

# MANUEL KRANNICH

## PERSONAL DATA

---

ADDRESS: Karlsruhe Institute of Technology  
Department of Mathematics  
Englerstraße 2  
76128 Karlsruhe  
Germany

EMAIL: [krannich@kit.edu](mailto:krannich@kit.edu)

WEBSITE: [manuelkrannich.github.io](https://manuelkrannich.github.io)

RESEARCH INTERESTS: Algebraic and Geometric Topology  
(topology of moduli spaces, manifold bundles and their characteristic classes, automorphism and embedding spaces of manifolds, mapping class groups, surgery theory, cobordism categories, configuration spaces, K-theory, arithmetic groups, applications to differential geometry)

## POSITIONS

---

since Apr 2022 KARLSRUHE INSTITUTE OF TECHNOLOGY  
Junior Professor (Tenure-Track, W1 to W3)  
Department of Mathematics

Oct 2021 – Mar 2022 UNIVERSITY OF MÜNSTER  
Postdoc  
Mathematics Münster: Dynamics–Geometry–Structure  
Postdoctoral mentor: Michael Weiss

Oct 2018 – Sept 2021 UNIVERSITY OF CAMBRIDGE  
Research Associate  
Department of Pure Mathematics and Mathematical Statistics  
Postdoctoral mentor: Oscar Randal-Williams

## EDUCATION

---

2015 – 2018 UNIVERSITY OF COPENHAGEN  
PhD in Mathematics  
Member of the Centre for Symmetry and Deformation  
Thesis: *On characteristic classes of manifold bundles*  
Advisor: Nathalie Wahl

2013 – 2015 KARLSRUHE INSTITUTE OF TECHNOLOGY  
Master of Science (M.Sc.) in Mathematics

2010 – 2013 KARLSRUHE INSTITUTE OF TECHNOLOGY  
Bachelor of Science (B.Sc.) in Mathematics

## AWARDS

---

2019 UNIVERSITY OF COPENHAGEN  
*SCIENCE PhD Award 2019* for one of the three best PhD theses in sciences of the year.

2015 KARLSRUHE INSTITUTE OF TECHNOLOGY  
*Faculty Award 2015* for the best master's degree of the year.

2013 KARLSRUHE INSTITUTE OF TECHNOLOGY  
*Faculty Award 2013* for the best bachelor's degree of the year.

## SCHOLARSHIPS AND STIPENDS

---

|             |  |
|-------------|--|
| 2015 – 2018 | University of Copenhagen, Centre of Symmetry and Deformation, Department of Mathematical Sciences<br><i>PhD stipend.</i> |
| 2013 – 2015 | German National Academic Foundation<br><i>Scholarship.</i>   |
| 2012 – 2013 | German Federal Ministry of Education and Research<br><i>Scholarship Deutschlandstipendium.</i>                           |
| 2011 – 2012 | German Federal Ministry of Education and Research<br><i>Scholarship Deutschlandstipendium.</i>                           |

## EXTENDED VISITS

---

|                                 |   |
|---------------------------------|---|
| JAN 2022 – MAR 2022             | INSTITUT MITTAG-LEFFLER<br>Attending research programme:<br><i>Higher algebraic structures in algebra, topology and geometry.</i> |
| APR 2018, MAR 2019,<br>MAR 2020 | HARVARD UNIVERSITY<br>Visiting Alexander Kupers.  |
| FEB 2018 – APR 2018             | STANFORD UNIVERSITY<br>Visiting Søren Galatius.   |
| JAN 2017 – APR 2017             | UNIVERSITY OF CAMBRIDGE<br>Visiting Oscar Randal-Williams.  |

