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EDUCATION

DARTMOUTH COLLEGE, HANOVER, NEW HAMPSHIRE, 1999-2004
Ph.D. in Mathematics, June 2004
Advisor: Carolyn S. Gordon
A.M. in Mathematics, June 2001
BOWDOIN COLLEGE, BRUNSWICK, MAINE, 1995-1999
A.B. in Mathematics (with Honors) and French, *summa cum laude*

ACADEMIC POSITIONS

BUCKNELL UNIVERSITY, LEWISBURG, PENNSYLVANIA, August 2006-present
Professor, Department of Mathematics, July 2017-present
Associate Professor, Department of Mathematics, July 2012-June 2017
Assistant Professor, Department of Mathematics, August 2006-June 2012
TRINITY COLLEGE DUBLIN, June 2012-June 2013
Visiting Professor, School of Mathematics
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, January-August 2009, June-August 2010
Visiting Scholar in Pure Mathematics
MATHEMATICAL SCIENCES RESEARCH INSTITUTE, BERKELEY, CALIFORNIA, August-December 2008
Postdoctoral Fellow, Analysis of Singular Spaces program
INSTITUTO SUPERIOR TÉCNICO, LISBON, PORTUGAL, October 2005-July 2006
Postdoctoral Fellow, Centro de Análise Matemática, Geometria e Sistemas Dinâmicos
CENTRE INTERFACULTAIRE BERNOULLI, EPFL, LAUSANNE, SWITZERLAND, August-September 2005
Visiting Professor, Spaces of Negative Curvature program
MCGILL UNIVERSITY, MONTREAL, CANADA, August 2004-July 2005
Postdoctoral Fellow, Department of Mathematics and Statistics
COLLEGE OF WILLIAM AND MARY, WILLIAMSBURG, VIRGINIA, June-July 2004
Mentor, Research Experience for Undergraduates (REU) in Matrix Analysis
EPFL, LAUSANNE, SWITZERLAND, January 2004
Invited Academic Visitor, Département de Mathématiques

RESEARCH INTERESTS

Geometry, with connections to analysis. Recent work involves inverse spectral problems, asymptotics of the equivariant heat trace, heat content, and eigenvalue bounds.

PUBLICATIONS

Sharp Poincaré inequalities in a class of non-convex sets, with Barbara Brandolini, Francesco Chiacchio, and Jeffrey J. Langford, *Journal of Spectral Theory*, to appear. arXiv:1608.01236, 20 pp.
Spectral geometry of the Steklov problem on orbifolds, with Teresa Arias-Marco, Carolyn S. Gordon, Asma Hassanezhad, Allie Ray, and Elizabeth Stanhope, *International Mathematics Research Notices*, **2017**, 1-50.
Exit time moments and eigenvalue estimates, with Jeffrey J. Langford and Patrick McDonald, *Bulletin of the London Mathematical Society*, **49** (2017), 480-490.
Semi-classical weights and equivariant spectral theory, with Victor Guillemin and Rosa Sena-Dias, *Advances in Mathematics*, **299** (2016), 202-246.
Recovering S^1 -invariant metrics on S^2 from the equivariant spectrum, with Diana Macedo and Rosa Sena-Dias, *International Mathematics Research Notices*, **16** (2016), 4882-4902.

