### MANUEL KRANNICH

#### Personal data

Address: Karlsruhe Institute of Technology

Department of Mathematics

Englerstraße 2 76128 Karlsruhe Germany

EMAIL: krannich@kit.edu

Website: manuelkrannich.github.io

RESEARCH INTERESTS: Algebraic and Geometric Topology

### **Positions**

Since Apr 2022 Karlsruhe Institute of Technology

Junior Professor (Tenure-Track, W1 to W3)

Head of research group Algebraic and Geometric Topology

Institute for Algebra and Geometry

Department of Mathematics

Oct 2021 – Mar 2022 University of Münster

Postdoctoral researcher

Mathematics Münster: Dynamics-Geometry-Structure

Oct 2018 – Sept 2021 University of Cambridge

Research Associate

Department of Pure Mathematics and Mathematical Statistics

### **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

International Conference for Basic Science (ICBS)

 Frontiers of Science Award 2023 for the publication "A homological approach to pseudoisotopy theory I".

 University of Copenhagen

 SCIENCE PhD Award 2019 for one of the three best PhD theses in sciences of the year.

 Karlsruhe Institute of Technology

 Faculty Award 2015 for the best master's degree of the year.

 Karlsruhe Institute of Technology

 Faculty Award 2013 for the best bachelor's degree of the year.

1

### Scholarships, stipends, and grants

starting 2026	European Research Council  ERC Starting Grant "Manifolds and Functor Calculus"
2023	Karlsruhe House of Young Scientists  Aspiring Grant to fund a research visit of Robin Stoll
since 2022	Deutsche Forschungsgesellschaft Principal Investigator of the <i>Research Training Group 2229</i> "Asymptotic Invariants and Limits of Groups and Spaces" funded by the DFG (acquired funding for a PhD student through a supplementary proposal).
2015 – 2018	University of Copenhagen, Centre of Symmetry and Deformation, Department of Mathematical Sciences <i>PhD stipend</i> .
2013 - 2015	German National Academic Foundation Scholarship.
2012 - 2013	German Federal Ministry of Education and Research Scholarship Deutschlandstipendium.
2011 - 2012	German Federal Ministry of Education and Research Scholarship Deutschlandstipendium.
XTENDED VISITS	

#### Ex

Jan 2022 – Mar 2022	Institut Mittag-Leffler
	Research programme Higher algebraic structures in algebra, topology and geometry.
Apr 2018, Mar 2019,	Harvard University
Mar 2020	Visiting Alexander Kupers.
Feb 2018 – Apr 2018	Stanford University
	Visiting Søren Galatius.
Jan 2017 – Apr 2017	University of Cambridge
	Visiting Oscar Randal-Williams.

### **Publications**

- Geoffroy Horel, Manuel Krannich, and Alexander Kupers, Two remarks on spaces of maps between operads of little cubes. Higher Structures, 9 (1) (2025) 329-339.
- Manuel Krannich and Alexander Kupers, On Torelli groups and Dehn twists of smooth 4-manifolds. Bulletin of the London Mathematical Society, 57 (3) (2025), 956-963.
- Manuel Krannich and Alexander Kupers, *The Disc-structure space*. Forum of Mathematics, Pi, 12 (2024) E26 1-98.
- · Mauricio Bustamante, Manuel Krannich, Alexander Kupers, and Bena Tshishiku Mapping class groups of exotic tori and actions by  $SL_d(\mathbb{Z})$ .
  - Transactions of the American Mathematical Society, 11 (2024), pp. 1316–1349.
- · Manuel Krannich and Alexander Kupers, A note on homotopy and pseudoisotopy of diffeomorphisms of 4-manifolds. Comptes Rendus Mathématique, **362** (2024), pp. 1515-1520.
- · Mauricio Bustamante, Manuel Krannich, and Alexander Kupers, Finiteness properties of automorphism spaces of manifolds with finite fundamental group. Mathematische Annalen, 388 (2024), 3321-3371.

· Thomas Goodwillie, Manuel Krannich, and Alexander Kupers, Stability of concordance embeddings.

Proceedings of the Royal Society of Edinburgh: Section A Mathematics 154 (6) (2024) 1713-1748.

- Manuel Krannich and Alexander Kupers, Embedding calculus for surfaces. Algebraic & Geometric Topology **24**-2 (2024), 981–1018.
- 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  ${\it H}P^2$ -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 highdimensional 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, Alexander Kupers, and Fadi Mezher, Framed configuration spaces and exotic

Preprint (2025), arXiv:2509.19074.

 Manuel Krannich and Alexander Kupers, Pontryagin—Weiss classes and a rational decomposition of spaces of homeomorphisms.

