

# Jessica S. Purcell

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## Employment

**Assistant Professor**, Brigham Young University, Provo, Utah. June 2007 to present.

**Postdoctoral Researcher**, University of Oxford Mathematical Institute, Oxford, England.  
Fall 2007 to Fall 2008.

**Instructor**, University of Texas at Austin, Austin, Texas. Fall 2006 to Spring 2007.

**VIGRE Postdoctoral Instructor**, University of Texas at Austin, Austin, Texas. Fall 2004  
to Summer 2006.

## Education

**Ph.D. in Mathematics**, Stanford University, Stanford, California, June 2004.  
Dissertation: *Cusp shapes of hyperbolic link complements and Dehn filling*.  
Advisor: Steven Kerckhoff.

**M.S. in Mathematics**, University of Michigan, Ann Arbor, Michigan, May 1999.

**B.A. in Mathematics**, University of Utah, Salt Lake City, Utah, June 1998.  
*Summa cum laude*, minor in computer science.

## Publications

(with D. Futer) *Links with no exceptional surgeries*, *Commentarii Mathematici Helvetici*, Vol. 82 (2007), no. 3, pp. 629–664. [ArXiv:math.GT/0412307](https://arxiv.org/abs/math/0412307)

*Volumes of highly twisted knots and links*, *Algebraic and Geometric Topology*, Vol. 7 (2007), pp. 93–108. [ArXiv:math.GT/0604476](https://arxiv.org/abs/math/0604476)

(with D. Futer and E. Kalfagianni) *Dehn filling, volume, and the Jones polynomial*, *Journal of Differential Geometry*, Vol. 78 (2008), no. 3, pp. 429–464. [ArXiv:math.GT/0612138](https://arxiv.org/abs/math/0612138)

*Slope lengths and generalized augmented links*, *Communications in Analysis and Geometry*, Vol. 16 (2008), no. 4, pp. 883–905. [ArXiv:math/0703638](https://arxiv.org/abs/math/0703638)

*Cusp shapes under cone deformation*, *Journal of Differential Geometry*, Vol. 80 (2008), no. 3, pp. 453–500. [ArXiv:math.GT/0410233](https://arxiv.org/abs/math/0410233)

(with D. Futer and E. Kalfagianni) *Symmetric links and Conway sums: volume and Jones polynomial*, Mathematical Research Letters, Vol. 16 (2009), no. 2, pp. 233–253. ArXiv:0804.1542

(with D. Cooper and M. Lackenby) *The length of unknotting tunnels*, Algebraic and Geometric Topology, Vol. 10 (2010), pp. 637–661. ArXiv:0812.0858

*Hyperbolic geometry of multiply twisted knots*, Communications in Analysis and Geometry, Vol. 18 (2010), no. 1, pp. 101–120. ArXiv:0709.2919

(with D. Futer and E. Kalfagianni) *On diagrammatic bounds of knot volumes and spectral invariants*, Geometriae Dedicata, Vol. 147 (2010), no. 1, pp. 115–130. ArXiv:0901.0119

*On multiply twisted knots that are Seifert fibered or toroidal*, Communications in Analysis and Geometry, Vol. 18 (2010), no. 2, pp. 219–256. ArXiv:0906.4575

(with D. Futer and E. Kalfagianni) *Cusp areas of Farey manifolds and applications to knot theory*, International Mathematics Research Notices, Vol. 2010 (2010), no. 23, pp. 4434–4497. ArXiv:0808.2716

(with Juan Souto) *Geometric limits of knot complements*, Journal of Topology, Vol. 3 (2010), no. 4, pp. 759–785. ArXiv:0902.1662

(with D. Futer and E. Kalfagianni) *Slopes and colored Jones polynomials of adequate links*, Proceedings of the American Mathematical Society, Vol. 139 (2011), no. 5, pp. 1889–1896. ArXiv:1002.0256

*An introduction to fully augmented links*, Intersections between hyperbolic geometry, quantum topology, and number theory, Contemporary Mathematics, Vol. 541 (2011), pp. 205–220.

