Matthew Habermann

CV of Matthew Habermann

Personal Information

Citizenship Australia & UK.

Employment

2021–Present **Research assistant (Post-doc)**, *Quantum Universe Cluster of Excellence, the University of Hamburg*.
Mentor: Tobias Dyckerhoff.

Education

2017-2021 **PhD in Mathematics**, *University College London, as part of the London School of Geometry and Number Theory*.
Advisor: Yankı Lekili.
Thesis title: Homological mirror symmetry for invertible curve singularities.
Degree awarded: 10-28-2021.

2016 **Bachelor of Science in Mathematics with Honours Class I**, *University of Queensland*, Brisbane.
Thesis title: Gauge construction and the Yang–Mills heat flow over real four-manifolds.
Advisor: Huy The Nguyen.

2011-2015 **Bachelor of Science with an Extended Major in Mathematics**, *University of Queensland*, Brisbane.
Includes an exchange year studying at the Technical University of Munich.

2011-2016 **Diploma of Languages (German)**, *University of Queensland*, Brisbane.

Awards

- University College London Overseas Research Scholarship. Stipend of approximately £17,000 per year, £7000 travel grant (over the four years), plus full international tuition fees of approximately £20,000 per year.
- University of Queensland Dean's Commendations for academic excellence.
- University of Queensland Exchange Travel Grant for academic merit.

Research interests

- Symplectic topology, algebraic geometry, representation theory, homological mirror symmetry.

Publications

- Homological Berglund-Hübsch mirror symmetry for curve singularities, Joint with Jack Smith. J. Symplectic Geom. Volume 18 (2020), no. 6, 1515-1574. arXiv: 1903.01351.
- Homological mirror symmetry for invertible polynomials in two variables. Quantum Topol., 13 (2022), no. 2, pp. 207–253. arXiv: 2003.01106.
- Homological mirror symmetry for nodal stacky curves. Accepted for publication at Math. Res. Lett. arXiv:2101.12178.

Preprints

- A note on Homological Berglund-Hübsch-Henningson mirror symmetry for curve singularities. arXiv: 2205.12947. Submitted.

Invited talks

Jul 2023 On the symplectic cohomology of Milnor fibres of compound A_n singularities, conference on mirror symmetry and differential equations, Boğaziçi University, Istanbul, Türkiye.

Jul 2023 On the symplectic cohomology of Milnor fibres of compound A_n singularities, special session on symplectic and contact topology and connections to physics, 29^{th} Nordic congress of mathematicians, Aalborg, Denmark.

Apr 2023 Homological Berglund-Hübsch-Henningson mirror symmetry for curve singularities, Symplectic geometry, gauge theory and categorification seminar, Columbia University, New York City, USA.

Oct 2022 Homological Berglund-Hübsch-Henningson mirror symmetry for curve singularities, Geometry seminar, Uppsala university, Sweden.

May 2022 Homological Berglund-Hübsch-Henningson mirror symmetry for curve singularities, 3CinG conference, Warwick, UK.

Apr 2021 Homological mirror symmetry nodal stacky curves, Korean Institute of Advanced Study Geometry Seminar (virtual).

Mar 2021 Homological mirror symmetry nodal stacky curves, UCGEN seminar (virtual).

Feb 2021 Homological mirror symmetry nodal stacky curves, Higher structures seminar (virtual).

Feb 2021 Homological mirror symmetry nodal stacky curves, Freemath seminar (virtual).

Oct 2020 Homological mirror symmetry for two variable invertible polynomials, FD-Seminar, University of Bonn (virtual).

Jul 2020 Homological mirror symmetry for invertible polynomials in two variables, Fanosearch research group, Imperial College London (virtual).

Jan 2020 Homological mirror symmetry for invertible polynomials in two variables, Junior geometry at the University of Cambridge.

Other talks

Dec 2022 Homological Berglund-Hübsch-Henningson mirror symmetry for curve singularities, Workshop on Singularities and Mirror Symmetry, Glasgow, UK (Contributed talk).

Apr 2022 An introduction to homological mirror symmetry, part II. Higher structures seminar, University of Hamburg.

Apr 2022 An introduction to homological mirror symmetry, part I. Higher structures seminar, University of Hamburg.

Sep 2020 Homological mirror symmetry for non-commutative deformations of weighted projective planes, Symplectic Cut (virtual).

Jun 2020 On the immersion classes of nearby Lagrangians, Symplectic Cut (virtual).

Mar 2020 Homological mirror symmetry for two variable invertible polynomials, Symplectic Cut (virtual).

Feb 2020 A stability phenomenon for symplectic packing, Symplectic Cut.

