

Christopher William Davis

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Employment

- Associate Professor, University of Wisconsin - Eau Claire, Fall 2017 - present.
- Assistant Professor, University of Wisconsin - Eau Claire, Fall 2013 - Summer 2017.
- Zassenhaus Assistant Professor, Ohio State University, Fall 2012 - Spring 2013.

Education

- PhD Mathematics, Rice University, 2012. Thesis advisor: Tim Cochran.
- B.S. Mathematics with Minor in Computer Science, Westminster College of Salt Lake City. 2007

Publications

A complete list of my papers on the arXiv can be found at https://arxiv.org/a/davis_c_1.html

- Triple linking numbers and surface systems. Joint with Matthias Nagel, Patrick Orson, and Mark Powell. Indiana University Journal of Mathematics. (2020). DOI: [10.1512/iumj.2020.69.8081](https://doi.org/10.1512/iumj.2020.69.8081)
- Linear independence of cables in the knot concordance group. Joint with JungHwan Park and Arunima Ray. To appear: Transactions of the American Mathematical Society. Arxiv preprint available at <https://arxiv.org/abs/1806.06225>
- The C-complex clasp number of links Joint with Jonah Amundsen, Eric Anderson, and Daniel Guyer. Rocky Mountain J. Math., Volume 50, Number 3 (2020), 839-850. DOI: [10.1216/rmj.2020.50.839](https://doi.org/10.1216/rmj.2020.50.839)
- On the indeterminacy of Milnor's triple linking number. Joint with Jonah Amundsen and Eric Anderson. Journal of Knot Theory and its Ramifications. Vol. 29, No. 09, 2050064 (2020). <https://doi.org/10.1142/S0218216520500649>
- Isotopy and equivalence of knots in 3-manifolds Joint with Paolo Aceto, Corey Bregman, JungHwan Park, and Arunima Ray. Arxiv preprint available at <https://arxiv.org/abs/2007.05796>
- Concordance, crossing changes, and knots in homology spheres. (2019) Canadian Mathematical Bulletin. DOI: <https://doi.org/10.4153/S0008439519000791>
- Topological concordance of knots in homology spheres and the solvable filtration. (2019) Journal of Topology. DOI: [10.1112/topo.12126](https://doi.org/10.1112/topo.12126)
- Concordance to links with an unknotted component. Joint with JungHwan Park. Mathematical Proceedings of the Cambridge Philosophical Society. (2019) DOI: <https://doi.org/10.1017/S0305004119000367>.
- Every genus 1 algebraically slice knot is 1-solvable. Joint with Taylor Martin, Carolyn Otto, and JungHwan Park. Transactions of the American Mathematical Society. (2019) <https://doi.org/10.1090/tran/7682>

- Concordance of knots in $S^1 \times S^2$. Joint with Matthias Nagel, JungHwan Park, and Arunima Ray. Journal of the London Mathematical Society. (2018) DOI: 10.1112/jlms.12125
- When do links have equivalent C-complexes? Joint with Grant Roth. Journal of Knot Theory and its Ramifications. (2017) DOI: 10.1142/S0218216517500109.
- Cutting open null-bordisms and the signatures of derivatives of slice knots. Joint with Tim Cochran. Arxiv preprint available at <http://arxiv.org/abs/1511.07295>
- A new family of links topologically, but not smoothly, concordant to the Hopf link. Joint with Arunima Ray. Journal of Knot Theory and its Ramifications. (2016) DOI: 10.1142/S0218216517400028
- Satellite operations as a group action on knot concordance. Joint with Arunima Ray. Algebraic and Geometric Topology 16-2 (2016), 945–969. DOI 10.2140/agt.2016.16.945
- Counterexamples to Kauffman’s conjecture on Slice knots. Joint with Tim Cochran. Advances in Mathematics (2016) DOI: 10.1016/j.aim.2014.12.006
- Injectivity of satellite operators in knot concordance. Joint with Tim Cochran and Arunima Ray Journal of Topology (2014) DOI: 10.1112/jtopol/jtu003
- Computing the ρ -invariants of links via the signature of colored links with applications to the linear independence of twist knots. Arxiv preprint available at <http://arxiv.org/abs/1201.6068>
- Linear independence of knots arising from iterated infection without the use of the Tristram-Levine signature. International Mathematics Research Notices. (2014) DOI: 10.1093/imrn/rns277
- Von Neumann rho invariants and torsion in the topological knot concordance group. Algebraic and Geometric Topology. (2012) DOI: 10.2140/agt.2012.12.753
- Strong coprimality and strong irreducibility of Alexander polynomials. joint with Evan M. Bullock. Topology and its Applications, DOI: 10.1016/j.topol.2011.08.019

