Matt Booth

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Personal

Born 27 August 1993, Bath, United Kingdom. British Citizen.

Employment

Imperial College London **2024-2026**
Heilbronn research fellow

Lancaster University **2022-2024**
Senior Research Associate
Host: Prof. Andrey Lazarev

University of Antwerp **2020-2022**
Postdoctoral researcher in noncommutative geometry
Host: Prof. Wendy Lowen

Education

University of Edinburgh **2015-2019**
PhD in Mathematics, defending in August 2019.
Supervisor: Dr. Jonathan Pridham.
Thesis: The derived contraction algebra, ArXiv:1911.09626.

Merton College, University of Oxford **2011-2015**
MMath in Mathematics with first-class honours.

Research Interests

I am in a broad sense a noncommutative geometer; I am interested in anything that sits at any of the interfaces of algebraic geometry, homotopy theory, representation theory, and algebraic topology. I am particularly interested in:

- Deformation theory: Koszul duality, prorepresentability theorems, Mac Lane cohomology for abelian categories, topological Hochschild cohomology for ring spectra and spectral categories, noncommutative and derived deformations. Applications to algebraic topology.
- Derived noncommutative geometry: triangulated, dg, and spectral categories, noncommutative resolutions, contraction algebras and the homological minimal model program, singularity categories, matrix factorisations, Calabi-Yau algebras, links to representation theory.

Papers and preprints

5. Global Koszul duality (with A. Lazarev)
   ArXiv:2304.08409
   Submitted.
4. The derived deformation theory of a point
   Math. Z. **300** (2022), no. 3, 3023–3082
3. Singularity categories via the derived quotient
   Adv. Math. **381** (2021), 107631
2. The derived contraction algebra
   ArXiv:1903.12156
1. Noncommutative deformation theory, the derived quotient, and DG singularity categories
   ArXiv:1810.10060

Teaching

In Lancaster I unofficially supervised two PhD students.

In Antwerp I unofficially supervised a Masters student.

Courses tutored at the University of Edinburgh:

- Honours Algebra
- Fundamentals of Pure Mathematics
- Honours Analysis
- Geometry
- Calculus and its Applications
- Engineering Mathematics 1B

Service

I am a reviewer for several journals including *Advances in Mathematics*, *Compositio Mathematica*, *Higher Structures*, and *Journal of Topology*.

In 2023 I gave a public talk in Lancaster as part of Science Week.

In 2024 I ran a learning seminar on ∞-categories.

I ran a seminar on coalgebras in Lancaster in 2023.

I ran a seminar on singularity categories in Lancaster in 2022–2023.

Organiser of the Hodge Club seminar, Edinburgh, 2016–2018.

Organiser of the Postgraduate Colloquium, Edinburgh, 2016–2017.

Selected talks given

2024

Research Seminar on Algebraic Topology, Hamburg
Algebraic Topology Seminar, Warwick
Homotopical Algebra and Higher Structures, Oberwolfach
ALPE, Toulouse
Algebraic Geometry seminar, Glasgow

MAGIC seminar, Imperial College London
New Directions in Group Theory and Triangulated Categories, online
CLAN, Glasgow

2023

FD Seminar, online
Algebra seminar, Prague
Pure seminar, Lancaster

2022

Homological Algebra Symposium, Aarhus
Algebraic Geometry Seminar, Glasgow
ARTIN 60, Nottingham
Transpennine Topology Triangle, online

2021

TopFlavours, online
Antwerp Algebra Colloquium, online
LAGOON, online
Manchester Algebra Seminar, online

2020

Seminar on knot homologies, online
Derived, Birational, and Categorical Algebraic Geometry, online
Higher Homotopy Algebras in Topology 2, Dublin

2019

Derived Categories, Moduli Spaces and Deformation Theory, Cetraro
Algebra Seminar, Glasgow
CALF, Warwick
Postgraduate seminar, Lancaster

2018

JAWS, Warwick
GAEL XXVI, Strasbourg
Noncommutative Hodge theory seminar, Edinburgh

2017

Derived categories working group, Edinburgh
Reading Course on Deformation Theory, Edinburgh
GEARS, Glasgow

2016

Hodge Day, Edinburgh

Selected conferences attended

2024

Homotopical Algebra and Higher Structures, Oberwolfach
Hochschild (Co)Homology and Applications, Oberwolfach

2023

Geometry and Physics, Paris

2022

Noncommutative shapes, Antwerp
Barcelona Conference on Higher Structures, Barcelona

Derived Geometry, CRM

2021

Young Topologists Meeting, online
Workshop on Higher Structures and Operadic Calculus, online
Oberwolfach Seminar: Cellular E_k-Algebras, online
British Mathematical Colloquium, online

2020

Categories and birational geometry, online
Masterclass in Condensed Mathematics, online
ICRA, online
∞-categories and their applications, online
Motivic, Equivariant and Non-commutative Homotopy Theory, online

2019

The Geometry of Derived Categories, Liverpool
Homotopy meets homology, Dublin

2018

Young Perspectives in Deformation Theory, Turin
Homotopy algebras, deformation theory and quantization, Będlewo

2017

British Algebraic Geometry 3, Cambridge
Hausdorff School: Derived Noncommutative Geometry, Bonn

2016

Geometry and Physics, Sheffield
WARTHOG, Eugene
Motives and derived algebraic geometry, Essen

2015

Derived Geometry, Oberwolfach

Research visits

2023

Sebastian Opper, Prague

2022

Jenny August, Aarhus