

CURRICULUM VITAE

Patricia Cahn, October 13, 2018

ADDRESS AND TELEPHONE NUMBER

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DEGREES

2012 Ph. D. Mathematics. Dartmouth College
2009 M.A. Mathematics. Dartmouth College
2006 B.A. *summa cum laude* Mathematics. Smith College

AWARDS AND HONORS

2012, 2013 Good Teaching Award, Penn Dept. of Mathematics.
2012 Filene Graduate Teaching Award, Dartmouth College.
2011 Kenneth P. Bogart Teaching Award, Dartmouth College Dept. of Mathematics.
2004, 2006 Benedict and Pokora Prizes in Mathematics, Smith College.
2005 Phi Beta Kappa.

EMPLOYMENT HISTORY

2016-Present. Assistant Professor, Department of Mathematics and Statistics, Smith College.
2014; 2015-2016. Max Planck Institute for Mathematics, Postdoctoral Fellow.
2012-2015. University of Pennsylvania, Rademacher Instructor of Mathematics.

GRANTS RECEIVED

2018-2021 NSF Research Grant. *Data-Driven Methods in Classical Knot Theory*.
PI with R. Blair and A. Kjuchukova. Individual award \$122,271.
2018-2019 Jean Picker Fellowship, Smith College. Provides one course release.
2017-2022 Simons Collaboration Grant. *Topics in Low-Dimensional Topology*.
PI. \$42,000. Held for 2017-2018 only, due to NSF support.
2013-2015 AMS-Simons Travel Grant. PI. \$4,000.

PUBLICATIONS

In mathematics, authors' names are listed alphabetically.

Published Peer-Reviewed Journal Articles

- 2018 P. Cahn, H. Gluck, H. Nuchi. Germs of fibrations of spheres by great circles always extend to the whole sphere. *Algebr. Geom. Topol.* 18, no. 3, pp. 1323-1360.
- 2018 P. Cahn, F. Fanoni, and B. Petri. Mapping class group orbits of curves with self-intersections. *Israel J. Math.* 223, pp. 53-74.
- 2017 P. Cahn. A generalization of Turaev's virtual string cobracket and self-intersections of virtual strings. *Comm. Contemp. Math.* 19, no. 4, 1650053 (37 pages). Online first 2016.
- 2015 P. Cahn and A. Levi. Vassiliev invariants of virtual Legendrian knots. *Pacific J. Math.* 273, no. 1, pp. 21-46.
- 2014 P. Cahn, V. Chernov, and R. Sadykov. The number of framings of a knot in a 3-manifold. *J. Knot Theory Ramifications.* 23, 1340072 (9 pages).
- 2013 P. Cahn. A Generalization of the Turaev cobracket and the minimal self-intersection number of a curve on a surface. *New York J. Math.* 19, pp. 253-283.
- 2013 P. Cahn and V. Chernov. Intersections of loops and the Andersen-Mattes-Reshetikhin algebra. *J. London Math. Soc.* (2) 87, no. 3, pp. 785-801.
- 2012 P. Cahn, R. Haas, A.G. Helminck, J. Li, and J. Schwartz. Permutation notations for the exceptional Weyl group F_4 . *Involve.* 5, no. 1, pp. 81-89.
- 2008 M. Albert, J. Bratz, P. Cahn, T. Fargus, N. Haber, E. McMahon, J. Smith, S. Tekansik. *Congr. Numer.* 190, pp. 161-171.

WORKS IN PROGRESS

Submitted Articles

- P. Cahn and A. Kjachukova. Linking numbers in three-manifolds.
- P. Cahn and V. Chernov. Knots transverse to a nowhere zero vector field.
- P. Cahn and A. Kjachukova. Singular branched covers of four-manifolds.

Articles in Preparation

- P. Cahn and B. Tosun. On the classification of knots in overtwisted contact structures.
- R. Blair, P. Cahn, and A. Kjachukova. Odd indefinite four-manifolds as three-fold branched covers of the four sphere.

CONCERTS, PERFORMANCES, AND EXHIBITIONS

N/A

SCHOLARLY LECTURES AND OTHER PROFESSIONAL PRESENTATIONS

Colloquia and Undergraduate Talks (*Invited)

- 2018 *Stranger strings.
Vassar College Mathematics Colloquium. February 27.
- 2018 *Stranger strings.
University of Alabama Pi Mu Epsilon Talk. February 19.
- 2017 *Stranger strings.
Colby College Mathematics and Statistics Colloquium. October 9.
- 2017 *Stranger strings.
Monmouth University Mathematics Colloquium. April 7.
- 2013 *Penrose tilings.
Ursinus College Mobius Talk. April 26.
- 2013 *Counting self-intersections of loops on a surface.
Haverford/Bryn Mawr Bi-College Colloquium. January 28.
- 2010 *Counting self-intersections of loops on a surface.
St. Michael's College Colloquium. November 5.
- 2010 *Counting self-intersections of loops on a surface.
Smith College Dept. of Mathematics and Statistics Lunch Talk Series. September 14.
- 2010 *Counting self-intersections of loops on surfaces.
Edge Summer Program, North Carolina State University. June 28.

