018
British Mathematics Colloquium, Algebra workshop	Apr 2017
Varsity Event, Emmy Noether Society (Cambridge) and Mirzakhani Society, Oxford, UK	Feb 2017
LMS Applied Algebra and Geometry meeting, Nottingham, UK	Feb 2017

Florence Nightingale Day (outreach), Lancaster, UK	Jan 2017
AMS special session: Theory and Application of Numerical Algebraic Geometry.	Jan 2017
Joint Mathematics Meetings, Atlanta, GA	
Topological, Geometric, and Statistical Techniques in Biological Data Analysis Workshop	
Mathematical Biosciences Institute, Ohio State Univ, OH USA. (declined, conflict with AIM SQuaRE)	
Applications and Statistics of Multidimensional Persistence. EPFL, Lausanne, Switzerland.	Aug 2016
Princeton – Rutgers Applied Topology Workshop (declined, conflict with BAMC 2016)	
Generalized Network Structures and Dynamics Workshop	Mar 2016
Mathematical Biosciences Institute, Ohio State Univ, Columbus, OH, USA.	
Alan Turing Institute workshop, TDA in Material Science, Strathclyde, UK.	Mar 2016
Algebraic and Topological Methods in Biological Networks Conference	Jan 2016
Warren Center for Network and Data Sciences, Univ of Penn. Philadelphia, USA.	
Applied Topology Workshop	Jan 2016
Queen Mary University of London, UK.	
Conference on Computational Topology, Geometry and Stochastic Topology	Dec 2015
National Autonomous University of Mexico, Querétaro, Mexico.	
Numerical Algebraic Geometry mini-symposium	Aug 2015
SIAM Conference on Applied Algebraic Geometry. Daejon, South Korea.	
Algebraic structures arising in systems biology mini-symposium	Aug 2015
SIAM Conference on Applied Algebraic Geometry. Daejon, South Korea.	
Algebraic and Combinatorial Approaches in Systems Biology Conference	May 2015
Center for Quantitative Medicine, University of Connecticut, Farmington, CT, USA.	
EDGE talks by women in pure and applied mathematics mini-symposium	Jan 2014
AMS/MAA Joint Mathematics Meeting, Baltimore, MD, USA.	
European meeting in Chemical Reaction Networks, Imperial College, UK.	Nov 2012
Biochemistry, Biology and Pathology of MAP Kinases conference, Israel.	Oct 2012
Algebraic Methods in Systems and Evolutionary Biology,	May 2012
Mathematical Biosciences Institute, Ohio State University, OH, USA.	
Mathematical and Statistical Approaches in Molecular Biology, Vienna, Austria.	Mar 2011
Summer Graduate Program Presentations, Math Biosci Inst, Ohio State Univ, OH, USA.	Jul 2007

Selected contributed talks and presentations: Workshops and Conferences

The 8th MSJ SI 2015, Mathematical Society of Japan, Current Trends on Gröbner Bases	Jul 2015
The 50th Anniversary of Gröbner Bases Osaka University, Osaka, Japan.	
LMS Women in Mathematics Day, De Morgan House, London, UK.	May 2011
5th BioSim Workshop on Computation of Biochemical Pathways and Genetic Networks,	Sep 2008
Bioquant, University of Heidelberg, Germany.	

MATHEMATICAL ACTIVITIES (SELECTED/FUNDED PARTICIPANT OR VISITOR, NOT LISTED ON TALKS)

Fall 2023	Mathematics of movement, Newton Institute, Cambridge UK
Fall 2023	Algebraic Statistics and Applications, IMSI, Chicago, IL, USA
May 2023	Dagstuhl Seminar week, Topological Data Analysis and Applications, Wadern, Germany
Oct 2022	Geometry, Topology and Statistics in Data Sciences, IHP, Paris
Apr 2022	NSF–Simons Research MathBioSys Annual Meeting (joining virtually), NY, USA
Mar 2022	American Institute of Mathematics Square, San Jose, CA, USA
Fall 2019	ATI group on Machine Learning and Dynamical Systems (R MacKay and B Hamzi)
Fall 2018	Institute for Computational and Experimental Research in Mathematics (ICERM), semester long program on Nonlinear Algebra

