

PAUL E. GUNNELLS

**Office**

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**Home**

20 Bayberry Lane  
Amherst, MA 01002

**Personal**

Born 4 August 1967 in Atlanta, Georgia. Married, with two children.

**Degrees**

BS 1989, with honors, Stanford University. Honors thesis: *The topology of hypersurface singularities*. Advisor: Steven Kerckhoff.  
PhD 1994, MIT. Thesis title: *The topology of Hecke correspondences*. Advisor: Robert D. MacPherson.

**Experience**

Tufts University. Instructor, 1994–95.  
Columbia University. Ritt Assistant Professor, 1995–99.  
Barnard College, Columbia University. Visiting Assistant Professor, 1999–2000.  
Rutgers University (Newark). Assistant Professor, 2000–02.  
Max Planck Institut für Mathematik (Bonn). Research affiliate, Spring 2001.  
University of Massachusetts (Amherst), Assistant Professor, 2002–06.  
University of Massachusetts (Amherst), Associate Professor, 2006–12.  
University of Massachusetts (Amherst), Professor, since 2012.  
ICERM, Brown University, Research Fellow for special semester *Automorphic Forms, Combinatorial Representation Theory and Multiple Dirichlet Series*, Spring 2013.

**Research Interests**

Algebraic geometry, number theory, representation theory, and topology of singular spaces (MR Classification Numbers: 11F, 20G, 14M)

**Publications**

*Appeared/To Appear*

- [1] *Modular symbols for  $\mathbf{Q}$ -rank one groups and Voronoï reduction*, J. of Number Theory **75** (1999), no. 2, 198–219.
- [2] *Symplectic modular symbols*. Duke Math. J. **102** (2000), no. 2, 329–350.
- [3] *Finiteness of minimal modular symbols for  $SL_n$* . J. of Number Theory **82** (2000), no. 1, 134–139.
- [4] *Computing Hecke eigenvalues below the cohomological dimension*, J. of Experiment. Math. **9** (2000), no. 3, 351–367.
- [5] *Computing special values of partial zeta functions*, with Gautam Chinta and Robert Sczech, Algorithmic number theory (Leiden, 2000), 247–256, Lecture Notes in Comput. Sci., 1838, Springer, Berlin, 2000.
- [6] *Modular symbols and Hecke operators*, Algorithmic number theory (Leiden, 2000), 347–358, Lecture Notes in Comput. Sci., 1838, Springer, Berlin, 2000.
- [7] *Eisenstein series twisted by modular symbols for the group  $SL_n$* , with Dorian Goldfeld. Math. Res. Lett. **7** (2000), 1–10.