## PUBLICATIONS

---

- Manuel Krannich, *A homological approach to pseudoisotopy theory. I.* Inventiones Mathematicae, **227** (2022) no. 3 1093–1167.
- Manuel Krannich, Alexander Kupers, and Oscar Randal-Williams, *An  $HP^2$ -bundle over  $S^4$  with nontrivial  $\hat{A}$ -genus.* Comptes Rendus. Mathématique, Tome **359** (2021) no. 2, pp. 149–154.
- Bena Tshishiku, with an appendix by Manuel Krannich, *Geometric cycles and characteristic classes of manifold bundles.* Commentarii Mathematici Helvetici, **96** (1) (2021), 1–45.
- Manuel Krannich, *Mapping class groups of highly connected  $(4k+2)$ -manifolds.* Selecta Mathematica, **26**, 81 (2020).
- Manuel Krannich and Oscar Randal-Williams, *Mapping class groups of simply connected high-dimensional manifolds need not be arithmetic.* Comptes Rendus. Mathématique, Tome **358** (2020) no. 4, pp. 469–473.
- Manuel Krannich, *A note on rational homological stability of automorphisms of manifolds.* The Quarterly Journal of Mathematics **71** (3) (2020), 1069–1079.
- Manuel Krannich and Alexander Kupers, *Some Hermitian  $K$ -groups via geometric topology.* Proceedings of the American Mathematical Society **149** (2021), 2745–2752.
- Manuel Krannich and Jens Reinhold, *Characteristic numbers of manifold bundles over surfaces with highly connected fibers.* Journal of the London Mathematical Society **102** (2) (2020), 879–904.
- Manuel Krannich, *On characteristic classes of exotic manifold bundles.* Mathematische Annalen **379** (2021), 1–21

- Manuel Krannich, *Homological stability of topological moduli spaces*. Geometry & Topology **23** (5) (2019), 2397–2474.

## PREPRINTS

---

- Manuel Krannich and Alexander Kupers, *The Disc-structure space*. Preprint (2022), arXiv:[2205.01755](#).
- Manuel Krannich and Oscar Randal-Williams, *Diffeomorphisms of discs and the second Weiss derivative of  $B\mathrm{Top}(-)$* . Preprint (2021), arXiv:[2109.03500](#).
- Manuel Krannich and Alexander Kupers, *On Torelli groups and Dehn twists of smooth 4-manifolds*. Preprint (2021), arXiv:[2105.08904](#).
- Mauricio Bustamante, Manuel Krannich, and Alexander Kupers, *Finiteness properties of automorphism spaces of manifolds with finite fundamental group*. Preprint (2021), arXiv:[2103.13468](#).
- Manuel Krannich and Alexander Kupers, *Embedding calculus for surfaces*. Preprint (2021), arXiv:[2101.07885](#).

## CONTRIBUTIONS TO CONFERENCE PROCEEDINGS

---

- Manuel Krannich, *Moduli spaces of  $h$ -cobordisms of discs*. Oberwolfach Reports **17** (2020), no. 21, 1089–1090.
- Manuel Krannich, *Pseudoisotopies of even discs, revisited*. Oberwolfach Reports **17** (2020), no. 1, 431–432.

## INVITED TALKS

---

- |           |  |
|-----------|--|
| SEP 2022  | <i>TBD</i> , 4-Manifolds: from Above and Below, CIRM, Luminy (scheduled).  |
| SEP 2022  | <i>TBD</i> , Classifying spaces in homotopy theory: in honour of Ran Levi’s 60th Birthday, ICMS, Edinburgh (scheduled).                                  |
| JUNE 2022 | <i>The Disc-structure space</i> , Topology Seminar, Kansas State University (scheduled).   |
| JUNE 2022 | <i>The Disc-structure space</i> , Topology Seminar, Bonn (scheduled).  |
| MAY 2022  | <i>Top(d) and orthogonal calculus</i> , Topology Seminar, Stockholm.   |
| FEB 2022  | <i>The Disc-structure space</i> , Higher algebraic structures in algebra, topology and geometry, Institut Mittag-Leffler, Stockholm.                     |
| FEB 2022  | <i>Pseudoisotopies of discs and <math>K(\mathbb{Z})</math></i> , Oberseminar Geometrie und Topologie, Göttingen.   |
| DEC 2021  | <i>Smoothing fibre bundles and diffeomorphism groups of discs</i> , IMUNAM Algebraic Topology Seminar, Mexico City.                                      |
| OCT 2021  | <i>Top(d) and orthogonal calculus</i> , Topology Seminar, Münster.   |
| JULY 2021 | <i>(In)finiteness properties of automorphism spaces of manifolds</i> , AG-Seminar, Regensburg.   |
| APR 2021  | <i>Embedding calculus, factorisation homology, and surfaces</i> , Séminaire de l’équipe Topologie Algébrique, Université Sorbonne Paris Nord (Paris 13). |
| APR 2021  | <i>Embedding calculus in codimension zero</i> , Building Bridges Seminar: Invariants of Embedding spaces, virtual.                                       |
| FEB 2021  | <i>Smoothing fibre bundles and diffeomorphism groups of discs</i> , Geometry & Topology Seminar, Toronto.  |
| JULY 2020 | <i>Moduli spaces of <math>h</math>-cobordisms of discs</i> , Topologie, Oberwolfach.   |
| MAY 2020  | <i>Pseudoisotopies of discs and algebraic <math>K</math>-theory of the integers</i> , Topology Seminar, Purdue.  |
| MAY 2020  | <i>The pseudoisotopy stable range</i> , Topology Seminar, Bonn.  |