Jan 2018	Statistics for Data with Geometric Structure, Oberwolfach, Germany
Sep 2015–18	Ideals in Biology, American Institute of Mathematics SQuaRE, CA, USA (4 visits)
Nov 2015	Women in data science conference, Stanford University
Apr 2015	Non-linear algebra workshop, Berlin, Germany
Jun 2014	AMS Mathematical Research Communities, Snowbird, Utah
Spring 2013	Lewis-Sigler Institute, Princeton University (3 months)
Mar 2013	Mathematics arising from biochemical reaction networks workshop, Am Inst of Math, CA
Jun 2011	ESF Effective Methods in Algebraic Geometry, Stockholm Univ
Summer 2009	Courant Institute of Mathematical Sciences, New York University (3 months)
Jul 2006	Enhancing Diversity in Graduate Education, New College Florida
Summer 2005	Mathematical and Theoretical Biology Institute, Los Alamos Natl Lab/Arizona State Univ
Summer 2004	Research Experience for Undergraduates (REU) Dept of Mathematics, Univ of Mass
Jul 2004	Geometric Combinatorics, Institute for Advanced Study/ Park City Math Institute

SUPERVISION AND MENTORING

Research supervision and mentoring

Research fellows (University of Oxford)

1. Jane Ivy Coons, St John's Research Fellow, Mathematical Institute
2. Gillian Grindstaff, Mathematical Institute, (NSF Postdoctoral Fellow)

Postdoctoral scholars (University of Oxford)

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| 1. Hamid Rahkooy, Mathematical Institute (TDA postdoc) | Oct 2022 – June 2024 |
| 2. Adam Brown, Mathematical Institute (TDA postdoc) | Sep 2022 – Sep 2024 |
| 3. Pedro Soto, Wellcome Centre Human Genetics (postdoc with J Knight) | Sep 2022 – Sep 2023 |
| 4. Iris Yoon, Mathematical Institute, (TDA and mathbio postdoc) | Mar 2022 – Feb 2023 |
| 5. Oliver Gäfvert, Mathematical Institute, (TDA postdoc, Celgene/BMS) | Oct 2021 – Sep 2023 |
| 6. Gillian Grindstaff, Mathematical Institute, (now NSF Postdoctoral Fellow) | Sep 2021 – Sept 2022 |
| 7. Renee Hoekzema, Mathematical Institute, (now Assistant Prof, Free University of Amsterdam) | Jun 2020 – May 2022 |
| 8. Gregory Henselman-Petrusek, Mathematical Institute, (now PNNL Senior Scientist) | Sep 2020 – Dec 2021 |
| 9. Bernadette Stolz, Mathematical Institute, (now EPFL postdoc) | Oct 2019 – Sep 2023 |
| 10. Kelly Spendlove, Mathematical Institute, (now Google) | Oct 2019 – Jan 2022 |
| 11. Emilie Dufresne, Mathematical Institute (now Lecturer at York) | Dec 2015 – Nov 2016 |
| 12. Adam MacLean, Mathematical Institute (now Assistant Prof, USC) | Jan – Nov 2014 |

Doctoral students (University of Oxford)

Current

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| 1. Robert MacDonald, Mathematical Institute, joint with H Byrne | Oct 2021 – |
| 2. Katherine Benjamin, Mathematical Institute, joint with U Tillmann | Oct 2021 – |
| 3. Thomas Chaplin, Mathematical Institute, joint with U Tillmann | Oct 2020 – |
| 4. Otto Sumray, Nuffield Dept Medicine, joint with V Nanda and X Lu | Oct 2020 – |
| 5. Lewis Marsh, Mathematical Institute, joint with H Byrne and X Lu | Oct 2019 – |
| 6. David Beers, Mathematical Institute, joint with A Goriely | Oct 2019 – |

Previous

1. Jacob Leygonie, Mathematical Institute, joint with U Tillmann Oct 2018 – Sep 2022
2. Agnese Barbensi, Mathematical Institute, joint with M Lackenby & D Buck Apr 2020
Placement: Hooke Research Fellow, now PDRA at Univ of Melbourne
3. Nina Otter, Mathematical Institute, joint with U Tillmann Jul 2018
Placement: Lecturer (Assistant Professor), Queen Mary (2019 – 2021)
4. Michael Adamer, Mathematical Institute, joint with T Woolley & E Gaffney Jul 2019
Placement: postdoc, ETH Zurich (2020 – 2022)
5. Bernadette Stolz, Mathematical Institute, joint with J Tanner Oct 2019
Placement: postdoc, EPFL (2022)

Masters students (University of Oxford)

