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Field of research

Symplectic geometry and its connections with algebraic geometry, algebraic topology and combinatorics

Employment

2009-Present	Cornell University: Associate Professor
Fall 2014	von Neumann Fellow at the Institute for Advanced Study, Princeton
Spring 2014	Simons Fellow in Mathematics
	Oliver Smithies Lecturer and Visiting Fellow, Balliol College, Oxford
	Academic visitor, Mathematical Institute, Oxford
Spring 2010	Mathematical Sciences Research Institute: General member (5 months)
2005-2009	Cornell University: Assistant Professor
Spring 2009	Mathematical Sciences Research Institute: General member (1 month)
Summer 2008	Université Paul Sabatier: Maître de conférence
2005-2007	University of Connecticut: Assistant Professor
2002-2005	University of California, Berkeley:
	NSF Postdoctoral Fellow and Visiting Assistant Professor
2003-2004	Mathematical Sciences Research Institute: General member
Summer 2002	Clay Mathematics Institute: Liftoff Mathematician

Education

1997-2002	Massachusetts Institute of Technology:
	Ph.D. in Mathematics, June 2002
	Thesis title: Equivariant Cohomology, Homogeneous Spaces and Graphs
	Thesis advisor: Victor Guillemin
Spring 2001	Mathematical Sciences Research Institute:
	Visiting graduate student
1993-1997	Dartmouth College:
	A.B. June 1997, *Summa cum laude* with High Honors in Mathematics
	and a minor in French
	Undergraduate thesis title: Tolerance Sphere-of-Influence Graphs
	Undergraduate thesis advisor: Kenneth Bogart

Fellowships and awards (selected)

Fellow of the American Mathematical Society (inducted 2013)
Simons Sabbatical Fellow in Mathematics, 2013–2014
von Neumann Fellow at the Institute for Advanced Study, Autumn 2014
Awarded CU-ADVANCE PDG grants, 2007, 2008, 2011
AIM Project NExT Fellow, 2006–2007
National Science Foundation Postdoctoral Research Fellowship, 2002–2005
Clay Foundation Liftoff Fellowship, Summer 2002
National Defense Science and Engineering Graduate Fellowship, 1997–2000

External grants

Simons Sabbatical Fellowship in Mathematics, 2013–2014 ..... $86,736.00
PI on NSF Disciplinary Grant DMS-1206466, 2012–2015 ..... $196,837.00
PI on Simons Foundation Collaboration Grant, June 2011–2012 ..... $7,000.00
AWM Travel Grant, April 2011 ..... $1,300.00
Co-PI on NSF Conference Grant DMS–0847996 ..... $114,336.00
PI on NSF Conference Grant DMS–0758479 ..... $25,155.00
PI on NSF Disciplinary Grant DMS–0604807/0835507 2006–10 ..... $112,222.00
National Science Foundation Postdoctoral Research Fellowship
DMS-0202409, 2002–2005 ..... $108,000.00

Teaching Experience (since PhD)

2014	Sabbatical Leave
Fall 2013	Parental Leave
Spring 2013	Instructor for (graduate) seminar in algebraic geometry (7670) at Cornell
Fall 2012	Instructor for Linear Algebra (4310) at Cornell
Spring 2012	Instructor for (graduate) seminar in equivariant topology (7520) at Cornell
Fall 2011	Head instructor for Calculus I (1110) at Cornell
Summer 2011	Director of Cornell's Summer Math Institute
Spring 2011	Parental Leave
Fall 2010	Instructor for (graduate) equivariant symplectic geometry (7610) at Cornell
Fall 2009	Head instructor for Calculus I (1110) at Cornell
Spring 2009	Head instructor for Calculus I (1110) at Cornell
Fall 2008	Instructor for (graduate) seminar in toric topology (7510) at Cornell
Spring 2008	Instructor for (graduate) symplectic geometry (758) at Cornell
	Instructor for Theoretical Linear Algebra and Calculus II (224) at Cornell
Fall 2007	Instructor for Theoretical Linear Algebra and Calculus I (223) at Cornell
Spring 2007	Instructor for (undergraduate) differential geometry (454) at Cornell
Fall 2006	Instructor for (undergraduate) topology (453) at Cornell
Spring 2006	Instructor for (graduate) algebraic topology II (374) at UConn
Fall 2005	Instructor for (graduate) algebraic topology I (373) at UConn
	Instructor for single variable calculus (115Q) at UConn
Fall 2004	Supervisor for an undergraduate honors thesis at UC Berkeley
Fall 2003	Instructor for linear algebra (110) at UC Berkeley
Summer 2003	Supervisor for independent study for an undergraduate at UC Berkeley
Spring 2003	Instructor for (undergraduate) abstract algebra (113) at UC Berkeley
Fall 2002	Instructor for linear algebra (110) at UC Berkeley