(with A. Champanerkar, D. Futer, I. Kofman, and W. Neumann) *Volume bounds for generalized twisted torus links*, submitted 2010. ArXiv:1007.2932.

## Selected Awards

**Sloan Research Fellow**, from the Alfred P. Sloan Foundation, 2011.

**Distinguished scholarship award**, Brigham Young University mathematics department, 2010.

**NSF Research Grant (PI)**, Collaborative research: Hyperbolic geometry of knots and 3-manifolds (with David Futer), award DMS-1007437, 2010 to 2013.

**NSF Conference Grant (PI)**, Moab Topology Conference; Moab, UT; May 2009.

**NSF Research Grant (PI)**, Geometry and Topology of Knots and Links, award DMS-0704359, 2007 to 2010.

**Centennial Teaching Award**, Stanford University, 2003.

**ARCS Foundation Graduate Fellowship**, 2002 to 2003.

**NSF Graduate Fellowship**, 1998 to 2001.

**Alice Schafer Prize**, from the Association for Women in Mathematics, 1998.

**Barry Goldwater Scholarship**, 1997 to 1998.

**Phi Beta Kappa**, 1997.

## Academic Presentations

### *Invited seminar and colloquium talks*

Santa Clara University, mathematics colloquium. May 2010.

California State University Channel Islands, mathematics colloquium. April 2010.

Joint Temple, Bryn Mawr, Haverford topology seminar. November 2009.

University of Michigan, Ann Arbor, topology seminar. March 2009.

Michigan State University, topology seminar. March 2009.

Brigham Young University, colloquium and topology seminar. October 2008.

Warwick University, topology seminar. March 2008.

University of Oxford, topology seminar. January 2008.

University of Liverpool, colloquium. November 2007.

Columbia University, topology seminar. May 2007.

Rice University, topology seminar. April 2007.

California State University Channel Islands, mathematics colloquium. March 2007.

Vassar College, mathematics colloquium. February 2007.

University of Oklahoma, colloquium. February 2007.

Brigham Young University, topology seminar and colloquium. January 2007.

University of Texas at Austin, topology seminar. December 2006.

Michigan State University, topology seminar. October 2006.

Stanford University, topology seminar. May 2006.

University of Texas at Austin, topology seminar. February 2005.

University of California, Berkeley topology seminar. March 2004.

University of Texas at Austin, topology seminar. February 2004.

University of Utah, topology seminar. January 2004.

Stanford University, topology seminar. January 2004.

*Recent invited conference and workshop talks*

Geometric topology of knots, Centro di Ricerca Matematica Ennio De Giorgi, Pisa, Italy, May 2011.

Topology and Computers 2010, two talks. Tokyo Institute of Technology, Tokyo, Japan, September 2010.

Topology and Geometry in Dimension Three: Triangulations, Invariants, and Geometric Structures. A conference in honor of William Jaco. Oklahoma State University. June 2010.

Special session on geometric aspects of link and 3-manifold invariants, Joint Mathematics Meetings, San Francisco, California. January 2010.

Geometry and dynamics in surfaces and 3-manifolds, Park City, Utah. August 2009.

Interactions between hyperbolic geometry, quantum topology, and number theory conference, Columbia University, New York. June 2009.

Interactions between hyperbolic geometry, quantum topology, and number theory workshop (three invited workshop talks), Columbia University, New York. June 2009.

Oberwolfach workshop in topology, Oberwolfach, Germany. September 2008.

Workshop in Geometric Topology, Park City, Utah. June 2008.

Wasatch Topology Conference, University of Utah, Salt Lake City, Utah. August 2007.

Workshop on 3-manifold geometry and topology, Warwick Mathematics Institute, University of Warwick, Coventry, England. July 2007.

A second time around the volume conjecture, Louisiana State University, Baton Rouge, Louisiana. June 2007.

Cascade Topology Seminar, Portland State University, Portland, Oregon. October 2006.

Workshop on the deformation theory of hyperbolic 3-manifolds, Ahlfors-Bers Colloquium, University of Michigan, Ann Arbor, Michigan. May 2005.

Special session on low-dimensional topology and Kleinian groups, AMS sectional meeting, Northwestern University, Evanston, Illinois. October 2004.

