

Department of Mathematics  
University of Arizona  
617 N Santa Rita  
P.O. Box 210089  
Tucson, AZ 85721  
phone: (520) 621-2463

fax: (520) 621-8322  
email: [glickenstein@math.arizona.edu](mailto:glickenstein@math.arizona.edu)  
webpage: <http://math.arizona.edu/~glickenstein>

## RESEARCH INTERESTS

Discrete differential geometry, curvature and geometry on simplicial complexes, discrete curvature flows, Ricci flow on Riemannian manifolds, geometric partial differential equations, convergence and compactness theorems in Riemannian geometry, Delaunay triangulations and generalizations, applications of differential geometry.

## DISSERTATION

Dissertation Title: *Precompactness of solutions to the Ricci flow and a maximum principle for combinatorial Yamabe flow*  
Advisor: Prof. Bennett Chow

## EDUCATION

- Ph.D. Mathematics, June 2003  
University of California, San Diego
- M.A. Mathematics, December 1999  
University of California, San Diego
- B.A. Mathematics (*Cum Laude*) and Computer Science, May 1997  
Cornell University

## POSITIONS

- University of Arizona, Associate Professor with Tenure, August 2009 - Present
- University of Arizona, Tenure Track Assistant Professor, August 2003 - August 2009
- Massachusetts Institute of Technology, C.L.E. Moore Instructor, September 2003 - May 2005 (on leave 2003-2004)

## RESEARCH PUBLICATIONS

- *Regge's Einstein-Hilbert functional on the double tetrahedron* (with Daniel Champion and Andrea Young), *Differential Geom. Appl.* 29 (2011), 109-124, doi:10.1016/j.difgeo.2010.10.001.
- *Discrete conformal variations and scalar curvature on piecewise flat two and three dimensional manifolds*, *J. Differential Geom.* 87 (2011), 201-237.
- *Ricci flow on three-dimensional, unimodular metric Lie algebras* (with Tracy L. Payne), *Comm. Anal. Geom.* 18 (2010), no. 5, 927-962.
- *Riemannian groupoids and solitons for three-dimensional homogeneous Ricci and cross curvature flows*, *Int. Math. Res. Not. IMRN* 2008, no. 12, Art. ID rnn034, 49 pp.
- *A monotonicity property for weighted Delaunay triangulations*, *Discrete Comput. Geom.* 38 (2007), No. 4, 651-664.
- *Geometric duality and discrete Laplacians on manifolds*.  
Preprint at arXiv:math/0508188v1 [math.MG].
- *A semi-discrete linear curve shortening flow* (with Bennett Chow), *Amer. Math. Monthly* 114 (2007), No. 4, 316-328.
- *Collapsing sequences of solutions to the Ricci flow on 3-manifolds with almost nonnegative curvature* (with Bennett Chow and Peng Lu), *Math. Zeit.*, 254 (2006) 1-28.
- *A combinatorial Yamabe flow in three dimensions*, *Topology* 44 (2005), No. 4, 791-808.
- *A maximum principle for combinatorial Yamabe flow*, *Topology* 44 (2005), No. 4, 809-825.
- *Metric transformations under collapsing of Riemannian manifolds* (with Bennett Chow and Peng Lu), *Math Res Lett.* 10 (2003), No. 5-6, 737-746.
- *Precompactness of solutions to the Ricci flow in the absence of injectivity radius estimates*, *Geom. Topol.* 7 (2003), 487-510.
- *Nonlinear self-similar measures and their Fourier transforms* (with Robert Strichartz), *Indiana Univ. Math. J.* 45 (1996), no. 1, 205-220.

## SUMMARY PUBLICATIONS

- *The Ricci Flow: Techniques and Applications Part I: Geometric Aspects* (with Bennett Chow, Sun-Chin Chu, Christine Guenther, Jim Isenberg, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni), *Mathematical Surveys and Monographs*, 135. American Mathematical Society, Providence, RI, 2007.

