Connor Malin

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Research interests

algebraic & geometric topology, homotopy theory, operads, functor calculus

Education

University of Notre Dame — South Bend, IN
MS, Ph.D. in Mathematics — August 2019 – May 2024
Adviser: Mark Behrens
Dissertation: Some results on operads and configuration spaces

University of Alabama — Tuscaloosa, AL
BA, MA in Mathematics — 2015 – 2019
Adviser: Lawrence Roberts

Employment

Max Planck Institute for Mathematics — Bonn, Germany
Postdoctoral Researcher — July 2024 – Present

Publications

1. **Unstable homotopy groups and Lie algebras**. *Phil. Trans. R. Soc. A* 384 (2026), no. 2328, 20240396. arXiv (joint with M. Behrens).
2. **One-point compactifications of configuration spaces and the self duality of the little disks operad**. *Algebraic & Geometric Topology* 25 (2025), 4163–4184. arXiv.
3. **Koszul self-duality of manifolds**. *Journal of Topology* 17 (2024), e12334. arXiv.
4. **The stable embedding tower and operadic structures on configuration spaces**. *Homology, Homotopy, and Applications* 26 (2024), 229–258. arXiv.
5. **An elementary proof of the homotopy invariance of stabilized configuration spaces**. *Proceedings of the American Mathematical Society* 151 (2023), 3635–3644. arXiv.

Preprints

6. **Surgery on manifold operads**. 2026. arXiv (joint with X. Chen and P. Salvatore).
7. **Unstable 1-semiadditivity as classifying Goodwillie towers**. 2025. arXiv.
8. **Koszul duality and a classification of stable Weiss towers**. 2024. arXiv (joint with N. Taggart).

Organizer

Conference on Interactions between higher algebra, manifolds and functor calculus. MPIM, Bonn. May 18 – May 22, 2026. 15 speakers, 80 attendees (with T. Blom, C. Kremer, and P. Teichner).

Students supervised

Mingyu Xia. Master's degree in Mathematics at the University of Bonn. October 2025 – September 2026. Co-supervised with Markus Hausmann. Thesis: "Koszul Duality between Operadic Comodules and Cooperadic Modules".

Seminar organizer

Functor Calculus Seminar. MPIM Seminar. Fall 2024.
Factorization Homology Seminar. Notre Dame Graduate Student Topology Seminar. Spring 2023.
Embedding Calculus Seminar. Notre Dame Graduate Student Topology Seminar. Spring 2021.

Teaching experience

Instructor, Notre Dame Department of Mathematics:
Spring 2024 Calculus II.
Teaching assistant, Notre Dame Department of Mathematics:
2020–2023 Calculus A, Calculus B, Calculus II, Calculus III (2 semesters),
Geometry and Topology RTG Undergraduate Workshop (twice).
Grader, Notre Dame Department of Mathematics: Topology I, Topology II.

Professional Service

Max Planck Institute Postdoc Election Committee Member	Fall 2024
Oberwolfach Workshop Reporter for "Topologie"	Fall 2024
Notre Dame Postdoc Application Panel Member	Spring 2024
Notre Dame Grad School Application Panel Member	Summer 2022

Awards

Richard Sady Dissertation Award (Notre Dame)	2024
Bayer Fellowship (Notre Dame)	2022
Schmitt Fellowship (Notre Dame)	2019
Thomas W. Palmer Scholarship (University of Alabama)	2019
University of Alabama Presidential Scholarship	2015
National Merit Scholarship	2015

Selected Talks

Divided power Lie algebras and spaces. November 2026. Rochester Topology Seminar. Rochester, New York.
On the spectral lower central series of a pointed space. November 2026. MIT Algebraic Topology Seminar. Cambridge, Massachusetts.
An application of nonabelian Poincaré duality to embedding calculus. November 2026. Northeast Conference on Categorical Methods. Cambridge, Massachusetts.
Formal geometric Lie algebras: a homotopical perspective on complete Lie algebras. September 2026. Higher Structures in Rome. Rome.

Some k-nilpotent algebras arising in the Goodwillie calculus of spaces. November 2025. Topology Intercity Seminar. Utrecht.

The unreasonable effectiveness of right modules in homotopy theory. April 2025. University of Bonn Topology Seminar.

Semiadditive geometry and classifications of Goodwillie towers. April 2025. Operads and Calculus at Queen's University, Belfast.

Goodwillie-Weiss duality for stable manifold calculus. February 2025. Karlsruhe Institute of Technology Topology Seminar.

A scanning map for the E_n operad. November 2024. Tor Vergata Università Topology Seminar.

Koszul Duality and connections to functor calculus. November 2024. MPIM Functor Calculus Seminar.

