

## Cary L. Malkiewich

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Assistant Professor

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Department of Mathematics

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### Employment

Assistant Professor, Binghamton University (SUNY).

2017 – present

J. L. Doob Research Assistant Professor, UIUC.

2014 – 2017

### Visiting Positions

Postdoctoral Fellow, Max Planck Institute for Mathematics, Bonn.

Jan 2018 – Dec 2018

Trimester Program *K-Theory and Related Fields*, Hausdorff Institute, Bonn.

Jul 2017

Junior Trimester Program *Topology*, Hausdorff Institute, Bonn.

Sept 2016

Visitor, University of Copenhagen.

Summer 2015

### Education

Ph.D. in Mathematics, Stanford University. Advisor: Ralph L. Cohen.

2014

B.A. in Mathematics, Princeton University.

2009

### Research Interests

Algebraic topology. Key words: homotopy theory, spectra,  $G$ -spectra, parametrized spectra, free loop spaces, topological Hochschild homology (THH), algebraic  $K$ -theory, functor calculus, duality, traces, transfers, Nielsen theory (fixed-point theory),  $h$ -cobordisms, high-dimensional manifolds.

### Awards and Grants

NSF Award (DMS - 2052923): FRG: Collaborative Research: Trace Methods and Applications for Cut-and-Paste  $K$ -Theory

2021-2024

NSF Award (DMS - 2005524): Algebraic  $K$ -Theory in Fixed-Point Theory and Smooth Manifolds

2020-2023

NSF Award (DMS - 1612162): Young Topologists Meeting 2016

July 2016

AMS Simons Travel Grant

July 2015 – June 2017

Stanford University Centennial Teaching Assistant Award

June 2013

### Papers and Preprints

*Coherence for bicategories, lax functors, and shadows.* (with Kate Ponto.) [arxiv.org:2109.01249](https://arxiv.org/abs/2109.01249).  
submitted.

*K-theoretic torsion and the zeta function.* (with John Klein.) [arxiv.org:2009.10120](https://arxiv.org/abs/2009.10120).  
Accepted, *Annals of K-Theory*.

*K-theory of endomorphisms, the TR-trace, and zeta functions.*

(with Jonathan Campbell, John Lind, Kate Ponto, and Inna Zakharevich.) arxiv.org:2005.04334.  
submitted.

*The equivariant parametrized h-cobordism theorem, the non-manifold part.*

(with Mona Merling.) arxiv.org:2001.05563.  
submitted.

*Parametrized spectra, a low-tech approach.* arxiv.org:1906.04773.

submitted.

*Coassembly is a homotopy limit map.* (with Mona Merling.) arxiv.org:1904.05858.

Annals of K-Theory 5.3 (2020): 373-394.

*Periodic points and topological restriction homology.* (with Kate Ponto.) arxiv.org:1811.12871.

International Mathematics Research Notices (2020).

*Comparing cyclotomic structures on different models for topological Hochschild homology.*

(with Emanuele Dotto, Irakli Patchkoria, Steffen Sagave, and Calvin Woo.) arxiv.org:1707.07862.

Journal of Topology 12.4 (2019): 1146–1173.

*The Morita equivalence between parametrized spectra and module spectra.* (with John Lind.) arxiv.org:1702.07794.

Contemporary Mathematics 707, New Directions in Homotopy Theory (2018): 45–66.

*Equivariant A-theory.* (with Mona Merling.) arxiv.org:1609.03429.

Documenta Mathematica 24 (2019): 815–855.

*The transfer map of free loop spaces.* (with John Lind.) arxiv.org:1604.03067.

Transactions of the American Mathematical Society 371 (2019): 2503–2552.

*The transfer is functorial.* (with John Klein.) arxiv.org:1603.01872.

Advances in Mathematics 338 (2018): 1119–1140.

*Cyclotomic structure in the topological Hochschild homology of  $DX$ .* arxiv.org:1505.06778.

Algebraic & Geometric Topology 17.4 (2017): 2307–2356.

*The topological cyclic homology of the dual circle.* arxiv.org:1610.06898.

Journal of Pure and Applied Algebra 221.6 (2017): 1407–1422.

*Coassembly and the K-theory of finite groups.* arxiv.org:1503.06504.

Advances in Mathematics 307C (2017): 100–146.

*A tower connecting gauge groups to string topology.* arxiv.org:1209.1778.

Journal of Topology 8.2 (2015): 529–570.

## Other Publications and Preprints

*Spectral Waldhausen categories, the  $S_\bullet$ -construction, and the Dennis trace.* (with Jonathan Campbell,

John Lind, Kate Ponto, and Inna Zakharevich.)

arxiv.org:2006.04006.

*Coherence for indexed symmetric monoidal categories.* (with Kate Ponto.) arxiv.org:1811.12873.

*The user's guide project: giving experiential context to research papers.* (with Mona Merling, David White, Luke Wolcott, and Carolyn Yarnall.)

