

TARA S. HOLM  
CURRICULUM VITÆ

**Address**

Department of Mathematics – Malott Hall  
Cornell University  
Ithaca, NY 14853-4201  
tsh@math.cornell.edu

Office Phone (607) 255-2392  
Fax (607) 255-7149  
Home Phone (607) 272-0363  
<http://www.math.cornell.edu/~tsh/>

**Field of research**

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

**Employment**

2005-Present Cornell University: Assistant Professor  
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

**Awards, Grants, and Honors**

PCCW Affinito-Stewart Research Grant (Cornell funding body), 2008  
NSF Conference Grant DMS-0758479 in Topology & Geometric Analysis, 2008  
Professional Development Grant from Cornell ADVANCE program, 2007  
Invited one hour AMS address, Rutgers University, October 2007  
NSF Disciplinary Grant DMS-0604807 in Geometric Analysis, 2006-2009  
AIM Project NExT Fellow, 2006-2007  
US Junior Oberwolfach Fellow (an NSF grant), 2004  
National Science Foundation, Postdoctoral Research Fellowship, 2002-2005  
Clay Foundation Liftoff Fellowship, Summer 2002  
American Institute of Mathematics, Finalist for AIM Five-Year Fellowship, 2002  
National Defense Science and Engineering Graduate Fellowship, 1997-2000

**Teaching Experience (selected)**

- Spring 2009 Head instructor for Calculus I (1110) at Cornell
- Fall 2008 Supervisor for independent study in algebra for an undergraduate at Cornell
- Fall 2008 Instructor for (graduate) seminar in toric topology (7510) at Cornell
- Spring 2008 Instructor for (graduate) symplectic geometry (758) at Cornell
- Spring 2008 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
- Fall 2005 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
- Nov 2000 Recitation instructor for Discrete Mathematics at ArsDigita University
- Sept 2000 Instructor for Mathematics for Computer Science at ArsDigita University
- Fall 2000 Recitation instructor for linear algebra (18.06) at MIT
- Fall 1999 Recitation instructor for single variable calculus (18.01) at MIT

**Graduate student and postdoctoral mentoring**

- Currently advising one graduate student
- Currently serving as a secondary member for three additional graduate students
- Currently mentoring one postdoctoral fellow

**Publications**

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.**  
*Contemp. Math.: Poisson geometry in mathematics and physics*, **450** (2008) 127–146.  
Preprint arXiv:0704.0257.
15. **Torsion and abelianization in equivariant cohomology**  
(with R. Sjamaar) *Transf. Groups* **13** (2008) no. 3/4, 585–616.  
Preprint math.AT/0607069.

#### Manuscripts accepted for publication

16. **Act globally, compute locally: group actions, fixed points, and localization**  
*Contemp. Math.*, to appear.  
Preprint arXiv:0710.5295.

#### Preprints

17. **Conjugation spaces and edges of compatible torus actions.**  
(with J-Cl. Hausmann)  
Preprint arXiv:0807.3289.
18. **How is a graph like a manifold?**  
(with E. Bolker and V. Guillemin) Currently being turned into a much more substantial monograph, with (in addition) C. Zara.  
Preprint math.CO/0206103.

**Conference proceedings, expository articles and theses**

19. **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.
20. **A combinatorial card trick**  
(with S. Simonson) PRIMUS, XIII no. 3 (2003), 248–269.
21. **Equivariant Cohomology, Homogeneous Spaces and Graphs**  
Ph.D. Thesis, MIT, 2002.
22. **Tolerance Sphere-of-Influence Graphs**  
Senior Honors Thesis, Dartmouth College, 1997.

**Invited talks (Fall 2005–present)**

1. **Divided difference operators in equivariant cohomology**  
Binghamton University, Topology Seminar, December 2008  
University of Pennsylvania, Combinatorics, Algebra and Geometry Seminar, Oct 2008  
Université de Genève, Topology Seminar, June 2008  
University of Chicago, Algebraic Topology Seminar, May 2008
2. **The K-theory of Symplectic Orbifolds**  
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
3. **Dance of the Astonished Topologist**  
MIT, Women in Math Celebration, April 2008
4. **Symplectic techniques in algebraic combinatorial geometry**  
Courant Institute, Lecture at AMS Sectional Meeting, March 2008
5. **Act globally, compute locally: Localization in symplectic geometry**  
Rutgers University, Invited address at AMS Sectional Meeting, October 2007
6. **The topology of real symplectic manifolds**  
Utrecht University, Geometric Aspects of Analysis and Mechanics, August 2007
7. **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
8. **The topology of symplectic quotients**  
University of Georgia, Topology Seminar, September 2006
9. **Loop groups in symplectic geometry**  
Cornell University, Two Lie groups seminars, September 2006
10. **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
11. **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

**12. 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

**13. Act globally, compute locally: group actions, fixed points, and localization**

Summer Institute in Algebraic Geometry at University of Washington, August 2005

**Memberships**

American Mathematical Society

Association for Women in Mathematics

Mathematical Association of America

**Service**

Referee for *Advances in Mathematics*, *Commentarii Mathematici Helvetici*, *Contemporary Mathematics*, *Transformation Groups*.

NSF grant proposal reviewer, 2007

Reviewer for Mathematics Reviews, Summer 2001–present

Alumna member of MIT Corporation Visiting Committee to the Dept. of Mathematics, Fall 2003–Present

Member of Cornell Mathematics Hiring Committee 2008–present,

Cornell Topology Festival Organizing Committee 2006–present,

Cornell Mathematics Undergraduate Teaching Committee 2007–2008,

Cornell Mathematics Graduate Admissions Committee 2006–2008.

Coorganizer for Fields Institute conference on

Mathematical 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 American 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

Organizer of the MIT Math Graduate Student Seminar, Fall 1998–Spring 2002