- *The Ricci Flow: Techniques and Applications Part II: Analytic Aspects* (with Bennett Chow, Sun-Chin Chu, Christine Guenther, Jim Isenberg, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni), *Mathematical Surveys and Monographs*, 144. American Mathematical Society, Providence, RI, 2008.
- *The Ricci Flow: Techniques and Applications Part III: Geometric-Analytic Aspects* (with Bennett Chow, Sun-Chin Chu, Christine Guenther, Jim Isenberg, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni), *Mathematical Surveys and Monographs*, 163. American Mathematical Society, Providence, RI, 2010.
- *The Ricci Flow: Techniques and Applications Part IV* (with Bennett Chow, Sun-Chin Chu, Christine Guenther, Jim Isenberg, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni), *Mathematical Surveys and Monographs*, in preparation.

## GRANTS

- 2008, NSF DMS 0748283, CAREER: Discrete and Generalized Riemannian Geometry and Curvature Flows. Funds awarded: \$401,686 for 5 years.
- 2007, NSF DMS 0628812, Workshop on "Analysis on Homogeneous Spaces," with Philip Foth and Kirti Joshi, Analysis program. Funds awarded: \$19,750 for 1 year.
- 2006, University of Arizona foreign travel grant.

## CONFERENCES AND SESSIONS ORGANIZED

- Special Session on Geometric Analysis and Riemannian Geometry (co-organized with Guofang Wei and Andrea Young), AMS Fall Western Sectional Meeting, Tucson, AZ, October 27-28, 2012 (accepted).
- Special Session on Partial Differential Equations and Geometric Analysis (co-organized with Sunhi Choi and Lennie Friedlander), AMS Spring Western Section Meeting, Tucson, AZ, April 21-22, 2007.
- Conference on Analysis on Homogeneous Spaces (co-organized with Philip Foth and Kirti Joshi), March 22-25, 2007. Supported by NSF DMS 0628812.

## STUDENT CONTACT (ALL UNIVERSITY OF ARIZONA)

- Postdoctoral advisor: Andrea Young (VIGRE postdoc, 2008-2011)
- Ph.D.s directed: Jefferson Taft (Math, May 2010), Daniel Champion (Math, April 2011), Yuliya Gorlina (Math, September 2011).

- Ph.D. oral examinations supervised: Jefferson Taft (Math, December 2006), Benjamin Pittman-Polletta (Applied Math, April 2007), Daniel Champion (Math, February 2008), Yuliya Gorlina (Math, December 2008).
- Masters supervised: Benjamin Pittman-Polletta (Applied Math, April 2007), Veronica Marino (Math, May 2011)
- Doctoral dissertation committee (not advisor): Derek Habermas (Math, May 2006), Panagiota Konstantinou (Math, May 2006), Abhishek Bhattacharya (Math, November 2008), Chunmei Chen (Aerospace/Mech. Engineering, April 2009), McKenzie Lamb (Math, August 2009), Tom LaGatta (Math, May 2010), Benjamin Pittman-Polletta (Applied Math, May 2010).
- Oral examination committee (not advisor): J. Arlo Caine (Math, April 2004), Abhishek Bhattacharya (Math, December 2006), McKenzie Lamb (Math, December 2006), Chunmei Chen (AME, May 2008), John Gemmer (Applied Math, October 2009), Matt Pennypacker (Applied Math, May 2011), Patrick Waters (Math, March 2012), Jeremy Birrell (Applied Math, March 2012).
- Graduate Minor test supervision: Chunmei Chen (Aerospace/Mech. Engineering, May 2007).
- Director of Arizona Summer Program, Summer 2010, attended by 13 undergraduate students for conducting research.
- Undergraduate Research Assistants - Alex Henniges (Summer/Fall 2008, Spring/Summer/Fall 2009, Spring/Summer 2010), Tom Williams (Summer/Fall 2008), Mitch Wilson (Summer 2008), Kurtis Norwood (Spring/Summer/Fall 2009, Spring 2010), Joseph Thomas (Spring/Summer 2009), Taylor Johnson (Spring/Summer 2010), Howard Cheng (Spring/Summer 2010), Kira Kiviat (Fall 2010, Spring 2011).
- Undergraduate Teaching Assistants - Mitch Wilson (Fall 2006), Ryan Wong (Fall 2008).