Journal of Humanistic Mathematics (2015) 5 (2): 186-188.

*Duality and linear approximations in Hochschild homology, K-theory, and string topology.* Ph.D. thesis.

## Talks

- The higher characteristic polynomial.* June 2020 - present  
Universität Regensburg, George Mason University
- K-theory of endomorphisms, topological restriction homology, and periodic points.* Autumn 2019  
University of Madison
- Homotopical Nielsen theory and periodic points.* June 2019  
KU Leuven (Kortrijk, Belgium)
- Periodic orbits and topological restriction homology.* Spring 2017 - Spring 2019  
AMS IU Bloomington, Hausdorff Institute, SUNY Albany, Midwest Topology Seminar (Wayne State), Stanford University, Higher Geometric Structures along the Lower Rhine, Universität Wuppertal, Ruhr-Universität Bochum, Universität Regensburg, EPFL, University of Copenhagen, Workshop “Manifolds” at the Isaac Newton Institute (Cambridge), University of Rochester, Cornell University
- The transfer map of free loop spaces.* Autumn 2017 - Autumn 2018  
AMS Buffalo, Princeton University, NRW Topology Meeting, Universität Regensburg, Universiteit Utrecht
- Colloquium: Fixed point theory and traces.* Autumn 2017  
Vassar College.
- The transfer in K-theory and THH.* Spring - Autumn 2017  
UIC, Hausdorff Institute
- A tale of two transfers.* Spring - Autumn 2016  
Hausdorff Institute of Mathematics, Indiana Topology Seminar.
- Colloquium: Transfer maps in algebra and topology.* Spring 2016  
Indiana University Purdue University Indianapolis.
- Duality in topological Hochschild homology.* Summer 2015 - Autumn 2015  
Indiana University Bloomington, University of Virginia, Wayne State University, Brown University, Massachusetts Institute of Technology, Universität Regensburg, University of Copenhagen.
- A visual introduction to cyclic sets and cyclotomic spectra.* July 2015  
Young Topologists Meeting (EPFL).
- Coassembly in algebraic K-theory.* Autumn 2013 - Spring 2015  
Universität Regensburg, University of Kentucky, Purdue University, Johns Hopkins University, University of Notre Dame, Young Topologists Meeting (Copenhagen), Topology in Dubrovnik (Goodwillie’s 60th birthday conference), Northwestern University, University of Chicago, Vanderbilt University.
- Manifold calculus for spaces.* Spring 2013  
Johns Hopkins University, University of Haifa, Hebrew University of Jerusalem.

## Teaching

### Binghamton University

- Math 330: Number Systems Autumn 2021
- Math 518: Algebraic Topology II Autumn 2021
- Math 479: Real Analysis II Spring 2021
- Math 517: Algebraic Topology I Spring 2021
- Math 330: Number Systems Autumn 2020

Math 601A: Topics in Topology (Fiber Bundles and Differential Topology)	Spring 2020
Math 330: Number Systems	Autumn 2019
Math 518: Algebraic Topology II	Autumn 2019
Math 517: Algebraic Topology I	Spring 2019
Math 513: General Topology I	Autumn 2017
Math 304: Linear Algebra	Autumn 2017

### University of Illinois at Urbana-Champaign

Math 390: Interactive Learning Tools for Linear Algebra	Spring 2017
Math 415: Applied Linear Algebra	Spring 2017
Math 390: Interactive Learning Tools for Linear Algebra	Autumn 2016
Math 390/492: Interactive Learning Tools for Linear Algebra	Spring 2016
Math 415: Applied Linear Algebra	Spring 2016
Math 492: Interactive Learning Tools for Linear Algebra	Autumn 2015
Math 597: Foundations of Spectra and Stable Homotopy Theory (large reading course)	Spring 2015
Math 415: Applied Linear Algebra	Spring 2015
Math 348: Fundamental Mathematics with Writing	Autumn 2014

### Stanford University

Math 53: Ordinary Differential Equations with Linear Algebra (TA)	Winter 2014
Math 51H: Honors Multivariable Mathematics (TA)	Autumn 2013
Stanford University Mathematics Camp	Summer 2013
Center for Teaching and Learning, Math Dept. Liaison	Autumn 2012 – Spring 2014
Mentors in Teaching (MinT) Fellow	Autumn 2012 – Spring 2013
Math 215B: Complex Analysis, Geometry, and Topology (TA)	Winter 2013
Math 53: Ordinary Differential Equations with Linear Algebra (TA)	Autumn 2012
Stanford Undergraduate Research Institute in Mathematics	Summer 2012
Math 215B: Complex Analysis, Geometry, and Topology (TA)	Winter 2012
Math 51H: Honors Multivariable Mathematics (TA)	Autumn 2011
Stanford University Mathematics Camp	Summer 2011
Math 215B: Complex Analysis, Geometry, and Topology (Grader)	Winter 2011
Stanford University Mathematics Camp	Summer 2010

