

Simon Brendle

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Personal Information

Born June 1981. Citizen of Germany; Permanent Resident of the United States of America

Education

Doctoral Degree in Mathematics (summa cum laude), Tübingen University, Germany, February 2001

Undergraduate Degree (with distinction), Tübingen University, Germany, October 1999

Academic Appointments

Professor, Stanford University, September 2008 – present

Assistant Professor, Stanford University, September 2005 – August 2008

Assistant Professor, Princeton University, July 2003 – August 2005

Member, Institute for Advanced Study, September 2002 – June 2003

Postdoctoral Fellow, German Research Foundation (Deutsche Forschungsgemeinschaft), March 2001 – August 2002

Visiting Positions

Visiting Professor, Cambridge University, November 2012

Visiting Professor, Princeton University, Fall 2010

Visiting Professor, ETH Zürich, Fall 2008

Visiting Professor, University of Paris, December 2007

Visiting Scholar, MIT, Spring 2002

Honors and Awards

Euler Lecture Prize, Berlin Mathematical Society, 2012

National Science Foundation Three-Year Grant, 2012 – 2015

Takagi Lecturer, Mathematical Society of Japan, 2011

Yamabe Lecturer, Northwestern University, 2010

Roever Lecturer, Washington University, 2010

Seifert Lecturer, Heidelberg University, 2009

National Science Foundation Three-Year Grant, 2009 – 2011

Presidential Research Grant, Stanford University, 2009

Distinguished Lecturer (Nachdiplomvorlesung), ETH Zürich, 2008

Alden H. and Winifred Brown Fellowship, 2007

Invited Speaker (45 minute lecture), International Congress of Mathematicians, Madrid, 2006

National Science Foundation Three-Year Grant, 2006 – 2008

Alfred P. Sloan Fellowship, 2006

Frederick E. Terman Fellowship, 2005

National Science Foundation Three-Year Grant, 2003 – 2005

Clay Mathematics Institute, Special Research Project, 2002

Doctoral Dissertation Award, Tübingen University, 2001

Undergraduate Thesis Award, German Mathematical Society, September 1999

Fellow, German National Merit Foundation (Studienstiftung des Deutschen Volkes), 1996 – 1999

Winner of a nationwide Mathematics Contest for high school students in Germany (Bundeswettbewerb Mathematik), 1995, 1996, 1997

Professional Service

Reviewer for the Ministry of Science and Education of Russia

Reviewer for the United States National Science Foundation

Reviewer for the National Science Foundation of Israel

Reviewer for the National Science Foundation of Switzerland

Reviewer for the Research Commission at ETH Zürich
Co-organizer, Conference on Global Differential Geometry, Oberwolfach
Appointments Committee, Stanford University, 2010 – 2011
Graduate Admissions Committee, Stanford University, 2008 – 2009
Admissions Committee for the Program in Mathematical Finance, Stanford University, 2007

Conference Lectures

Conference on the occasion of H. Blaine Lawson's 70th birthday, Stony Brook, October 23 – 28, 2012
Conference on Calculus of Variations, Oberwolfach, July 22 – 28, 2012
Conference on Optimal Transport and Differential Geometry, Banff, May 21 – 25, 2012
27th Annual Geometry Festival, Duke University, April 27 – 29, 2012
Texas Geometry and Topology Conference, Houston, February 17 – 19, 2012
Chern Centennial Conference, Mathematical Sciences Research Institute, Berkeley, October 30 – November 5, 2011
Plenary lecture, EQUADIFF Conference, August 1 – 5, 2011
Conference on Geometry and Analysis, Edinburgh, June 20 – 24, 2011
Conference on Geometric and Nonlinear Analysis, Nancy, June 12 – 17, 2011
Conference on Geometry and Topology, Harvard University, April 29 – May 1, 2011
Geometry Conference on the occasion of Werner Ballmann's 60th birthday, Max Planck Institute for Mathematics, Bonn, April 8 – 12, 2011
International Conference on Geometric Analysis, Luminy, January 17 – 21, 2011
Southeast Geometry Seminar, University of Tennessee, December 13, 2010
Conference on Scalar Curvature, Geometry, and Topology, Münster, August 30 – September 3, 2010
Conference on Calculus of Variations, Oberwolfach, July 18 – 24, 2010
International Symposium on Geometry and Topology in Honor of C.C. Hsiung, Lehigh University, May 29 – June 1, 2010

Plenary Lecture, American Mathematical Society Eastern Sectional Meeting, Newark, May 22 – 23, 2010