Preprint (2025), arXiv:2504.20265.

· Manuel Krannich, Alexander Lytchak, and Marco Radeschi, Isoparametric foliations and bounded geometry.

Preprint (2025), arXiv:2502.20191.

- Manuel Krannich and Alexander Kupers,  $\infty$ -operadic foundations for embedding calculus. Preprint (2024), arXiv:2409.10991.
- · Manuel Krannich and Oscar Randal-Williams, Diffeomorphisms of discs and the second Weiss *derivative of* BTop(-).

Preprint (2021), arXiv:2109.03500.

### Contributions to conference proceedings

- Manuel Krannich, *Pontryagin–Weiss classes*. Oberwolfach Reports, **21** (2024), no. 3, 1959–1961.
- Manuel Krannich, *Stability of concordance embeddings*. Oberwolfach Reports, **19** (2022), no. 3, 1979–1982.
- 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 lecture series

SEP 2026	Mini-course: TBD, European Autumn School in Topology, Utrecht (scheduled).
Jun 2025	Mini-course: Embedding calculus and applications to diffeomorphism groups, Young Topologists Meeting, Stockholm.
Apr 2024	Mini-course: Pontryagin–Weiss classes and diffeomorphisms of discs, Masterclass: Homotopical methods in manifold theory, Copenhagen.
JULY 2023	$\label{lem:minicourse:disc} \textit{Mini-course: Diffeomorphism groups of discs}, \textit{Workshop: Algebraic K-Theory of Spaces}, \textit{Regensburg.}$
June 2022	Lecture series: The Disc-structure space, Topology Seminar, Kansas State University.

#### INVITED TALKS

Invited talks		
geome-		
g.		
ia.		
onto.		
moduli		
rement),		
Seminar,		
s to BV-		
entialge-		
bersem-		
guration		
be		

- MAR 2023 Pontryagin classes of Euclidean fibre bundles over spheres, Dublin Mathematics Colloquium, Dublin.
- FEB 2023 Diffeomorphisms of discs, Colloquium, LMU Munich.
- ${\tt Jan~2023} \qquad \textit{Manifolds and calculus}, {\tt Chromatic~Homotopy}, {\tt K-Theory~and~Functors}\,, {\tt CIRM}, {\tt Luminy}.$
- OCT 2022 *Manifolds and calculus*, Ib Fest: On the occasion of Ib Madsen's 80'th birthday, Copenhagen.
- SEP 2022 *Multirelative connectivity results in geometric topology*, 4-Manifolds: from Above and Below, CIRM, Luminy.
- SEP 2022 *The Disc-structure space*, Classifying spaces in homotopy theory: in honour of Ran Levi's 60th Birthday, ICMS, Edinburgh.
- July 2022 Stability of concordance embeddings, Topologie, Oberwolfach.
- June 2022 The Disc-structure space, Topology Seminar, Bonn.
- MAY 2022 *Top(d) and orthogonal calculus*, Topology Seminar, Stockholm.
- Feb 2022 *The Disc-structure space*, Higher algebraic structures in algebra, topology and geometry, Institut Mittag-Leffler, Stockholm.
- FEB 2022 *Pseudoisotopies of discs and K(Z)*, Oberseminar Geometrie und Topologie, Göttingen.
- DEC 2021 Smoothing fibre bundles and diffeomorphism groups of discs, IMUNAM Algebraic Topology Seminar, Mexico City.
- OCT 2021 *Top(d) and orthogonal calculus*, Topology Seminar, Münster.
- July 2021 (In)finiteness properties of automorphism spaces of manifolds, AG-Seminar, Regensburg.
- APR 2021 Embedding calculus, factorisation homology, and surfaces, Séminaire de l'équipe Topologie Algébrique, Université Sorbonne Paris Nord (Paris 13).
- APR 2021 *Embedding calculus in codimension zero*, Building Bridges Seminar: Invariants of Embedding spaces, virtual.
- Feb 2021 Smoothing fibre bundles and diffeomorphism groups of discs, Geometry & Topology Seminar, Toronto.
- JULY 2020 *Moduli spaces of h-cobordisms of discs*, Topologie, Oberwolfach.
- MAY 2020 Pseudoisotopies of discs and algebraic K-theory of the integers, Topology Seminar, Purdue.
- MAY 2020 The pseudoisotopy stable range, 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.
- Ост 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 The Disc-structure space, Conference Manifolds and K-theory: the legacy of Andrew Ranicki, Edinburgh.
- DEC 2018 *Mapping class groups of highly connected manifolds*, Workshop "Manifolds", part the programme "Homotopy harnessing higher structures", Newton Institute, Cambridge.
- Jun 2018 On the signature of smooth bundles over surfaces, International Conference on Manifolds, Groups and Homotopy, Skye.
- Sept 2017 On characteristic classes of bundles of manifolds connect summed with an exotic sphere (short talk), Research School: Algebraic Topology of Manifolds, Oxford.
- July 2017 On the cohomology of moduli spaces of manifolds connect summed with an exotic sphere, Young Topologists Meeting, Stockholm.
- Sept 2016 Homological stability of  $E_2$ -modules and twisted stability of moduli spaces of manifolds, European Autumn School in Topology 2016, Utrecht.
- May 2016 Scanning & stability Scrutinizing topological moduli spaces, 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, American Journal of Mathematics, Crelle, Communications in Mathematical Physics, Forum of Mathematics Sigma, Geometry & Topology, Journal of the European Mathematical Society, Journal of Topology, Mathematische Annalen, Philosophical Transactions of the Royal Society A, Selecta Mathematica. OCTOBER 2024 Examiner for PhD thesis of Étienne Batelier, University of Münster. NOVEMBER 2023 Organiser of the workshop Spaces of manifolds: algebraic and geometric approaches, Banff International Research Station. Examiner for PhD thesis of Erik Lindell, Stockholm University. MAY 2023 Organiser of the Online Seminar on Manifolds, homotopy theory, and re-SINCE MAY 2022 lated topics, jointly with Alexander Kupers and Oscar Randal-Williams. MAY 2022 Examiner for licentiate thesis of Robin Stoll, Stockholm University. SPRING 2021 Organiser of the Seminar on Factorisation Homology, Cambridge.