- [8] *Toric modular forms and nonvanishing of  $L$ -functions*, with Lev A. Borisov. J. Reine Angew. Math. **539** (2001), 149–165.
- [9] *Toric varieties and modular forms*, with Lev A. Borisov, Invent. Math. **144** (2001), no. 2, 297–325.
- [10] *Elliptic functions and equations of modular curves*, with Lev A. Borisov and Sorin Popescu, Math. Ann. **321** (2001), no. 3, 553–568.
- [11] *A smooth space of tetrahedra*, with Eric Babson and Richard Scott, Adv. Math. **165** (2002), no. 2, 285–312.
- [12] *Cohomology of congruence subgroups of  $SL(4, \mathbf{Z})$* , with Avner Ash and Mark McConnell, J. of Number Theory **94** (2002), 181–212.
- [13] *Wonderful blowups associated to group actions*, with Lev A. Borisov, Selecta Math. N.S. **8** (2002), no. 3, 373–379.
- [14] *Evaluation of Dedekind sums, Eisenstein cocycles, and special values of  $L$ -functions*, with Robert Sczech. Duke Math. J. **118** (2003), no. 2, 229–260.
- [15] *Hecke operators and  $\mathbf{Q}$ -groups associated to self-adjoint homogeneous cones*, with Mark McConnell, J. of Number Theory **100** (2003), no. 1, 46–71.
- [16] *Toric modular forms of higher weight*, with Lev A. Borisov, J. Reine Angew. Math. **560** (2003), 43–64.
- [17] *A characterization of Dynkin elements*, with Eric Sommers, Math. Res. Lett. **10** (2003), no. 2–3, 363–373.
- [18] *Some elementary Ramanujan graphs*, Geometriae Dedicata. **112** (2005), no. 1, 53–65.
- [19] *Geometry of the tetrahedron space*, with Eric Babson and Richard Scott. Adv. Math. **204** (2006), no. 1, 176–203.
- [20] *Cells in Coxeter groups*, Notices of the AMS, **53** (2006), no. 5, 528–535.
- [21] *Computing in higher rank*, appendix to the book *Modular Forms, a computational approach*, by William Stein, GSM v.79, American Math. Society.
- [22] *Robert MacPherson and arithmetic groups*, Pure and Appl. Math. Quarterly **2** (2006), no. 4, 1015–1052. Special volume dedicated to Robert MacPherson.
- [23] *Weyl group multiple Dirichlet series constructed from quadratic twists*, with Gautam Chinta, Invent. Math. **167** (2007), no.2, 327–353.
- [24] *On certain integral Schreier graphs of the symmetric group*, with Richard Scott and Byron Walden, Electronic J. of Combinatorics **14** (2007), no. 1.
- [25] *Lattice polytopes, Hecke operators, and the Ehrhart polynomial*, with Fernando Rodriguez Villegas, Selecta Math. **13** (2007), 253–276.
- [26] *On the  $p$ -parts of quadratic Weyl multiple Dirichlet series*, with Gautam Chinta and Solomon Friedberg, J. Reine Angew. Math. **623** (2008), 1–23. J. Reine Angew. Math.
- [27] *Cohomology of congruence subgroups of  $SL(4, \mathbf{Z})$  II*, with Avner Ash and Mark McConnell, J. of Number Theory **128** (2008), no. 8, 2263–2274.
- [28] *Hecke operators and Hilbert modular forms*, with Dan Yasaki, Algorithmic number theory (Banff, 2008), 387–401, Lecture Notes in Comput. Sci., 5011, Springer, Berlin, 2008.
- [29] *Constructing Weyl group multiple Dirichlet series*, with Gautam Chinta, J. Amer. Math. Soc. **23** (2010), 189–215.
- [30] *Cohomology of congruence subgroups of  $SL_4(\mathbf{Z})$  III*, with Avner Ash and Mark McConnell, Math. Comp. **79** (2010), 1811–1831.
- [31] *Weyl group multiple Dirichlet series of type  $A_2$* , with Gautam Chinta. *Number Theory, Analysis and Geometry: In Memory of Serge Lang*, 125–142, Springer, New York, 2012.
- [32] *On the cohomology of congruence subgroups of  $SL_4(\mathbf{Z})$* , Proceedings of the RIMS workshop *Automorphic representations, automorphic  $L$ -functions, and arithmetic*, (ed. Yoshi-Hiro Ishikawa), RIMS Kôkyûroku 2009.
- [33] *Automata and cells in affine Weyl groups*, Represent. Theory **14** (2010), 627–644.
- [34] *Torsion in the cohomology of congruence subgroups of  $SL(4, \mathbf{Z})$  and Galois representations*, with Avner Ash and Mark McConnell. J. Algebra **325** (2011), 404–415.

