

Updated June 2021

## CURRICULUM VITAE

### **CRISTINA BALLANTINE**

Distinguished Professor of Science  
Department of Mathematics and Computer Science  
College of the Holy Cross  
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### Research Interests

Number Theory, Automorphic Forms and Representation Theory, Buildings, Algebraic Combinatorics, Graph Theory, Visualization of Complex Functions.

### Education

- Ph.D.**      University of Toronto, Canada (November 1998)  
Advisor: Professor James Arthur  
Thesis: *Hypergraphs and Automorphic Forms*
- M.Sc.**      University of Toronto, Canada (November 1992)
- Diplom**     University of Stuttgart, Germany (1988)

### Academic Appointments

- |                          |   |
|--------------------------|---|
| Sept. 2021 – Present     | College of the Holy Cross: <i>Distinguished Professor of Science</i>                    |
| Sept. 2018 – August 2021 | College of the Holy Cross:<br><i>Anthony and Renee Marlon Professor in the Sciences</i> |
| Sept. 2014 – Aug. 2018   | College of the Holy Cross: <i>Professor</i>   |
| Sept. 2015 – Dec. 2015   | ICERM (Brown University): <i>Visiting Researcher</i>                                    |
| Sept. 2007 – Aug. 2014   | College of the Holy Cross: <i>Associate Professor</i>                                   |
| Jan. 2013 – May 2013     | ICERM (Brown University): <i>Visiting Researcher</i>                                    |
| Sept. 2002 – Aug. 2007   | College of the Holy Cross: <i>Assistant Professor</i>                                   |
| Sept. 2004 – July 2005   | Universität Münster: <i>Fulbright Research Scholar</i>                                  |
| Sept. 2000 – Aug. 2002   | Dartmouth College: <i>J.W. Young Research Instructor</i>                                |
| Sept. 1999 – Aug. 2000   | Bowdoin College: <i>Visiting Assistant Professor</i>                                    |
| Sept. 1998 – Aug. 1999   | University of Wyoming: <i>Visiting Assistant Professor</i>                              |
| Sept. 1996 – Jan. 1998   | University of Toronto, Canada: <i>Instructor</i>  |
| Aug. 1994 – Dec. 1994    | Santa Rosa Junior College, CA: <i>Instructor</i>  |

## Research and Publications

### Refereed Research Papers

1. Alignments of permutations: their number, mean number, and total number of cycles (with Mircea Merca), submitted.
2. Generalizations of Stanley's Theorem: Combinatorial Proofs and Related Inequalities (with Mircea Merca), submitted.
3. 4-Regular partitions and the pod function (with Mircea Merca), submitted.
4. Beck-type companion identities for Franklin's identity (with Amanda Welch), submitted.
5. Almost 3-regular overpartitions with Mircea Merca), accepted to *Ramanujan J.*
6. Beck-type identities: new combinatorial proofs and a modular refinement (with Amanda Welch), accepted to *Ramanujan J.*
7. Beck-type identities for Euler pairs of order  $r$  (with Amanda Welch), accepted to *PROMS (Proceedings in Mathematics & Statistics)*.
8. Combinatorial Proof of the Minimal Excludant Theorem (with Mircea Merca), accepted to the *International Journal of Number Theory*.
9. Beck-type companion identities for Franklin's identity via a modular refinement (with Amanda Welch), *Discrete Mathematics*, 344 (8) (2021) 112480, 11 pp.
10. Minimal Excludant and colored partitions (with Mircea Merca), *Sém. Lothar. Combin.* 84B (2020), Art. 23, 12 pp.
11. Combinatorial proofs of two theorems related to the number of even parts in all partitions of  $n$  into distinct parts (with Mircea Merca), *Ramanujan J.* 54 (2021), no. 1, 107–112.
12. The  $r$ -Stirling numbers of the first kind in terms of the Möbius function (with Mircea Merca), *Ramanujan J.* 55 (2021), no. 2, 593–608.
13. Quasisymmetric Power Sums (with Zajj Daugherty, Angela Hicks, Sarah Mason and Elizabeth Niese), *J. Combin. Theory Ser. A* 175 (2020), 105273, 37 pp.
14. Bisected Theta Series, Least  $r$ -Gaps in Partitions, and Polygonal Numbers (with Mircea Merca), *Ramanujan J.*, 52 (2020), no. 2, 433–444.
15. On identities of Watson type (with Mircea Merca), *Ars Math. Contemp.* 17 (2019), no. 1, 277–290.
16. A Combinatorial proof of an Euler identity type theorem of Andrews (with Richard Bielak), *Ann. Comb.* 23 (2019), no. 3-4, 511–525.
17. On lacunary recurrences for Fibonacci numbers (with Mircea Merca), *Miskolc Math. Notes*, Vol. 20 (2019), No. 2, pp. 767–772.
18. Almost partition identities (with George E. Andrews), *Proc. Natl. Acad. Sci. USA* 116 (2019), no. 12, 5428–5436.

