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Education

Ph.D. Mathematics, Rice University, May 2002.
B.S. Mathematics, California Polytechnic State University, San Luis Obispo, June 1997.

Appointments

Assistant Professor, Rice University, 2005-present.
C.L.E. Moore Instructor, Massachusetts Institute of Technology, 2002-2005 (on leave 2002-2003).
National Science Foundation Mathematical Sciences Postdoctoral Research Fellow,
- · Massachusetts Institute of Technology, Sponsoring Scientist: Tomaz Mrowka, 2003-2005
- · University of California at San Diego, Sponsoring Scientist: Peter Teichner, 2002-2003

Fellowships and Honors

2008 NSF Faculty Early Career Development (CAREER) Award.
2006 Alfred P. Sloan Fellow.
Rice University Nominee for 2006 Packard Fellowship.
National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship, 2002-2005.
2004 FEW Distinguished Lecturer, University of Pennsylvania.
Finalist for the 2002 American Institute of Mathematics Postdoctoral Research Fellowship.

Research Support

National Science Foundation Grant (Principal Investigator), CAREER: Algebraic Methods in Low-Dimensional Topology, DMS-0748458, 2008–2013.
National Science Foundation Grant (Principal Investigator), Applications of Noncommutative Algebra to Low-Dimensional Topology, DMS-0539044, 2005–2008.
National Science Foundation Mathematical Sciences Postdoctoral Research Fellow, University of California at San Diego, 2002-2003, MIT 2003–2005, NSF DMS-0202488.

Publications

1. Homology and Derived p-Series of Groups (joint with T. Cochran), *J. Lond. Math. Soc.* (to appear), 16 pages. http://arxiv.org/abs/math/0702894
2. Homology Cobordism Invariants and the Cochran-Orr-Teichner Filtration of the Link Concordance Group, *Geom. Topol.*, Vol. 12 (2008), 387–430.
3. Homology and Derived Series of Groups II: Dwyer's Theorem (joint with T. Cochran), *Geom. Topol.*, Vol. 12 (2008), 199–232.
4. Non-commutative Multivariable Reidemeister Torsion and the Thurston Norm (joint with S. Friedl), *Algebr. Geom. Topol.*, Vol. 7 (2007), 755–777.
5. New Phenomena in Knot and Link Concordance (joint with T. Cochran and C. Leidy), Workshop on "Four-Dimensional Manifolds," *Oberwolfach Reports*, Volume 3, Issue 3 (2006).
6. Monotonicity of Degrees of Generalized Alexander Polynomials of Groups and 3-Manifolds, *Math. Proc. Cambridge Philos. Soc.* 140 (2006), no. 3, 431–450.
7. Homology and Derived Series of Groups (joint with T. Cochran), *Geom. Topol.*, Vol. 9 (2005) no. 49, pp. 2159–2191.
8. Higher-Order Polynomial Invariants of 3-Manifolds Giving Lower Bounds for the Thurston Norm, *Topology*, Vol. 44, Iss. 5 (2005), 895–945.
9. On the Cut Number of a 3-Manifold, *Geom. Topol.*, Vol. 6 (2002) Paper no. 15, pages 409-424.
10. A Research Experience for Undergraduates (joint with A. Ritter), *Notices*, Vol. 45, No. 2 (1998) pp. 267-269.

Preprints

1. Knot Concordance and Higher-Order Blanchfield Duality (joint with T. Cochran and C. Leidy), submitted, 54 pages. http://arxiv.org/abs/0710.3082
2. On Transverse Knots and Branched Covers (joint with K. Kawamuro and O. Plamenevskaya), submitted, 29 pages. http://arxiv.org/abs/0712.1557
3. Link Concordance and Generalized Doubling Operators [formerly: Knot Concordance and Blanchfield Duality] (joint with T. Cochran and C. Leidy), submitted, 45 pages. http://arxiv.org/abs/0801.3677
4. Homological Stability of Series of Groups (joint with T. Cochran), preprint, 15pages. http://arxiv.org/abs/0802.2390
5. Rank Invariants of Groups, 3-Manifolds and Links, in preparation.
6. Generalizations of Gropes (joint with T. Cochran, C. Gwosdz-Gee and C. Leidy), in preparation.
7. Higher-Order Signature Cocycles for Subgroups of the Torelli Group (joint with T. Cochran), in preparatation.

