

Matthew T. Hogancamp

Curriculum Vitae

Northeastern University
Department of Mathematics
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POSITIONS HELD:

Northeastern University, Assistant Professor (NTT) of Mathematics (September 2019 - present)

University of Southern California, Assistant Professor (NTT), mentor: A. Lauda (July 2016-July 2019)
Buseman Assistant professor, with reduced teaching load (August 2018-July 2019)

Indiana University, Bloomington, Zorn Post-Doctoral Fellow, mentor: V. Turaev (August 2013-May 2016)

Isaac Newton Institute, Cambridge England
Program Participant, Homology theories in low-dimensional topology (May 2017-June 2017)

Max Planck Institute for Mathematics, Bonn, Germany
Program Participant, Semester on 4-manifolds and their combinatorial invariants (January 2013 - June 2013)

EDUCATION:

University of Virginia, Ph.D. Math (August 2013), Advisor: Slava Krushkal
Thesis: “Local and quasi-local \mathfrak{sl}_2 link homology”

University of Notre Dame, B.S. Physics and Honors Mathematics (May 2006)

AWARDS AND GRANTS:

NSF grant DMS 1702274 “Categorical Diagonalization, Representation Theory, and Link Homology”
(July 1, 2017- June 30 2020)

UVA Graduate School of Arts and Sciences Dissertation Year Fellowship (2012-2013)

Government Assistance in Areas of National Need (GAANN) Fellowship (2007-2012)

RESEARCH INTERESTS:

Low dimensional topology, quantum topology, categorification, representation theory

PUBLISHED AND ACCEPTED PAPERS:

Serre duality for Khovanov-Rozansky homology,
with E. Gorsky, A. Mellit, K. Nagane
Selecta Math. (N.S.) 25 (2019), no. 5, Art. 79, 33 pages ([arxiv/1902.08281](https://arxiv.org/abs/1902.08281))

A polynomial action on colored \mathfrak{sl}_2 link homology,
Quantum Topology 10 (2019), no. 1, 1–75 ([arxiv:1405.2574](https://arxiv.org/abs/1405.2574))

On the computation of torus link homology, with B. Elias
Compositio Mathematica 155 (2019), no. 1, 164–205 ([arxiv:1603.00407](https://arxiv.org/abs/1603.00407)).

A DG-extension of symmetric functions arising from higher representation theory,
with A. Appel, I. Egilmez, and A. Lauda
J. Comb. Algebra 2 (2018), no. 2, 169-214 ([arxiv/1704.00713](https://arxiv.org/abs/1704.00713))

Categorified Young symmetrizers and stable homology of torus links II, with M. Abel,
Selecta Math. (N.S.) 23 (2017), no. 3, 1739-1801 ([arxiv:1510.05330](https://arxiv.org/abs/1510.05330))

Categorified Young symmetrizers and stable homology of torus links,
Geom. Topol. 22 (2018), no. 5, 2943-3002 ([arxiv:1505.08148](https://arxiv.org/abs/1505.08148))

An exceptional collection for Khovanov homology, with B. Cooper,
Algebr. Geom. Topol. 15 (2015), no. 5, 2659-2707 ([arxiv:1209.1002](https://arxiv.org/abs/1209.1002))

SO(3) Homology of Graphs and Links, with V. Krushkal and B. Cooper,
Algebr. Geom. Topol. 11 (2011), no. 4, 2137-2166 ([arxiv:1012.3672](https://arxiv.org/abs/1012.3672))

PREPRINTS:

