

Mathematics Department
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Research Interests: Low-dimensional topology, knot theory, hyperbolic geometry.

Employment

ASSISTANT PROFESSOR, Temple University, 2008–present.

RTG POSTDOCTORAL INSTRUCTOR, Michigan State University, 2005–2008.

Education

STANFORD UNIVERSITY, Stanford, CA.

Ph.D. in Mathematics, 2005. Advisor: Steven P. Kerckhoff.

Thesis: *Angled Triangulations of Link Complements*.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, PA.

B.A. in Mathematics and Philosophy, *magna cum laude*, 1999.

M.A. in Mathematics, 1999.

Selected Awards and Honors

NATIONAL SCIENCE FOUNDATION GRANT, “*Collaborative research: Hyperbolic geometry of knots and 3-manifolds,*” award DMS-1007221, 2010–2013.

PROFESSEUR INVITÉ, Université des Sciences et Technologies de Lille, France, April 2009.

GENERAL MEMBER, Mathematical Sciences Research Institute, August–December 2007.

VISITING FELLOW, Osaka University, Japan, January–February 2006.

CENTENNIAL TEACHING AWARD, Stanford University School of Humanities and Sciences, 2005.

OUTSTANDING TA AWARD, Stanford University Mathematics Department, 2004.

UNDERGRADUATE RESEARCH PRIZE, University of Pennsylvania Mathematics Department, 1998 and 1999.

Publications

1. D. Futer, A. Gnepp, D. McMath, B. Munson, T. Ng, S-H Pakh, C. Yoder. “*Cost-minimizing networks among immiscible fluids in \mathbb{R}^2 .*” *Pacific Journal of Mathematics* **196** (2000), 395–414.
2. D. Futer, “*Involutions of knots that fix unknotting tunnels.*” *Journal of Knot Theory and its Ramifications* **16** (2007), No. 6, 741–748. arXiv:math/0401421.
3. D. Futer and J. Purcell, “*Links with no exceptional surgeries.*” *Commentarii Mathematici Helvetici* **82** (2007), No. 3, 629–664. arXiv:math/0412307.

4. D. Futer, “*Geometric triangulations of two-bridge link complements.*” Appendix to an article by F. Guéritaud. *Geometry & Topology* **10** (2006), 1267–1282, arXiv:math/0406242.
5. D. Futer, E. Kalfagianni, and J. Purcell, “*Dehn filling, volume, and the Jones polynomial.*” *Journal of Differential Geometry* **78** (2008), 429–464. arXiv:math/0612138.
6. D. Futer and F. Guéritaud, “*Angled decompositions of arborescent link complements.*” *Proceedings of the London Mathematical Society* **98** (2009), Issue 2, 325–364. arXiv:math/0610775.
7. O. Dasbach, D. Futer, E. Kalfagianni, X-S Lin, N. Stoltzfus, “*The Jones polynomial and graphs on surfaces.*” *Journal of Combinatorial Theory, Series B* **98** (2008), Issue 2, 384–399. arXiv:math/0605571.
8. O. Dasbach, D. Futer, E. Kalfagianni, X-S Lin, N. Stoltzfus, “*Alternating sum formulae for the determinant and other link invariants.*” *Journal of Knot Theory and its Ramifications*, **19** (2010), Issue 6, 765–782. arXiv:math/0611025.
9. D. Futer, E. Kalfagianni, and J. Purcell, “*Symmetric links and Conway sums: volume and Jones polynomial.*” *Mathematical Research Letters* **16** (2009), Issue 2, 233–253. arXiv:0804.1542.
10. D. Futer, E. Kalfagianni, and J. Purcell, “*Cusp areas of Farey manifolds and applications to knot theory.*” *International Mathematics Research Notices* 2010, 4434–4497. arXiv:0808.2716.
11. D. Futer, M. Ishikawa, Y. Kabaya, T. Mattman, and K. Shimokawa. “*Finite surgeries on three-tangle pretzel knots.*” *Algebraic & Geometric Topology* **9** (2009), 743–771. arXiv:0809.4278.
12. D. Futer, E. Kalfagianni, and J. Purcell, “*On diagrammatic bounds of knot volumes and spectral invariants.*” *Geometriae Dedicata* **147** (2010), 115–130. arXiv:0901.0119.
13. D. Futer, E. Kalfagianni, and J. Purcell, “*Slopes and colored Jones polynomials of adequate knots.*” *Proceedings of the AMS* **139** (2011), Issue 5, 1889–1896. arXiv:1002.0256.
14. D. Futer and F. Guéritaud, “*From angled triangulations to hyperbolic structures.*” *Contemporary Mathematics* **541** (2011), 159–182. arXiv:1004.0440.
15. A. Champanerkar, D. Futer, I. Kofman, W. Neumann, and J. Purcell, “*Volume bounds for generalized twisted torus links.*” *Mathematical Research Letters*, to appear. arXiv:1007.2932
16. D. Futer and A. Thomas, “*Surface quotients of hyperbolic buildings.*” *International Mathematics Research Notices*, to appear. arXiv:1007.5140
17. D. Futer and F. Guéritaud, “*Explicit angle structures for veering triangulations.*” Submitted. arXiv:1012.5134.
18. D. Cooper, D. Futer, and J. Purcell, “*Dehn filling and the geometry of unknotting tunnels.*” Submitted. arXiv:1105.3461.
19. D. Futer, E. Kalfagianni, and J. Purcell, “*Guts of surfaces and the colored Jones polynomial.*” Submitted. arXiv:1108.3370.
20. D. Futer and S. Schleimer, “*Cusp geometry of fibered 3-manifolds.*” Submitted. arXiv:1108.5748.
21. D. Futer, E. Kalfagianni, and J. Purcell, “*Jones polynomials, volume, and essential knot surfaces: a survey.*” Submitted. arXiv:1110.6388.