Publications (chronological order)

1. **On tolerance sphere-of-influence graphs**
(with K. Bogart) *Bull. Inst. Combin. Appl.* **24** (1998) 33–46.
2. **On majority domination in graphs**
Discrete Math., **239** (2001) 1–12.
3. **The equivariant cohomology of Hamiltonian G-spaces from residual S^1 actions**
(with R. Goldin) *Math. Research Letters* **8** (2001) 67–78.
Preprint `math.SG/0107131`.
4. **Distinguishing chambers of the moment polytope**
(with R. Goldin and L. Jeffrey) *Journal of Symplectic Geometry* **2** (2003), no. 1, 109–131.
Preprint `math.SG/0302265`.
5. **The mod 2 equivariant cohomology of real loci**
(with D. Biss and V. Guillemin) *Adv. Math.* **185** (2004) no. 2, 370–399.
Preprint `math.SG/0107151`.
6. **GKM theory for torus actions with non-isolated fixed points**
(with V. Guillemin) *International Math. Res. Notices* **40** (2004) 2105–2124.
Preprint `math.SG/0308008`.
7. **Real loci of symplectic reductions**
(with R. Goldin) *Trans. AMS*, **356** (2004), no. 11, 4623–4642.
Preprint `math.SG/0209111`.
8. **Conjugation spaces**
(with J-Cl. Hausmann and V. Puppe) *Algebr. Geom. Topol.* **5** (2005) 923-964.
Preprint `math.AT/0409305`.
9. **Computation of generalized equivariant cohomologies of Kac-Moody flag varieties**
(with M. Harada and A. Henriques) *Adv. Math.*, **197** (2005) No. 1, 198–221
Preprint `math.AT/0409305`.
This is a substantially rewritten version of the preprint `math.DG/0402079`.
10. **The equivariant cohomology of hypertoric varieties and their real loci**
(with M. Harada) *Communications in Analysis and Geometry*, **13** (2005) No. 3 645–677.
Preprint `math.SG/0405422`.
11. **A GKM description of the equivariant cohomology ring of a homogeneous space**
(with V. Guillemin and C. Zara) *J. Algebraic Combin.* **23** (2006) no. 1, 21–41.
Preprint `math.SG/0112184`.
12. **Connectivity properties of moment maps on based loop groups**
(with M. Harada, L. Jeffrey and A-L. Mare) *Geom. Topol.* **10** (2006), 1607–1634.
Preprint `math.SG/0503684`.
13. **Orbifold cohomology of torus quotients**
(with R. Goldin and A. Knutson) *Duke Math. J.* **139** (2007) no. 1, 89–139.
Preprint `math.SG/0502429`.
14. **Orbifold cohomology of abelian symplectic reductions and the case of weighted projective spaces.**
Poisson geometry in mathematics and physics, 127–146, *Contemp. Math.*, **450** Amer. Math. Soc., Providence, RI, 2008.
Preprint `arXiv:0704.0257`.