- Homological perturbation theory with curvature**, 2019 ([arxiv/1912.03843](#))
- Torus link homology**, with A. Mellit, 2019 ([arxiv/1909.00418](#))
- On the functoriality of $sl(2)$ tangle homology**,
with A. Beliakova, K. Putyra, S. Wehrli, 2019 ([arxiv/1903.12194](#))
- Ext-enhanced monoidal Koszul duality for $GL(2)$** , with S. Makisumi ([arxiv/1903.00461](#))
- The Fukaya category of the pillowcase, traceless character varieties, and Khovanov cohomology**,
with M. Hedden, C. M. Herald, and P. Kirk, 2018 ([arxiv/1808.06957](#))
- Categorical diagonalization of full twists**, with B. Elias, 2017 ([arxiv/1801.00191](#))
- Hilbert schemes and y-ification of Khovanov-Rozansky homology**, with E. Gorsky, 2017
([arxiv/1712.03938](#))
- An involutive epsilon invariant**, with C. Livingston, 2017 ([arxiv/1710.08360](#))
- Categorical diagonalization**, with B. Elias, 2017 ([arxiv/1707.04349](#))
- Khovanov-Rozansky homology and higher Catalan sequences**, 2017 ([arxiv/1704.01562](#))
- Idempotents in triangulated monoidal categories**, 2017 ([arxiv/1703.01001](#))
- Morphisms between categorified spin networks**, 2012 ([arxiv:1209.2732](#))

INVITED TALKS:

- Topology Seminar, Boston College
Derived annular link homology November 2019
- Algebra Seminar, UCLA
Trace of the Hecke category October 2019
- GPRT Seminar, Northeastern University,
Trace of the Hecke category September 2019
- Workshop “Hilbert schemes, categorification and combinatorics”, UC Davis
Derived traces of the type A Hecke category June 2019
- Topology seminar, UNC Chapell Hill
Serre duality for Khovanov-Rozansky homology March 2019
- Workshop “Catégorification en topologie et théorie des représentations”, University of Caen
Khovanov-Rozansky homology and Hilbert schemes of points (2 lectures) February 2019
- Workshop “Representation theory connections to (q,t)-combinatorics”, BIRS, Banff, CA
How to compute superpolynomials, January 2019
- Worskhop “Categorification in quantum topology and beyond”, ESI, Vienna
Curved Soergel bimodules and Khovanov-Rozansky homology (2 lectures) January 2019
- Geometric representation theory seminar, MIT
The curved Hecke category and the isospectral Hilbert scheme October 2018
- Berkeley string math seminar, UC Berkeley
Monodromic deformation of Khovanov-Rozansky homology and Hilbert schemes October 2018
- Workshop “Categorified Hecke algebras, link homology, and Hilbert schemes”, AIM
Soergel bimodules and Khovanov-Rozansky homology October 2018
- Conference “Categorification and higher representation theory”, Mittag-Leffler Institute
Soergel bimodules, polygraphs, and Hilbert schemes July 2018
- Mathematical physics seminar, Perimeter Institute
Curved complexes, deformation of Khovanov-Rozansky homology, and Hilbert schemes May 2018
- Algebra and geometry seminar, Caltech
Curved complexes, Khovanov-Rozansky homology, and Hilbert schemes, April 2018