- Mapping properties of the heat operator on edge manifolds, with Eric Bahuaud and Boris Vertman, *Mathematische Nachrichten*, **288** (2015), 126-157.
- Isospectrality and heat content, with Michiel van den Berg and Thomas Kappeler, *Bulletin of the London Mathematical Society*, **46** (2014), 793-808.
- Equivariant inverse spectral theory and toric orbifolds, with Victor Guillemin and Rosa Sena-Dias, *Advances in Mathematics*, **231** (2012), 1271-1290.
- Equivariant inverse spectral problems, with Victor Guillemin and Rosa Sena-Dias, *Spectral Geometry*, Proceedings of Symposia in Pure Mathematics, **84** (2012), 155-166.
- Hearing Delzant polytopes from the equivariant spectrum, with Victor Guillemin and Rosa Sena-Dias, *Transactions of the American Mathematical Society*, **364** (2012), 887-910.
- Bounding the eigenvalues of the Laplace-Beltrami operator on compact submanifolds, with Bruno Colbois and Ahmad El Soufi, *Bulletin of the London Mathematical Society*, **42** (2010), 96-108.
- Huber's Theorem for Hyperbolic Orbisurfaces, with Alexander Strohmaier, *Canadian Mathematical Bulletin*, **52** (2009), 66-71.
- Asymptotic expansion of the heat kernel for orbifolds, with Carolyn S. Gordon, Sarah J. Greenwald and David L. Webb, *Michigan Mathematical Journal*, **56** (2008), 205-238.
- Hearing the weights of weighted projective planes, with Miguel Abreu, Pedro Freitas and Leonor Godinho, *Annals of Global Analysis and Geometry*, **33** (2008), 373-395.
- Extremal G -invariant eigenvalues of the Laplacian of G -invariant metrics, with Bruno Colbois and Ahmad El Soufi, *Mathematische Zeitschrift*, **258** (2008), 29-41.
- Adjacent edge conditions for the totally nonnegative completion problem, with Charles R. Johnson and Brenda K. Kroschel, *Linear and Multilinear Algebra*, **56** (2008), 261-277.
- Collars and partitions of hyperbolic cone-surfaces, with Hugo Parlier, *Geometriae Dedicata*, **127** (2007), 139-149.
- Geometric and Spectral Properties of Compact Riemann Orbisurfaces*, Ph.D. thesis, 2004.

ARTICLES NOT INTENDED FOR PUBLICATION

- In search of a round football, with Elizabeth Stanhope.
- Isospectral finiteness of hyperbolic orbisurfaces.

HONORS AND AWARDS

- Presidential Award for Teaching Excellence, Bucknell University, 2017
- Simons Foundation Collaboration Grant, 2011-2016 (extended to 2018)
- AWM-NSF Mentoring Travel Grant, 2010
- Project NExT (New Experiences in Teaching) Fellow, 2006-2007
- Graduate Fellowship, Dartmouth College, 1999-2004
- Hammond Mathematics Prize, Bowdoin College, 1999
- Phi Beta Kappa, 1999
- Barry M. Goldwater Scholarship, 1997-1999
- Smyth Mathematics Prize, Bowdoin College, 1997

SELECTED RESEARCH PRESENTATIONS

- Recovering geometric and topological information from oscillation frequencies*
Lafayette-Lehigh Geometry-Topology Seminar, 25 March 2017
- Lower bounds for the smallest eigenvalue of non-convex sets*
Geometric Analysis Oberseminar, Universität Bonn, 28 June 2016
- Can you hear the metric on a sphere?*
AMS Special Session on Analytic Methods in Geometry, Seattle, 9 January 2016
- Shape Optimization and Spectral Geometry Workshop, International Centre for Mathematical Sciences, Edinburgh, 2 July 2015

Analysis Seminar, Temple University, 16 March 2015

AMS Special Session on Geometry of Manifolds, Singular Spaces, and Groups, Michigan State University, 15 March 2015

Using 'big' spectral data to recover polytopes

Differential Geometry Seminar, University of Illinois at Urbana-Champaign, 29 October 2013

Isospectrality and heat content

Montreal Analysis Seminar, McGill University, 29 November 2013

AMS Special Session on Geometric and Spectral Analysis, Temple University, 13 October 2013

Beating and heating planar domains

Irish Geometry Conference, Maynooth, Ireland, 21 June 2013

What the heat invariants can(not) tell us

Analysis Seminar, University of Bristol, 5 November 2012

Constructing polytopes from spectral data

School of Mathematical Sciences Colloquium, University College Cork, 23 January 2013