1. Robert MacDonald, joint with M Bruna, Mathematical Institute May – Sep 2020
2. Timothy Hobson, joint with P Kevrekidis, Mathematical Institute Jan – May 2020
3. Lewis Marsh, Mathematical Institute Apr – Sep 2019
4. Gregory Greif, joint with A Muench, Mathematical Institute Apr – Sep 2019
5. Wojciech Reise, joint with M Beguerisse-Díaz (Spotify), visiting student EPFL Feb – Jun 2019
6. Dimitri Lozeve, joint with R Lamboitte and M Porter Jul – Sep 2018
7. Rohan Arambepola, joint with F Kirwan and E Dufresne Jul – Oct 2017
Systems Biology Doctoral Training Centre
8. Andreia Pereira Chapouto, Mathematics, joint with H Byrne and P Maini Sep 2016 – Jan 2017
visiting student from University of Coimbra, Portugal.
9. Parker Edwards, joint with E Dufresne Apr – Sep 2016
Mathematical Foundations in Computer Science MSc
10. Leo Speidel, joint with M Porter and J Chapman Apr – Jul 2016
Systems Biology Doctoral Training Centre
11. Michael Adamer, joint with T Woolley Apr – Jul 2016
Systems Biology Doctoral Training Centre
12. Matishalin Patel, joint with M Bonsall (Zoology) Apr – Jul 2016
Interdisciplinary Bioscience Doctoral Training Partnership
13. Dorian Levy, joint with R Van Gorder May – Sep 2015
Mathematical Modelling and Scientific Computation MSc
14. Erin Price-Wright, joint with M Porter Apr – Sep 2015
Mathematical Foundations in Computer Science MSc
15. Alice Schwarze, joint with A Papachristodoulou and J Anderson (Eng) Apr – Jul 2015
Systems Approaches to Biomedical Sciences Centre for Doctoral Training
16. Barbara Mahler, joint with M Porter Summer 2014, Winter 2015
Systems Biology Doctoral Training Centre
17. Bernadette Stolz, joint with M Porter May – Sep 2014
Mathematical Modelling and Scientific Computation
18. Jake Taylor-King, joint with D Basanta (Moffitt Cancer, USA), and M Porter Apr – Jul 2014
Systems Biology Doctoral Training Centre
19. Andrew Parker, joint with B Rodriguez, H Byrne and A MacLean Jul – Sep 2014
Systems Biology Doctoral Training Centre
20. Florian Klimm, Physics, joint with M Porter Jul – Sep 2013
visiting student from Humboldt-Universität zu Berlin

Undergraduate students (University of Oxford)

1. Niharika Paul, Part B examination Mathematical research topic (joint with J Coons) Oct 2022 – Apr 2023
2. Heidi Fang, Royal Society summer research (joint with G Grindstaff) Jul 2022 – Sep 2022

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| 3. Jingjie Yang, Royal Society summer research (joint with G Grindstaff) | Jul 2022 – Sep 2022 |
| 4. Mark Williams, EPSRC summer research (joint with G Grindstaff) | Jul 2022 – Sep 2022 |
| 5. Wilf Offord, EPSRC summer research (joint with G Grindstaff) | Jul 2022 – Sep 2022 |
| 6. Siddharth Kumar, Summer research project | Aug 2018 – Sep 2018 |
| 7. Richard Tanburn, joint with E Dufresne. Part C, then Summer research | Oct 2016 – Jul 2018 |

Academic supervision, mentoring and pastoral care

University of Oxford (2013 – present)

- Mentor to research fellows in Mathematical Institute
- Mentor to students on Mathematics and Foundations of Computer Science MSc
- Mentor to students on Mathematical Modelling and Scientific Computing MSc
- St Cross graduate advisor. Meet 7 postgraduate students once termly and offer pastoral support. MSc, MPhil and DPhil students from a range of scientific disciplines (chemistry, computing, healthcare and health sciences, and engineering, neuroscience).

Imperial College London (2007 – 2010)

- Fisher Hall Resident Sub-warden. Worked with team to manage and operate university residence (150 students); prepared and submitted budgets, applied problem-solving skills in emergency situations.
- Mentor (initiated buddy system) to first year PhD students.