- [35] *Kazhdan–Lusztig cells in infinite Coxeter groups*, with Misha Belolipetsky, to appear in Proceedings of Belfast (UK) meeting Workshop on Algebra, Combinatorics and Dynamics, August 17–21, 2009. (Also available in Russian.)
- [36] *Littelman patterns and Weyl group multiple Dirichlet series of type D*, with Gautam Chinta, *Multiple Dirichlet Series, L-functions and Automorphic Forms*, 119–130, Birkhäuser Boston, 2012.
- [37] *Modular forms and elliptic curves over the field of fifth roots of unity*, with Farshid Hajir and Dan Yasaki. *Experimental Math.* **22** (2013), no. 2, 203–216
- [38] *Metaplectic Whittaker functions and Crystals of type B*, with Ben Brubaker, Dan Bump, and Gautam Chinta, *Multiple Dirichlet Series, L-functions and Automorphic Forms*, 93–118, Birkhäuser Boston, 2012.
- [39] *Metaplectic Ice*, with Ben Brubaker, Dan Bump, Gautam Chinta, and Solomon Friedberg, *Multiple Dirichlet Series, L-functions and Automorphic Forms*, 65–92, Birkhäuser Boston, 2012.
- [40] *Resolutions of the Steinberg module for  $GL(n)$* , with Avner Ash and Mark McConnell. *J. Algebra* **349** (2012), 380–390.
- [41] *Generalized Burnside rings and module categories*, with Andrew Rose and D. Rumynin. *J. Algebra* **358** (2012), 33–50.
- [42] *Modular forms and elliptic curves over the cubic field of discriminant  $-23$* , with Dan Yasaki. *Int. J. Number Theory* **9** (2013), no. 1, 53–76.
- [43] *On Hilbert modular threefolds of discriminant 49*, with Lev A. Borisov. *Selecta Math. (N.S.)* **19** (2013), no. 4, 923–947.
- [44] *Lectures on computing cohomology of arithmetic groups.* in *Computations with Modular Forms*, edited by G. Böckle and G. Wiese. Proceedings of a Summer School and Conference, Heidelberg, August/September 2011. Contributions in Mathematical and Computational Sciences (Springer-Verlag) **6** (2014), 3–45.
- [45] *Cells in Coxeter Groups I*, with Misha Belolipetsky. *J. Algebra* **385** (2013), 134–144.
- [46] *Mod 2 homology for  $GL(4)$  and Galois representations*, with Avner Ash and Mark McConnell. *J. Number Theory* **146** (2015), 4–22 (special issue dedicated to Steve Rallis).
- [47] *Kazhdan–Lusztig Cells in planar hyperbolic Coxeter groups and automata*, with Mikhail Belolipetsky and Richard Scott. *International Journal of Algebra and Computation* **24** (2014), no. 5, 757–772.
- [48] *Crystal graphs, Tokuyama’s formula, and the Gindikin–Karpelevič formula for  $G_2$* , with Holley Friedlander and Louis Gaudet. *Journal of Algebraic Combinatorics* **41** (2015), no. 4, 1089–1102.
- [49] *A table of elliptic curves over the cubic field of discriminant  $-23$* , with Steve Donnelly, Arian Klages-Mundt, and Dan Yasaki. *Exp. Math.* **24**, (2015), no. 4, 375–390.
- [50] *On the homology of linear groups over imaginary quadratic fields*, with Mathieu Dutour Sikirić, Herbert Gangl, Jonathan Hanke, Achill Schürmann, and Dan Yasaki. To appear in *Journal of Pure and Applied Algebra*.
- [51] *A Class of Hash Functions Based on the Algebraic Eraser*, with Iris Anshel, Derek Atkins, and Dorian Goldfeld. *Groups, Complexity, and Cryptology*, **8**, (2016), no. 1, 1–7.
- [52] *Metaplectic Demazure operators and Whittaker functions*, with Gautam Chinta and Anna Puskás. *Indiana University Mathematics Journal*, **66**, (2017), no. 3, 1045–1064.
- [53] *Torus orbits on homogeneous varieties and Kac polynomials of quivers*, with Emmanuel Letellier and Fernando Rodriguez Villegas. To appear in *Math. Zeit.*
- [54] *Exotic matrix integrals: the Albert algebra and the spin factor*. To appear in *Moscow Math. Journal*.

*Submitted/Preprints*

Most preprints are available from [arXiv.org](https://arxiv.org).

- [55] *Units, polyhedra, and a conjecture of Satake*, with Jacob Sturm. Preprint 2002.
- [56] *On toric varieties and modular forms*, MPIM preprint 2001. This is a writeup of a talk given at the Arbeitstagung, Bonn, 2001.