- MAR 2020 *Pseudoisotopies of even discs and algebraic  $K$ -theory of the integers*, Topology Seminar, Wayne State.
- MAR 2020 *Pseudoisotopies of even discs and algebraic  $K$ -theory of the integers*, Geometry & Topology Seminar, Brown.
- MAR 2020 *Pseudoisotopies of even discs and algebraic  $K$ -theory of the integers*, Topology Seminar, Brandeis.
- FEB 2020 *Pseudoisotopies of even discs, revisited*, Manifolds and Groups, Oberwolfach.
- JAN 2020 *A homological approach to pseudoisotopy theory*, Topology Seminar, Warwick.
- DEC 2019 *A homological approach to pseudoisotopy theory*, Topology Seminar, Münster.
- NOV 2019 *Diffeomorphism groups of discs*, Topology Seminar, Aberdeen.
- OCT 2019 *Mapping class groups, signatures, and arithmeticity*, MPI Topology Seminar, Bonn.
- JULY 2019 *Diffeomorphism groups of discs*, Four Manifolds: Confluence of High and Low Dimensions, Fields Institute, Toronto.
- JUNE 2019 *Rational homotopy groups of diffeomorphism group of discs, revisited* (short talk), Conference: SYM 10 Years Old, Copenhagen.
- APR 2019 *Mapping class groups of highly connected manifolds*, Utrecht Geometry Centre Seminar, Utrecht.
- APR 2019 *Mapping class groups of highly connected manifolds*, Seminar in Algebra & Geometry, Stockholm.
- MAR 2019 *Mapping class groups of highly connected manifolds*, Topology Seminar, MIT.
- JAN 2019 *Mapping class groups of highly connected manifolds*, Geometry and Topology Seminar, Durham.
- DEC 2018 *On the signature of bundles over surfaces*, Oberseminar Differentialgeometrie, Augsburg.
- DEC 2018 *Mapping class groups of highly connected manifolds*, Bavarian Geometry and Topology Seminar, Augsburg.
- NOV 2018 *Detecting exotic smooth structures in diffeomorphism groups*, Differential Geometry and Topology Seminar, Cambridge.
- SEPT 2018 *Topological moduli spaces,  $E_2$ -algebras, and homological stability*, Workshop: Cohomological study of mapping class groups and related topics, Strasbourg.
- APR 2018 *Characteristic numbers of manifold bundles over surfaces with highly connected fibres*, Oxford–Aberdeen–Cambridge Meeting on Manifolds, Cambridge.
- APR 2018 *Homological stability of topological moduli spaces*, Topology Seminar, Purdue.
- APR 2018 *Detecting exotic smooth structures in diffeomorphism groups*, Topology Seminar, Northwestern.
- APR 2018 *Topological moduli spaces,  $E_2$ -algebras, and homological stability*, Geometry/Topology Seminar and Topology Seminar (joint), University of Chicago.
- JAN 2018 *On characteristic classes of exotic manifold bundles*, Topology Seminar, Bonn.
- JAN 2018 *On characteristic classes of exotic manifold bundles*, Topology Seminar, Karlsruhe.
- JAN 2018 *On characteristic classes of exotic manifold bundles*, Topology Seminar, Münster.
- OCT 2017 *On characteristic classes of exotic manifold bundles*, Topology Seminar, Copenhagen.
- MAR 2017 *Homological stability of  $E_1$ -modules over  $E_2$ -algebras and twisted stability of topological moduli spaces*, Topology Seminar, Aberdeen.
- MAR 2017 *Moduli spaces of manifolds*, Geometry Tea, Cambridge.
- JUNE 2015 *Through scanning to the theorem of Galatius-Madsen-Tillmann-Weiss*, Topology Seminar, Karlsruhe.