Conference on Optimal Transportation and Applications, Banff, April 18 – 23, 2010

Conference on Complex and Differential Geometry, Hannover, September 14 – 18, 2009

Plenary Lecture, 27th Brazilian Mathematical Colloquium, held at the Instituto Nacional de Matemática Pura e Aplicada, Rio de Janeiro, July 27 – 31, 2009

Conference on the occasion of Charles Fefferman's 60th birthday, Princeton University, May 4 – 8, 2009

Conference on Geometric Partial Differential Equations, held at the Institute for Advanced Study, Princeton, February 23 – 28, 2009

Yamabe Memorial Symposium, University of Minnesota, September 26 – 28, 2008

Conference celebrating the 50th Anniversary of the Institut des Hautes Études Scientifiques, Bures-sur-Yvette, May 19 – 21, 2008

Conference celebrating the 40th Anniversary of the Journal of Differential Geometry, Harvard University, May 2 – 4, 2008

Texas Geometry and Topology Conference, College Station, October 19 – 21, 2007

Workshop on Geometric Partial Differential Equations, Columbia University, October 4 – 5, 2007

Conference on Manifolds with Nonnegative Sectional Curvature, American Institute of Mathematics, Palo Alto, September 17 – 21, 2007

Conference on Curvature and Global Shape, Münster, July 29 – August 4, 2007

Conference on Partial Differential Equations, Oberwolfach, July 22 – 28, 2007

International Conference on Geometry and Partial Differential Equations, Luminy, June 18 – 22, 2007

22nd Annual Geometry Festival, held at the University of Maryland, April 27 – 29, 2007

Conference on Geometric Evolution Equations, Mathematical Sciences Re-

search Institute, Berkeley, March 12 – 16, 2007

8th Pacific Rim Geometry Conference, held at Murramarang, Australia, December 11 – 15, 2006

Conference on Analytic and Computational Aspects of Elliptic and Parabolic Equations, Mathematical Sciences Research Institute, Berkeley, October 23 – 27, 2006

Conference on Nonlinear Evolution Problems, Scuola Normale Superiore di Pisa, September 19 – 23, 2006

Plenary Lecture, International Conference on Global Differential Geometry, Münster, August 13 – 19, 2006

American Mathematical Society Western Sectional Meeting, San Francisco, April 29 – 30, 2006

Pacific Northwest Geometry Meeting, held at the University of British Columbia, Vancouver, April 1 – 2, 2006

Conference on the Einstein Constraint Equations, Isaac Newton Institute, Cambridge, December 12 – 16, 2005

Conference on Nonlinear Elliptic Equations and their Interactions with Geometry, Mathematical Sciences Research Institute, Berkeley, October 31 – November 4, 2005

Conference on Partial Differential Equations and Mathematical Finance, Royal Institute of Technology, Stockholm, August 15 – 19, 2005

International Conference on Conformal Invariants, National Center for Theoretical Sciences, Hsinchu, Taiwan, June 6 – June 14, 2005

Conference on Geometric Evolution Problems, Oberwolfach, May 29 – June 4, 2005

Texas Geometry and Topology Conference, College Station, October 29 – 31, 2004

Conference on Geometric Flows, University of California, Los Angeles, February 23 – 27, 2004

American Mathematical Society Eastern Sectional Meeting, New York, April 12, 2003

Workshop on General Relativity, Stanford University, April 21 – 27, 2002

Conference on Global Methods in Complex Geometry, Marburg, June 18 – 22, 2001

Conference on Geometric Evolution Equations, Isaac Newton Institute, Cambridge, March 26 – 30, 2001

Conference on Functional Analysis and Partial Differential Equations, Oberwolfach, March 20 – 24, 2000

Conference on Evolution Equations and their Applications in Physical and Life Sciences, Bad Herrenalb, September 14 – 19, 1998

Seminar and Colloquium Lectures

Lecture Series on the Ricci Flow, Institut Henri Poincaré, Paris, 2012

Lecture Series on Evolution Equations in Geometry, International Center for Theoretical Physics, Trieste, 2012

Euler Lecture, Potsdam, May 11, 2012

Colloquium Lecture, University of California, Santa Cruz, February 16, 2012

Lecture Series on Rigidity Questions involving Scalar Curvature, ETH Zürich, December 2011

Colloquium Lecture, Tübingen University, July 11, 2011

Geometry Seminar, Kyoto University, June 6, 2011

Takagi Lecture, Kyoto University, June 4, 2011

Special Colloquium Lecture on the occasion of Werner Ballmann's 60th birthday, Bonn University, April 8, 2011