- [57] *On the cryptanalysis of the generalized simultaneous conjugacy search problem and the security of the Algebraic Eraser*. Submitted 2011.
- [58] *Defeating the Kalka–Teicher–Tsaban linear algebra attack on the Algebraic Eraser*, with Dorian Goldfeld. Submitted 2011.
- [59] *On topological computation of  $K_4$  of the Gaussian and Eisenstein integers*, with Mathieu Dutour Sikirić, Herbert Gangl, Jonathan Hanke, Achill Schürmann, and Dan Yasaki. Submitted 2014.
- [60] *Defeating the Ben-Zvi, Blackburn, and Tsaban Attack on the Algebraic Eraser*, with Iris Anshel, Derek Atkins, and Dorian Goldfeld. Preprint 2016.
- [61] *On the growth of torsion in the cohomology of arithmetic groups*, with Avner Ash, Mark McConnell, and Dan Yasaki. Submitted 2016.
- [62] *Tiered trees, weights, and  $q$ -Eulerian numbers*, with William Dugan, Sam Glennon, and Einar Steingrímsson. Submitted 2017.
- [63] *Ironwood Meta Key Agreement and Authentication Protocol*, with Iris Anshel, Derek Atkins, and Dorian Goldfeld. Submitted 2017.
- [64] *The Bott – Brion – Dehn – Ehrhart – Euler – Khovanskii – Maclaurin – Puklikov – Sommerville – Vergne formula for simple lattice polytopes*, with M. Beck and E. Materov. Preprint 2017.

*In preparation*

- [65] *The Atiyah–Singer theorem and elementary number theory (2nd ed.)*, with Friedrich E. P. Hirzebruch and Don Zagier (approximately 250 new pages to be written, currently have 175 pp. completed)
- [66] *The Voronoi cone method for homology computations*, with Mathieu Dutour Sikirić, Herbert Gangl, Jonathan Hanke, Achill Schürmann, and Dan Yasaki.
- [67] *On the cohomology of congruence subgroups of  $GL_3$  over the Eisenstein integers*, with Dan Yasaki and Mark McConnell.
- [68] *Cohomology with twisted one-dimensional coefficients for congruence subgroups of  $GL(4, \mathbf{Z})$  and Galois representations*, with Avner Ash and Mark McConnell.

**Awards and Honors**

Simons Fellow in Mathematics, 2012.

**Research Grants**

- NSF Graduate Fellow, 1989–1993.
- NSF Mathematical Sciences Computing Research Environments grant DMS 9627870, 1996–1999.
- NSF Mathematical Sciences Grant, *Algebraic geometry and number theory*, DMS 0070747, DMS 0196109, DMS 0245580, (PI); July 1, 2000—June 30, 2004, \$67,850.
- Rutgers Competitive Fellowship Grant, spring 2001.
- NSF Mathematical Sciences Grant, *Algebraic geometry, number theory, and representation theory* DMS 0401525, (PI); July 1, 2004—June 30, 2008, \$107,000.
- Five College Number Theory Seminar *Program in analysis in number theory*, 2005–2007 NSA Mathematical Sciences Program CWSS, H98230-05-1-0291, co-PI with Robert Benedetto, Gregory Call, Giuliana Davidoff, Farshid Hajir, Leanne Robertson, Margaret Robinson, Thomas Weston, and Siman Wong.
- NSF Mathematical Sciences Computing Research Environments grant DMS 0619492, 2006, \$84,000. Co-PI with Hans Johnston, Markos Katsoulakis, Panayotis Kevrekidis, and Bruce Turkington.
- NSF Mathematical Sciences Grant, *Problems in number theory and representation theory*, DMS 0801214, (PI); July 1, 2008—June 30, 2012, \$150,001.
- NSF Mathematical Sciences Grant, *Problems in arithmetic groups and multiple Dirichlet series*, DMS 1101640, (PI); July 1, 2011–June 30, 2014, \$155,891.

- NSF Mathematical Sciences Grant, *Multiple Dirichlet series, Whittaker functions, and the cohomology of arithmetic groups*, DMS 1501832, (PI); July 1, 2015–June 30, 2018, \$218,207.
- NSF Mathematical Sciences Grant, *EAGER: Braid Statistics and Hard Problems in Braid Groups with Applications to Cryptography*, DMS 1551271, (PI); July 1, 2015–June 30, 2017, \$149,989.