SPRING 2021 Organiser of the Seminar on Factorisation Homology, Cambridge.

FALL 2019 Organiser of the Seminar on work of Weiss and Williams, Cambridge.

JAN 2016 – SEPT 2018 Organiser of pre-talks to the Topology Seminar, Copenhagen.

Aug 2016 – Sept 2018 Organiser of the *ALG/NCG/TOP PhD students' seminar*, Copenhagen.

July 2016 Organiser of the conference *Young Topologists Meeting 2016*, Copenhagen.

#### SUPERVISION AND MENTORING EXPERIENCE

starting Nov 2025 Postdoctoral mentor of Fadi Mezher.
since Apr 2023 PhD advisor of João Lobo Fernandes.
Oct 2022 – Sept 2025 Postdoctoral mentor of Florian Kranhold.
SUMMER 2025 Supervision of five Bachelor's theses.
WINTER 2024/2025 Supervision of two Master's theses.
WINTER 2023/2024 Supervision of a Master's thesis and a Bachelor's thesis.
SUMMER 2023 Supervision of a Master's thesis.

# TEACHING EXPERIENCE

WINTER 2012/2013

Lecture: Topics in Homotopy Theory, Karlsruhe, Lecturer. WINTER 2025/2026 WINTER 2024/2025 Lecture: Algebraic Topology, Karlsruhe, Lecturer. **SUMMER 2024** Lecture: Lectures on Exotic Spheres, Karlsruhe, Lecturer. Seminar: Fundamental groups and covering spaces, Karlsruhe, Lecturer. **SUMMER 2024** WINTER 2023/2024 Lecture: Elementary Geometry, Karlsruhe, Lecturer. Seminar: Cohomology and Characteristic Classes, Karlsruhe, Lecturer. **SUMMER 2023** Lecture: Algebraic Topology, Karlsruhe, Lecturer. WINTER 2022/2023 **SUMMER 2022** Seminar: Vector bundles and topological K-theory, Karlsruhe, Lecturer. Lecture series: Lectures on Manifold Toplogy: Exotic Spheres, Lecturer (as part **FALL 2020** of the Online Graduate Lecture Series of the London Mathematical Society). FALL 2017 Lecture: Algebraic Topology, Copenhagen, Teaching Assistent. FALL 2016 Lecture: Algebraic Topology, Copenhagen, Teaching Assistent. **SUMMER 2015** Lecture: Algebraic Topology, Karlsruhe, Tutor. WINTER 2014/2015 Lecture: Introduction into Geometry and Topology, Karlsruhe, Tutor. WINTER 2013/2014 Lecture: Differential Geometry, Karlsruhe, Teaching Assistent. Lecture: Introduction into Algebra and Number Theory, Karlsruhe, Tutor. SUMMER 2013

7

Lecture: Introduction into Geometry and Topology, Karlsruhe, Tutor

Summer 2012 Lecture: *Linear Algebra II*, Karlsruhe, Tutor. Winter 2012/2013 Lecture: *Linear Algebra I*, Karlsruhe, Tutor