### Princeton University

Freshman Scholars Institute Tutor	July – August 2008
Peer Tutor	Sept 2007 – May 2009
McGraw Study Hall Tutor	Sept 2008 – May 2009

### Other Employers

Hampshire College Summer Studies in Mathematics	July – August 2006 and 2007
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### Conferences and Workshops Attended

<i>Various virtual seminars and workshops during CoVID-19.</i>	2020-2021
<i>AMS Sectional (special session co-organizer), Binghamton University.</i>	October 2019
<i>Midwest Topology Seminar (MayDay), University of Chicago.</i>	October 2019
<i>AMS Sectional, Madison.</i>	September 2019
<i>Nielsen Theory and Related Topics, Kortrijk, Belgium.</i>	June 2019
<i>55th Cornell Topology Festival, Cornell University.</i>	May 2019

<i>Manifolds</i> , Isaac Newton Institute, Cambridge, UK.	December 2018
<i>30th NRW Topology Meeting</i> , Universität Münster.	November 2018
<i>New trends in K-theory and homotopy theory</i> , Institut Henri Poincaré, Paris.	November 2018
<i>Utrecht Topology Feest</i> , Universiteit Utrecht.	August 2018
<i>Homotopy Theory Summer Berlin</i> , Freie Universität Berlin.	June 2018
<i>Homotopy Theory Workshop</i> , Universität Regensburg.	May 2018
<i>29th NRW Topology Meeting</i> , Universität Bonn.	April 2018
<i>Higher Geometric Structures along the Lower Rhine XI</i> , MPIM Bonn.	March 2018
<i>Women in Topology</i> , MSRI.	November 2017
<i>Midwest Topology Seminar</i> , Wayne State.	November 2017
<i>AMS Sectional</i> , Buffalo.	September 2017
<i>Workshop: K-theory and related fields</i> , HIM.	July 2017
<i>Trimester Program</i> , HIM.	July 2017
<i>Midwest Topology Seminar</i> , University of Chicago.	May 2017
<i>AMS Sectional</i> , IU Bloomington.	April 2017
<i>Shanks Workshop in Homotopy Theory</i> , Vanderbilt.	March 2017
<i>Midwest Topology Seminar</i> , University of Notre Dame.	Feb 2017
<i>Joint Mathematics Meetings</i> , Atlanta.	January 2017
<i>New Directions in A-theory, Junior Trimester Program (Topology)</i> , HIM.	September 2016
<i>Indiana Topology Seminar</i> , IUPUI.	April 2016
<i>Mid-Atlantic Topology Seminar</i> , Johns Hopkins University.	March 2016
<i>Midwest Topology Seminar</i> , Northwestern University.	February 2016
<i>Midwest Topology Seminar</i> , Wayne State University.	November 2015
<i>K-theory, Cyclic Homology and Motives</i> , Rutgers.	August 2015
<i>Summer School on Algebraic K-theory and Trace Methods</i> , Regensburg.	August 2015
<i>Young Topologists Meeting</i> , EPFL.	July 2015
<i>European Talbot Workshop: Invariants of Structured Ring Spectra</i> , Klosters.	July 2015
<i>Equivariant and motivic homotopy theory</i> , Reed.	May 2015
<i>Midwest Topology Seminar</i> , U Chicago.	May 2015
<i>Indiana Topology Seminar</i> , IUPUI.	April 2015
<i>Midwest Topology Seminar</i> , UI Chicago.	February 2015
<i>Indiana Topology Seminar</i> , IUPUI.	November 2014
<i>Midwest Topology Seminar</i> , Northwestern.	October 2014
<i>Young Topologists Meeting</i> , Copenhagen.	July 2014
<i>Topology in Dubrovnik</i> , Dubrovnik.	June 2014
<i>Reimagining the Foundations of Algebraic Topology</i> , MSRI.	April 2014
<i>Introductory Workshop: Algebraic Topology</i> , MSRI.	January 2014
<i>Semester in Algebraic Topology</i> , MSRI.	January-May 2014
<i>Joint Mathematics Meetings</i> , Baltimore.	January 2014
<i>Workshop in Algebraic Topology</i> , MSRI.	June 2013
<i>Midwest Topology Seminar</i> , U Kentucky.	May 2013
<i>Algebraic Topology: Applications and New Directions</i> , Stanford.	July 2012
<i>West Coast Algebraic Topology Summer School</i> , Stanford.	July 2012
<i>Young Topologists Meeting</i> , Copenhagen.	July 2012
<i>Homotopy Algebra and Applications</i> , CIRM, France.	June 2012
<i>Algebra, Topology, and Fjords Summer School</i> , Nordfjordeid, Norway.	June 2011
<i>9th Graduate Student Topology and Geometry Conference</i> , Michigan State.	April 2011
<i>Hot Topics: Kervaire Invariant</i> , MSRI.	October 2010

*Morse Theory Workshop*, UC Berkeley.  
*8th Graduate Student Topology and Geometry Conference*, U Michigan.

June 2010  
April 2010