### Meetings organized

- Special session on arithmetic geometry and modular forms*, AMS Eastern Section Meeting, with Farshid Hajir, Durham, NH, Spring 2006.
- Special session on automorphic forms and arithmetic geometry*, AMS Eastern Section Meeting, with Gautam Chinta, Hoboken, NJ, Spring 2007.
- Low-dimensional topology and number theory*, BIRS Workshop, Banff, Alberta, with David Boyd, Walter Neumann, and Adam Sikora, Fall 2007.
- Dedekind sums in geometry, topology, and arithmetic*, BIRS Workshop, Banff, Alberta, with Matthias Beck and Adam Sikora, Fall 2009.
- Whittaker Functions, Crystal Bases, and Quantum Groups*, BIRS Workshop, Banff, Alberta, with Ben Brubaker, Dan Bump, and Gautam Chinta, Summer 2010.
- Low-dimensional topology and number theory*, Oberwolfach Workshop, Germany, with Walter Neumann, Adam Sikora, and Don Zagier, Summer 2010.
- Torsion and arithmetic groups: geometry, arithmetic, and computation*, BIRS Workshop, Banff, Alberta, with Frank Calegari and Akshay Venkatesh. Summer 2012.
- Low-dimensional topology and number theory*, Oberwolfach Workshop, Germany, with Walter Neumann, Adam Sikora, and Don Zagier, Summer 2012.
- Whittaker Functions: Number Theory, Geometry and Physics*, BIRS Workshop, Banff, Alberta, with Ben Brubaker, Dan Bump, Solomon Friedberg, and Gautam Chinta. Fall 2013.
- Curves and Automorphic forms*, Arizona State University, with David Farmer, John Jones, and Holley Swisher. Spring 2014.
- Low-dimensional topology and number theory*, Oberwolfach Workshop, Germany, with Walter Neumann, Adam Sikora, and Don Zagier, Summer 2014.
- Computational Representation Theory in Number Theory*, Oregon State University, with David Farmer, John Jones, Kiran Kedlaya, Holley Swisher, and John Voight.
- Special session on automorphic forms, combinatorics and representation theory*, AMS Western Section Meeting, with Dan Bump, Sol Friedberg, and Anna Puskas, Salt Lake City, UT, Spring 2016.
- Whittaker Functions: Number Theory, Geometry and Physics*, BIRS Workshop, Banff, Alberta, with Ben Brubaker, Dan Bump, Solomon Friedberg, and Gautam Chinta. Summer 2016.
- Modularity and Bianchi groups*, Université du Luxembourg, member of scientific committee along with Nicolas Bergeron and Gebhard Boeckle. Summer 2016.
- Low-dimensional topology and number theory*, Oberwolfach Workshop, Germany, with Walter Neumann, Adam Sikora, and Don Zagier, 2017.
- Cohomology of Arithmetic Groups, Lattices and Number Theory: Geometric and Computational Viewpoint*, CIRM Luminy, with Eva Bayer Fluckiger, Phillippe Elbaz-Vincent, and Graham Ellis, 2019.

### Selected talks and conferences

#### *Special addresses*

- Japan–U.S. Mathematical Institute (JAMI) 2001, Johns Hopkins, *Toric varieties and modular forms*, Spring 2001.
- Arbeitstagung 2001, Bonn, Germany, *On toric varieties and modular forms*, Summer 2001.
- MSRI Summer Graduate Program on Modular forms, Berkeley, California, Summer 2006. Gave a short course of four lectures on computing cohomology of arithmetic groups.

- Southeast Regional Meeting on Numbers 2009, UNC Greensboro, plenary address, *Multiple Dirichlet Series*.
- Columbia–NYU–CUNY Joint Number Theory Seminar, *Weyl group multiple Dirichlet series*, Fall 2010. Gave three separate talks (talk for graduate students, Colloquium-style talk, detailed research talk).
- Summer school on Computational Modular forms, Heidelberg, Germany, Summer 2011. Gave a short course of five lectures on cohomology of arithmetic groups, automorphic forms, and computational techniques.
- UNCG Summer School in Computational Number Theory 2014 on Modular Forms and Geometry. Gave a short course of three lectures on modular symbols and modular forms.
- UNCG Summer School in Computational Number Theory 2017 on Modular Forms and Geometry. Gave a short course of three lectures on modular symbols and modular forms.