Bay Area Differential Geometry Seminar, February 5, 2011

Analysis Seminar, Zürich University, December 20, 2010

Greater Boston Geometric Analysis Seminar (joint seminar of MIT and Brown University), December 3, 2010

Colloquium Lecture, Columbia University, December 1, 2010

Colloquium Lecture, State University of New York at Stony Brook, November 18, 2010

Joint Colloquium of Harvard University, Brandeis University, Northeastern University, and MIT, October 28, 2010

Geometry Seminar, Courant Institute, October 25, 2010

Geometry Seminar, Princeton University, October 15, 2010

Colloquium Lecture, Princeton University, October 6, 2010

Colloquium Lecture, Université de Nantes, September 9, 2010
Colloquium Lecture, University of Vienna, July 1, 2010
London Geometry and Topology Seminar (joint seminar of Imperial College, King's College, and Queen Mary's College), June 25, 2010
Seminar on Spectral Theory and Geometry, Institut Fourier, Grenoble, June 17, 2010
Yamabe Memorial Lectures, Northwestern University, May 24 – 25, 2010
Colloquium Lecture, University of Chicago, May 7, 2010
Geometry and Topology Seminar, University of Chicago, May 6, 2010
Geometry Seminar, Washington University, St. Louis, April 30, 2010
Roever Lecture, Washington University, St. Louis, April 29, 2010
1st Herbert Seifert Lecture, Heidelberg University, December 21, 2009
Geometry and Analysis Seminar, Columbia University, December 9, 2009
Geometry Seminar, University of California, Berkeley, October 6, 2009
Differential Geometry Seminar, MIT, March 2, 2009
Joint Colloquium, ETH Zürich and Zürich University, December 9, 2008
Geometry Seminar, University of Warwick, November 27, 2008
Colloquium Lecture, Université de Fribourg, November 4, 2008
Analysis Seminar, ETH Zürich, October 14, 2008
Differential Geometry Seminar, Zürich University, October 8, 2008
Differential Geometry Seminar, Princeton University, September 2, 2008
Geometry and Topology Seminar, Duke University, August 29, 2008
Max Planck Institute for Gravitational Physics, Potsdam, July 2, 2008
Geometry and Analysis Seminar, Columbia University, March 27, 2008
Colloquium Lecture, University of Washington, Seattle, March 11, 2008
Colloquium Lecture, Bonn University, December 19, 2007
Geometry Seminar, Université de Cergy-Pontoise, December 5, 2007
Geometry Seminar, Institute de Mathématiques de Jussieu, Paris, December 3, 2007
Differential Geometry Seminar, Princeton University, November 30, 2007
Colloquium Lecture, University of Notre Dame, November 14, 2007

Colloquium Lecture, Stanford University, November 1, 2007
Colloquium Lecture, University of California, Santa Barbara, October 25, 2007
Geometry Seminar, University of Texas, Austin, October 18, 2007
Geometry Seminar, Free University, Berlin, July 10, 2007
Max Planck Institute for Gravitational Physics, Potsdam, July 9, 2007
Differential Geometry Seminar, Princeton University, March 30, 2007
Geometry and Topology Seminar, Duke University, March 27, 2007
Mathematical Sciences Research Institute, Berkeley, January 16, 2007
Max Planck Institute for Gravitational Physics, Potsdam, December 20, 2006
Colloquium Lecture, University of California, Santa Cruz, March 7, 2006
Geometry Seminar, Freiburg University, December 19, 2005
Geometry Seminar, University of California, San Diego, October 18, 2005
Colloquium Lecture, Chinese Academy of Sciences, Beijing, June 24, 2005
Lecture Series on Partial Differential Equations in Economics, Beijing University, June 2005
Johns Hopkins University, May 2, 2005
Finance Seminar, University of Texas, Austin, April 15, 2005
Nonlinear Analysis Seminar, Rutgers University, April 12, 2005
Geometry and Topology Seminar, Duke University, March 11, 2005
Differential Geometry Seminar, MIT, February 28, 2005
Differential Geometry Seminar, Courant Institute, February 25, 2005
Geometry and Analysis Seminar, Columbia University, February 17, 2005
Probability Seminar, Columbia University, February 11, 2005
Applied Mathematics Seminar, Courant Institute, January 28, 2005
Geometry Seminar, Stanford University, January 26, 2005
Mathematical Finance Seminar, Stanford University, January 21, 2005
Seminar on Financial and Insurance Mathematics, ETH Zürich, December 16, 2004
Analysis Seminar, ETH Zürich, December 14, 2004