19. Jacobi's Four and Eight Squares Theorems and Partitions into Distinct Parts (with Mircea Merca), *Mediterr. J. Math.* 16 (2019), no. 2, Art. 26, 15 pp.
20. Quasisymmetric Power Sums (with Zajj Daugherty, Angela Hicks, Sarah Mason and Elizabeth Niese), Proceedings of the 30<sup>th</sup> Conference on Formal Power Series and Algebraic Combinatorics (Hanover), *Séminaire Lotharingien de Combinatoire* 80B (2018), Article #25, 12 pp.
21. Combinatorial Proofs of Two Truncated Theta Series Theorems (with Mircea Merca, Donny Passary, and Ae Ja Yee), *J. Combin.Theory Ser. A*, 160 (2018), 168–185
22. Euler-Riemann zeta function and Chebyshev-Stirling numbers of the first kind (with M. Merca), *Mediterr. J. Math.* 15 (2018), no. 3, Art. 123, 10 pp.
23. Finite differences of Euler's zeta function (with Mircea Merca), *Miskolc Math. Notes* 18 (2017), no. 2, 639–642.
24. Parity of sums of partition numbers and squares in arithmetic progressions (with Mircea Merca), *Ramanujan J.* 44 (2017), no. 3, 617–630
25. Inequalities involving the generating function for the number of partitions into odd parts (with Mircea Merca), *Quaest. Math.* 40 (2017), no. 3, 319–332
26. New convolutions for the number of divisors (with Mircea Merca), *J. Number Theory* 170 (2017), 17–34
27. Padovan numbers as sums over partitions into odd parts (with Mircea Merca), *J. Inequal. Appl.* 2016, Paper No. 1, 14 pp.
28. Stability of coefficients in the Kronecker product of a hook and a rectangle (with William T. Hallahan), *J. Phys. A: Math. Theor.* 49 (2016), no. 5, 055203 (21pp)
29. Explicit construction of Ramanujan bigraphs (with B. Feigon, R. Ganapathy, J. Kool, K. Maurischat and Amy Wooding). In *Women in Numbers Europe: Research Directions in Number Theory*, Association for Women in Mathematics Series, Springer Verlag, September 2015, 1–16, ISBN 978-3-319-17986-5.
30. Schur positivity in a square (with Rosa Orellana), *Elec. Journal of Combinatorics*, Vol 21, Issue 3 (2014), #P3.46, 1-36.
31. Connections: Graphs through Number Theory, *CMS Notes*, Vol. 44, No 4, Sept. 2012, 16–17.
32. Powers of the Vandermonde determinant, Schur functions and recursive formulas, *J. Phys. A: Math. Theor.* 45, No. 31 (2012)
33. Powers of the Vandermonde determinant, Schur functions, and the dimension game, 23rd International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2011), Proceedings of the conference held in Reykjavik, June 13–17, 2011. *Discrete Mathematics & Theoretical Computer Science Proceedings (DMTCS)*, 87–98.