TEACHING

University of Oxford (2013 – present)

- College tutor: Second year, Topology course
- Lecture courses: Mathematical modelling in biology, Part A short option, 8 hours. Networks, fourth year and MSc (MMSC, MFoCS, MMathPhys), 16 hours.
- Lectured modules: Doctoral Training Centre, Advanced Mathematical Biology (6 hours lectures on algebraic methods, statistical inference and model selection, network analysis), Case Study: Population ecology of more than 2 species, MSc Mathematical Modeling and Scientific Computing (6 hours of lectures on modelling case studies)
- Class tutor: B5a, Third year course, Techniques of Applied Mathematics, B8a, Third year course, Mathematical Ecology and Biology

Imperial College London (2006 – 2013)

- Guest lecturer in Bioinformatics MSc on mathematical methods and statistics
- Lead teaching assistant: Bioeng Year 1 Mathematics
- Demonstrator: Bioeng Year 1 Mathematics
- Marker: Complex Analysis I M2P3, Differential Equations M2M2, Mathematical Biology M3/4A21, Chem Eng Year 2 Math, Chem Eng Year 1 Math, Biomedical Eng Year 1 Math

University of Massachusetts at Amherst (2003 – 2006)

- UG teaching assistant (ran sessions, held office hours): Pre-Calculus & Calculus
- Marker: Calculus I & II, ODEs

UNIVERSITY EXAMINING

2022	Tadas Temcinas, DPhil confirmation of status (Oxford)
2021	Oliver Gäfvert, PhD viva (KTH)
2020	Christian Goodbrake, DPhil viva (Oxford)
2020	Lyuba Bozhilova, DPhil viva (Oxford)
2020	Naya Yerolemou, DPhil transfer of status (Oxford)
2019	Rodrigo Leal Cervantes, DPhil transfer of status (Oxford)
2018	Lyuba Bozhilova, DPhil confirmation of status (Oxford)
2019	ASO marker Mathematical Modelling in Biology (Oxford)
2018	Andreas Petrides DPhil viva (Cambridge)
2018	Florian Klimm, DPhil viva (Oxford)
2018	Joshua Bull, DPhil confirmation of status (Oxford)
2018	Oliver Vipond, DPhil transfer of status (Oxford)
2018	Lyuba Bozhilova, DPhil transfer of status (Oxford)
2018	Christian Goodbrake, DPhil transfer of status (Oxford)
2017	Networks mini-projects (Oxford)
2016	Prelims marker (Oxford)
2016	Parker Edwards MFoCS viva (Oxford)
2016	Nicola Trendle DPhil transfer of status (Oxford)
2016	Alice Schwarze, DPhil transfer of status (Oxford)
2015	Rodrigo Mendoza-Smith, DPhil confirmation of status (Oxford)
2015	Erin Price-Wright, MFoCS MSc viva (Oxford)
2015	Thomas Durrant MFoCS MSc viva (Oxford)
2015	Andrew Parker, DPhil transfer of status (Oxford)
2015	Tomislav Pleas, DPhil transfer of status (Oxford)
2015	Jake Stroud, DTC viva (Oxford)
2014	Marta Sarzynska, DPhil confirmation of status (Oxford)
2014	Ross Johnstone, DTC viva (Oxford)

COLLEGE INVOLVEMENT

2023	Tutorials at St John's College in Topology
2019 – 2020	Member of Research Committee, St John's College
2019 – 2020	Tutorials at St John's College in ASO Mathematical Biology
2014 – 2016	Sports Fellow at St Cross College (chair of committee, managed 50K sports budget)
2013 – 2014	Rowed W1 for St Cross College (Division 1 Summer Eights).

ADMINISTRATION AND SERVICE

Conference, workshop and meeting organisation (28 events)

2023	WinCompTop3 (with Erin Wolf Chambers and Claudia Landi)
2022	SIAM Workshop on Network Science 2022 (Program Committee Member)
2022	Enhancing Diversity in Graduate Education (EDGE), hosted at the Mathematical Institute and St John's College, Oxford.
2022	Algebraic Topology: Methods, Computation, & Science (ATMCS), 5 day conference, Mathematical Institute in Oxford. Co-chair with Ulrike Tillmann and Vidit Nanda.
2020	SIAM Workshop on Network Science (Program Committee Member)
2019	Spires: Topological Data Analysis Conference (Co-organiser with Ulrike Tillmann)

2019	SIAM Applied Algebraic Geometry Conference (Program Committee Member)
2017 –	LMS Applied Algebra and Geometry network (with Emilie Dufresne and Dimitra Kosta), 3 meetings each year (10 meetings in total)
2017	Workshop on Computational and Statistical Topology (with Vidit Nanda, Jared Tanner and Ulrike Tillmann)
2016	SIAM Annual meeting mini-symposia co-organizer (with Nicolette Meshkat) Algebraic Approaches for Investigating Biological Systems
2016	British Applied Mathematics Colloquium mini-symposia co-organizer (with Ulrike Tillmann) I. Applied and Computation Algebra, II. Applied and Computational Topology.
2015	Alan Turing Institute scoping workshop co-organizer (with Ulrike Tillmann and Patrick Wolfe) on Computational Algebraic Topology September 2015, University of Oxford.
2015	Workshop co-organizer Computational Algebraic Topology: Theory, Computation and Application, Feb and June 2015, University of Oxford.
2015	AMS-MAA Joint Meetings Special session co-organizer on Algebraic and Geometric Methods in Applied Discrete Mathematics, January 2015, San Antonio, USA.
2014	Workshop co-organizer on MAPK models and experiments, April 2014, Barcelona, Spain.
2014	Workshop organizer (4 events) <i>Model selection and parameter estimation</i> , Univ of Oxford
2007–2009	Co-chair conference organizer, Inst of Eng and Tech/ BioSysBio