#### COURSES TAUGHT

- Pre-calculus, Calculus I, Calculus II, Mathematical Analysis for Engineers, Advanced Applied Analysis, Theory of Graphs and Networks, Global Differential Geometry, Circle Packing and Discrete Conformal Mappings, Ricci flow and the Poincare Conjecture, Formal Reasoning and Writing, Geometry and Topology.

#### EARLY RESEARCH EXPERIENCE

- July 2002-June 2003, Summer 2001, **Research Assistant**, Mathematics Department, UCSD  
Differential geometry under direction of Prof. Bennett Chow.

- March -September 2000, **Research Assistant**, Mathematics Department, UCSD  
Differential geometry under direction of Prof. Richard Hamilton.
- Summer 1999, **Research Assistant**, Mathematics Department, UCSD  
Computational noncommutative algebra under direction of Prof. J. William Helton.
- Summer 1996, **Research Assistant**, Naval Undersea Warfare Center, New London, CT (now Newport, RI)  
Assistant in acoustics lab.
- Summer 1995, **Undergraduate Researcher** (REU grant), Mathematics Department, Cornell University  
Fractal geometry under direction of Prof. Robert Strichartz.

#### EARLY TEACHING EXPERIENCE

- September 2004-May 2005, **Teaching Assistant and Course Coordinator**, Mathematics Department, MIT. Taught/coordinated multivariable calculus.
- September-December 2001, **Associate in Mathematics**, Mathematics Department, UCSD.  
Instructor for Math 3C Pre-Calculus/Life Science.
- September 1997-June 2001, **Teaching Assistant**, Mathematics Department, UCSD.  
Experience with calculus and upper division mathematics courses.
- Summer 1998, **Course Program Developer**, Mathematics Department, UCSD  
Developed modules and program for Stochastic Differential Equations (Math 286) and Mathematical Computing (Math 161) through a donation from the GenCorp Foundation of Aerojet under supervision of Prof. Ruth Williams and Prof. Michael Sharpe
- August 1995-May 1997, **Math Lab Consultant**, Cornell University.  
Assisted in instructional use of computers for mathematics classes.

#### SELECTED COLLOQUIA, CONFERENCE, AND (OUT OF TOWN) SEMINAR TALKS

- University of Kansas Mathematics Colloquium. Scheduled May 2012.
- Arizona State Mathematical and Statistical Sciences Colloquium. Scheduled April 2012.

- Special Session on Geometric Evolution Equations and Related Topics, AMS Fall Western Sectional Meeting (invited): *Flows to find (approximate) Riemann mappings*. (Salt Lake City, UT, October 2011).
- Numerical Ricci Flow in Computer Science, Geometry, and Physics workshop at Applied Mathematics Perspectives 2011 (invited): *Scalar curvature on piecewise flat manifolds and other topics*. (Vancouver, CA, July 2011).
- Rocky Mountain Mathematics Consortium Summer School: *Curvature and Laplacians on polyhedral manifolds*. (Laramie, WY, June 2011).
- Undergraduate Research (REU) seminar at University of Wyoming: *Unfoldings: (locally) short paths and life on a polyhedral surface* (Laramie, WY, June 2011).
- Oregon State University Colloquium: *Discrete conformal geometry*. (Corvallis, OR, February 2011).
- Joint UC Irvine/UC San Diego Geometry Seminar: *Discrete conformal variations of piecewise flat manifolds*. (Irvine, CA, November 2010).
- Special Session on Global Geometric Analysis, AMS Fall Western Sectional Meeting (invited): *Discrete conformal variations of piecewise flat manifolds*. (Los Angeles, CA, October 2010).
- Barrett Memorial Lectures (contributed): *Conformal Variations of Regge's Einstein-Hilbert Functional*. (Townsend, TN, May 2010).
- Cornell Analysis Seminar: *Ricci flow on 3D metric Lie algebras*. (Ithaca, NY, December 2009).
- Rutgers Geometry and Topology Seminar: *Discrete conformal variations and discrete scalar curvatures*. (New Brunswick, NJ, December 2009).
- University of Arizona Mathematics Colloquium: *Curvature functionals and canonical metrics in smooth and discrete Riemannian structures*. (Tucson, AZ, November 2009).
- Special Session on Global Analysis on Homogeneous Spaces, AMS Fall Central Section Meeting (invited): *Riemannian groupoids, homogeneous spaces, and Ricci flow*. (Waco, TX, October 2009).
- Geometric Flows in Mathematics and Theoretical Physics (invited and supported): *Discrete conformal variations and discrete scalar curvatures*. (Pisa, Italy, June 2009).
- Symposia on Analysis of Geometric Evolution (invited and supported): *Ricci flow on 3D Lie groups*. (Austin, TX, May 2009).