Geometric Aspects of Spectral Theory, Oberwolfach, Germany, 3 July 2012

Building polygons from spectral data

MAA Special Session on Decoding Geometry, Boston, 5 January 2012

Upper bounds for eigenvalues of submanifolds

Topology and Geometric Group Theory Seminar, Cornell University, 31 August 2010

Upper bounds on eigenvalues of the Laplacian: surfaces and beyond

Texas Geometry and Topology Conference, Texas Christian University, 27 February 2010

Hearing Delzant polygons from the equivariant spectrum

AMS-AWM Special Session on Spectral Problems on Compact Riemannian Manifolds, San Francisco, 15 January 2010

Upper bounds for eigenvalues of submanifolds

AMS Special Session on Microlocal Analysis and Spectral Theory on Singular Spaces, University Park, Pennsylvania, 25 October 2009

Orbifolds and isometries

Mellon 23 Workshop on Global Riemannian Geometry, Orbifolds, and Related Topics, Middlebury College, 10 October 2009

The equivariant heat trace and isospectrality

Spring Meeting of the Swiss Mathematical Society 2009: Geometric Spectral Theory, Neuchâtel, 10 June 2009

Eigenvalue (mis)behavior on manifolds

Mathematics Department Colloquium, Lehigh University, 20 October 2010

Mathematics Department Colloquium, Dartmouth College, 7 May 2009

Hearing Delzant polygons

Spectral Geometry Seminar, Dartmouth College, 7 May 2009

The asymptotic expansion of the heat kernel for orbifolds

MSRI Joint Postdoctoral Seminar, 24 October 2008

Hearing the geometry of orbifolds

Mathematics Department Colloquium, San Francisco State University, 5 November 2008

Mathematics Department Colloquium, UC Santa Cruz, 7 October 2008

Listening to orbifolds: What does the Laplace spectrum tell us?

Interdisciplinary Seminar on PDEs and their Applications, Penn State Altoona, 9 May 2008

Extremal invariant eigenvalues of the Laplacian of invariant metrics

AMS Special Session on Inverse Problems in Geometry, San Diego, 8 January 2008

Hearing the weights of weighted projective planes

AMS Special Session on Spectral Theory, Orbifolds, Symplectic Reduction and Quantization, Oxford, Ohio, 17 March 2007

Using heat invariants to hear the geometry of orbifolds

Geometria em Lisboa, Instituto Superior Técnico, Portugal, 7 March 2006

Upper bounds for invariant eigenvalues of the Laplacian

Seminário de Física-Matemática, Universidade de Lisboa, Portugal, 10 February 2006

The Laplace spectrum reveals (some of) its secrets

Research Seminar, Centre Interfacultaire Bernoulli, Lausanne, Switzerland, 31 August 2005

Listening to Orbifolds: What does the Laplace spectrum tell us?

Mathematics Department Colloquium, Bucknell University, 1 February 2005

Inverse Spectral Problems on Hyperbolic Orbisurfaces

Analysis Seminar, McGill University, 28 January 2005

Collars and Partitions of Hyperbolic Cone-Surfaces

AMS Special Session on Inverse Spectral Geometry, Atlanta, 8 January 2005

Isospectrality of Compact Riemann Orbisurfaces

Recent developments in spectral geometry, Blossin, Germany, 2 November 2004

Geodesic Behavior on Hyperbolic Cone-Surfaces

Séminaire CIRGET, Université du Québec à Montréal, 10 September 2004

Geometric and Spectral Properties of Compact Riemann Orbisurfaces

Thesis Defense, Dartmouth College, 13 May 2004

Bounding the Size of Isospectral Sets of Orbifolds

Analysis Seminar, McGill University, 27 February 2004

Isospectrality of Two-Dimensional Riemannian Orbifolds

Workshop on Inverse Spectral Problems, Dartmouth College, 21 November 2003

Inverse Spectral Problems on Riemannian Orbifolds

Differential Geometry Session, Union College Mathematics Conference, 8 November 2003

Isospectrality of Orbifolds

Geometry Seminar, EPFL, Switzerland, 25 June 2003

SELECTED EXPOSITORY PRESENTATIONS

Can you hear the shape of a drum?