Conference “Categorification in mathematical physics”, Simons Center for Geometry and Physics <i>Curved complexes, Khovanov-Rozansky homology, and Hilbert schemes</i>	April 2018
Conference “Quantum knot homology and supersymmetric gauge theories”, Aspen Center for Physics <i>Curved complexes, Khovanov-Rozansky homology, and Hilbert schemes,</i>	March 2018
Lie group and representation theory seminar, University of Maryland <i>Categorification of Young idempotents</i>	February 2018
Topology seminar, UCLA <i>Curved complexes, Khovanov-Rozansky homology, and Hilbert schemes</i>	January 2018
Conference “Algebraic structures in geometry and topology,” Riederalp, Switzerland <i>Link splitting and y-ification of Khovanov-Rozansky homology</i>	January 2018
Special Session “Quantum Link Invariants, Khovanov Homology, and Low-dimensional Manifolds,” JMM <i>Link splitting and y-ification of Khovanov-Rozansky homology</i>	January 2018
Special session “Rational Cherednik algebras and categorification,” AMS meeting, UC Riverside <i>Curved complexes, Soergel bimodules, and the isospectral Hilbert scheme</i>	November 2017
Special session “Combinatorial representation theory,” AMS meeting, UC Riverside <i>Torus links and Catalan combinatorics</i>	November 2017
Special session “Combinatorial aspects of the polynomial ring,” AMS meeting, UC Riverside <i>Braids, symmetric functions, and shuffle conjectures</i>	November 2017
Special session “Symmetry in algebra, topology, and physics”, Math. Cong. of the Americas, McGill, <i>Categorical Diagonalization</i>	July 2017
Conference “Representation Theory and Combinatorics of Torus Links,” UMass Amherst <i>How to compute some link homologies</i>	July 2017
Workshop “Quantum topology and categorified representation theory,” INI, Cambridge, UK <i>Categorical diagonalization</i>	June 2017
Conference “Equivariant combinatorics,” CRM, University de Montreal, <i>Khovanov-Rozansky homology and the higher q, t Catalan sequences.</i>	June 2017
Isaac Newton Institute HTL seminar, University of Cambridge, <i>How to compute torus link homology</i>	June 2017
Workshop “Physics and knot homologies,” INI, University of Cambridge <i>Khovanov-Rozansky homology and q, t Catalan numbers</i>	April 2017
Topology seminar, Claremont College <i>Torus knots and combinatorics</i>	February 2017
Workshop “Categorification, derived geometry and quantum cohomology,” Paris 7 <i>Categorified Young symmetrizers and torus link homology, with connections to Hilbert schemes (two lectures)</i>	January 2017
Joint LA Topology seminar at UCLA <i>Categorical diagonalization and link homology</i>	November 2016
UCSD Combinatorics seminar <i>Knot homology and the q, t Catalan</i>	September 2016
WARTHOG “Knot homologies, Hilbert schemes, and Cherednik algebras”, University of Oregon <i>Categorical diagonalization (two lectures)</i>	July 2016
Conference “Advances in Quantum and Low-Dimensional Topology”, U. of Iowa <i>Categorical diagonalization of the full twist</i>	March 2016
Topology seminar, Michigan State University <i>Stability phenomena in link homology</i>	April 2016
Special session “Topological representation theory,” Joint Mathematics Meetings, Seattle <i>Diagonalization of the full twist</i>	January 2016

MIT special seminar <i>Categorical diagonalization of the full twist</i>	November 2015
Columbia University SGGTC seminar <i>Categorical diagonalization of the full twist</i>	November 2015
Algebra seminar, UC Davis <i>Categorical diagonalization of the full twist</i>	October 2015
Topology seminar, Duke University <i>Categorical diagonalization of the full twist</i>	October 2015
Special session “Geometric perspectives in knot theory,” AMS sectional meeting, Loyola University <i>Stable homology of torus links, and a conjecture of Gorsky-Rasmussen</i>	October 2015
Felix Klein seminar, University of Notre Dame <i>On categorified Young symmetrizers</i>	April 2015
University of Virginia geometry seminar <i>The stable Khovanov-Rozansky homology of torus knots</i>	December 2014
Joint IU/Vanderbilt operator algebras seminar, Vanderbilt University <i>Singular Soergel bimodules and planar algebras</i>	November 2014
Columbia SGGT seminar, Columbia University <i>The stable Khovanov-Rozansky homology of torus knots</i>	October 2014
WARTHOG “Kazhdan-Lusztig Theory and Soergel Bimodules,” University of Oregon <i>Rouquier complexes</i>	Aug 2014
International conference “Quantum topology,” Chelyabinsk, Russia <i>A quasi-local approach to link homology</i>	July 2014
Special session “Categorification in Representation Theory,” AMS sectional meeting, UC Riverside <i>A quasi-local approach to link homology</i>	November 2013
Joint LA topology seminar, University of Southern California <i>A quasi-local approach to link homology</i>	November 2013
UNC/Duke topology seminar, UNC <i>A quasi-local approach to link homology</i>	October 2013
Topology seminar, George Washington University <i>$SO(3)$ Kauffman Homology</i>	April 2012
Conference “Knots in Washington XXXIV,” George Washington University <i>Categorification of Generalized Jones-Wenzl Projectors</i>	March 2012
Conference “Homological Knot Invariants in Low-Dimensional Topology,” SUNY Stony Brook <i>Properties of categorified spin networks</i>	June 2011
“Graduate Student Topology and Geometry Conference,” Michigan State University <i>A Category for the chromatic polynomial</i>	April 2011
Conference “Knots in Washington XXXI,” George Washington University <i>$SO(3)$ Kauffman Homology for graphs and links</i>	December 2010
Symplectic geometry and gauge theory seminar, Columbia University <i>$SO(3)$ Kauffman Homology of graphs and links</i>	November 2010