Internal Talks at Smith College

- 2016 Stranger strings.
Smith College Dept. of Mathematics and Statistics Lunch Talk Series. September 29.

Research Presentations (*Invited, **Plenary)

- 2018 Colored tri-plane diagrams and branched covers of the 4-sphere.
Knots in Washington. George Washington University. May 5.
- 2018 *Ribbon obstructions and colored tri-plane diagrams.
AMS Special Session on Algebraic and Combinatorial Structures in Knot Theory. Portland State University. April 15.
- 2018 *Colored tri-plane diagrams and the Slice-Ribbon Problem.
Wesleyan University Topology Seminar. April 11.
- 2018 *Deformation and extension of fibrations of spheres by great circles.
AMS Special Session on Symmetry in Differential Geometry. Ohio State University. March 17.
- 2018 *Ribbon obstructions and dihedral branched covers of 4-manifolds.

- AMS Special Session on Algebraic, Combinatorial, and Quantum Invariants of Knots and Manifolds.* Ohio State University. March 17.
- 2018 *Colored tri-plane diagrams and the Slice-Ribbon Problem.
University of Alabama Algebra and Topology Seminar. February 19.
- 2017 *Trisected surfaces and singular branched covers of 4-manifolds.
University of Massachusetts Geometry/Topology Seminar. December 15.
- 2017 Ribbon obstructions and singular branched covers of 4-manifolds.
Knots in Washington. George Washington University. December 9.
- 2017 *Signatures of branched covers of the 4-sphere via linking numbers in 3-manifolds.
Swiss Knots. University of Bern, Switzerland. June 7.
- 2017 *Linking numbers and dihedral branched covers of 3- and 4-manifolds.
Dartmouth College Geometry/Topology Seminar. May 16.
- 2017 *Computing the signature of a dihedral cover of a 4-manifold with singular branching set.
AMS Special Session on Invariants of Knots, Links, and 3-Manifolds. Hunter College. May 7.
- 2017 **Irregular dihedral covers of the 4-sphere and linking numbers in 3-manifolds.
Knots in Washington. George Washington University. April 29.
- 2017 *Signatures of 4-manifolds via linking numbers of knots in dihedral covers of S^3 .
AMS Special Session on Combinatorial and Algebraic Structures in Knot Theory. Washington State University. April 23.
- 2016 Linking numbers in 3-manifolds.
Knots in Washington. George Washington University. December 10.
- 2016 *Computing linking numbers of curves in dihedral branched covers.
AMS Special Session on Algebraic Structures Motivated by and Applied to Knot Theory. North Carolina State University. November 13.
- 2016 Linking numbers of pseudo-branch curves in irregular dihedral covers.
AMS Special Session on the Topology of 3- and 4-Manifolds. University of St. Thomas. October 30.
- 2016 *Knots transverse to a vector field and loose Legendrian knots.
University of Massachusetts Geometry/Topology Seminar. September 23.
- 2016 *V-transverse and pseudo-Legendrian knots.
Advances in Quantum and Low-Dimensional Topology. University of Iowa. March 13.
- 2016 *Knots transverse to a vector field.
University of Wisconsin Madison Geometry/Topology Seminar. March 10.
- 2016 *Knots transverse to a vector field and the classification of Legendrian knots.
AMS Special Session on Algebraic Structures in Knot Theory. University of Georgia. March 6.
- 2016 *Knots transverse to a vector field.
University of Warwick Geometry/Topology Seminar. February 4.
- 2016 *Knots transverse to a vector field.
Max Planck Institute Differential Geometry Short Talks Seminar. January 26.
- 2016 *Deformation and extension of fibrations of spheres by great circles.
AMS Special Session on Knots in Washington. Joint Math Meetings, Seattle, WA. January 8.
- 2015 *Deformation and extension of fibrations of spheres by great circles.