Editorial board membership

Associate editor, AIMS Foundations of Data Science.	2019 –
Associate editor, Bulletin of Mathematical Biology.	2019 –
Associate editor, Biophysical Journal.	2020 –
Associate editor, Elsevier Brain Multiphysics.	2019 –
Associate editor, IMA Mathematical Medicine & Biology.	2022 –
Associate editor, SIAM Applied Algebra and Geometry.	2018 –
Associate editor, SIAM Journal on Applied Dynamical Systems.	2020 –
Associate editor, Letters in Biomathematics.	2017 –
Associate editor, Transactions of the LMS.	2020 –
Book series editor, Springer Mathematics of Data. How to find structure in data?	2020 –
Editor, Chaos. Issue: Dynamics on Networks with Higher-Order Interactions	2021 – 2022

University or external committee, memberships

2021 – 2022	Advisory Board Member, Algebra, Topology, Geometry in Life Sciences (AlToGeLiS)
2021 – 2022	Member of Turing-Roche Expert Advisory Panel
2021 –	CHIMERA - independent advisory group of EPSRC Healthcare Hub
2019 –	Board of Directors, Enhancing diversity in graduate education (EDGE) foundation
2019 – 2020	Member of Department Committee, Mathematical Institute
2019 – 2020	Member of Early Career Committee, London Mathematical Society
2019 –	Royal Society International Exchanges Committee, Royal Society
2019 – 2020	Harassment Advisor, University of Oxford
2018 – 2019	Member of Early Career Research Committee, University of Oxford
2018 –	UK grant reviewer: BBSRC, EPSRC, MRC, NERC and Wellcome Trust.
2016 – 2018	Postdoc representative of Mathematical Institute Department Committee
2014 –	Interview panels: DTC DPhil admission, mathematics DPhil admission, six postdocs in mathematics.

- 2012 –** Referee for peer-reviewed journals: Biophys J, BMC Syst Biol, Bull Math Biol, Eur J Appl Math, J Clin Monit Comput, J R Soc Interface, J Theor Biol, Phys Biol, PLoS Comput Biol, PLoS One, Proceedings B, PRX, SIAM J Appl Math, Sci Rep.
- 2009–** Memberships: AMS. LMS. SIAM, Activity groups: Dynamical Systems, Linear Algebra, Applied Algebraic Geometry,
- 2013 – 2015** Member of Good Practice Committee (promoting good working conditions for all)
- 2015** Panel member LMS Women in Maths session. Careers: what can I do with a maths PhD?

Outreach, public engagement and scientific community

- 2022** Local organiser, one month residential programme: Enhancing Diversity in Graduate Education (EDGE)
- 2022** Oxford Scientific Society talk
2017 Florence Nightingale Day (outreach), Lancaster, UK
- 2017 –** LMS Scheme 3 network in Applied Algebra and Geometry
co-organizer (with D Kosta and E Dufresne), in total 10 meetings around UK
- 2017** Outreach talks: Mirzakhani Society. Florence Nightingale Day.
- 2016** LMS Popular Lectures, London and Birmingham, UK.
- 2015** PROMYS Europe (outreach), University of Oxford, UK.
- 2015 – 2016** North-meets-South Colloquium co-organizer, Mathematical Institute, University of Oxford
- 2012 – 2015** Network Days Outreach Program (Year 9 students),
Somerville College and/or Mathematical Institute, University of Oxford
- 2011 – 2012** Journal club organiser, Centre for Integrative and Systems Biology (CISBIC), Imperial College London

Refereed papers in primary journals.