15. **Torsion and abelianization in equivariant cohomology**
(with R. Sjamaar) *Transf. Groups* **13** (2008), no. 3-4, 585–615.
Preprint `math.AT/0607069`.
16. **Act globally, compute locally: group actions, fixed points, and localization**
Toric topology, 179–195, *Contemp. Math.*, **460** Amer. Math. Soc., Providence, RI, 2008.
Preprint `arXiv:0710.5295`.
17. **The Full Orbifold K-theory of Abelian Symplectic Quotients.**
(with R. Goldin, M. Harada and T. Kimura) *J. K-Theory*, 8 (2011) 339–362.
Preprint `arXiv:0812.4964`.
18. **Conjugation spaces and edges of compatible torus actions.**
(with J-Cl. Hausmann) in *Geometric aspects of analysis and mechanics*, 179–198, *Progr. Math.*, **292**, Birkhäuser/Springer, New York, 2011.
Preprint `arXiv:0807.3289`.
19. **Torsion in the full orbifold K-theory of abelian symplectic quotients.**
(with R. Goldin and M. Harada) *Geom. Dedicata*, **157** (2012), 187204.
Preprint `arXiv:0907.5170`.
20. **Equivariant cohomology for Hamiltonian torus actions on symplectic orbifolds**
(with T. Matsumura) *Transform. Groups* **17** (2012), no. 3, 717746.
Preprint `arXiv:1008.3315`.
21. **The topology of toric origami manifolds.**
(with A. R. Pires) *Math. Research Letters*, **20** (2013) no.5, pp.885–906.
Preprint `arXiv:1211.6435`.

Preprints

22. **The fundamental group and Betti numbers of toric origami manifolds.**
(with A. R. Pires) Submitted.
Preprint `arXiv:1407.4737`.
23. **The Morse-Bott-Kirwan condition is local.**
(with Y. Karshon) Submitted.
Preprint `arXiv:1407.3526`.
24. **The equivariant K-theory and cobordism rings of divisive weighted projective spaces.**
(with M. Harada, N. Ray, and G. Williams) Submitted.
Preprint `arXiv:1306.1641`.
25. **Simple Hamiltonian manifolds.**
(with J-Cl. Hausmann), recently accepted at *Communications in Analysis and Geometry*.
Preprint `arXiv:1012.4740`.
26. **How is a graph like a manifold?**
(with E. Bolker and V. Guillemin)
Preprint `math.CO/0206103`.
UPDATE: This is currently being turned into a substantially longer monograph, together with C. Zara.

Conference proceedings, expository articles and theses

27. **The Topology of Toric Origami Manifolds**
(based on joint work with A. R. Pires)
Toric Goemetry. Abstracts from the workshop held April 15–21, 2012. *Oberwolfach Rep.* **21/2012** (2012), 1276–1279.
28. **Topological invariants of orbifolds**
(based in part on joint work with R. Goldin and M. Harada)
Manifold perspectives. Abstracts from the workshop held May 24–30, 2009. *Oberwolfach Rep.* **6** (2009) no. 1, 1531–1534.
29. **Kirwan surjectivity for preorbifold cohomology**
(with R. Goldin and A. Knutson) *Cohomological Aspects of Hamiltonian Group Actions*, Mathematisches Forschungsinstitut Oberwolfach Report no. 20 (2004) 36–39.
30. **Using a card trick to teach discrete mathematics**
(with S. Simonson) PRIMUS, **XIII** no. 3 (2003), 248–269.
31. **Equivariant Cohomology, Homogeneous Spaces and Graphs**
Ph.D. Thesis, MIT, 2002.
32. **Tolerance Sphere-of-Influence Graphs**
Senior Honors Thesis, Dartmouth College, 1997.