- Max Planck Institute Differential Geometry Oberseminar.* November 19.
- 2015 *Deformation and extension of fibrations of spheres by great circles.
Max Planck Institute Oberseminar. September 17.
- 2015 *Knot theory transverse to a vector field.
Dartmouth Geometry/Topology Seminar. May 27.
- 2015 *Knots transverse to a vector field.
Philadelphia Area Contact Topology Seminar. Three talks: March 3, April 7, April 21.
- 2015 *Knots transverse to a vector field.
AMS Special Session on Algebraic Structures in Knot Theory. University of Nevada, Las Vegas. April 18.
- 2015 *Knots transverse to a vector field.
Syracuse University Geometry/Topology Seminar. April 9.
- 2015 *Knots transverse to a vector field.
Temple University Geometry/Topology Seminar. April 7.
- 2015 *Knots transverse to a vector field.
North Carolina State University Geometry/Topology Seminar. March 30.
- 2015 Knots transverse to a vector field.
Knots in Washington. George Washington University. March 11.
- 2015 *Knots transverse to a vector field.
AMS Special Session on Geometric Structures on Low-dimensional Manifolds and their Invariants. Georgetown University. March 7.
- 2015 The classification of V-transverse knots and loose Legendrians.
AMS Session on Topology and Manifolds. Joint Math Meetings. San Antonio, TX. January 11.
- 2014 *The classification of V-transverse knots and loose Legendrians.
AMS Special Session on Algebraic Structures Motivated by Knot Theory. UNC–Greensboro. November 9.
- 2014 *Algebras counting intersections and self-intersections of loops on a surface.
Max Planck Institute Oberseminar. February 20.
- 2014 *Intersections and self-intersections of arcs and curves on surfaces.
Max Planck Institute Geometry/Topology Seminar. January 6.
- 2013 *Vassiliev invariants of virtual Legendrian knots.
Georgia Tech Geometry/Topology Seminar. November 25.
- 2013 *Vassiliev invariants of virtual Legendrian knots.
AMS Special Session on Algebraic and Combinatorial Invariants of Knots. Washington University. October 18.
- 2013 *Finite type invariants of virtual Legendrian knots.
AMS Special Session on Geometric Topology of Knots and 3-Manifolds. Temple University. October 13.
- 2013 *Counting crossings of curves on surfaces.
Pennsylvania Area Contact Topology Seminar. Four talks: March 19–April 16.
- 2013 *Intersections of loops and the Andersen-Mattes-Reshetikhin Algebra.
Dartmouth College Geometry/Topology Seminar. April 8.
- 2013 Algebras counting intersections and self-intersections of loops.
Special Session on Geometric Topology of Knots and 3-Manifolds. Spring Topology and

- Dynamics Conference, Central Connecticut State University. March 24.
- 2013 *Algebras counting intersections and self-intersections of loops on a surface.
Rutgers Geometry/Topology Seminar. March 12.
- 2012 *Algebras counting intersections and self-intersections of curves.
Temple University Geometry/Topology Seminar. October 9.
- 2012 *Vassiliev invariants of virtual Legendrian knots.
Penn Geometry/Topology Seminar. April 5.
- 2012 *Vassiliev invariants of virtual Legendrian knots.
AMS Special Session on Invariants of Knots. University of Kansas. March 31.
- 2012 Algebras counting minimal intersection and self-intersection numbers.
AMS Session on Manifolds, Cell Complexes, and Global Analysis. Joint Mathematics Meetings, Boston, MA. January 5.
- 2011 The Andersen-Mattes-Reshetikhin bracket counts intersections.
Knots in Washington. George Washington University. December 3.
- 2011 *Algebras counting minimal intersection and self-intersection numbers.
Brown Geometry/Topology Seminar. October 26.
- 2011 *Algebras counting minimal intersection and self-intersection numbers.
AMS Session on Algebraic and Geometric Topology. Cornell University. September 11.
- 2011 *Counting self-intersections of loops on a surface.
Stony Brook University Topology Workshop. August 24.
- 2011 *A generalization of the Turaev cobracket and the minimal self-intersection number for curves and virtual strings.
Moscow State University Seminar on Knots and Representation Theory. (Skype.) April 19.
- 2011 A generalization of the Turaev cobracket and the minimal self-intersection number.
AMS Special Session on Knot Theory. Joint Mathematics Meetings, New Orleans, LA. January 9.
- 2010 A generalization of Turaev's cobracket and the minimal self-intersection number of a virtual string.
Knots in Washington. George Washington University. December 3.
- 2010 *A generalization of the Turaev cobracket for the Andersen-Mattes-Reshetikhin algebra.
Distinguished Graduate Student Talk, Knots in Washington. George Washington University. May 21.
- 2010 A generalization of the Turaev cobracket and the minimal self-intersection number of a curve on a surface.
AMS Special Session on Quantum Invariants of 3-Manifolds and Modular Categories. Macalester College. April 11.
- 2010 A generalization of the Turaev cobracket and the minimal self-intersection number of a curve on a surface.
Knots in Washington. George Washington University. December 5.

OTHER PROFESSIONAL ACTIVITIES

Conference Organization

- 2018 Organizing committee: Women in Mathematics in New England, Smith College. September 22.
- 2017 Co-organizer: AMS Special Session on Algebraic and Combinatorial Structures in Knot Theory. UC Riverside. November 4-5.