#### Colloquia

- University of Arizona, *Configuration varieties and the space of tetrahedra*, Fall 2004.
- University of Massachusetts, *Dedekind sums in arithmetic and geometry*, Fall 2005.
- City College of New York Joint Math–CS Colloquium. *Expander graphs*, Spring 2012.
- Center for Women in Mathematics at Smith College, *Impartial games*, Spring 2015.

#### Research Seminars

- MIT Number Theory Seminar, *Weyl group multiple Dirichlet series*, Spring 2009.
- Brown Algebra Seminar, *Modular forms and elliptic curves over  $\mathbf{Q}(\zeta_5)$* , Spring 2009.
- CUNY Graduate Center (New York), Collaborative Number theory seminar, *Modular forms and elliptic curves over  $\mathbf{Q}(\zeta_5)$* , Spring 2009.
- Boston University Algebra Seminar, *Modular forms and elliptic curves over  $\mathbf{Q}(\zeta_5)$* , Spring 2010.
- University of Texas Number Theory Seminar, *Modular forms and elliptic curves over number fields*, Fall 2011.
- University of North Carolina (Greensboro) Number Theory Seminar, *Automorphic forms, cohomology, and Galois representations*, Spring 2015.
- Boston University Algebra Seminar, *On the growth of torsion in the cohomology of arithmetic groups*, Spring 2017.

#### Invited talks and workshops

- Automorphic representations, automorphic  $L$ -functions, and arithmetic, RIMS, Kyoto, Japan, *On the cohomology of congruence subgroups of  $SL(4, \mathbf{Z})$* , Spring 2009.
- Stanford Workshop on Multiple Dirichlet Series, Stanford, California, *On  $p$ -parts of Weyl group multiple Dirichlet series*, Summer 2009.
- Explicit methods in number theory, Oberwolfach, Germany, *Modular forms and elliptic curves over  $\mathbf{Q}(\zeta_5)$* , Summer 2009.
- Computational Arithmetic Geometry, Warwick, UK, *Hecke operators, automorphic forms, and the cohomology of arithmetic groups I*, Fall 2009.
- Dedekind sums in geometry, topology, and arithmetic (co-organizer), Banff International Research Station, Alberta, Canada, Fall 2009.
- Eastern section of the AMS (Lie Algebras and Representation Theory) Newark, NJ, *Automata and affine Kazhdan–Lusztig cells*, Spring 2010.
- Whittaker Functions, Crystal Bases, and Quantum Groups (co-organizer), Banff International Research Station, Alberta, Canada, Summer 2010.
- Low-dimensional topology and number theory (co-organizer), Oberwolfach, Germany, Summer 2010.
- Durham Days on Modular Forms, Durham, UK, *Weyl group multiple Dirichlet series*, Summer 2010.
- Computations with explicit reduction theories (SQuaRE – Structured Quartet Research Ensemble), American Institute of Mathematics, Palo Alto, California, Spring 2011.

Number theory and physics at the crossroads, Banff International Research Station, Alberta, Canada, *Whittaker functions and lattice models*, Spring 2011.

Explicit methods in number theory, Oberwolfach, Germany, *On Hilbert modular threefolds of discriminant 49*, Summer 2011.

Computations with explicit reduction theories (SQuaRE – Structured Quartet Research Ensemble), American Institute of Mathematics, Palo Alto, California, Spring 2012.

Conference in honor of Dan Bump, Stanford University, *The Metaplectic Demazure character formula*, Summer 2012.

Explicit methods in number theory, Oberwolfach, Germany, Summer 2013.

Computations with explicit reduction theories (SQuaRE – Structured Quartet Research Ensemble), American Institute of Mathematics, Palo Alto, California, Fall 2013.

Analytic Number Theory and its Applications: A Conference in Honor of Jeff Hoffstein, Thessaloniki, Greece, *Modular forms and elliptic curves over number fields*, Summer 2014.

Explicit methods in number theory, Oberwolfach, Germany, *On the growth of torsion in the cohomology of arithmetic groups*, Summer 2015.

Computations in the cohomology of arithmetic groups, Oberwolfach, Germany, *Modular symbols and the Sharbly complex*, Fall 2016.