## Conferences and workshops attended

ONI EREFICES I	WORKSHOTS THEELED
June 2026	Workshop, Topologie, Oberwolfach (scheduled).
Apr 2026	TBD, Workshop, Lisbon (scheduled).
Ост 2025	Conference: Higher Invariants: interactions between arithmetic geometry and global analysis, Regensburg).
DEC 2024	Workshop: Real THH in Venice, Venice.
Aug 2024	Conference: Topology of moduli spaces (on the occasion of Ulrike Tillmann's 60th birthday), Copenhagen.
July 2024	Workshop, Topologie, Oberwolfach.
Apr 2024	Masterclass: Homotopical methods in manifold theory, Copenhagen.
November 2023	Workshop Spaces of manifolds: algebraic and geometric approaches, Banff International Research Station .
August 2023	Workshop: String topology and connections to BV-quantization, symplectic topology, and manifold topology, Dublin.
July 2023	Workshop: Algebraic K-Theory of Spaces, Regensburg.
JAN 2023	Workshop, Workshop on Homology of Configuration Spaces and related topics, Paris.
Jan 2023	Conference, Chromatic Homotopy, K-Theory and Functors, CIRM, Luminy.
OCT 2022	Conference, Ib Fest: Conference on the occasion of Ib Madsen's 80th birthday, Copenhagen.
SEP 2022	Workshop, 4-Manifolds: from Above and Below, CIRM, Luminy.
SEP 2022	Workshop, Classifying spaces in homotopy theory: in honour of Ran Levi's 60th Birthday, ICMS, Edinburgh.
July 2022	Workshop, Topologie, Oberwolfach.
June 2021	Conference Manifolds and K-theory: the legacy of Andrew Ranicki, Edinburgh.
July 2020	Workshop <i>Topologie</i> , Oberwolfach.
FEB 2020	Workshop Manifolds and Groups, Oberwolfach.
Ост 2019	Workshop 2019 Clay Research Conference and Workshops, Oxford.
SEPT 2019	Workshop Automorphisms of Manifolds, Hausdorff Center, Bonn.
Jul 2019	Workshop Four Manifolds: Confluence of High and Low Dimensions, Fields Institute, Toronto.
Jun 2019	Conference SYM 10 years old, Copenhagen.
DEC 2018	Conference Bavarian Topology and Geometry Meeting, Augsburg.
DEC 2018	Workshop <i>Manifolds</i> , part of the programme <i>Homotopy harnessing higher structures</i> , Isaac Newton Institute, Cambridge.
SEPT 2018	Workshop Cohomological study of mapping class groups and related topics, Strasbourg.
July 2018	Conference Young Topologists Meeting 2018, Copenhagen.
June 2018	Conference Manifolds, Groups and Homotopy, Skye.
June 2018	Workshop Secondary and delocalized index invariants, Copenhagen.
Apr 2018	Oxford-Aberdeen-Cambridge meeting on Manifolds, Cambridge.
Apr 2018	Conference Graduate Student Topology and Geometry Conference, Chicago.
SEPT 2017	Research School Algebraic Topology of Manifolds, Oxford.
July 2017	Conference Young Topologists Meeting 2017, Stockholm.
June 2017	Masterclass Stable Homotopy Theory and p-Adic Hodge Theory, Copenhagen.

June 2017	Conference <i>Groups</i> , <i>Manifolds and K-Theory</i> , Münster.
MAY 2017	Masterclass Cohomology of Arithmetic Groups, Copenhagen.
,	
APR 2017	Conference Moduli and Traces, Copenhagen.
Mar 2017	Oxford-Aberdeen-Cambridge meeting on <i>Manifolds</i> , Oxford.
DEC 2016	Winter School on Bordism, L-theory, and Real Algebraic K-Theory, Regensburg.
Ост 2016	Conference Configuration Spaces and Moduli Spaces in Homotopy Theory, Bonn.
SEPT 2016	Autumn School European Autumn School in Topology 2016, Utrecht.
JULY 2016	Conference Young Topologists Meeting 2016, Copenhagen.
June 2016	Conference Topology of Manifolds, Lisbon.
June 2016	Conference Algebra in Geometry, Copenhagen.
FEB 2016	Oxford-Aberdeen-Cambridge meeting on Manifolds, Oxford.
Nov 2015	Workshop on Automorphism of Free Groups, Copenhagen.
May 2015	Introductory School to TP Homotopy Theory, Manifolds and Field Theories, Bonn.
FEB 2014	Karlsruhe-Stuttgart Seminar Representation Theory and Geometry, Blaubeuren.
June 2014	Summer School on Surgery Theory and its Applications in Geometry, Münster.