Outreach and Teaching Activities

- 2017, 2018 Posse Summer Immersion Program Instructor, Smith College. July-August.
- 2017 MathPath Faculty. Designed and taught one-week course. Mount Holyoke College. July.
- 2013, 2015 Panelist: Program for Women in Mathematics, Institute for Advanced Study. May.
- 2013 Workshop facilitator, Philadelphia Math Teacher's Circle.
- 2013 Discussion Moderator, Post-Performance Q&A for Truth Values: One Girl's Romp Through MIT's Male Math Maze, University of Pennsylvania.
- 2013 Co-Instructor, GEMS: Girls in Engineering, Math and Science Camp.
- 2012 Teaching Assistant, Legendrian Knot Theory Course, Program for Women in Mathematics, Institute for Advanced Study. May.
- 2011 Member of Organizing Committee and Workshop Leader, Sonia Kovalevsky Math Day, Dartmouth College.
- 2011, 2010 Workshop Leader, Johns Hopkins Center for Talented Youth Family Academic Program, Dartmouth College.
- 2009 Instructor, Exploring Mathematics Camp at Dartmouth College.

Seminars on Teaching and Learning and Other Professional Development

- 2017 National Center for Faculty Development and Diversity Faculty Success Program. May-August.
- 2017 Sherrerd Center Teaching and Learning Seminar for Junior Faculty. February-May.
- 2014-2015 Penn Structured Active In-Class Learning Seminar. September-May.
- 2011 Dartmouth College Active Learning Institute. August.
- 2009 Dartmouth Mathematics Department Teaching Course. June-July.

Refereeing

Journal of Topology, Journal of Knot Theory and its Ramifications, Involve.

Dissertation Committees

- 2018 David Freund, Dartmouth College, May 2018.

PROFESSIONAL MEMBERSHIPS

American Mathematical Society
Association for Women in Mathematics

COLLEGE OR DEPARTMENT COMMITTEE AND OTHER COLLEGE SERVICE

Advising

2017– Liberal arts, major, minor and postbacc advisor.

Special studies supervised

2018 Algebraic topology (Spring semester, 3 students)

2017 Point-set and algebraic topology (Fall semester, 6 Students)

2017 Homology theory (Spring semester, 1 student)

2016 Algebraic topology (Fall semester, 1 student)

Undergraduate research supervised

2018 MTH 301 Project. Linking in dihedral covers. (Fall semester, 3 students)

2018 SURF Project with Mariya Germash. Linking in dihedral covers.

2018 MTH 301 Project. Linking in dihedral covers. (Spring semester, 4 students)

Service to the Department

2018-2019 Co-Director, Postbaccalaureate Program.

2018 TA coordinator (fall only).

2018 Calculus coordinator (fall only).

2018 Search committee for visiting positions.

2018 Led student trip to Hudson River Undergraduate Mathematics Conference at St. Lawrence University in Canton, NY. April 6-7.

2018 Organized Smith Mathematics and Statistics student and alumnae gathering at the Joint Mathematics Meetings in San Diego, CA.

2017, 2018 Mathematics and Statistics Department Webmaster.

2017, 2018 Postbacc admissions committee.

2016, 2017 Organizer and moderator for graduate school panel at Women in Mathematics in New England Conference, Smith College.

2017 Mathematics and Statistics Alumnae Newsletter.

2017 Organized senior dinner.

Prior Departmental Service

2014-2015 Penn Mathematics Undergraduate Committee.

2013-2015 Penn Undergraduate Math Society Faculty Liaison.

2013 Penn Mathematics Graduate Student Topology/Geometry Seminar Organizer.

2012-2014 Penn Mathematics Graduate Preliminary Exam Committee.

2012-2013 Penn Departmental Advanced Placement Exam Committee.

TEACHING RECORD

Smith College

Courses taught

MTH 212: Calculus III. (Fall 2018)
MTH 211: Linear Algebra. (Spring 2018)
MTH 370: Geometry of Curves and Surfaces. (Fall 2017)
MTH 370: Topology. (Spring 2017)
MTH 112: Calculus II. (Fall 2016; Spring 2017; Fall 2017; Spring 2018; Fall 2018)

University of Pennsylvania

Courses taught

Topics in knot theory and low-dimensional topology. (Spring 2015, graduate-level)
Point-set and algebraic topology. (Fall 2013, Fall 2014)
Ordinary differential equations. (Fall 2012)
Linear algebra and differential equations. (Fall 2014)
Second-semester calculus. (Fall 2012, Spring 2013, Fall 2014)

Dartmouth College

Courses taught

The Shape of Space: topics in topology and geometry. (Winter 2012)
Abstract algebra. (Fall 2010)
First-semester calculus with algebra. (Fall 2009)

Teaching Assistant

The Shape of Space: topics in topology and geometry. (Winter 2010)
Calculus II. (Spring 2008; Spring 2009)
Differential Equations. (Fall 2008)
Calculus I. (Fall 2007)