Undergraduate research projects

- Fall 2018 - Spring 2019 “Complexity of common C-complexes” With Jonah Amundsen, Eric Anderson, and Dan Guyer.
- Summer 2018 “The indeterminacy group of Milnor’s triple linking number” With Jonah Amundsen and Eric Anderson.
- Fall 2017 - Spring 2018 “Higher order colorability” With Grace Odegaard, Benjamin Stickney, Michael Vaughan and Kee Shen Yim.
- Summer 2017 “Link Homotopy via quandles” With Benjamin Stickney, Michael Vaughan and Kee Shen Yim.
- Spring 2017 “Knot theory via quandles” With Grace Odegaard
- Summer 2016 “Using algorithms to test assumptions about the evolutionary forces shaping spider webs” With Carolyn Otto, Todd Wellnitz, Kayla Billman, Taren Leitzke, Sarah Reukema.
- 2015-2016 academic year: “When to links admit homeomorphic C-complexes?” with Grant Roth at UWEC.
- 2014-2015 academic year: “Minimal complexity C-complexes,” with Grant Roth at UWEC.
- 2013-2014 academic year: “Distinguishing colored links,” with Grant Roth at UWEC.
- Summer 2010: “Energy Minimizing Unit Vector Fields,” VIGRE Summer research internship, Rice University

Selected Invited Talks:

- Links in homology spheres are homotopic to slice links – an application of the relative Whitney trick. Monday, February 8, 2021 for Classical Knots + Virtual Knots + Algebraic Structures Related to Knots at The Ohio State University, Columbus, OH, USA.
<https://u.osu.edu/ckvkastrks/2021/02/08/links-in-homology-spheres-are-homotopic-to-slice-links-an-application-of-the-relative-whitney-trick/>
- Concordance, crossing changes and knots in homology spheres. Thursday, December 5 2019 for the topology seminar at at the University of Iowa. Iowa City, Iowa, USA
- Why should you care about concordance of knots in homology spheres? Thursday, December 5 2019 for the topology seminar primer at at the University of Iowa. Iowa City, Iowa, USA
- L^2 signature invariants and the solvable filtration of knot concordance. Tuesday, June 4, 2019 at the American Institute of Mathematics workshop “Smooth concordance classes of topologically slice knots.” San Jose, CA, USA.
<https://aimath.org/pastworkshops/concordsliceknot.html>
- Knots in homology spheres, crossing changes and concordance Monday, February 25, 2019 at the Joint Topology Seminar of the University of Georgia - Athens and Georgia Institute of Technology. Georgia Tech, Atlanta, GA, USA
- Knot, links, homology, and concordance Tuesday, November 6, 2018 as a surprise Math colloquium at The University of Wisconsin - Eau Claire. Eau Claire, WI, USA.
- The solvable filtration and the concordance genus. Monday, June 11, 2018 for the Topology Seminar at the Max Plank Institute for Mathematical Research. Bonn, Germany.
- Knots in homology spheres and the solvable filtration of the topological knot concordance group. Thursday, November 23, 2017 for the Topology Seminar at McMaster University. Hamilton, Ontario, Canada.
- Knots in homology spheres and the solvable filtration of the topological knot concordance group. Monday, October 2, 2017 for the Topology Seminar at the Max Plank Institute for Mathematical Research. Bonn, Germany.
- Topological concordance, knots in homology spheres and the solvable filtration. Friday, January 13 2017 for the Centre Interuniversitaire de Recherches en Géométrie et Topologie at Université du Québec á Montreal.
- The classification of simply connected 4-manifolds. December 13, 2016 for the the Surgery learning seminar at the Hausdorff Research Institute for Mathematics. Bonn, Germany.
- The solvable filtration and fractal structure on knot concordance. October 10, 2016 for the Knot concordance learning seminar at the Hausdorff Research Institute for Mathematics. Bonn, Germany.
- Overview of the solvable filtration of knot concordance. October 3, 2016 for the Knot concordance learning seminar at the Hausdorff Research Institute for Mathematics. Bonn, Germany.
- An overview of knot concordance. September 26, 2016 for the Joint Topology Seminar at the Hausdorff Institute for Mathematics. Bonn, Germany.
- Every genus 1 algebraically slice knot is 1-solvable. June 2, 2016 for the conference “Topology in Dimension 3.5” In honor of Tim Cochran at the Rice University. <http://math.rice.edu/NewsEvents/Conferences/TopoConference2016/index.html>
- Every genus 1 algebraically slice knot is 1-solvable. February 25, 2016 for the conference “Synchronizing Smooth and topological 4-manifolds” at the Banff International Research Station. Banff, Alberta, Canada A recording of the talk may be found at <http://www.birs.ca/events/2016/5-day-workshops/16w5145/videos>