48. Marsh L, Dufresne E, Byrne HM, **Harrington HA** (2022) *Algebra, Geometry and Topology of ERK Kinetics*. Accepted, Bull Math Biol. Available at arXiv:2112.00688.
47. Dong R, Goodbrake C, **Harrington HA**, Podugin G. (2022) *Computing input-output projections of dynamical models with applications to structural identifiability*. Accepted, SIAGA. Available at arXiv:2111.00991.
46. Bick C, Gross E, **Harrington HA**, Schaub MT. *What are higher order networks?* Accepted, to appear SIAM Review. Available at arXiv:2104.11329.
45. Barbensi A, Buck D, **Harrington HA**, Lackenby M. *Double branched covers of knotoids*. Accepted, Comm in Anal Geom.
44. Hoekzema RS, Marsh L, Sumray O, Carroll TM, Lu X, Byrne HM, **Harrington HA**. (2022) *Multiscale methods for signal selection in single-cell data*. Entropy 24 (8) 1116.
43. Stolz BJ, Kaeppler J, Markelc B, Mech F, Lipsmeier F, Muschel RJ, Byrne HM, **Harrington HA** (2022) *Multiscale Topology Characterises Dynamic Tumour Vascular Networks*. Sci Adv 8 (23).
42. Brown EL, Lefebvre TL, Sweeney PW, Stolz BJ, Grohl J, Hacker L, Huang Z, Couturier D-L, **Harrington HA**, Byrne HM, Bohndiek SE. (2022) *Quantification of vascular networks in photoacoustic mesoscopy*. Photoacoustics 26, 100357.
41. Thorne T, Kirk PDW, **Harrington HA**. (2022) *Topological Approximate Bayesian Computation for Parameter Inference of an Angiogenesis Model*. Bioinformatics 38 (9) 2529-2535.
40. COMBAT Consortium (203 authors). (2022) *A blood atlas of COVID-19 defines hallmarks of disease severity and specificity*. Cell. 185,. 916938
39. Seigal A, **Harrington HA**, Nanda V. (2022) *Principal Components along Quiver Representations*. Found Comut Math 1-37.
38. Vipond O, Bull JA, Macklin PS, Tillmann U, Pugh CW, Byrne HM, **Harrington HA**. (2021) *Multi-parameter persistent homology landscapes identify immune cell spatial patterns in tumors*. Proc Nat Acad Sci. 118 (41) e210216611.
37. Nardini JT, Stolz BJ, Flores KB, **Harrington HA**, Byrne HM. (2021) *Topological data analysis distinguishes parameter regimes in the Anderson-Chaplain model of angiogenesis*. PLoS Comput Biol. 17(6) e1009094.
36. Dufresne E, **Harrington HA**, Kevrekidis PG, Tripoli P. (2021) *On some configurations of oppositely charged trapped vortices in the plane*. Adv in Appl Math. 124:102099.
35. Stolz BJ, Emerson T, Nahkuri S, Porter MA, **Harrington HA**.(2021) *Topological Data Analysis of Task-Based fMRI Data from Experiments on Schizophrenia*. J of Physics Complexity 2(3).
34. Stolz BJ, Tanner J, **Harrington HA**, Nanda V. (2020) *Geometric anomaly detection in data*. Proc Nat Acad Sci. 117(33):19664-19669.
33. Gross E, **Harrington HA**, Meshkat N, Shiu A. (2020) *Joining and decomposing biochemical reaction networks*. J Math Biol. 80:1683–1731.
32. Adamer MF, **Harrington HA**, Gaffney, E. Woolley TE. (2020) *Coloured Noise from Stochastic Inflows in Reaction-Diffusion Systems*. Bull Math Biol. 82(4):44.
31. Yeung E, McFann S, Marsh L, Dufresne E, Filippi S, **Harrington HA**, Wühr M, Shvartsman SY. (2020) *Inference of Multisite Phosphorylation Rate Constants and their Modulation via Pathogenic Mutations*. Curr Biol 30(5):877-882.
30. Barbensi A, Celoria D, **Harrington HA**, Stasiak A, Buck D. (2020) *Grid diagrams as tools to investigate knots space and topoisomerases-mediated simplification of DNA topology*. Sci Adv. 6(9).