---

#### CONTRIBUTED TALKS

|           |  |
|-----------|--|
| JUNE 2021 | <i>The Disc-structure space</i> , Conference <i>Manifolds and K-theory: the legacy of Andrew Ranicki</i> , Edinburgh.  |
| DEC 2018  | <i>Mapping class groups of highly connected manifolds</i> , Workshop "Manifolds", part the programme "Homotopy harnessing higher structures", Newton Institute, Cambridge. |
| JUN 2018  | <i>On the signature of smooth bundles over surfaces</i> , International Conference on Manifolds, Groups and Homotopy, Skye.  |
| SEPT 2017 | <i>On characteristic classes of bundles of manifolds connect summed with an exotic sphere</i> (short talk), Research School: Algebraic Topology of Manifolds, Oxford.      |
| JULY 2017 | <i>On the cohomology of moduli spaces of manifolds connect summed with an exotic sphere</i> , Young Topologists Meeting, Stockholm.  |
| SEPT 2016 | <i>Homological stability of <math>E_2</math>-modules and twisted stability of moduli spaces of manifolds</i> , European Autumn School in Topology 2016, Utrecht.           |
| MAY 2016  | <i>Scanning &amp; stability — Scrutinizing topological moduli spaces</i> , ALG/NCG/TOP PhD students' seminar, Copenhagen.  |

## SERVICE

---

|                      |  |
|----------------------|--|
| since 2018           | Referee reports and opinions for various journals in mathematics including Acta Mathematica, Advances in Mathematics, Algebraic & Geometric Topology, Forum of Mathematics Sigma, Journal of Topology, Mathematische Annalen, Selecta Mathematica. |
| NOVEMBER 2023        | Organiser of the workshop <i>Spaces of manifolds: algebraic and geometric approaches</i> , Banff International Research Station.   |
| SINCE MAY 2022       | Organiser of the <i>Online Seminar on Manifolds, homotopy theory, and related topics</i> , jointly with Alexander Kupers and Oscar Randal-Williams.  |
| MAY 2022             | External examiner for licentiate thesis of Robin Stoll, Stockholm University.  |
| SPRING 2021          | Organiser of the <i>Seminar on Factorisation Homology</i> , Cambridge.   |
| FALL 2019            | Organiser of the <i>Seminar on work of Weiss and Williams</i> , Cambridge.   |
| JAN 2016 – SEPT 2018 | Organiser of pre-talks to the <i>Topology Seminar</i> , Copenhagen.  |
| AUG 2016 – SEPT 2018 | Organiser of the <i>ALG/NCG/TOP PhD students' seminar</i> , Copenhagen.  |
| JULY 2016            | Organiser of the conference <i>Young Topologists Meeting 2016</i> , Copenhagen.  |

## OUTREACH

---

|           |  |
|-----------|--|
| SEPT 2019 | Talk <i>Symmetries of exotic spheres</i> , PhD Graduation Ceremony, Faculty of Science, Copenhagen.  |
| MAY 2018  | Talk <i>An algebraic topological aperitif</i> , course on University Pedagogy, Department of Science Education, Copenhagen.                            |
| OCT 2017  | Talk <i>What is an exotic sphere?</i> , site visit of the DNRF (Danish National Research Foundation), Department of Mathematical Sciences, Copenhagen. |

## TEACHING EXPERIENCE

---

|                  |   |
|------------------|---|
| FALL 2020        | <i>Lectures on Manifold Topology: Exotic Spheres</i> , Lecturer (as part of the Online Graduate Lecture Series of the London Mathematical Society). |
| FALL 2017        | <i>Algebraic Topology</i> , Copenhagen, Teaching Assistant.   |
| FALL 2016        | <i>Algebraic Topology</i> , Copenhagen, Teaching Assistant.   |
| SUMMER 2015      | <i>Algebraic Topology</i> , Karlsruhe, Tutor.   |
| WINTER 2014/2015 | <i>Introduction into Geometry and Topology</i> , Karlsruhe, Tutor.  |
| WINTER 2013/2014 | <i>Differential Geometry</i> , Karlsruhe, Teaching Assistant.   |

|                  |  |
|------------------|--|
| SUMMER 2013      | <i>Introduction into Algebra and Number Theory</i> , Karlsruhe, Tutor. |
| WINTER 2012/2013 | <i>Introduction into Geometry and Topology</i> , Karlsruhe, Tutor      |
| SUMMER 2012      | <i>Linear Algebra II</i> , Karlsruhe, Tutor.                           |
| WINTER 2012/2013 | <i>Linear Algebra I</i> , Karlsruhe, Tutor                             |