Invited talks (selected, since 2004)

1. **The Geometry of Origami: How the ancient Japanese art triumphed over Euclid**
(A public lecture)
Bryn Mawr College, October 2014
Franklin & Marshall College, October 2014
Cornell, Smorgasbord Seminar, July 2014
Balliol College Oliver Smithies Lecture & Oxford Mathematics Special Lecture, May 2014
2. **The Topology of Trousers**
(A public lecture)
Cornell, Tea-Time Tiny Talk, October 2012
Cornell, Workshop for In-Service Teachers, February 2013
Cornell, CAM Mentoring Evening, February 2013
Cornell, Smorgasbord Seminar, July 2013
Cornell, SMI Seminar, July 2013
3. **The Morse-Bott-Kirwan condition is local**
Cornell, Lie Groups Seminar, November 2012
4. **The topology of toric origami manifolds**
IAS Computer Science/Discrete Mathematics Seminar, November 2014
University of Illinois: Poisson 2014, August 2014
Manchester University Transpennine Topology Triangle, May 2014
Edinburgh University EDGE seminar, March 2014
Oxford University Geometry and Analysis Seminar, February 2014
Joint Mathematics Meetings Special Session on Geometric Applications of Algebraic Combinatorics, January 2014
Oberwolfach Workshop on Toric Goemetry, April 2012

5. **Morse Theory and Invariants of (almost) Symplectic Manifolds**
   University of Toronto Symplectic Geometry Seminar, January 2012
   Princeton/IAS Symplectic Geometry Seminar, November 2011
6. **Symplectic Techniques in Toric Topology**
   Princeton, Princeton-Rider Workshop on Homotopy Theory and Toric Spaces, Feb. 2012
   Hausdorff Institute RinG *Topological invariants of orbifold toric varieties*, May 2011
7. **The discrete geometry of moment polytopes**
   Formal Power Series & Algebraic Combinatorics '10, August 2010
8. **Symplectic reduction in stages and orbifold invariants**
   MIT Geometry Seminar, September 2009
   Institut Henri Poincaré, Colloque Paulette Libermann, December 2009
9. **Topological invariants of orbifolds**
   AWM Anniversary Conference at Brown University, September 2011
   Oberwolfach Workshop on Manifold Perspectives, May 2009
10. **Symplectic techniques in algebraic geometry**
    MSRI Connections for Women in Algebraic Geometry, January 2009
11. **Divided difference operators in equivariant cohomology**
    University of Pennsylvania, Combinatorics, Alg. and Geom. Seminar, October 2008
    Université de Genève, Topology Seminar, June 2008
    University of Chicago, Algebraic Topology Seminar, May 2008
12. **The K-theory of Symplectic Orbifolds**
    MSRI conference on Combinatorial, Enumerative and Toric Geometry, March 2009
    Penn State University, Topology Seminar, September 2008
    University of Manchester, Workshop on Toric Topology, July 2008
    CRM Barcelona, Workshop on Moment Maps, June 2008
    Université de Toulouse Paul Sabatier, Topology Seminar, June 2008
13. **Dance of the Astonished Topologist**
    (A public lecture)
    Swarthmore College, Kitao Lecture, December 2014
    MIT, DW Weeks Lecture, January 2012
    Wellesley, Martha Davenport Heard Lecture, September 2011
    MIT, Women in Math Celebration, April 2008
14. **Symplectic techniques in algebraic combinatorial geometry**
    Courant Institute, Lecture at AMS Sectional Meeting, March 2008
15. **Act globally, compute locally: Localization in symplectic geometry**
    IAS Members' Seminar, October 2014
    Princeton Algebraic Topology Seminar, October 2014
    Balliol College Oliver Smithies Lecture & Oxford Mathematics Special Lecture, May 2014
    UC Davis, Algebra and Discrete Mathematics Seminar, April 2010
    San Francisco State University, AGC Seminar, April 2010
    University of Sydney, Mathematics Colloquium, February 2010
    Rutgers University, Plenary lecture at AMS Sectional Meeting, October 2007
16. **The topology of real symplectic manifolds**
    Utrecht University, Geometric Aspects of Analysis and Mechanics, August 2007
17. **Symplectic techniques for computing the cohomology of orbifolds**
    Lafayette College, Spring Geometry and Topology Seminar, March 2008
    Institut Henri Poincaré, Workshop on Quantum Cohomology of Stacks, February 2007