Recent Invited Talks

DEPARTMENTAL COLLOQUIA:

- 2007-08: Oberlin, Gettysburg, Florida State U, Temple U, UC Santa Cruz, U Connecticut.
- 2008-09: Haverford College, Washington U. St. Louis.
- 2010-11: Penn State, Alabama.
- 2011-12: The College of New Jersey, BYU.

GEOMETRY/TOPOLOGY SEMINARS:

- 2007-08: MSRI, UC Davis, Columbia, Michigan State, Pomona College.
- 2008-09: Columbia, Penn, Yale, Temple, Bryn Mawr, BYU, Rutgers, CUNY, Lille, Lafayette.
- 2009-10: Temple, Maryland, Princeton, Stanford, Utah, BYU, Rutgers, Michigan State.
- 2010-11: Tufts, Warwick, Penn State, CUNY, Yale, BYU, Rutgers.
- 2011-12: Virginia, Temple, Brown, Boston College, Princeton.

CONFERENCE TALKS:

- 2006: Hiroshima Topology Conference, Hiroshima, Japan.
- 2006: Around the Volume Conjecture, New York, NY.
- 2006: Hyperbolic Geometry Workshop, Fields Institute, Toronto, Canada.
- 2006: Park City Math Institute summer program, Park City, UT.
- 2007: AMS National Meetings, New Orleans, LA.
- 2007: A Second Time Around the Volume Conjecture, Baton Rouge, LA.
- 2007: Geometric Topology Conference, Beijing, China.
- 2007: International Conference on Geometric Topology, Hangzhou, China.
- 2007: AIM Workshop on Triangulations, Heegaard Splittings & Hyperbolic Geometry.
- 2008: AMS Western Section Meeting, Claremont, CA.
- 2008: One-Day Conference on 3-Manifolds, Hangzhou, China.
- 2009: Spring Topology & Dynamics Conference, Gainesville, FL.
- 2009: Moab Topology Conference, Moab, UT.
- 2009: Hyperbolic Geometry, Quantum Topology and Number Theory, New York, NY.
- 2010: AMS National Meetings, San Francisco, CA.
- 2010: AMS Eastern Section Meeting, Newark, NJ.
- 2010: Topology and Geometry in Dimension Three, Stillwater, OK.
- 2011: FRG Workshop on Low Dimensional Topology and Geometry, Princeton, NJ.
- 2011: Ninth Annual Graduate Topology and Geometry Conference, East Lansing, MI.
- 2011: AMS Eastern Section Meeting, Worcester, MA.

MINI-COURSES:

- 2006: *“Angle structures and hyperbolic structures.”* Series of 8 lectures (joint with François Guéritaud) at Osaka U.
- 2007: *“Angled triangulations and hyperbolic geometry.”* Series of 4 lectures, Center for Mathematical Sciences, Hangzhou.
- 2008: *“Introduction to Geometrization.”* Series of 4 lectures, Center for Mathematical Sciences, Hangzhou.
- 2009: *“Introduction to hyperbolic knots.”* Series of 3 lectures. Interactions Between Hyperbolic Geometry, Quantum Topology and Number Theory, Columbia U.