Faculty Colloquium, Bucknell University, 19 November 2013

Can you hear the shape of a drum?

Dublin University Mathsoc, Trinity College Dublin, 5 December 2012

Are right spherical triangles wrong?

Mathematics Department Student Colloquium, Bucknell University, 6 February 2014

Mathematics Department Colloquium, Bowdoin College, 13 April 2010

Bagels, beach balls, and the Poincaré Conjecture

Mathematics Department Colloquium, Susquehanna University, 18 October 2007

Mathematics Department Student Colloquium, Bucknell University, 6 September 2007

Can one hear the shape of a...?

Mathematics Department Colloquium, Scripps College, 16 February 2005

Triangles, Tilings, and Tori

Mathematics Department Colloquium, Middlebury College, 8 February 2005

TEACHING AND MENTORING EXPERIENCE

BUCKNELL UNIVERSITY, Fall 2006-present

Instructor

Spring 2018: Math 201 (Calculus I)

Fall 2017: Math 211 (Calculus III)
 Spring 2017: Math 280 (Logic, Sets, and Proofs), Math 345 (Advanced Linear Algebra)
 Spring 2016: Math 192 (Topics in Calculus), Math 212 (Differential Equations)
 Fall 2015: Math 212 (Differential Equations), Math 245 (Linear Algebra)
 Spring 2015: Math 211 (Calculus III)
 Fall 2014: Math 202 (Calculus II), Math 280 (Logic, Sets, and Proofs)
 Spring 2014: Math 201 (Calculus I), Math 345 (Advanced Linear Algebra)
 Fall 2013: Math 303 (Probability)
 Spring 2012: Math 211 (Calculus III), Math 213 (Elementary Linear Algebra)
 Spring 2011: Math 192 (Topics in Calculus), Math 319 (Curves and Surfaces)
 Fall 2010: Math 213 (Elementary Linear Algebra), Math 335 (Geometry)
 Spring 2010: Math 202 (Calculus II)
 Fall 2009: Math 211 (Calculus III), Math 280 (Logic, Sets, and Proofs)
 Spring 2008: Math 202 (Calculus II), Math 345 (Linear Algebra)
 Fall 2007: Math 211 (Calculus III)
 Spring 2007: Math 213 (Elementary Linear Algebra)
 Fall 2006: Math 202 (Calculus II), Math 335 (Geometry)

Mentor for Honors Thesis

Fall 2017-Spring 2018: supervised Maddie Brown '18, "Spectral Geometry of Surfaces"
 Fall 2009-Spring 2010: supervised Dennis Fillebrown '10, "The Fundamental Gap for Hyperbolic Triangles"

Mentor for Presidential Fellow

Fall 2015-Spring 2016: supervised a "Mathematics Videographer/Researcher"
 Fall 2007: assisted in supervising a "Mathematics WeBWorK Intern"

Summer Academic Counselor: Summers 2014, 2015

McGILL UNIVERSITY, Summer 2005

Mentor: supervised undergraduate research project in Riemannian "football" orbifolds

COLLEGE OF WILLIAM AND MARY, REU in Matrix Analysis, Summer 2004

Mentor: supervised undergraduate research project in completion problems for partial matrices

DARTMOUTH COLLEGE, Winter 2002, Spring 2003, Fall 2003

Lecturer: Calculus with Algebra and Trigonometry, Linear Algebra with Applications, Discrete Probability

SERVICE TO BUCKNELL UNIVERSITY

MEMBER, Faculty Development Committee, August 2014-July 2017 (on leave September 2014-July 2015, July-December 2016)

MEMBER, Provost Search Committee, September 2014-March 2015

MEMBER, Committee on Honorary Degrees, August 2011-May 2014 (on leave August 2011-January 2012, June 2012-June 2013)