A simple construction of the self duality of E_n. October 2024. Operadic Methods in Geometry II. École Normale Supérieure de Paris.

The stable chain rule in orthogonal calculus. September 2024. Topologie. Oberwolfach.

A glimpse into Koszul duality for factorization algebras. August 2024. Max Planck Physical Math Seminar.

Manifold calculus in the style of Goodwillie. May 2024. University of Victoria Topology Seminar.

Generalizing a result of Cohen on the homology of configuration spaces. April 2024. University of Massachusetts Amherst Geometry and Topology Seminar.

Koszul Duality and Orthogonal Calculus. January 2024. Copenhagen Algebra/Topology Seminar.

Koszul Duality and Functor Calculus. January 2024. Stockholm Topology Seminar.

Configuration spaces with labels in a spectral Lie algebra. January 2024. JMM Special Session: *Homotopy theory*. San Francisco.

Homotopy invariance results for configuration spaces. January 2024. JMM Special Session: *Modern developments in the theory of configuration spaces*. San Francisco.

On the intersection of embedding calculus, Goodwillie calculus, and chromatic homotopy theory. November 2023. Spaces of Manifolds: Algebraic and Geometric Approaches. Banff International Research Station.

A tautological construction of the self duality of the little disks operad. November 2023. University of Illinois Urbana-Champaign Topology Seminar.

A scanning construction of the self duality of the little disks operad. November 2023. Ohio State University Homotopy Theory Seminar.

Koszul duality with applications to axiomatic functor calculus. November 2023. New Mexico State University Geometry and Topology Seminar.

Applications of Koszul duality to Goodwillie calculus and factorization homology. October 2023. University of Chicago Algebraic Topology Seminar.

Koszul duality and manifold calculus. June 2023. *Advances in Homotopy theory IV*.

Embedding calculus of singular manifolds. March 2023. University of Lafayette Topology Seminar.

The homotopy theory of configuration spaces. February 2023. University of Alabama Algebra and Topology Seminar.

Koszul duality and the Lie bracket on the homology of configuration spaces. September 2022. European Autumn School in Topology.

Duality in topology. August 2022. Notre Dame Math Orientation.

Other Talks

An intro to abstract Goerss-Hopkins theory. March 2025. Notre Dame Graduate Student Topology Seminar.

Norm maps in equivariant and parametrized stable homotopy theory. February 2024. Notre Dame Graduate Student Topology Seminar.

Transforms in calculus and category theory. February 2024. Notre Dame Graduate Student Seminar.

K-theory methods in manifold topology. October 2023. BIRS Workshop Online Seminar.

Koszul duality from a homotopical perspective. September 2023. Notre Dame Graduate Student Seminar.

Koszul self duality of manifolds. July 2023. Young Topologists Meeting.

Differentiating automorphisms of the E_n operad. July 2023. Stability in Topology, Arithmetic, and Representation Theory Workshop.

An operadic proof of Poincaré-Koszul duality. March 2023. Notre Dame Graduate Topology Seminar.

An introduction to factorization homology. February 2023. Notre Dame Graduate Topology Seminar.

Nonabelian Poincaré Duality. February 2023. Notre Dame Graduate Topology Seminar.

Resolutions of moduli spaces by moduli spaces. October 2022. Notre Dame Graduate Topology Seminar.

Spectral Lie algebra models for unstable v_n-periodic homotopy theory. April 2022. Notre Dame Graduate Topology Seminar.

Diff isomorphic implies diffeomorphic. September 2021. Notre Dame Graduate Topology Seminar.

Demystifying buzzwords: real homotopy theory is derived algebra. September 2021. Notre Dame Graduate Seminar.

Operads and manifold calculus. March 2021. Notre Dame Graduate Topology Seminar.

Homotopy sheaves and manifold calculus. March 2021. Notre Dame Graduate Topology Seminar.

Funky manifolds. September 2020. Notre Dame Graduate Topology Seminar.

Applications of the Poincaré conjecture. September 2020. Notre Dame Graduate Topology Seminar.

Manifold up to homotopy = Poincaré duality + what?. August 2020. Notre Dame Graduate Seminar.

Spaces of manifolds, cobordism categories, and the Madsen-Weiss theorem. July 2020. Notre Dame Oral Exam.

The geometric model structure on categories. January 2020. Notre Dame Reading Seminar.

The Hopf invariant 1 problem via Adams operations. November 2019. Notre Dame Graduate Topology Seminar.

Homotopy and its application to the Brouwer fixed point theorem. April 2019. Troy MathFest.

Games on groups. August 2018. University of Alabama Algebra & Topology Seminar.

On subsums of series with positive terms. April 2018. University of Tennessee Undergraduate Math Conference.