- Pacific Northwest Geometry Seminar (invited and supported): *Ricci flow on 3D Lie groups and their quotients*. (Corvallis, OR, October 2008).
- Workshop on Ricci Flow and Related Topics at the Institut Henri Poincaré (invited and supported): *Geometric flows on homogeneous spaces from a Riemannian groupoid perspective*. (Paris, France, June 2008).
- Idaho State University Mathematics Colloquium: *Ricci flow: applications and long term solutions*. (Pocatello, ID, April 2008).
- UC San Diego Differential Geometry Seminar: *Weighted Delaunay triangulations and discrete Laplacians*. (La Jolla, CA, May 2006).
- Workshop on Discrete Differential Geometry at Mathematisches Forschungsinstitut Oberwolfach (invited and supported): *Discrete curvature flows and Laplacians*. (Oberwolfach, Germany, March 2006).
- Workshop on Geometric Analysis and Flows (invited and supported): *Combinatorial Yamabe flow*. (La Jolla, CA, June 2005).
- Princeton Differential Geometry Seminar: *Combinatorial Yamabe flow*. (Princeton, NJ, April 2005).
- UC San Diego Differential Geometry Seminar: *Combinatorial Yamabe flow*. (La Jolla, CA, April 2005).
- U of Texas Differential Geometry Seminar: *Combinatorial Yamabe flow*. (Austin, TX, March 2005).
- MIT Differential Geometry Seminar: *Ricci flow and collapsing manifolds*. (Cambridge, MA, November 2004).
- Colorado State Algebra Seminar: *Combinatorial Yamabe flow: between geometric analysis and graph theory*. (Fort Collins, CO, September 2004).
- U of Colorado Kempner Colloquium: *Ricci flow, geometrization, and beyond*. (Boulder, CO, August 2004).
- Universita di Pavia, Physics Department (invited): *Ricci flow and Thurston's Program; Compactness of solutions to the Ricci flow, collapse, and Gromov-Hausdorff distance; Combinatorial Ricci-Yamabe flow in 2 and 3D PL manifolds* (3 supported talks). (Pavia, Italy, May 2004).
- AMS/MAA Joint meetings (invited): *Combinatorial curvature flow methods and PDE*. (Phoenix, AZ, January 2004).