- Every genus 1 algebraically slice knot is 1-solvable. December 15, 2015 at the 2015 Canadian Mathematical Society Winter Meeting, Montreal, Quebec, Canada
- L^2 -signatures and an example of Cochran-Harvey-Leidy. September 12, 2014 at the University of Wisconsin-Madison geometry and topology seminar
- Obstructions to being the derivative of a slice link, August 2014, Knots and Low-Dimensional Manifolds: A Satellite conference of the Seoul ICM.
- Satellite operators as a group action. November 6, 2013. The Topology Seminar at Michigan State University.
- Satellite operators as a group action. May 17, 2013. The Topology Seminar at Rice University, Houston, Texas.
- Satellite operators as a group action. March 28, 2013. The Topology Seminar at Indiana University at Bloomington.
- Unexpected slice knots and counterexamples to Kauffman's concordance conjecture. February 21 2013, University of Wisconsin - Eau Claire.
- Slice knots with nonslice derivatives. October 20, 2012 at the AMS Fall Central Sectional Meeting, University of Akron, Akron, Ohio
- Computing abelian rho-invariants of links via the Cimasoni-Florens signature. September 18, 2012 at the OSU topology seminar
- Slice knots with non-slice derivatives. September 13, 2012 at the OSU math department Welcome Seminar
- Computing first order signatures and making a construction of Cochran-Harvey-Leidy explicit. March 10, 2012 at the Spring Southeastern Section Meeting of the AMS at the University of South Florida, Tampa, FL
- Rho-invariants via link signatures and the linear independence of the twist knots. January 5, 2012 at the AMS-MAA Joint Mathematics Meeting.
- Knot Concordance Via Metabolizing Links. November 11, 2011 in the University of Wisconsin - Eau Claire Mathematics department colloquium
- Non-triviality of Knots Arising from Iterated Infection Without the Use of the Tristram Levine Signature. September 12, 2011 in the Rice Topology Seminar
- Abelian ρ -invariants via the Cimasoni-Florens signature. August 10, 2011 in the Rice Topology Seminar
- Non-triviality of Knots Arising from Iterated Infection Without the Use of the Tristram Levine Signature. May 1, 2011 at Spring Western Section Meeting of the AMS at the University of Nevada at Las Vegas
- Localized rho-invariants as obstructions to torsion in the topological knot concordance group. July 22, 2010 At Knot Concordance and Homology Cobordism Workshop at Wesleyan University
- Localized rho-invariants as obstructions to torsion in the topological knot concordance group. September 20, 2010 in Rice Topology Seminar

Selected talks given at UWEC

- The Alexander Polynomial From a Diagram Wednesday, June 26, 2018 for the Knot Theory Seminar at The University of Wisconsin - Eau Claire.
- Invariants of links, Milnor's triple linking number. Wednesday, June 6, 2018 for the Knot Theory Seminar at The University of Wisconsin - Eau Claire.

- Knot theory via Seifert surfaces. Monday, May 1, 2017 for the University of Wisconsin - Eau Claire Math department retreat.

Selected talks given as a graduate student.

- Cobordism groups of homology cylinders. September 27, 2011
- L^2 eta-invariants and their approximation by unitary eta-invariants. February 15, 2011
- Generalized seifert surfaces and signatures of colored links. November 16, 2010
- Polynomial splittings of von Neumann rho-invariants. August 10, 2010
- Classification of lens spaces: an application of torsion. September 8, 2009
- An introduction to torsion. September, 1 2009
- The oldest talk in VIGRE Seminar: Eilenberg and Steenrod's treatment of Čech homology. April, 7 2009
- Approximation of L^2 invariants by their compact counterparts. December 12, 2008
- Long knots are long: embeddings of the long line, January 26, 2012 in Current Mathematics Seminar
- A four-dimensional tool for a four-dimensional problem: How I feel about von Neumann rho-invariants and knot concordance, January 11, 2011 in Current Mathematics Seminar
- Trees of homotopy types of 2-dimensional CW complexes. II, October 2010 in Current Mathematics Seminar