Nov 2019 Bussi's construction of the perverse sheaf of vanishing cycles, Symplectic Cut.

Jun 2019 Applications of the log PSS map to Lagrangian embeddings and computations of symplectic cohomology, Symplectic Cut.

May 2019 An introduction to homological mirror symmetry for invertible polynomials, KCL/UCL junior geometry seminary.

Feb 2019 Refined disk potentials for immersed Lagrangian surfaces, Symplectic Cut.

Nov 2018 Homotopy groups and Hopf fibrations, ICL junior geometry.

Oct 2018 Topological Fukaya categories of punctured surfaces, Symplectic Cut.

Jul 2018 The Fukaya-Seidel category with applications, BIG Workshop, Jersey.

May 2018 Symplectomorphims of $\mathbb{CP}^2$ and $S^2 \times S^2$, Symplectic Cut.

Feb 2018 Invertibles in quantum cohomology and π_1 of symplectic automorphism groups, Symplectic Cut.

Dec 2017 (Non)displaceability of toric fibres via symplectic reduction, Symplectic Cut.

Aug 2016 The Heisenberg vertex algebra, University of Queensland QFT Seminar.

Apr 2016 The reverse Poincaré inequality, University of Queensland Analysis Seminar.

Mar 2016 Higher regularity for harmonic maps, University of Queensland Analysis Seminar.

Mar 2016 Structure theory for $\mathfrak{sl}_2$, University of Queensland QFT Seminar.

Service

Refereeing

Referee for Compositio Mathematica, Advances in Mathematics, Annals of Representation Theory and Mathematische Annalen, McGill Science Undergraduate Research Journal.

Events Organised

Mar 2023 Workshop on higher categorical methods in algebra in geometry, with Tobias Dyckerhoff, Jonte Gödicke and Angush Rush.

Seminars Organised

Summer semester 2023 Higher structures seminar thematic programme on symplectic cohomology, with Tobias Dyckerhoff, Janko Latschev and Merlin Christ.

Sep 2019 – Dec 2020 Symplectic cut seminar, with Yankı Lekili.

Sep 2019 – Jun 2020 The UCL/KCL junior geometry seminar, with Daniel Platt.

Conference Attendance

Jul 2023 Mirror symmetry and differential equations, Boğaziçi University, Istanbul, Türkiye.

Jul 2023 Special session on symplectic and contact topology and connections to physics, 29^{th} Nordic congress of mathematicians, Aalborg, Denmark.

Sep 2022 Periods in mirror symmetry, Edinburgh, UK.

Jul 2022 Convexity in contact and symplectic topology, Institute Henri Poincaré, Paris, France.

May 2022 3CinG conference, Warwick, UK.

Mar 2022 Recent developments in Lagrangian Floer Theory, Simons Center for Geometry and Physics, Stony Brook, USA.

Sep 2021 Conference in honour of Sir Michael Atiyah, Isaac Newton Institute, Cambridge.

Aug 2019 International conference on symplectic topology, IMPA, Rio de Janeiro.

Mar 2019 Categorical Symplectic Topology, University of Cambridge.

Workshop Attendance

Aug 2023 Workshop on Symplectic Field Theory X, Humboldt Universität zu Berlin.

Dec 2022 Workshop on Singularities and Mirror Symmetry, Glasgow, UK.

Aug 2019 School of symplectic topology, IMPA, Rio de Janeiro.

Jul 2018 British Isles Geometry Conference, Jersey.

Nov 2016 W-Algebras, University of Melbourne.

Jan 2016 Calculus of Variations, RMIT University Melbourne.

Teaching Experience

2018-2021 **Tutor**, *King's College London*.
- Algebraic Geometry, 2021
- Galois Theory, 2021
- Topology, 2019
- Linear Algebra and Geometry I, 2019
- Algebraic Curves, 2018, 2019
- Linear Algebra and Geometry II, 2019

2019 **Summer School Tutor**, *London School of Economics*.
- ME306: Real Analysis

2017 **Tutor**, *University of Melbourne*.
- MAST10006: Calculus II,
- MAST20029: Engineering Mathematics.

2013-2016 **Tutor**, *University of Queensland*.

- MATH1050: Mathematical Foundations
- MATH1051: Calculus and Linear Algebra I,
- MATH1052: Multivariate Calculus and Ordinary Differential Equations,
- MATH2400: Mathematics Analysis,
- MATH3405: Differential Geometry,
- MATH3403: Partial Differential Equations,
- STAT2201: Analysis of Engineering and Scientific Data (super tutor).

Languages

English **Native.**

German **Advanced.** *Written and spoken German used daily in both professional and non-professional contexts.*