29. **Harrington HA**, Otter N, Schenck H, Tillmann U. *Stratifying multiparameter persistent homology*. SIAM J Appl Algebr Geom. 3(3):439-471. Available at arXiv:1708.07390
28. Gross E, **Harrington HA**, Meshkat N, Shiu A. (2019) *Linear compartmental models: input-output equations and operations that preserve identifiability*. SIAM J Appl Math. 79(4):1423-1447.
27. Seigal A, Beguerisse-Díaz M, Schoeberl B, Niepel M, **Harrington HA**. (2019) *Tensors and algebra give interpretable groups for crosstalk mechanisms in breast cancer*. J R Soc Interface. 16.
26. **Harrington HA**, Ho KL, Meshkat N. (2019) *Differential algebra for model comparison*. Complexity 6041981.
25. Dufresne E, **Harrington HA**, Raman D. (2018) *The Geometry of Sloppiness*. 9:1. J Alg Stat.
24. Speidel L, **Harrington HA**, Chapman SJ, Porter MA. (2018) *Topological data analysis of continuum percolation with disks*. Phys Rrev E. 98, 012318.
23. Adamer MF, Woolley TE, **Harrington HA**. (2017) *Graph-Facilitated Resonant Mode Counting in Stochastic Interaction Networks*. J R Soc Interface 14 20170447.
22. Otter N, Porter MA, Tillmann U, Grindrod P, **Harrington HA**. (2017) *Roadmap for the computation of persistent homology*. EPJ Data Science 6 (1) 17.
21. Smith RCG, Stumpf PS, Ridden SJ, Sim A, Filippi S, **Harrington HA**, MacArthur BD. (2017) *Nanog fluctuations in ES cells highlight the problem of measurement in cell biology*. Biophys J 112(12):2641-265.
20. Stolz BJ, **Harrington HA**, Porter MA. (2017) *Persistent homology of time-dependent functional networks constructed from coupled time series*. Chaos 27, 047410
19. Kay SK, **Harrington HA**, Shepherd S, Brennan K, Dale K, Osborne JM, Gavaghan DJ, Byrne HM. (2017) *The Role of the Hes1 Crosstalk Hub in Notch-Wnt Interactions of the Intestinal Crypt*. PLoS Comput Biol 13(2).
18. **Harrington HA** and Van Gorder R. (2017) *Reduction of dimension for nonlinear dynamical systems*. Nonlinear Dynamics 88(1):715-734
17. Gross E, Davis B, Ho KL, Bates DJ, **Harrington HA**. (2016) *Numerical algebraic geometry for model selection with application to the life sciences*. J R Soc Interface 13:123.
16. Levy D, **Harrington HA**, Van Gorder R. (2016) *Role of seasonality on predator-prey-subsidy population dynamics*. J Theor Biol 396:163-181.
15. Gross E, **Harrington HA**, Rosen Z, Sturmfels B. (2016) *Algebraic systems biology: a case study for the Wnt pathway*. Bull Math Biol 78(1), 21-51.
14. Taylor D, Klimm F, **Harrington HA**, Kramar M, Mischaikow K, Porter MA, Mucha PJ. (2015) *Topological data analysis of contagion maps for examining spreading processes on networks*. Nat Commun 6:7723.
13. MacLean AL, Rosen Z, Byrne HM, **Harrington HA**. (2015) *Parameter-free methods distinguish Wnt pathway models and guide design of experiments*. Proc Nat Acad Sci. Mar;112(9):2652-2657
12. Jovanovic G, Sheng X, Ale A, Feliu E, Kirk P, Wiuf C, **Harrington HA**, Buck M, Stumpf MPH. (2015) *Phosphorelay in non-orthodox two component systems in-vivo functions through a bi-molecular mechanism: the case of ArcB*. Molecular BioSystems.
11. MacLean A, **Harrington HA**, Stumpf MPH, Hansen M. (2014) *Epithelial-Mesenchymal Transition in Metastatic Cancer Cell Populations Affects Tumor Dormancy in a Simple Mathematical Model*. Biomedicines , 2(4):384-403.
10. Michailovici I, **Harrington HA**, Azogui HH, Yahalom-Ronen Y, Plotnikov A, Ching S, Stumpf MPH, Klein OD, Seger R, Tzahor E. (2014) *Nuclear-cytoplasmic shuttling of ERK provides a switch-like transition between proliferation and differentiation of muscle progenitors*. Development, Jul;141(13):2611-20.