34. Ramanujan bigraphs associated with  $SU(3)$  over a  $p$ -adic field (with D. Ciubotaru), *Proc. Amer. Math. Soc.* 139, 6 (2011), 1939–1953.
35. Colour visualization of Blaschke product mappings (with D. Ghisa), *Complex Var. Elliptic Equ.* 55 (2010), no. 1-3, 201–217.
36. Global mapping properties of rational functions (with D. Ghisa), *Progress in analysis and its applications*, 13–22, World Sci. Publ., Hackensack, NJ, 2010.
37. Color visualization of Blaschke self-mappings of the real projective plane (with D. Ghisa), *Rev. Roumaine Math. Pures Appl.* 54 (2009), no. 5–6, 375–394.
38. A mathematical analysis of some indices used to classify ammonite shells, *Lethaia Seminar, Lethaia*, Vol. 40, 2007, 197–198.
39. A Combinatorial Interpretation for the Coefficients in the Kronecker Product  $s_{(n-p,p)} * s_\lambda$  (with R. Orellana), *Séminaire Lotharingien de Combinatoire* 54A, 2006, Article B54Af.
40. Determinants Associated to Zeta Matrices of Posets (with S. Frechette and J. Little), *Linear Algebra and its Applications* 411, 2005, 364-370.
41. On the Kronecker Product  $s_{(n-p,p)} * s_\lambda$  (with R. Orellana), refereed abstract, on CD-ROM: FPSAC (Formal Power Series and Algebraic Combinatorics) 2005, Taormina, Italy.
42. On the Kronecker Product  $s_{(n-p,p)} * s_\lambda$  (with R. Orellana), *Elec. Journal of Combinatorics*, Vol 12, 2005, R28, 1-26.
43. Hecke Operators for  $GL_n$  and Buildings (with T. Shemanske and J. Rhodes), *Acta Arithmetica* 112, 2004, 131-140.
44. Ramanujan Type Graphs and Bigraphs, Dynamical systems and differential equations (Wilmington, NC, 2002), *Discrete and Continuous Dynamical Systems*, 2003, suppl., 78–82.
45. A Simple Proof of Rolle’s Theorem for Finite Fields (with J. Roberts), *The American Mathematical Monthly*, Vol. 109 (1), 2002, 72-74.
46. A Hypergraph with Commuting Partial Laplacians, *Canad. Math. Bull.*, Vol. 44 (4), 2001, 385-397.
47. Ramanujan Type Buildings, *Canad. J. Math.*, Vol. 52 (6), 2000, 1121-1148.

### Research Papers In-Progress

48. Mock theta functions and related combinatorics, (with Hannah Burson, Amanda Folsom, Chi-Yun Hsu, Isabella Negrini, and Boya Wen), in preparation
49. Beck Type Companion Identities to Lehmer’s Identity, (with Hannah Burson, Amanda Folsom, Chi-Yun Hsu, Isabella Negrini, and Boya Wen), in preparation

### Non-refereed Publications

50. James G. Arthur: AMS 2017 Leroy P. Steele Prize for Lifetime Achievement, James Cogdell and Freydoon Shahidi, Guest Editors. Contributions by David Vogan, Ngô Bào Châu, Robert Langlands, Colette Moeglin, Jean-Loup Waldspurger, Eric Friedlander, and Cristina Ballantine, *Notices Amer. Math. Soc.* 65 (2018), no. 6, 637–645.
51. Rolle’s Theorem over Local Fields (with. T. Shemanske), preprint
52. Math Mom, *The Funnel* (the news magazine of the German-American Fulbright Commission), Number 1, Volume 42, Winter 2005, 16–17.

### Translations

53. Early Cretaceous microfacies and algae from the central - eastern sectors of the Moesian Carbonate Platform, by Ovidiu Dragastan, Ion Stefan Popescu, Aida Popescu, *Acta Paleontologica Romaniaae*, Vol. 5, 2005, 141–162 (translation from Romanian into English).

### Grants, Awards, Honors

2018 –2021	Anthony and Renee Marlon Professorship in the Sciences
June 2019	IAS Summer Collaborators Program (with Shai Evra, Brooke Feigon, Kathrin Maurischat, and Ori Parzanchevski)
2012 – 2018	Simons Foundation Collaboration Grant (\$35,000)
2012	O’Leary Faculty Recognition Award
2012	Marfuggi Research Award
2011	Research and Publication Grant (\$1600)
2009	AWM-NSF Travel Grant (\$887)
2008	Research and Publication Grant (\$3000)
2006	Batchelor Ford Foundation Summer Fellowship (\$3,500)
2004 – 2005	Fulbright Junior Research Award to Germany (\$21,700)
2004	Batchelor Ford Foundation Summer Fellowship (\$3,500)
2003	Research and Publication Grant (\$500)
2002	AWM-NSF Travel Grant (\$700)
1996	Daniel B. DeLury Teaching Award (University of Toronto)
1992–1994, 1995–1997	University of Toronto Open Fellowship
1991–1992	Simcoe Fellowship