Differential Geometry Seminar, Harvard University, November 29, 2004
Applied Mathematics Colloquium, MIT, November 22, 2004
Geometry and Topology Seminar, Duke University, October 26, 2004
Seminar on Finance and Actuarial Science, University of Michigan, October 7, 2004
Differential Equations Seminar, University of Michigan, October 6, 2004
Geometry and Analysis Seminar, Columbia University, April 29, 2004
Differential Equations Seminar, University of Michigan, April 7, 2004
Nonlinear Analysis Seminar, Rutgers University, March 23, 2004
Joint Geometry Seminar of Princeton University, Columbia University, and the Courant Institute, March 19, 2004
Joint Analysis Seminar of Princeton University, the Institute for Advanced Study, and Rutgers University, October 23, 2003
Gauge Theory and Topology Seminar, Harvard University, April 4, 2003
Geometry Seminar, Stanford University, January 23, 2003
Nonlinear Analysis Seminar, Rutgers University, November 19, 2002
University of Wisconsin, Madison, October 28, 2002
Courant Institute, October 8, 2002
Max Planck Institute for Mathematics, Leipzig, June 13, 2002
Joint Nonlinear Analysis Seminar of Princeton University, the Institute for Advanced Study, and Rutgers University, March 14, 2002
Geometry and Analysis Seminar, Columbia University, February 21, 2002
Analysis Seminar, ETH Zürich, December 11, 2001
Analysis Seminar, Bonn University, December 6, 2001
Three City Seminar on Geometric Partial Differential Equations, Tübingen, November 20, 2001
Differential Geometry Seminar, MIT, September 24, 2001
Max Planck Institute for Mathematics, Leipzig, April 24, 2001
Three City Seminar on Geometric Partial Differential Equations, Freiburg, December 19, 2000

Monograph

Ricci Flow and the Sphere Theorem, Graduate Studies in Mathematics, volume 111, American Mathematical Society (2010)

Selected Research Publications and Surveys

48. Embedded minimal tori in S^3 and the Lawson conjecture, arxiv:1203.6597
47. Rotational symmetry of Ricci solitons in higher dimensions, arxiv:1203.0270
46. Rotational symmetry of self-similar solutions to the Ricci flow, arxiv:1202.1264
45. Isoperimetric and Weingarten surfaces in the Schwarzschild manifold, preprint (joint with M. Eichmair)
44. A sharp bound for the area of minimal surfaces in the unit ball, to appear in Geometric and Functional Analysis
43. On the Lagrangian minimal surface equation and related problems, to appear in Surveys in Differential Geometry
42. Hypersurfaces of constant mean curvature in deSitter-Schwarzschild space, arxiv:1105.4273
41. Rigidity phenomena involving scalar curvature, Surveys in Differential Geometry XVII, 179–202 (2012)
40. Der Sphärensatz in der Riemannschen Geometrie, Jahresbericht der Deutschen Mathematiker-Vereinigung 113, 123–138 (2011)
39. Evolution equations in Riemannian geometry, Japanese Journal of Mathematics 6, 45–61 (2011)
38. Ricci flat Kähler metrics with edge singularities, arxiv:1103.5454
37. Uniqueness of gradient Ricci solitons, Mathematical Research Letters 18, 531–538 (2011)
36. Recent progress on the Yamabe problem, Surveys in Geometric Analysis and Relativity, Advanced Lectures in Mathematics volume 20, pp. 29–47 (2011) (joint with F.C. Marques)
35. Scalar curvature rigidity of geodesic balls in S^n , Journal of Differential Geometry 88, 379–394 (2011) (joint with F.C. Marques)
34. Deformations of the hemisphere that increase scalar curvature, Inventiones Mathematicae 185, 175–197 (2011) (joint with F.C. Marques and A. Neves)
33. Curvature, sphere theorems, and the Ricci flow, Bulletin of the Ameri-