Special session on the geometry of hyperbolic manifolds, AMS sectional meeting, Vanderbilt University, Nashville, Tennessee. October 2004.

Georgia Topology Conference, University of Georgia, Athens, Georgia. August 2004.

*Invited Presentations for Undergraduates and General Audiences*

*Geometry out of the Paper: An Introduction to Manifolds*, Saturday Morning Math Group, University of Texas at Austin. September 2006.

*Geometry and 3-manifolds*, presentation for BYU's Research Experience for Undergraduates, Provo, Utah. July 2007.

*Mathematics: geometry and higher dimensions*, Expanding Your Horizons, for junior high and high school girls, Utah Valley University. March 2010.

*What is hyperbolic geometry?*, presentation for undergraduate students, Center for Undergraduate Research in Mathematics, Spring Research Conference, Provo, Utah. March 2010.

*Hyperbolic geometry and knot theory*, invited guest speaker, Utah Valley University knot theory course, Orem, Utah. April 2010.

*Hyperbolic geometry*, presentation for BYU's Research Experience for Undergraduates, Provo, Utah. July 2010.

*An introduction to hyperbolic geometry*, presentation to high school seniors. November 2010.

*Hyperbolic geometry*, presentation to mathematics majors, Provo, Utah. December 2010.

*Mathematics: geometry and higher dimensions*, Expanding Your Horizons, for junior high and high school girls, Utah Valley University. March 2011.

## Teaching

*Courses Taught***Assistant Professor, Brigham Young University**

Differential calculus (Winter 2011, Fall 2010, Fall 2009, Winter 2009, Fall 2008).

Algebraic topology, graduate level (Winter 2009, Winter 2011).

Hyperbolic knot theory, graduate level (Winter 2010).

Differential topology, graduate level (Fall 2010).

**Instructor, University of Texas at Austin**

Single variable differential calculus (Fall 2006, Fall 2005).

Multivariable calculus (Spring 2005).

Linear algebra (Spring 2007).

Probability (Fall 2004).

Discrete math (Fall 2006, Spring 2006).

Hyperbolic geometry, graduate level (Spring 2007).

**Graduate Student Instructor, Stanford University**

Single variable differential calculus (Winter 2004, Summer 2002).

**Teaching Assistant, Stanford University**

Multivariable calculus (Fall 2003, Fall 2002, Fall 2001).

*Mentoring Undergraduate Research*

Visiting participant, Center for Undergraduate Research in Mathematics, Heber, Utah, August 2009.

Mentor for undergraduate research projects:

Project: *Hyperbolic geometry of chain links*. Two students, 2009–2011.

Progress: Students presented work at spring research conference, March 2010, BYU.

Won “best in section” presentation award.

Students invited to present poster at Young Mathematicians Conference, August 2010.

Students presented work at student research conference, March 2011, BYU. Won “best in section” presentation award.

Joint publication in preparation.

Project: *Triangulations and augmented links*. One student, 2010–2011.

Progress: Student presented work at student research conference, March 2011, BYU.

## Service

**Co-organizer**, Moab topology conference, Moab, Utah, May 2009.

**Co-organizer of teaching seminars**, Brigham Young University, 2008 to 2011.

**Co-organizer of topology seminars**, Brigham Young University, September 2008 to present.

**Brigham Young University Committees:**

Member, teaching committee, 2008–2010.

Advisor, undergraduate mathematics majors, 2008–2010.

Thesis committee member, Masters students (winter 2009, summer 2009).

Dissertation committee member, PhD students (winter 2010, summer 2010).

**Referee.** *Geometry and Topology Monographs, Geometriae Dedicata, Communications in Analysis and Geometry*

**Reviewer.** Math Reviews.

**Teaching Consultant, Teaching Liason**, Stanford Center for Teaching and Learning, 2002 to 2004.

Facilitated small-group teaching evaluations and practice teaching sessions for graduate students from all departments, held two TA training sessions on office hours. Guided graduate students to teaching events and resources.

**Organizer**, Teaching lunch seminars, Stanford mathematics department, 2002 to 2003.