18. **The topology of symplectic quotients**
    University of Georgia, Topology Seminar, September 2006
19. **Loop groups in symplectic geometry**
    Cornell University, Two Lie groups seminars, September 2006
20. **Toric varieties and orbifolds in the symplectic category**
    Osaka City University, International Conference on Toric Topology, May 2006
    Hanoi University of Education, Minicourse, June 2006
21. **The combinatorial structure of moment polytopes**
    Univ. of Minnesota, Duluth, Conference on Communicating Mathematics, July 2007
    Cornell University, Discrete Geometry and Combinatorics Seminar, November 2006
    University of Georgia, VIGRE Graduate Seminar, September 2006
    UConn, SIGMA seminar, April 2006
    Reed College, Colloquium, March 2006
22. **Orbifold cohomology of abelian symplectic quotients**
    Hanoi University of Education, Geometry and Physics IV, June 2006
    National Olympics Memorial Youth Center Tokyo, Poisson 2006 Conference, June 2006
    Wesleyan University, Topology Seminar, April 2006
    SUNY Stony Brook, Symplectic Geometry Seminar, March 2006
    University of Illinois, Urbana-Champaign, Geometry Seminar, November 2005
    Brown University, Geometry Seminar, November 2005
    University of Massachusetts, Amherst, Valley Geometry Seminar, October 2005
    Boston University, Geometry Seminar, October 2005
23. **Act globally, compute locally: group actions, fixed points, and localization**
    Summer Institute in Algebraic Geometry at University of Washington, August 2005
24. **Morse theory in real symplectic geometry**
    University of Minnesota, Colloquium, November 2004
    University of Michigan, Colloquium, November 2004
    Penn State University, Colloquium, December 2004
    University of Connecticut, Colloquium, December 2004
    Ohio State, Colloquium, January 2005
    Cornell University, Colloquium, February 2005
    Texas A&M, Colloquium, February 2005
    Rice University, Colloquium, February 2005
    San Francisco State University, Colloquium, February 2005
    University of Arizona, Colloquium, February 2005
    Australia National University, Colloquium, June 2005
27. **Distinguishing chambers of the moment polytope**
    University of Sydney, Representation Theory Seminar, June 2005
    AWM Workshop for Recent Ph.D.'s and Graduate Students, January 2005

Memberships

American Mathematical Society
Association for Women in Mathematics
Mathematical Association of America

Service (2002–Present)

Service at Cornell

Member of the Cornell A&S College Nominating Committee, 2011–2014
Faculty fellow at Cornell's Becker House, 2009–present
Cornell Mathematics Departmental Service:
Cornell Mathematics Undergraduate Teaching Committee 2007–2009
Cornell Mathematics Curriculum Committee 2010–2011
Cornell Mathematics Library Committee 2011–present
Cornell Mathematics Faculty Search Committee 2011–2013
Cornell Mathematics Graduate Admissions Committee 2006–2009
Faculty Advisor to Cornell Undergraduate Mathematics Club 2009–2010

Service related to professional societies

Co-organizer of *Transforming Post-Secondary Education in Mathematics*, `tpsemath.org`, August 2013–present.
Member of the Council of the American Mathematical Society, 2011–present
Member of the Executive Committee of the Council of the AMS, 2013–present
Chair of the AMS Committee on Education, February 2012–present
Chair of the AMS Committee on Committees, February 2013–present
Member of the Executive Council of the Association for Women in Mathematics, 2012–present
Member of the Board of Directors, Budapest Semesters in Mathematics, 2014–present.