Teaching Experience

Courses Taught

- Math 499: Directed study on algebraic topology, Spring 2020. The University of Wisconsin - Eau Claire
- Math 498: Math Internship - Capstone project, Spring 2020. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Spring 2020. The University of Wisconsin - Eau Claire (2 sections)
- Math 316: Introduction to Real Analysis I Spring 2020. The University of Wisconsin - Eau Claire
- Math 114, 215, 216. Calculus sequence. Spring 2020. The University of Wisconsin Extension (co-instructor)
- Math 316: Introduction to Real Analysis II, Fall 2019. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Fall 2019. The University of Wisconsin - Eau Claire (2 sections)
- Math 114, 215, 216. Calculus sequence. Fall 2019. The University of Wisconsin Extension (co-instructor)
- Math 114, 215, 216. Calculus sequence. Summer 2019. The University of Wisconsin Extension (co-instructor)
- Math 399: Independent study on combinatorial topology Summer 2019
- Math 316: Introduction to Real Analysis I, Spring 2019. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Spring 2019. The University of Wisconsin - Eau Claire (2 sections)
- Calculus sequence, Fall 2018. The University of Wisconsin Extension (co-instructor)

- Math 316: Introduction to Real Analysis I, Fall 2018. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Fall 2018. The University of Wisconsin - Eau Claire (Two sections)
- Math 299: Directed studies in algebraic topology. Spring 2018. The University of Wisconsin - Eau Claire
- Math 316: Introduction to Real Analysis I, Spring 2018. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Spring 2018. The University of Wisconsin - Eau Claire (Two sections)
- Math 299: Directed studies in geometric topology. Fall 2017. The University of Wisconsin - Eau Claire
- Math 316: Introduction to Real Analysis I, Fall 2017. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Fall 2017. The University of Wisconsin - Eau Claire (Two sections)
- Math 299: Directed studies in point-set topology. Summer 2017. The University of Wisconsin - Eau Claire
- Math 316: Introduction to Real Analysis I, Spring 2017. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics Spring 2017. The University of Wisconsin - Eau Claire (Two sections)
- Math 114: Calculus I, Spring 2016. The University of Wisconsin - Eau Claire (Three sections)
- Math 316: Introduction to Real Analysis I, Fall 2015. The University of Wisconsin - Eau Claire
- Math 114: Calculus I, Fall 2015. The University of Wisconsin - Eau Claire (Two sections)
- Math 316: Introduction to Real Analysis I, Spring 2015. The University of Wisconsin - Eau Claire
- Math 399: A reading course in combinatorial topology, Spring 2015. The University of Wisconsin - Eau Claire
- Math 215: Calculus II, Spring 2015. The University of Wisconsin - Eau Claire (Two sections)
- Math 112: Precalculus Mathematics, Fall 2014. The University of Wisconsin - Eau Claire (Two sections)
- Math 216: Calculus III, Fall 2014. The University of Wisconsin - Eau Claire
- Math 316: Introduction to Real Analysis I, Spring 2014. The University of Wisconsin - Eau Claire
- Math 114: Calculus I, Spring 2014. The University of Wisconsin - Eau Claire
- Math 317: Introduction to Real Analysis II, Fall 2013. The University of Wisconsin - Eau Claire
- Math 112: Precalculus Mathematics, Fall 2013. The University of Wisconsin - Eau Claire (two sections)
- Math 4547: Introduction to Real Analysis I, Spring 2013. Ohio State University
- Math 1151: Calculus I, Fall 2012. Ohio State University (two sections)
- Math 211: Ordinary Differential Equations and Linear Algebra, Summer 2011. Rice University
- Math 211: Ordinary Differential Equations and Linear Algebra, Fall 2009. Rice University
- Math 102: Integral Calculus, Summer 2008 (co-instructor). Rice University
- Teaching assistant, Rice University, Fall 2007 - Spring 2012. Various classes

Conferences and Workshops organized

- Conference on knot concordance and 4-manifolds. Max Plank Institute for Mathematics. Bonn, Germany. October 17 – 21, 2016
- Knot concordance and 4-manifolds. A Junior Hausdorff Trimester Program. Hausdorff Institute for Mathematics. Bonn, Germany. September – December 2016
- Knot concordance and low dimensional manifolds, AMS sectional Meeting, University of Wisconsin - Eau Claire, September 2014
- Knots and 4-manifolds, AMS sectional Meeting, University of Akron, October 2012