9. **Harrington HA**, Feliu E, Wiuf C, Stumpf MPH. (2013) *Cellular compartments cause multistability in biochemical reaction networks and allow cells to process more information*. Biophys J April;104:1824-1831.
8. Chaidos A, Barnes C, Cowan G, May P, Melo V, Hatjiharissi E, Papaioannou M, **Harrington HA**, Doolittle H, Terpos E, Abdalla S, Yarranton H, Naresh D, Foroni L, Reid A, Rahemtulla A, Stumpf M, Roberts I, Karadimitris A. (2013) *Tumor-propagating cells and clinical drug resistance in multiple myeloma*. Blood. Jan 10;121(2):318-28.
7. **Harrington HA**, Ho KL, Thorne T, Stumpf MPH (2012) *A parameter-free model selection criterion based on steady-state coplanarity*. Proc Nat Acad Sci. Sept;109(39):15746-15751.
6. **Harrington HA**, Komorowski M, Beguerisse-Díaz M, Ratto GM, Stumpf MPH (2012) *Mathematical modeling reveals the functional implications of the different nuclear shuttling rates of Erk1 and Erk2*. Phys Biol. May 3;9(3):036001.
5. Tanaka RJ, Ono M, **Harrington HA** (2011) *Skin barrier homeostasis in atopic dermatitis: feedback regulation of kallikrein activity*. PLoS One. 6(5):e19895.
4. Ho KL, **Harrington HA** (2010) *Bistability in apoptosis by receptor clustering*. PLoS Comput Biol 6(10): e1000956.
3. Boyle JJ, **Harrington HA**, Piper E, Elderfield K, Stark J, Landis RC, Haskard DO (2009) *Coronary intraplaque hemorrhage evokes a novel atheroprotective macrophage phenotype*. Am J Pathol. Mar;174(3):1097-108.
2. **Harrington HA**, Ho KL, Ghosh S, Tung KC (2008) *Construction and analysis of a modular model of caspase activation in apoptosis*. Theor Biol Med Model 5: 26.
1. **Harrington HA**, Maier M, Naidoo L, Whitaker N, Kevrekidis PG (2007) *A hybrid model for tumor-induced angiogenesis in the cornea in the presence of inhibitors*. Mathematical and Computer Modelling. Aug;46(3-4):513-524.

Pre-prints and submitted manuscripts

5. McDonald RA, Neuhausler R, Robinson M, Larsen LG, **Harrington HA**, Bruna M. *Topological descriptors for coral reef resilience using a stochastic spatial model* Available at arXiv:2209.08974.
4. Goodbrake C, Beers D, Thompson TB, **Harrington HA**, Goriely A. *Brain Chains as Topological Signatures for Alzheimer's Disease*. Available at arXiv:2208.12748.
3. H Ryou, Sirinukunwattana K, Aberdeen A, Grindstaff G, Stolz B, Byrne HM, **Harrington HA**, Sousos N, Godfrey AL, Harrison CN, Psaila B, Mead AJ, Rees G, Turner GDH, Rittscher J, Royston D. *Continuous Indexing of Fibrosis (CIF): Improving the Assessment and Classification of MPN Patients*. Available at medRxiv.
2. Benjamin K, Mukta L, Moryoussef G, Uren C, **Harrington HA**, Tillmann U, Barbensi A Homology of homologous knotted proteins. Submitted. Available at arXiv:2201.07709.
1. Beers D, Goniotaki D, Hanger DP, Goriely A, **Harrington HA** *Barcodes distinguish morphology of neuronal tauopathy*. Submitted.

Books edited

1. American Mathematical Society Contemporary Mathematics Volume on *Algebraic and Geometric Methods in Applied Discrete Mathematics* (Mar 2017). Edited by: **Harrington HA**, Omar M, Wright M.

Book chapters (peer reviewed)

2. MacLean AL, **Harrington HA**, Stumpf MPH, Byrne HM. *Mathematical and Statistical Techniques for Systems Medicine: The Wnt Signaling Pathway as a Case Study*. Systems Medicine by Springer (2016)

1. Drellich E, Gainer-Dewar A, **Harrington HA**, He Q, Heitsch C, Poznanović. (2017) *Geometric combinatorics and computational molecular biology: Branching polytopes for RNA sequences*. Algebraic and Geometric Methods in Discrete Mathematics. Contemporary Mathematics 685:137-154.

Conference proceedings (peer reviewed)

2. Dufresne E, Edwards P, **Harrington HA**, Hauenstein J. *Sampling real algebraic varieties for topological data analysis*. Accepted, IEEE ICMLA. Available at arXiv:1802.07717.
1. **Harrington HA**, Mehta D, Byrne HM, Hauenstein JD. *Decomposing the parameter space of biological networks via a numerical discriminant approach*. Accepted, Maple Conference 2019. Available at arXiv:1604.02623

Outreach (peer reviewed)

2. Byrne HM, **Harrington HA**, Muschel R, Reinert G, Stolz BJ, Tillmann U. *Topology characterises spatial networks of tumour vasculature*. Math Today. 2019 55(5):206-210. Available at arXiv:1907.08711
1. **Harrington HA**, Beguerisse-Díaz M, Rombach MP, Keating LM, Porter MA. (2013) *Commentary: Teach network science to teenagers*. Network Science, Sept;2:1-22