

Richard Douglas Canary

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Employment:

Stanford University 1989 – 1991
 Gabor Szëgo Assistant Professor of Mathematics
University of Michigan 1991 – Present
 Assistant Professor of Mathematics 1991 – 1996
 Associate Professor of Mathematics 1996 – 2001
 Professor of Mathematics 2001 – Present

Education:

Princeton University 1984 – 89
 Ph.D. in Mathematics, June 1989
 Thesis: Hyperbolic Structures on 3-manifolds with Compressible Boundary
 Advisor: Bill Thurston
Warwick University, Coventry, England 1983 – 84
 M.S. in Mathematics, July 1985
 Thesis: A Boy's Guide to William P. Thurston
 Advisor: David Epstein
New College of USF 1980 – 83
 B.A. in Mathematics, June 1985
 Advisor: Soo Bong Chae

Visiting Positions:

Mathematics Institute, University of Warwick, April 1993–July 1993
Ecole Normale Supérieure de Lyon, May 1994–July 1994
Stanford University, September 1994–August 1995
Mathematical Sciences Research Institute, Berkeley, January 1995–June 1995
Institut Henri Poincaré, Paris, June 1996
University of Southampton, June–July 1997
Wesleyan University, September–December 2004
Mathematical Sciences Research Institute, Berkeley, August–December 2007
Institut de Mathématiques de Toulouse, May 2009
Institut Henri Poincaré, Paris, February–March 2012
Mathematical Sciences Research Institute, Berkeley, January–May 2015
Mathematical Sciences Research Institute, Berkeley, August 2020–April 2021

Awards:

Sloan Foundation Fellowship, 1993–1997.
Fellow of the American Mathematical Society, 2015.
Sigma Xi Distinguished Lecturer, 2015–2017.
Simons Fellowship, 2020–2021.

Papers:

- [1] (with D.B.A. Epstein and P. Green) “Notes on notes of Thurston”, in *Analytical and Geometrical Aspects of Hyperbolic Spaces*, Cambridge University Press, 1987, 3–92.
- [2] “The Poincaré metric and a conformal version of a theorem of Thurston,” *Duke Mathematical Journal* **64**(1991), 349–359.
- [3] “On the Laplacian and the geometry of hyperbolic 3-manifolds,” *Journal of Differential Geometry*, **36**(1992), 349–367.
- [4] “Ends of hyperbolic 3-manifolds,” *Journal of the American Mathematical Society*, **6**(1993), 1–35.
- [5] “Algebraic convergence of Schottky groups,” *Transactions of the American Mathematical Society*, **337**(1993), 235–258.
- [6] “Geometrically tame hyperbolic 3-manifolds,” in *Differential Geometry: Riemannian Geometry, Proceedings of Symposia in Pure Mathematics*, **54**(1993), Part 3, 99–109.
- [7] (with E. Taylor) “Kleinian groups with small limit sets,” *Duke Mathematical Journal* **73**(1994), 371–381.
- [8] (with M. Burger) “A lower bound on λ_0 for geometrically finite hyperbolic n -manifolds,” *Journal für die reine und angewandte Mathematik*, **454**(1994), 37–57.
- [9] “Covering theorems for hyperbolic 3-manifolds,” *Proceedings of Low-Dimensional Topology*, International Press, 1994, 21–30.
- [10] “A covering theorem for hyperbolic 3-manifolds and its applications,” *Topology*, **35**(1996), 751–778.
- [11] (with Y. Minsky) “On limits of tame hyperbolic 3-manifolds,” *Journal of Differential Geometry*, **43**(1996), 1–41.
- [12] (with J.W. Anderson) “Cores of hyperbolic 3-manifolds and limits of Kleinian groups,” *American Journal of Mathematics*, **118**(1996), 745–779.
- [13] (with J.W. Anderson, M. Culler and P. Shalen) “Free Kleinian groups and volumes of hyperbolic 3-manifolds,” *Journal of Differential Geometry*, **44**(1996), 738–782.
- [14] (with J.W. Anderson) “Algebraic limits of Kleinian groups which rearrange the pages of a book,” *Inventiones Mathematicae*, **126**(1996), 205–214.