- U of Oklahoma Karcher Colloquium: *Ricci flow with bounded curvature and compactness theorems* (2 talks). (Norman, OK, October 2003).
- U of Arizona Mathematics Colloquium: *Solutions of the Ricci flow with bounded curvature*. (Tucson, AZ, February 2003)
- AMS/MAA Joint Meetings (contributed): *Precompactness of solutions of the Ricci flow in the absence of injectivity radius estimates*. (Baltimore, MD, January 2003)
- UC Irvine Differential Geometry Seminar: *Precompactness of solutions of the Ricci flow in the absence of injectivity radius estimates*. (Irvine, CA, November 2002)
- Stanford Geometry Seminar: *Precompactness of solutions of the Ricci flow in the absence of injectivity radius estimates*. (Palo Alto, CA, October 2002)
- U of New Mexico Differential Geometry Seminar: *Introduction to the Ricci flow on Riemannian manifolds*. (Albuquerque, NM, October 2002)
- UC San Diego Differential Geometry Seminar: *Precompactness of solutions to the Ricci flow*. (La Jolla, CA, October 2002)
- Workshop on Geometric Evolution Equations, National Center for Theoretical Sciences, Tsing Hua University: *A (pre) compactness property for solutions of the Ricci flow in the absence of injectivity radius estimates*. (Hsinchu, Taiwan, August 2002)

#### U OF ARIZONA SEMINAR TALKS

- Graduate Student Recruitment Seminar: *The Poincaré Conjecture*. (Tucson, AZ, March 2012).
- Undergraduate TA Seminar: *Abstract geometric manifolds*. (Tucson, AZ, February 2012).
- Computer Science and Mathematics Collaboration Seminar: *Some ideas in intrinsic geometry*. (Tucson, AZ, September 2011).
- Graduate Student Recruitment Seminar: *The Poincaré Conjecture*. (Tucson, AZ, March 2011).
- Geometry Seminar: *Discrete conformal variations of piecewise flat manifolds*. (Tucson, AZ, October 2010).
- Geometry Seminar, Geometry Slam: *Discrete conformal geometry: circle packings meet Delaunay triangulations*. (Tucson, AZ, September 2010).

- Geometry Seminar: *Curvatures of convex and nonconvex sets*. (Tucson, AZ, February 2010).
- Geometry Seminar: *Discrete conformal variations and discrete scalar curvatures*. (Tucson, AZ, February 2010).
- RTG (research training) lectures (with A. Young): Geometric flows in Riemannian and discrete geometry. (Tucson, AZ, January/February 2009).
- Geometry seminar: *Ricci flow on 3D Lie groups and their quotients*. (Tucson, AZ, October 2008).
- Geometry Seminar: *Discrete Riemann mappings and circle packings*. (Tucson, AZ, March, 2008).
- Geometry Seminar: *Fun with the universal cover of  $SL(2, R)$*  (Tucson, AZ, September, 2007).
- Geometry Seminar: *Polygon shortening flows*. (Tucson, AZ, March 2007).
- Graduate Student Recruitment Seminar: *The Poincaré Conjecture: What is it?* (Tucson, AZ, March, 2007).
- Geometry Seminar: *Ricci flow on Riemannian groupoids*. (Tucson, AZ, November 2006).
- Analysis and Its Applications Seminar: *Proof of the Poincare Conjecture and Ricci Flow*. (Tucson, AZ, September 2006).
- Geometry Seminar: *Weighted Delaunay triangulations and discrete Laplacians* (2 talks). (Tucson, AZ, March 2006).
- Geometry Seminar: *Combinatorial Yamabe flow*. (Tucson, AZ, October 2005).
- Mathcats (undergraduate math group): *Ricci flow and the Poincare conjecture*. (Tucson, AZ, November 2004).
- Graduate Student Seminar: *Curvature flow in the discrete setting*. (Tucson, AZ, March 2004).
- Graduate Student Recruitment Workshop: *Diffusion in differential equations, geometry, and one million dollars*. (Tucson, AZ, March 2004).
- Geometry Seminar: *An introduction to Perelman's work on the Poincare conjecture*. (Tucson, AZ, February 2004).