Mathematics Conferences and Workshops Attended

- Smooth concordance classes of topologically slice knots. American Institute of Mathematics, San Jose, California, USA. June 3 – 7, 2019
- Mathematics Association of America Central Sectional Meeting. The University of Wisconsin - Eau Claire. April 6-7, 2018.
- Topology in Dimension 3.5. Memorial conference for Tim Cochran. Rice University June 2016.
- Synchronizing Smooth and Topological 4-Manifolds at the Banff International Research Station. (Banff, Alberta, Canada) February 2016.
- AMS-MAA Joint Mathematics Meeting (Seattle, WA), January 2016.
- Winter Meeting of the Canadian Mathematical Society, (Montreal, Quebec, Canada) December 2015.
- Knots and Low-Dimensional Manifolds: A Satellite conference of the Seoul ICM. (Busan, Korea) August 2014,
- “Hemplefest.” 3-Manifolds: Heegaard Splittings, the Curve Complex, and Hyperbolic geometry, Rice University, April 19-21, 2013.
- 2012 AMS Fall Central Sectional Meeting (University of Akron), October 2012
- 2012 Spring Southeastern Section Meeting of the AMS (University of Southern Florida), March 2012.
- AMS-MAA Joint Mathematics Meeting (Boston, MA), January 2012.
- 46th Texas Geometry and Topology Conference, (University of Texas - Austin, TX), October 2011
- 2011 Spring Western Section Meeting of the AMS (University of Nevada at Las Vegas), April 2011.
- The Fifth Triennial Ahlfors-Bers Colloquium (Rice University - Houston, TX), March 2011.
- 45th Spring Topology and Dynamics Conference (University of Texas - Tyler, TX), March 2011
- AMS-MAA Joint Mathematics Meeting (New Orleans, LA), January 2011.
- Knot Concordance and Homology Cobordism Workshop (Wesleyan University - Middletown CT), July 2010
- Eighth Annual Graduate Student Topology and Geometry Conference (University of Michigan - Ann Arbor, MI), April 2010
- Research Workshop: Homology Theories of Knots and Links (Mathematical Sciences Research Institute - Berkeley, CA), March 2010
- First National Forum for Young Topologists (Tulane University - New Orleans LA), November 2009.
- Georgia International Topology Conference (University of Georgia - Athens, GA), May 2009
- Louisiana Texas Topology Retreat (Rice University - Houston, TX), February 2008.

Selected Non-mathematics Conferences and Workshops Attended

- Recognizing and Responding to Microaggressions in the Classroom University of Wisconsin - Eau Claire, January 22, 2020
- Active shooter response training. The University of Wisconsin - Eau Claire. April 25, 2018.
- Diversity Conversations on Campus Workshop. The University of Wisconsin - Eau Claire. January 16, 2018.

Service

- 2016 – Present: ZB Math reviewer.
- 2017 – Present: Curriculum Committee.
- 2014 – Present: Mathscinet reviewer.
- 2020 Math meet exam writer and head reviewer. Day of meet room setup.
- 2019–2020 Math department colloquium organizer.
- 2019 Math retreat organizer.
- 2019 Sonya Kovalesky Day Volunteer.
- Math 112 textbook selection committee 2019
- Session moderator for the Mathematics Association of America Central Sectional Meeting. April 6-7, 2018. University of Wisconsin - Eau Claire.
- 2018 Sonya Kovalesky Day Volunteer.
- 2018 Math meet: Cochair, exam writer, exam reviewer.
- 2017 Sonya Kovalesky Day Volunteer.
- 2017 Math meet: exam writer, exam reviewer, day of meet manager.
- 2016 Math retreat math contest: Problem writer and grader.
- 2016 Sonya Kovalesky Day Volunteer.
- 2016 Math meet chair.
- 2015/2016 Student affairs committee chair
- 2015 Math retreat math contest: Problem writer and grader.
- 2014/2015 student affairs committee chair
- 2015 Math meet cochair.
- 2014 Math retreat math contest: Problem writer, editor and grader.
- 2014 Chippewa Falls High School STEM night attendee.
- 2014 Math Meet, Day of meet manager.
- 2014 Math Meet, Problem writer.

Awards

- Nominated for the UWEC Emerging Mentor in Research, Scholarship and Creative Activity Award, 2017

- Nominated for the UWEC Emerging Mentor in Research, Scholarship and Creative Activity Award, 2015
- Rice University Tracy Thomas award, 2009

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