#### *Graduate/Undergraduate/High school Colloquia*

PROMYS program (Boston University), *Diophantine equations in polynomials*, Summer 2004.

TAP program (UMass-Amherst), *Diophantine equations in polynomials* and *Configuration spaces*, Fall 2004.

TWIGS (UMass-Amherst), *What is a stratified space?*, Fall 2005.

TAP program (UMass-Amherst), *Ramanujan graphs*, Fall 2006.

UConn Math Club (UConn), *Ramanujan graphs*, Fall 2007.

PROMYS program (Boston University), *Configuration spaces*, Summer 2008.

TWIGS (UMass-Amherst), *What is a modular form?*, Fall 2009.

PROMYS program (Boston University), *Expander graphs*, Summer 2010.

## Service

### *Past UMass Departmental Service*

Colloquium Committee, 2001–02.

Graduate Affairs Committee, 2002–06.

Faculty search subcommittees (Number theory (Chairman) 2002–03; Topology, 2002–2012; Number theory and algebra, 2003–2012).

Course chair, Math 131, Spring 2004, Spring 2009.

Development Coordinator, 2004–05.

TAP seminar organizer, Fall 2004.

Algebra graduate examination committee, 2002–04.

Geometry graduate examination committee, 2004–05.

Research Computing Facility Committee, 2005–06.

*Dedekind Sums: a bridge between topology and number theory*, article for the 2005 Departmental Newsletter.

Departmental Personnel Committee, 2006–08, 2010–11.

Faculty Search Committee, 2008–10.

*Patterns in the Primes*, article for the 2009 Departmental Newsletter.

Development Coordinator, 2005–11.

Henry Jacob Mathematics Competition, 2005–11.

Newsletter Committee, 2006–12.

AQAD Committee, 2011–12.

Graduate Affairs Committee, 2011–12.

Departmental TA Training and Supervision, 2011–12.

*The ABC Conjecture: proved or not?*, article for the 2013 Departmental Newsletter.

#### *Current UMass Departmental Service*

Co-organizer of Five College Number Theory Seminar, since 2002.  
Topology graduate examination committee, since 2006.  
Vision committee (chair), 2013–2014.  
Strategic planning committee, since 2014.

#### *University Service*

College of Natural Sciences and Mathematics Awards Committee, 2008–09.  
College of Natural Sciences Personnel Committee, since 2013. Co-chair 2014–15.

#### *Professional*

Moderator for the number theory section (`math.NT`) of the preprint server `arXiv.org`, since 1999.  
Member of the `arXiv:math` advisory committee `arXiv.org`, since 2014.  
Editor of *Online Journal of Analytic Combinatorics*, since 2014.  
Referee for various journals, including Journal of the AMS, Compositio, Duke Mathematical Journal, Advances in Mathematics, Annals of Mathematics, Mathematische Annalen, Journal of Number Theory, Pure and Applied Mathematics Quarterly, International Journal of Number Theory, Experimental Mathematics, Journal of Algebraic Geometry, SIDMA, SICOMP, Proceedings of the AMS, Indagationes Mathematicae, Mathematics of Computation, Comptes rendus Mathematique, Annales of the Quebec Society, Acta Arithmetica, Nagoya Math Journal, Journal of Pure and Applied Algebra.  
Referee for various grant programs: National Science Foundation (NSF), National Security Agency (NSA), National Sciences and Engineering Research Council of Canada (NSERC), Austrian Science Fund (FWF), CUNY Research Award Program, The Danish Council for Independent Research (Natural Sciences), the Simons Foundation, and AmSud.  
Reviewer for Mathematical Reviews (41 reviews) and Zentralblatt (8 reviews).  
See also **Meetings organized**.