PRESIDENT, Phi Beta Kappa, November 2013-present

SECRETARY, Phi Beta Kappa, May 2009-May 2012

MEMBER, Composition Council, August 2008-July 2011 (on leave August 2008-July 2009)

MATHEMATICS DEPARTMENT COMMITTEES

Assessment Committee, Member: January 2012-May 2012

Calculus Review Committee, Member: January-May 2017

Curriculum Committee, Chair: January-May 2018; Member: August 2006-May 2007, January-December 2017

Curriculum Review Committee, Member: August 2010-May 2011

Departmental Review Committee, Member: May 2014-present (on leave May 2016-May 2017)

External Review Committee, Member: June 2009-May 2011

Hiring Committee, Chair: May 2015-May 2016; Member: June 2007-May 2008, June 2013-May 2014

Student Liaisons and Resources Committee, Member: August 2006-May 2008, June 2009-May 2010

Student Recruitment and Propaganda Committee, Chair: August 2010-May 2011

Talks Committee, Chair: June 2009-May 2010, June 2013-May 2014; Member: August 2006-May 2008, January 2012-May 2012, June 2014-May 2015

Teaching and Learning Center Liaison, January-May 2018

PARTICIPANT, Learning Community sponsored by the Teaching and Learning Center
 Diverse Perspectives in STEM, Fall 2015
 Work-Life Balance, Spring 2015

LEADER, First-year Common Reading Discussion
The Good Food Revolution by Will Allen, August 2015
Hamlet's BlackBerry: Building a Good Life in the Digital Age by William Powers, August 2013

FACILITATOR, "Games and strategy," Begin the Journey program at Reunion, May 2015

PRESENTER, "Are right spherical triangles wrong?," Bucknell Open House for Admitted Students, 24 April 2010

GRADUATE SCHOOL ADVISOR, Mathematics Department, August 2009-August 2010

MEMBER, Phi Beta Kappa Awards Committee, April 2008

ORGANIZER, student trip to Conference on Undergraduate Research in Mathematics, Penn State University, November 2007

PRESENTER, "The Poincaré Conjecture: the people, the intrigue, the money and the math," Bucknell Open House for Admitted Students, 14 April 2007

ADVISOR, Bucknell Chapter of Pi Mu Epsilon, August 2006-July 2008

OTHER PROFESSIONAL ACTIVITIES

FACILITATOR, Upper Susquehanna Valley Math Circle, "Geometry on Beach Balls," 20 February 2016

TEAM LEADER, Spectral geometry working group, Women in Geometry, Banff International Research Station, 1-6 November 2015

ORGANIZER, "Geometric Spectral Theory" International Conference, Lisbon and Porto, Portugal, 8-11 June 2015

JUDGE, Association for Women in Mathematics/Math for America Essay Contest, March 2014

PANELIST, Academic Job Options after your Ph.D., University of Illinois at Urbana-Champaign, 28 October 2013

LIAISON, Association for Women in Mathematics, August 2013-present

REVIEWER, Council on Undergraduate Research Posters on the Hill event, 2011, 2012 and 2014

AUTHOR, Teaching Time Savers: The Microphone is Mightier than the Pen, *MAA Focus*, November 2008

MEMBER, National Science Foundation Grant Proposal Review Panel, September 2008

SESSION CHAIR, Conference on Undergraduate Research in Mathematics, Penn State University, November 2007

ORGANIZER, Project NExT Panel on Assessment, Joint Mathematics Meetings, New Orleans, January 2007

JUDGE, Undergraduate Poster Session, Joint Mathematics Meetings, New Orleans, January 2007

ORGANIZER, Geometry Fair for area middle school students, November 2006

REFEREE, *Annals of Global Analysis and Geometry*, *Communications in Analysis and Geometry*, National Science Foundation, *New York Journal of Mathematics*, Proceedings of Symposia in Pure Mathematics, Swiss National Science Foundation, *Transactions of the American Mathematical Society*

REVIEWER, *Mathematical Reviews*, *Zentralblatt MATH*

MEMBER, American Mathematical Society and Association for Women in Mathematics