- can Mathematical Society 48, 1–32 (2011) (joint with R. Schoen)
32. Riemannian manifolds of positive curvature, Proceedings of the International Congress of Mathematicians 2010, volume I, pp. 449–475 (joint with R. Schoen)
31. Ancient solutions to the Ricci flow with pinched curvature, Duke Mathematical Journal 158, 537–551 (2011) (joint with G. Huisken and C. Sinestrari)
30. Rigidity of area-minimizing two-spheres in three-manifolds, Communications in Analysis and Geometry 18, 821–830 (2010) (joint with H. Bray and A. Neves)
29. Area-minimizing projective planes in three-manifolds, Communications on Pure and Applied Mathematics 63, 1237–1247 (2010) (joint with H. Bray, M. Eichmair, and A. Neves)
28. An existence theorem for the Yamabe problem on manifolds with boundary, arxiv:0908.4327 (joint with S. Chen)
27. A note on Ricci flow and optimal transportation, Journal of the European Mathematical Society 13, 249–258 (2011)
26. A boundary value problem for minimal Lagrangian graphs, Journal of Differential Geometry 84, 267–287 (2010) (joint with M. Warren)
25. Einstein metrics and preserved curvature conditions for the Ricci flow, Complex and Differential Geometry (edited by W. Ebeling, K. Hulek, and K. Smoczyk), Springer Proceedings in Mathematics volume 8, pp. 81–85 (2011)
24. Einstein manifolds with nonnegative isotropic curvature are locally symmetric, Duke Mathematical Journal 151, 1–21 (2010)
23. Sphere theorems in geometry, Surveys in Differential Geometry, volume XIII, 49–84 (2009)¹ (joint with R. Schoen)
22. A generalization of Hamilton’s differential Harnack inequality for the Ricci flow, Journal of Differential Geometry 82, 207–227 (2009)
21. Minimal Lagrangian diffeomorphisms between domains in the hyperbolic plane, Journal of Differential Geometry 80, 1–22 (2008)
20. A general convergence result for the Ricci flow in higher dimensions, Duke Mathematical Journal 145, 585–601 (2008)

¹This article has been reprinted in the Handbook of Geometric Analysis, volume III, pp. 41–75.

19. Classification of manifolds with weakly $1/4$ -pinched curvatures, *Acta Mathematica* 200, 1–13 (2008) (joint with R. Schoen)
18. Manifolds with $1/4$ -pinched curvature are space forms, *Journal of the American Mathematical Society* 22, 287–307 (2009) (joint with R. Schoen)
17. On the conformal scalar curvature equation and related problems, *Surveys in Differential Geometry*, volume XII, 1–19 (2008)
16. Blow-up phenomena for the Yamabe equation II, *Journal of Differential Geometry* 81, 225–250 (2009) (joint with F.C. Marques)
15. Blow-up phenomena for the Yamabe equation, *Journal of the American Mathematical Society* 21, 951–979 (2008)
14. Convergence of the Yamabe flow in dimension 6 and higher, *Inventiones Mathematicae* 170, 541–576 (2007)
13. A short proof for the convergence of the Yamabe flow on S^n , *Pure and Applied Mathematics Quarterly* 3, 499–512 (2007)
12. On a problem of optimal stochastic control with incomplete information, *Applied Mathematics and Optimization* 58, 257–274 (2008)
11. Portfolio selection under incomplete information, *Stochastic Processes and Applications* 116, 701–723 (2006)
10. Elliptic and parabolic problems in conformal geometry, *Proceedings of the International Congress of Mathematicians 2006*, volume II, pp. 691–704
9. Convergence of the Q -curvature flow on S^4 , *Advances in Mathematics* 205, 1–32 (2006)
8. Convergence of the Yamabe flow for arbitrary initial energy, *Journal of Differential Geometry* 69, 217–278 (2005)
7. A variational characterization for $\sigma_{n/2}$, *Calculus of Variations and Partial Differential Equations* 20, 399–402 (2004) (joint with J. Viaclovsky)
6. Global existence and convergence for a higher order flow in conformal geometry, *Annals of Mathematics* 158, 323–343 (2003)
5. Hypersurfaces in Minkowski space with vanishing mean curvature, *Communications in Pure and Applied Mathematics* 55, 1249–1279 (2002)
4. Partial functional differential equations with non-autonomous past, *Discrete and Continuous Dynamical Systems* 8, 1–24 (2002) (joint with R. Nagel)
3. On the asymptotic behavior of perturbed strongly continuous semigroups, *Mathematische Nachrichten* 226, 35–47 (2001)

2. On the spectral mapping theorem for perturbed strongly continuous semigroups, *Archiv der Mathematik (Basel)* 74, 365–378 (2000) (joint with R. Nagel and J. Poland)

1. Interpolation and extrapolation spaces for semigroups. In: *One-Parameter Semigroups for Linear Evolution Equations*, Graduate Texts in Mathematics, volume 194, Springer-Verlag, 2000, pp. 123–144