- [15] (with E.C. Taylor) “Hausdorff dimension and limits of Kleinian groups,” *Geometric and Functional Analysis*, **9**(1999), 283–297.
- [16] (with Y. Minsky and E. Taylor) “Spectral theory, Hausdorff dimension and the topology of hyperbolic 3-manifolds,” *Journal of Geometric Analysis*, **9**(1999), 18–40.
- [17] (with J.W. Anderson) “Cores of hyperbolic 3-manifolds and limits of Kleinian groups II,” *Journal of the London Mathematical Society* **61**(2000), 489–505.
- [18] “The conformal boundary and the boundary of the convex core,” *Duke Mathematical Journal*, **106**(2001), 193–207.
- [19] (with J.W. Anderson and D. McCullough) “On the topology of deformation spaces of Kleinian groups,” *Annals of Mathematics*, **152**(2000), 693–741.
- [20] (with J.W. Anderson) “The visual core of a hyperbolic 3-manifold,” *Mathematische Annalen*, **321**(2001), 989–1000.
- [21] (with M. Bridgeman) “From the boundary of the convex core to the conformal boundary,” *Geometriae Dedicata*, **96**(2003), 211–240.
- [22] (with M.Culler, S. Hersonsky, and P. Shalen) “Approximation by maximal cusps in boundaries of deformation spaces,” *J. Diff. Geom.*, **64**(2003), 57–109.
- [23] (with D. McCullough) “Homotopy equivalences of 3-manifolds and deformation theory of Kleinian groups,” *Memoirs of the A.M.S.*, **172**(2004), no. 812, xii+218 pp.
- [24] (with S. Hersonsky) “Ubiquity of geometric finiteness in boundaries of deformation spaces of hyperbolic 3-manifolds,” *Amer. J. Math.*, **126**(2004), 1193–1220.
- [25] “Pushing the boundary,” in *In the Tradition of Ahlfors and Bers, III*, Contemporary Mathematics **355**(2004), American Mathematical Society, 109–121.
- [26] (with M. Bridgeman) “Bounding the bending of a hyperbolic 3-manifold,” *Pac. J. Math*, **218**(2005), 299–314.
- [27] (with P. Bonfert-Taylor, G. Martin and E. Taylor) “Quasiconformal homogeneity of hyperbolic manifolds,” *Mathematische Annalen*, **331**(2005), 281–295.
- [28] (edited with D.B.A. Epstein and A. Marden) *Fundamentals of Hyperbolic Manifolds: Selected Expositions*, London Mathematical Society Lecture Note Series **328**, Cambridge University Press, 2006, xii+335 pages.
- [29] (with D.B.A. Epstein and P.L. Green) “Notes on notes of Thurston,” a re-issue of [1] which appears in [28] with a new foreword by R.D. Canary, 1–115.
- [30] (with C. Leininger) “Kleinian groups with discrete length spectrum,” *Bull. L.M.S.*, **39**(2007), 189–193.

- [31] (with P. Bonfert-Taylor, M. Bridgeman and E.C. Taylor) “Quasiconformal homogeneity of hyperbolic surfaces with fixed-point full automorphisms,” *Math. Proc. Camb. Phil. Soc.*, **143**(2007), 71–84.
- [32] (edited with J. Gilman, J. Heinonen, and H. Masur) *In the Tradition of Ahlfors-Bers, IV, Contemporary Mathematics* **432**(2007), xvi+229 pages.
- [33] “Marden’s Tameness Conjecture: History and Applications,” in *Geometry, Analysis and Topology of Discrete Groups*, ed. by L. Ji, K. Liu, L. Yang and S.T. Yau, Higher Education Press, 2008, 137–162.
- [34] “Introductory bumponomics: the topology of deformation spaces of hyperbolic 3-manifolds,” in *Teichmüller Theory and Moduli Problem*, ed. by I. Biswas, R. Kulkarri and S. Mitra, Ramanujan Math. Soc., 2010, 131–150.
- [35] (with P. Bonfert-Taylor, G. Martin, E. Taylor and M. Wolf) “Ambient quasiconformal homogeneity of planar domains,” *Ann. Acad. Sci. Fenn.*, **35**(2010), 275–283.
- [36] (with M. Bridgeman) “The Thurston metric on hyperbolic domains and boundaries of convex hulls,” *Geometric and Functional Analysis*, **20**(2010), 1317–1353.
- [37] (with P. Bonfert-Taylor, J. Souto and E.C. Taylor) “Exotic quasiconformally homogeneous surfaces,” *Bull. L.M.S.*, **43**(2011), 57–62.
- [38] (with J. Brock, K. Bromberg and Y. Minsky) “Local topology in deformation spaces of hyperbolic 3-manifolds,” *Geometry and Topology*, **15**(2011), 1169–1224.
- [39] (with Peter Storm) “The curious moduli space of unmarked Kleinian surface groups,” *Amer. J. Math.*, **134**(2012), 71–85.
- [40] (with J. Brock and Y. Minsky) “The classification of Kleinian surface groups II: the ending lamination conjecture,” *Annals of Mathematics*, **176**(2012), 1–149.
- [41] (with P. Storm) “Moduli spaces of hyperbolic 3-manifolds and dynamics on character varieties,” *Comm. Math Helv.* **88**(2013), 221–251.
- [42] (with M. Bridgeman) “Uniformly perfect domains and convex hulls: improved bounds in a generalization of a Theorem of Sullivan,” *Pure and Applied Mathematics Quarterly*, **9**(2013), 49–71.
- [43] (with J. Brock, K. Bromberg and Y. Minsky) “Convergence properties of end invariants,” *Geometry and Topology*, **13**(2013), 2877–2922.
- [44] (with P. Bonfert-Taylor and E.C. Taylor) “Quasiconformal homogeneity after Gehring and Palka,” *Computational Methods and Function Theory* (Gehring Memorial Volume) **14** (2014), 417–430.
- [45] (with A. Magid) “Dynamics on $\mathrm{PSL}(2, \mathbf{C})$ -character varieties: 3-manifolds with toroidal boundary components,” *Groups, Geometry and Dynamics*, **9**(2015), 149–185.