- Geometry Seminar: *Introduction to metric geometry, Introduction to the Ricci flow, Ricci flow and compactness theorems* (3 talks). (Tucson, AZ, September 2003)

#### ADDITIONAL HONORS, AWARDS, AND CONFERENCES ATTENDED

- 2006, Joint AMS, IMS, SIAM conference on Discrete and Computational Geometry Twenty Years Later, Snowbird, UT.  
Partially supported by AMS.
- 2006, Southern California Geometric Analysis Conference, Irvine, CA.  
Supported by NSF.
- 2005, MSRI workshop on Optimal Mass Transportation, Berkeley, CA.  
Supported by MSRI.
- 2005, Southern California Geometric Analysis Conference, La Jolla, CA  
Supported by NSF.
- 2004, Current Developments in Mathematics, Cambridge, MA.
- 2004, IPAM program on Geometric Flows: Theory and Computation, Los Angeles, CA.
- 2004, Southern California Geometric Analysis Conference, Irvine, CA.  
Supported by NSF.
- 2004, AMS/MAA Joint Meetings, Phoenix, AZ.
- 2003, MSRI program on Ricci flow and geometrization of manifolds (invited participant), Berkeley, CA.  
Supported by MSRI.
- 2003, Southern California Geometric Analysis Conference, La Jolla, CA
- 2003, AMS/MAA Joint Meetings, Baltimore, MD.
- 2002, Yamabe Festival, Minneapolis, MN  
Supported by NSF.
- 2002, Conference on Geometric Evolution Equations, Hsinchu, Taiwan  
Partially supported by the Institute for Theoretical Sciences
- 2002, AMS/MAA Joint Meetings, San Diego, CA.

- 2001, Teaching Assistant Excellence Award  
Awarded by the Mathematics Department of UCSD.
- 2001, Southern California Geometric Analysis Conference, Irvine, CA  
Supported by NSF.
- 2001, MSRI/Clay Mathematics Institute on the Global Theory of Minimal Surfaces  
Supported by Clay Math Institute.
- 1999, MSRI Summer Graduate program on Moving Frames and Exterior Differential Systems  
Supported by Mathematical Sciences Research Institute (nominated by UCSD).
- Member Golden Key National Honor Society

#### PROFESSIONAL ACTIVITIES AND SERVICE

- Reviewer, *Mathematical Reviews*.
- Reviewer (at large) for *Journal of Differential Geometry*, *Discrete and Computational Geometry*, *Geometry and Topology*, *Communications in Analysis and Geometry*, *International Math Research Notices IMRN*, *Advances in Theoretical and Mathematical Physics*, *Pacific Journal of Mathematics*, *Journal of Physics A*, *Classical and Quantum Gravity*, *Physica D*, *SIAM Review*, *Journal of Differential Equations*, *Journal of Mathematical Analysis and Applications*, *Journal of Geometry and Physics*, *International Journal of Computer Applications in Technology*
- National Science Foundation Review Committees.
- Task Force on Core Mathematics for University of Arizona, discussion leader for social sciences and business.
- Grade Appeal Committee, College of Science, May 2009.
- Promotion and Tenure committee (elected, Math Dept., 2010-2012).
- Hiring Committee (appointed, 2010-2012).
- Organizer, Geometry Seminar, including the Geometry Slam.
- Organizer, Computer Science and Math Collaboration Seminar.
- Ad hoc committee for graduate classes (2011).

- Judge for Southern Arizona Regional Science and Engineering Fair.
- Member of American Mathematical Society (AMS), Mathematical Association of America (MAA), Society for Industrial and Applied Mathematics (SIAM) with activity group in Geometric Design.

REFERENCES

- Bennett Chow, Department of Mathematics, University of California, San Diego, benchow@math.ucsd.edu
- Gang Tian, Department of Mathematics, Princeton University, tian@math.princeton.edu
- Feng Luo, Department of Mathematics, Rutgers University, fluo@math.rutgers.edu
- Mauro Carfora, Department of Nuclear and Theoretical Physics, University of Pavia and National Institute of Nuclear Physics, Pavia Section, Mauro.Carfora@pv.infn.it
- Xianfeng David Gu, Department of Computer Science, Stony Brook University, gu@cs.sunysb.edu
- Leonid Friedlander, Department of Mathematics, University of Arizona, friedlan@math.arizona.edu (teaching)

Additional references available upon request.