Invited Addresses

1. Special Session on Geometric Group Theory at the 2008 AMS Spring Southeastern Meeting, Baton Rouge, LA, March 30, 2008, *Higher-Order Signature Cocycles for Subgroups of the Torelli Group.*
2. Special Session on Knot and 3-Manifold Invariants at the 2008 AMS Spring Southeastern Meeting, Baton Rouge, LA, March 28, 2008, *The (n)-Solvable Filtration of the Knot Concordance Group.*
3. Topology Seminar, UT Austin, November 26, 2007, *Infinite Generation in the COT Filtration of the Knot Concordance Group.*
4. MIT Geometry Seminar, October 22, 2007, *Structure in the Knot Concordance Group.*
5. Colloquium, Weslayen University Math Department, October 18, 2007, *On the Enormity of the Knot Concordance Group.*
6. Columbia University Geometric Topology Seminar, October 12, 2007, *Knot Concordance and Blanchfield Duality.*
7. William Rowan Hamilton Geometry and Topology Workshop, Hamilton Mathematics Institute, Trinity College, Dublin, Ireland, September 7, 2007, *Iterated Torsion-Free Abelian Covers and L^2-Betti Numbers of 3-Manifolds.*
8. Workshop on 3-Manifold Geometry and Topology, Warwick Mathematics Institute, Coventry, England, July 10, 2007, *Homology and Derived p-Series of Groups.*
9. Geometric Topology Conference, Peking University, Beijing, China, June 19, 2007, *Classical Knot Concordance and Blanchfield Duality* .
10. University of Chicago Geometry and Topology Seminar, May 24, 2007, *Knot Concordance and Blanchfield Duality.*
11. Louisiana Texas Topology Retreat, February 3, 2007, *The (n)-Solvable Filtration of the Knot Concordance Group.*
12. Workshop on "4-Dimensional Manifolds," Mathematische Forschungsinstitut, Oberwolfach, Germany, August 7, 2006, *New Phenomena in Knot and Link Concordance.*
13. Conference on "Knots, Groups and 3-Manifolds," Marseille, France, May 22, 2006, *Group Theoretic Invariants of Links and 3-Manifolds.*
14. Workshop on "3-manifolds After Perelman," Edinburgh, Scotland, March 2006, *Group Theoretic Invariants of Links and 3-Manifolds.*
15. Plenary Lecture Series at the Third KAIST Geometric Topology Fair, Gyeongju, South Korea, June 2005, *I. Non-commutative Invariants of 3-manifolds giving Lower Bounds for the Thurston Norm II. Homology and Derived Series of Groups and Rank Invarants of Links III. Homology Cobordism of Invariants of Links and 3-manifolds via L^2-ρ Invariants.*
16. Conference on "Submanifolds, Singular Varieties and Stratified Spaces" in honor of Julius Shaneson, Courant Institute, March 2005, *Homology Cobordism of Manifolds and L^2-Signatures.*
17. Symplectic Geometry Seminar, Michigan State University, November 2004, *Homology Cobordism of 3-Manifolds.*
18. Conference on Low-Dimensional Topology, University of Virginia, Dec 2004, *Homology Cobordism of 3-Manifolds.*

19. Geometry and Topology Seminar, University of Pennsylvania, October 2004, *Homology and Derived Series of Groups.*
20. BIRS conference on Knots and Their Manifold Stories, May 2004, *Homology Equivalence of Groups and Spaces.*
21. University of Pennsylvania Topology Seminar, March 2004, *New Homology Cobordism Invariants.*
22. Brandeis University Topology Seminar, March 2004, *Homology and Derived Series of Groups.*
23. Rice University Colloquium, February 2004, *Homology Equivalence of Groups and Spaces.*
24. Harvard Gauge Theory Seminar, February 20, 2004, *Algebraic Invariants Obstructing Symplectic Structures.*
25. MIT Algebraic Topology Seminar, December 1, 2003, *HigherOrder Invariants of 3-manifolds.*
26. Brandeis University Topology Seminar, October 2003, *Invariants of 3-manifolds from Noncommutative Algebra.*
27. BIRS (Banff International Research Station) Conference on Topology in and Around Dimension Three, Banff, Canada, Sept 1318, 2003, *Invariants of 3-manifolds from Noncommutative Algebra.*
28. Midwest Geometry Conference, Washington University in St. Louis, May 2003, *Noncommuative generalizations of the Alexander Polynomial of a 3-manifold.*
29. University of Arkansas Spring Lecture Series, The AndrewsCurtis Conjecture and the Poincare Conjecture, April 2003, *Some remarks on the Virtual Betti Number of a 3manifold.*
30. University of California, Santa Barabara, Topology Seminar, February 2003, *Monotonicity of Some 3-manifold Invariants.*
31. Joint Caltech/USC Geometry and Topology Seminar , November 2002, *Higher-order Invariants of 3-manifolds with Applications to 3 and 4-manifolds.*
32. Wasatch Topology Conference, University of Utah, October 2002, *Some 3-manifold invariants and their applications to 4-manifolds.*
33. University of Illinois at Chicago Three Manifolds Seminar, October 2002, *Higher-order 3-manifold Invariants and their Applications.*
34. University of California at San Diego Topology/Geometry Seminar, September 2002, *Higher-Order 3-manifold Invariants and their Applications, Part I, II, III.*
35. ICM 2002 Beijing Satellite Conference in Geometric Topology, Shaanxi Normal University, Xi'an, China, August 2002, *Higher-Order 3-manifold Invariants with Applications to the Thurston Norm and Symplectic 4-manifolds.*
36. Ohio State University Topology Seminar, April 2002, *New Polynomial Invariants of 3-manifolds Using Noncommutative Algebra.*
37. Spring Topology and Dynamics Conference, University of Texas at Austin, March 2002, *On the Cut Number of a 3-manifold.*
38. University of Pennsylvania Geometry/Topology Seminar, February 2002, *New 3-manifold Invariants Giving Lower Bounds for the Thurston Norm.*
39. Columbia Geometric Topology Seminar, February 2002, *New 3-manifold Invariants Giving Lower Bounds for the Thurston Norm.*
40. University of Texas at Austin Geometry/Topology Seminar, February 2002, *A Resolution of the Cut Number Question.*
41. Brown University Colloquium, January 2002, *New 3-manifold Invariants with Applications to the Thurston Norm.*
42. AMS/MAA Joint Mathematical Meetings, San Diego, January 2002, *Higher-Order Polynomial 3-Manifold Invariants Giving Lower Bounds for the Thurston Norm.*
43. 2001 Georgia International Topology Conference, Summer 2001, *New Polynomial Invariants of 3-manifolds Giving Lower Bounds for the Thurston Norm.*
44. Lehigh Geometry and Topology Conference, Summer 2001, *Higher-Order 3-Manifold Invariants with Applications to Fibered 3-Manifolds.*
45. Topology Seminar, UC San Diego, Summer 2001, *3-Manifold Invariants Giving Lower Bounds for the Thurston Norm.*
46. Spring Topology and Dynamical Systems Conference, Morelia, MX, Spring 2001, *Polynomial Invariants of 3-Manifolds Giving Lower Bounds for the Thurston Norm.*
47. Colloquium at California Polytechnic State University, San Luis Obispo, Fall 1999, *Generalized*

