Katherine Benjamin

benjamin@maths.ox.ac.uk
https://people.maths.ox.ac.uk/benjamin

EDUCATION   **University of Oxford**

DPhil, Mathematics   2021–2025
- Thesis title: Topological data analysis for spatial biology
- Supervisors: Prof. Heather Harrington, Prof. Ulrike Tillmann
- Awards: JT Hamilton Scholarship; STEM for Britain 2024 Silver Medal

MMathCompSci, Mathematics and Computer Science   2017–2021

ARTICLES   **Preprints**

Katherine Benjamin, Aneesha Bhandari, Zhouchun Shang, Yanan Xing, Yanru An, Nannan Zhang, Yong Hou, Ulrike Tillmann, Katherine R. Bull, Heather A. Harrington. *Multiscale topology classifies and quantifies cell types in subcellular spatial transcriptomics.* arXiv:2212.06505. December 2022.

Journal articles

Katherine Benjamin, Lamisah Mukta, Gabriel Moryoussef, Christopher Uren, Heather A. Harrington, Ulrike Tillmann, Agnese Barbensi. Homology of homologous knotted proteins. *Journal of the Royal Society Interface* 20(201). April 2023.

Katherine Benjamin. Sum-free sets which are closed under multiplicative inverses. *Online Journal of Analytic Combinatorics* 16:08. September 2021.

TALKS   **Invited talks**

CHIMERA Seminar, University College London. April 2024.

Minisymposium on Topological Methods for Data Analysis in Science and Beyond, BAMC 2024, Newcastle. April 2024.

AIM-AMS Special Session on Applied Topology Beyond Persistence Diagrams, JMM 2024, San Francisco. January 2024.

Special Session on Nonlinear Algebra and Its Applications, PGMODays, EDF Lab Paris-Saclay. November 2023.

Minisymposium on Higher Order Networks in Complex Systems, ICIAM 2023, Tokyo. August 2023.

Minisymposium on Algebraic Methods in Biological Systems, SIAM Conference on Applied Algebraic Geometry, Eindhoven. July 2023.

Topology of Data in Rome, Tor Vergata. September 2022.

Contributed talks

Syennesis to Aristotle, 2400 years on: The implications of the machine learning revolution in medicine for the future of humanities research. Humanities Forward: Opportunities and Challenges for the Next Twenty Years, Oxford. Joint with Jenny Vo-Phamhi. May 2023.

Homology of homologous knotted proteins. British Early Career Mathematicians' Colloquium, Birmingham. July 2022.

Internal talks

The shape of data: How algebra and topology help us to understand the ways in which our cells organise themselves. Balliol Undergraduate Mathematics Society, Oxford. January 2024.

Multiscale topology classifies and quantifies cell types in subcellular spatial transcriptomics. Mathematics in Biology Day, Max Planck Institute for Mathematics in the Sciences, Leipzig. December 2023.

Persistent homology in theory and practice. Junior Topology and Group Theory Seminar, Oxford. November 2022.

Workshop tutorials

Topological data analysis tutorial. London Geometry and Machine Learning Summer School. July 2022.

SERVICE   Organiser, London Geometry and Machine Learning Summer School 2024

TEACHING   Mathematical Institute, University of Oxford

Departmental Tutor

Computational Mathematics	Michaelmas Term 2023
C3.9 Computational Algebraic Topology	Hilary Term 2023

Teaching Assistant

B3.5 Topology and Groups	Michaelmas Term 2022
B1.2 Set Theory	Hilary Term 2022