TEACHING EXPERIENCE:

Northeastern University

Math 2331: Linear algebra	Spring 2020
Math 1365: Introduction to mathematical reasoning	Fall 2019

University of Southern California

Math 125: Calculus I (two sections)	Fall 2018
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Math 126: Calculus II	Spring 2018
Math 425: Complex analysis	Spring 2018
Math 126: Calculus II	Fall 2017
Math 225: Linear algebra and differential equations	Spring 2017
Math 117: Precalculus for Business and Economics (two sections)	Fall 2016

Indiana University

Math M624: Quantum Invariants (topics course)	Spring 2016
Math M311: Calculus III (two sections)	Fall 2015
Math S343: Honors Ordinary Differential Equations I	Spring 2016
Math M343: Ordinary Differential Equations I	Fall 2015
Math M118: Finite Mathematics	Spring 2014
Math M212: Calculus II	Spring 2014
Math M211: Calculus I (two sections)	Fall 2013

University of Virginia

Math 1310: Calculus I	Fall 2012
Math 1310: Calculus I	Fall 2010
Math 1220: Applied Calculus II	Spring 2010
Math 1220: Applied Calculus II	Fall 2009
Math 122: Applied Calculus II	Spring 2009
Math 121: Applied Calculus I	Fall 2008
Math 325: Differential Equations (TA)	Spring 2008
Math 325: Differential Equations (TA)	Fall 2007

PROFESSIONAL ACTIVITIES:

Mentor to USC graduate student Nicolle Sandoval Gonzalez in aspects of professional development, mathematics research, and her Ph.D. thesis.	Fall 2017 - May 2019
Mentor to USC undergraduate Kelley Yang in independent study in group theory (Math 490, 2 credit hours).	Fall 2018
Co-organizer of summer school and conference in Categorification of Quantum Invariants, with Aaron Lauda and Andy Manion.	Summer 2018
Reviewer for AMS Math Reviews	June 2018 - present.
Geometry/Topology qualifying exam committee member at USC.	Spring 2018
Organizer of and primary speaker in learning seminar on categorical diagonalization at USC.	Fall 2017
Mentor in an independent study / research project with USC undergraduate Lewis Wang in Catalan combinatorics.	Fall 2017
Co-organizer of USC Categorification Seminar	2016-2019
Oral exam committee member for IU graduate student Josh Edge.	Spring 2016
Faculty co-mentor of the IU math club (with Keenan Kidwell)	Fall 2015-Spring 2016
Co-organizer of IU Quantum Topology seminar (with Noah Snyder)	Spring 2015-Spring 2016
IU STARS (Science, Technology, and Research Scholars) mentor Description: independent study and research with an IU undergraduate in knot theory.	Fall 2014-Spring 2015
Referee for Quantum Topology, Geometry and Topology, Algebraic and Geometric Topology, Compositio Math., Indiana Journal of Math., Topology Proceedings, JCTA	