Alexander Modules of Knots and Links.

Service to the Profession

Conferences Organized

- Co-organizer of the Third Louisiana Texas Topology Retreat (LTTR) held at Rice University, February 9-10, 2008.
- Co-organizer of the Fall 2006 Texas Geometry and Topology Conference (TGTC) held at Rice University, October 27-29, 2006.
- Co-organizer of the Second Louisiana Texas Topology Retreat (LTTR) held at Louisiana State University, February 3-4, 2007.

Student Mentoring

- MIT Math Club Guest Lecturer, Spring 2005.
- Inaugural Undergraduate Colloquium Speaker at University of Pennsylvania, October 2004, *Knot Theory and Twisting of 3-Dimensional Spaces.*
- Faculty mentor in the Student Teaching Mentoring Program at MIT, Fall 2003.
- Invited speaker, Arkansas Women in Statistics and Mathematics, April 2003, *Becoming a successful woman in mathematics.*

Service to the Community

- Director of the Rice University Mathematical Institute for Young Women; a summer math enrichment program for rising 9^{th} and 10^{th} grade girls from the greater Houston community.
- Presenter in the West Harris County Branch AAUW Expanding Your Horizons in Science and Mathematics Workshop for middle school girls All Tied up in Knots, February 2006, March 2007, and March 2008.
- Gave a lecture to 70 undergraduate and faculty at Sam Houston State University on "Knots in 4-Dimensional Space" in the Piney Woods Lecture Series (funded by the Tensor Foundation and the Mathematical Association of America). Had dinner with prospective undergraduate women math majors at SHSU. September 12, 2007.
- Lectured to the lead high school teachers on Knot Theory and Braid Theory the Rice Mathematical Leadership Institutes Summer Lecture Series, June 2005 and June 2007.

Service to the University

- Member of the Dean of Natural Sciences Search Committee, 2007-2008.
- Member of the NSF ADVANCE Retention and Climate Committee, 2007-2008.
- Faculty Associate of Brown College, 2006-present.
- Member of Rice Ally Program, providing support to GLBT persons, 2005-present.
- Freshman orientation week advisor, Fall 2006 and 2007.
- Member of the NSF ADVANCE committee to establish a mentoring program, 2006-2007.
- Panel member of the NSF ADVANCE workshop "Building Your Lab and Getting the Most from a Mentor" during the conference "Negotiating the Ideal Faculty Position," Fall 2006.

Service to the Department

- Graduate Thesis advisor, Carolyn Otto, 2007-present.
- Research Mentor for one Evans Instructor (Keiko Kawamuro), 2006-present.
- Chair, Evans Instructor hiring committee, 2005-present.
- Chair, Bochner Lectures committee, 2005-present.
- Chair, Wolfe Lectures committee, 2006-2007.
- Member of the graduate committee, 2005-2006.