- [46] “Dynamics on character varieties: a survey,” *Handbook of Group Actions, Vol. II*, L. Ji, A. Papadopoulos, and S.T. Yau, ed., International Press of Boston, 2015, 175–200.
- [47] (with M. Bridgeman, F. Labourie and A. Sambarino) “The pressure metric for Anosov representations,” *Geometric and Functional Analysis*, **25**(2015), 1089–1179.
- [48] (with J. Brock, K. Bromberg and C. Lecuire) “Convergence and divergence of Kleinian surface groups,” *Journal of Topology*, **8**(2015), 811–841.
- [49] (with M. Bridgeman and A. Yarmola) “An improved bound in Sullivan’s convex hull theorem,” *Proceedings of the London Mathematical Society*, **112**(2016) 146–168.
- [50] (with M. Lee, A. Sambarino and M. Stover) “Amalgam Anosov representations,” *Geometry and Topology*, **21**(2017), 215–251.
- [51] (with M. Bridgeman) “Renormalized volume and the volume of the convex core,” *Annales de L’Institut Fourier*, **67**(2017), 2083–2098.
- [52] (with M. Bridgeman) “Simple length rigidity for Kleinian surface groups and applications,” *Commentarii Mathematici Helvetici*, **92**(2017), 715–750.
- [53] (with M. Bridgeman and A. Sambarino) “An introduction to pressure metrics for higher Teichmüller spaces,” *Ergodic Theory and Dynamical Systems*, **38**(2018), 2001–2035.
- [54] (with M. Bridgeman, F. Labourie and A. Sambarino) “Simple root flows for Hitchin representations,” *Geometriae Dedicata*(Goldman Birthday Volume), **38**(2018), 57–86.
- [55] (with J. Brock, K. Bromberg, C. Lecuire and Y. Minsky) “Local topology in deformation spaces of hyperboile 3-manifolds II,” *Groups, Geometry and Dynamics*, **13**(2019), 767–793.
- [56] (with M. Stover and K. Tsouvalas) “New nonlinear hyperbolic groups,” *Bulletin of the London Mathematical Society*, **51**(2019), 547–553.
- [57] (with M. Bridgeman and F. Labourie) “Simple length rigidity for Hitchin representations,” *Advances in Mathematics*, **360**(2020) .
- [58] (with J. Brock, K. Bromberg and Y. Minsky) “Windows, cores and skinning maps,” *Annales Scientifiques de l’École Normale Supérieure*, **53**(2020), 173–216
- [59] (with K. Tsouvalas) “Topological restrictions on Anosov representations,” *Journal of Topoogy*, **13**(2020), 1497–1520.
- [60] (with H. Bray and L.Y. Kao) “Pressure metrics on deformation spaces of quasi-fuchsian groups with parabolics,” *Algebraic and Geometric Topology*, to appear.

- [61] (with H. Bray, L.Y. Kao and G. Martone) “Counting, equidistribution, and entropy gaps at infinity with applications to cusped Hitchin representations,” *Crelle’s Journal*, **791**(2022), 1–51.
- [62] (with T. Zhang and A. Zimmer) “Cusped Hitchin representations and Anosov representations of geometrically finite Fuchsian groups,” *Advances in Mathematics*, **404**(2022), 1–67.
- [63] “Hitchin representations of Fuchsian groups,” submitted.
- [64] (with H. Bray, L.Y. Kao and G. Martone) “Pressure metrics for cusped Hitchin components,” submitted.
- [65] (with T. Zhang and A. Zimmer) “Entropy rigidity for cusped Hitchin representations,” submitted.