#### CONFERENCES AND WORKSHOPS ATTENDED

---

|           |   |
|-----------|---|
| JAN 2023  | Workshop, Morphisms in Low Dimensions, Oberwolfach (scheduled).   |
| SEP 2022  | Workshop, 4-Manifolds: from Above and Below, CIRM, Luminy (scheduled).  |
| SEP 2022  | Workshop, Classifying spaces in homotopy theory: in honour of Ran Levi's 60th Birthday, ICMS, Edinburgh (scheduled).                |
| JULY 2022 | Workshop, Topologie, Oberwolfach (scheduled).   |
| JUNE 2021 | Conference <i>Manifolds and K-theory: the legacy of Andrew Ranicki</i> , Edinburgh.   |
| JULY 2020 | Workshop <i>Topologie</i> , Oberwolfach.  |
| FEB 2020  | Workshop <i>Manifolds and Groups</i> , Oberwolfach.   |
| OCT 2019  | Workshop <i>2019 Clay Research Conference and Workshops</i> , Oxford.   |
| SEPT 2019 | Workshop <i>Automorphisms of Manifolds</i> , Hausdorff Center, Bonn.  |
| JUL 2019  | Workshop <i>Four Manifolds: Confluence of High and Low Dimensions</i> , Fields Institute, Toronto.                                  |
| JUN 2019  | Conference <i>SYM 10 years old</i> , Copenhagen.  |
| DEC 2018  | Conference <i>Bavarian Topology and Geometry Meeting</i> , Augsburg.  |
| DEC 2018  | Workshop <i>Manifolds</i> , part of the programme <i>Homotopy harnessing higher structures</i> , Isaac Newton Institute, Cambridge. |
| SEPT 2018 | Workshop <i>Cohomological study of mapping class groups and related topics</i> , Strasbourg.  |
| JULY 2018 | Conference <i>Young Topologists Meeting 2018</i> , Copenhagen.  |
| JUNE 2018 | Conference <i>Manifolds, Groups and Homotopy</i> , Skye.  |
| JUNE 2018 | Workshop <i>Secondary and delocalized index invariants</i> , Copenhagen.  |
| APR 2018  | Oxford–Aberdeen–Cambridge meeting on <i>Manifolds</i> , Cambridge.  |
| APR 2018  | Conference <i>Graduate Student Topology and Geometry Conference</i> , Chicago.  |
| SEPT 2017 | Research School <i>Algebraic Topology of Manifolds</i> , Oxford.  |
| JULY 2017 | Conference <i>Young Topologists Meeting 2017</i> , Stockholm.   |
| JUNE 2017 | Masterclass <i>Stable Homotopy Theory and p-Adic Hodge Theory</i> , Copenhagen.   |
| JUNE 2017 | Conference <i>Groups, Manifolds and K-Theory</i> , Münster.   |
| MAY 2017  | Masterclass <i>Cohomology of Arithmetic Groups</i> , Copenhagen.  |
| APR 2017  | Conference <i>Moduli and Traces</i> , Copenhagen.   |
| MAR 2017  | Oxford–Aberdeen–Cambridge meeting on <i>Manifolds</i> , Oxford.   |
| DEC 2016  | Winter School on <i>Bordism, L-theory, and Real Algebraic K-Theory</i> , Regensburg.  |
| OCT 2016  | Conference <i>Configuration Spaces and Moduli Spaces in Homotopy Theory</i> , Bonn.   |
| SEPT 2016 | Autumn School <i>European Autumn School in Topology 2016</i> , Utrecht.   |
| JULY 2016 | Conference <i>Young Topologists Meeting 2016</i> , Copenhagen.  |
| JUNE 2016 | Conference <i>Topology of Manifolds</i> , Lisbon.   |
| JUNE 2016 | Conference <i>Algebra in Geometry</i> , Copenhagen.   |
| FEB 2016  | Oxford–Aberdeen–Cambridge meeting on <i>Manifolds</i> , Oxford.   |
| NOV 2015  | Workshop on <i>Automorphism of Free Groups</i> , Copenhagen.  |
| MAY 2015  | Introductory School to TP <i>Homotopy Theory, Manifolds and Field Theories</i> , Bonn.  |
| FEB 2014  | Karlsruhe–Stuttgart Seminar <i>Representation Theory and Geometry</i> , Blaubeuren.   |
| JUNE 2014 | Summer School on <i>Surgery Theory and its Applications in Geometry</i> , Münster.  |