Teaching and Mentoring Experience

SEMINAR LEADER. Presented conceptual review and moderated biweekly problem sessions for graduate students studying for their qualifying exams in complex analysis.

- *Complex analysis*, Stanford University, 2001–2003.

INSTRUCTOR. Lectured for 3–4 hours weekly, designed syllabus and exams. Coordinated special learning accommodations for a blind student and a deaf student.

Lower-level undergraduate courses:

- *Differential calculus*, Michigan State University, 2005; Temple University, 2011.
- *Integral calculus*, Michigan State University, 2008.
- *Multivariable calculus*, Temple University, 2008.
- *Linear algebra*, Stanford University, 2005.

Upper-level undergraduate courses:

- *Real analysis*, Michigan State University, 2006.
- *Metric spaces and topological spaces*, Michigan State University, 2006.
- *Differential geometry*, Temple University, 2010.

Graduate courses:

- *Introductory topology*, Temple University, 2009.
- *Algebraic topology*, Michigan State University, 2007; Temple University, 2011.
- *Smooth manifolds*, Temple University, 2010.
- *Mapping class groups*, Temple University, 2011.

INDEPENDENT STUDY SUPERVISOR. Guided reading projects for several groups of undergraduate and graduate students.

- *Real analysis*, Michigan State University, 2006.
- *Point-set topology*, Michigan State University, 2007.
- *Point-set and algebraic topology*, Temple University, 2010.
- *Hyperbolic 3-manifolds*, Michigan State University, 2008; Temple University, 2011.

GRADUATE ADVISOR. Supervised reading project and transition to research toward a Ph.D.

- Christian Millichap (B.A. 2008, Dickinson College), 2010–present.

POSTDOCTORAL MENTOR. Supervised the research of two postdoctoral fellows.

- Christopher Atkinson (Ph.D. 2009, University of Illinois at Chicago), at Temple 2009–2012.
- Kei Nakamura (Ph.D. 2008, University of California at Davis), at Temple 2009–2012.

Service Activities

TEACHING LIAISON AND CONSULTANT: Stanford University, 2002 – 2005.

- Led a training session at the University-wide TA orientation.
- Provided feedback to instructors using videotapes of their lectures.
- Organized lunch seminars to discuss teaching techniques and learning styles.

SEMINAR ORGANIZER:

- Hyperbolic geometry seminar, Park City Math Institute, 2006.
- Joint postdoctoral seminar, Mathematical Sciences Research Institute, 2007.
- Departmental colloquium, Temple University, 2008–11.
- Geometry–Topology seminar, Temple University, 2008–12.
- PATCH seminar (monthly joint seminar with Bryn Mawr, Haverford, and Penn), 2009–12.

CONFERENCE ORGANIZER:

- *From the longest increasing subsequence to instanton counting*, Emil Grosswald distinguished lecture series, given by Andrei Okounkov. Temple University, April 2010.
- *Hyperbolicity in manifolds and groups*, special session at AMS–MAA Joint Meetings. Boston, MA, January 2012. Joint with Genevieve Walsh.
- *Rigidity and flexibility in dimension 2, 3, and 4*, in honor of Steve Kerckhoff's 60th. Centre International de Rencontres Mathématiques, Luminy, France, May 2012. Joint with Ken Bromberg, Dick Canary, François Labourie, Jessica Purcell, Jean-Marc Schlenker, Michael Wolf.

COMMITTEE SERVICE: Temple University, 2008 – present.

- Chair's advisory committee, 2008–10.
- Graduate committee, 2008–12.
- Colloquium organizing committee, 2008–11.
- Calculus committee, 2009–10.

REFEREE:

- Algebraic & Geometric Topology.
- Annals of Combinatorics.
- Commentarii Mathematici Helvetici.
- Communications in Analysis and Geometry.
- Contemporary Mathematics.
- Duke Mathematics Journal.
- Geometry & Topology.
- Journal of Differential Geometry.
- Journal of the Australian Mathematical Society.
- Pacific Journal of Mathematics.
- Proceedings of the American Mathematical Society.
- Transactions of the American Mathematical Society.