Service in conference and seminar organizing

Member of Cornell Topology Festival Organizing Committee 2006–present
Coorganizer for Cornell/Penn State Joint Symplectic Seminar, 2010–present
Coorganizer for AMS Committee on Education Panel Discussion at JMM in Baltimore, MD
The Public Face of Mathematics, January 2014
Coorganizer for Special Session at Mathematical Congress of the Americas,
Guanajuato, Mexico, Toric geometry and topology, August 2013
Coorganizer for AMS Committee on Education Panel Discussion at JMM in San Diego, CA
Mathematics serving students in other disciplines, January 2013
Local coorganizer for AMS Sectional Meeting at Cornell, September 2011
Coorganizer for MSRI Graduate Student Learning Seminar, Spring 2010
Coorganizer for Fields Institute conference on Math. Physics and Geometric Analysis,
January 2008
Coorganizer for AMS Special Session at Rutgers University on
Invariants of Lie Group Actions and Their Quotients, October 2007
Coorganizer for Project NExT Panel Discussion at JMM New Orleans on
Mentoring graduate students, January 2007
Coorganizer for AMS Special Session at University of Connecticut on
Combinatorial Methods in Equivariant Topology, October 2006
Coorganizer for Banff International Research Station conference on
Moment maps in various geometries, May 2005
Coorganizer for Amerincan Institute of Mathematics workshop on
Moment maps and surjectivity in various geometries, August 2004
Coorganizer for UC Berkeley Symplectic Geometry seminar, Fall 2002–Spring 2005
Coorganizer for UC Berkeley Groups and Algebraic Geometry seminar,
Spring 2003–Fall 2004
Coorganizer for MIT conference on Symplectic Geometry, April 2002

Service in publishing

Associate Editor for the *American Mathematical Monthly*, 2012–present
Referee for *Advances in Mathematics*, *Commentarii Mathematici Helvetici*, *Contemporary Mathematics*, *Transformation Groups*, *J. Sympl. Geom.*, *Beitraege*, *IMRN*, *Inventiones*, *Archiv der Mathematik*, *Geometry and Topology*, *Discrete and Computational Geometry*, *J. European Mathematics Society*.
Reviewer for Mathematics Reviews, 2001–20012

Service in reviewing

Proposal reviewer for National Science Foundation (2007, 2012, 2013, 2014)
Proposal reviewer for National Security Agency (2010)
Proposal reviewer for Natural Sciences and Engineering Research Council of Canada (2009)
Member of the Vassar College Mathematics Visiting Committee, February 2013
Alumna member of MIT Corporation Visiting Committee to the Dept. of Mathematics, Fall 2003–2011

PhD Theses and Postdoctoral Fellows Supervised

1. Tomoo Matsumura (Cornell University, H.C. Wang Assistant Professor, 2008–2011)
   Matsumura and I have worked together studying orbifolds and their invariants. He has attended two of my graduate courses, and I have advised him about his teaching at the undergraduate and graduate level. We have written one paper, and continue to discuss mathematics informally. He is currently in a research position at Korea Advanced Institute of Science and Technology.
2. Ana Rita Pires (Cornell University, H.C. Wang Assistant Professor, 2011–2014)
   Pires arrived at Cornell in July 2011. We are working together on the topology of origami manifolds, and have produced one published paper and one preprint so far. We are looking forward to continuing our close collaboration for one more semester at the Institute for Advanced Study, where we will both spend the Autumn of 2014. She has started a tenure track position at Fordham University.
3. Milena Pabiniak (Cornell University, PhD May 2012)
   Pabiniak has completed one project in equivariant symplectic geometry, studying Hamiltonian S^1-actions and localization. She is now working on lower bounds on Gromov width of coadjoint orbits, using toric degeneration to improve known bounds. After spending a semester in Toronto, she is currently a post doc at Instituto Superior Técnico in Lisbon.
4. Shisen Luo (Cornell University, PhD May 2013)
   Luo has completed one project on the topology of toric contact manifolds, which led to some joint work with T. Matsumura and F. Moore. He has completed a second project on questions that arise in equivariant topology that are related to rigidity. He graduated in May 2013, and began a position at Goldman Sachs.
5. My Huynh (Cornell University, PhD student)
   Huynh is just beginning his doctoral studies with me. He is beginning a project on studying symplectic embeddings of balls and ellipsoids in polygon spaces. This project will include learning some basics of symplectic geometry, in preparation for the A-exam, and will get him started in his thesis research.