#### **Additional teaching service**

Mentor for the PROMYS program, Boston University, since 2002. Results from the 2013 project *A Generalization of Tokuyama's Formula to the Hall-Littlewood Polynomials* by Vineet Gupta, Uma Roy, and Roger Van Peski appeared in the Electronic Journal of Combinatorics **22** (2015), no. 2.  
Committee for the honors thesis of Jennie D'Ambroise, Univ. of Mass., 2002.  
Supervised undergraduate research and honors thesis of Daniel Epstein, Univ. of Mass., 2004–05. *The space of hypertetrahedra*.  
Supervised undergraduate research of Alexander McAvoy, Univ. of Mass., Summer 2006. *Cayley graphs on two generators for the symmetric group*.  
Supervised undergraduate research of Jacob Mitchell, Univ. of Mass., Fall 2006. *Arithmetic hyperbolic orbifolds*. Summer 2007. *Graphics in hyperbolic 3-space*.  
Doctoral thesis committee member, Eli Beechaven, Univ. of Mass., 2007.  
Doctoral thesis committee member (external), Joel Moller, Lehigh, 2008.  
Doctoral thesis committee member, Chris McDaniel, Univ. of Mass., 2010.  
Thesis supervisor, Patrick Boland, Univ. of Mass., 2010. *Geometry of Satake and Toroidal compactifications*. (Currently at Univ. of Michigan)  
Postdoctoral advisor, Dan Yasaki, Univ. of Mass., 2005–08. (Currently tenured at UNC Greensboro)  
Supervised undergraduate research of Andrew Havens, Univ. of Mass., Summer 2009. *Hyperbolic Kazhdan–Lusztig cells*.  
Co-supervised (with Siman Wong) graduate research of Jeffrey Hatley and Julie Rana, Univ. of Mass., Summer 2010. *Computation of Galois representations*.  
Supervised graduate research of Jeffrey Hatley, Univ. of Mass., 2010. *Galois representations and cohomology of arithmetic groups*.



Doctoral thesis committee member (external), Alexander Rahm, Institut Fourier, UJF Grenoble (France), 2010. *Cohomologies and K-theory of Bianchi groups using computational geometric methods*.  
 Doctoral thesis committee member, Adam Gamzon, Univ. of Mass., 2011.  
 Undergraduate thesis supervisor, Aria Klages-Mundt, Amherst College, 2011. *Computing Elliptic Curves over Complex Cubic Fields*.  
 Thesis supervisor, Holley Friedlander, Univ. of Mass., 2013. *Weyl group multiple Dirichlet series over the rational function field*. Currently tenure-track at Dickinson College.  
 Supervised undergraduate research of Louis Gaudet, Univ. of Mass., 2013. Results of the project published in *Crystal graphs, Tokuyama's formula, and the Gindikin–Karpelevič formula for  $G_2$*  (see publication list).  
 Doctoral thesis committee member (external), Aurel Page, Bordeaux (France), 2014. *Méthodes explicites pour les groupes arithmétiques*.  
 Postdoctoral advisor, Jun Wen, Univ. of Mass., 2014–2017.  
 Thesis supervisor, Samuel Glennon, Univ. of Mass., 2017. *Coverings of graphs and tiered trees*.  
 Undergraduate thesis supervisor, Zachary Plummer, Univ. of Mass., 2015. *Design and Development of a Video Game with Applied Graph Theory*.  
 Thesis supervisor, Matthew Bates, Univ. of Mass., since 2015.  
 Undergraduate thesis supervisor, William Dugan, Univ. of Mass., 2017. *Tiered Trees, Weights,  $q$ -Eulerian Numbers, and Applications to Hyperplane Arrangements*.  
 Habilitation à Diriger des Recherches committee member for Alexander Rahm, Mathématiques de Paris Centre Campus Jussieu (France), 2017. *Torsion Subcomplex Reduction*.  
 Doctoral thesis committee member (external), Thomas Camus, Grenoble (France), 2017. *Méthodes algorithmiques pour les réseaux algébriques*.  
 Postdoctoral advisor, Anna Puskas, Univ. of Mass., 2017–present.

## References

Avner Ash, Boston College.  
 Dan Bump, Stanford University.  
 John Cremona, Warwick University, UK.  
 Dorian Goldfeld, Columbia University.  
 Steve Kudla, University of Toronto.  
 Robert MacPherson, Institute for Advanced Study.  
 Samuel Patterson, Universität Göttingen.  
 Glenn Stevens, Boston University.  
 T. N. Venkataramana, Tata Institute, Bombay.  
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