### Invited Presentations

- Nov. 2019 *On a Minimal Excludant Theorem and its Generalization*, AMS Fall Southeastern Sectional Meeting, Gainesville, FL
- May 2019 *Almost Partitions Identities*, IMAR (Institute of Mathematics of the Romanian Academy), "Nicolae Popescu" Number Theory Seminar, Bucharest, Romania
- Jan. 2018 *Bisected Theta Series, Least  $r$ -Gaps in Partitions, and Polygonal Numbers*, Special Session on a Showcase of Number Theory at Liberal Arts Colleges, Joint Mathematics Meetings, San Diego, CA
- Apr. 2017 *Ramanujan Graphs*, AIM Workshop on Arithmetic Golden Gates, San Jose, CA
- Jan. 2017 *Explicit constructions of Ramanujan Bigraphs*, AWM Workshop: Special Session on Number Theory, Joint Mathematics Meetings, Atlanta, GA
- Oct. 2016 *Ramanujan graphs*, IMAR (Institute of Mathematics of the Romanian Academy), "Nicolae Popescu" Number Theory Seminar, Bucharest, Romania
- Sep. 2016 *Easy to state, hard to prove*, 8-th annual NEMATYC dinner meeting, Worcester, MA
- Sep. 2016 *Ramanujan graphs and bigraphs*, WPI Discrete Mathematics Seminar, Worcester, MA
- Sep. 2016 *Stability of coefficients in the Kronecker product of a hook and a rectangle*, AMS Fall Eastern Sectional Meeting, Bowdoin College, Brunswick, ME
- Jan. 2016 *Graphs and Number Theory*, AWM Distinguished Lecture Series, University of Oregon, Eugene, OR
- Jan. 2016 *Rolle's Theorem for Polynomials over Finite Fields*, AWM Distinguished Lecture Series, University of Oregon, Eugene, OR
- May 2015 *The Kronecker product for symmetric group representations indexed by a hook and a rectangle*, Representation Theory and Related Topics, University of Connecticut, Storrs, CT
- Mar. 2015 *Ramanujan bigraphs - explicit constructions*, 29th Automorphic Forms Workshop, Ann Arbor, MI
- Feb. 2015 *Rolle's Theorem for Polynomials over Finite Fields*, Colloquium, Amherst College, Amherst, MA
- Jan. 2015 *Schur Positivity in a Square*, Joint Mathematics Meetings, San Antonio, TX, Special Session in Algebraic Combinatorics and Representation Theory
- Sept. 2014 *Decomposing mathematical objects*, Faculty lunch series, College of the Holy Cross, Worcester, MA

- June 2014 *Expander graphs: algebraic and combinatorial constructions*, SUMRY, Yale University, New Haven, CT
- Oct. 2013 *Explicit Constructions of Ramanujan Bigraphs*, Women in Numbers, CIRM, Luminy, France
- June 2013 *Ramanujan Bigraphs*, Special Session on Discrete Mathematics and Theoretical Computer Science, Joint AMS-Romanian Mathematical Society Meeting, Alba Iulia, Romania
- Apr. 2013 *The Iwahori-Hecke Algebra, the Ramanujan Conjecture, and Expander Graphs*, Workshop on Combinatorics, Multiple Dirichlet Series and Analytic Number Theory, ICERM, Providence, RI
- Dec. 2012 *The Vandermonde Determinant Plays Tetris*, Undergraduate Research Colloquium, University of North Texas, Denton, TX
- Dec. 2012 *Graphs and Number Theory*, Millican Colloquium, University of North Texas, Denton, TX
- Mar. 2012 *Ramanujan bigraphs*, Collaborative Number Theory Seminar, CUNY Graduate Center, New York, NY
- Dec. 2011 *Ramanujan bigraphs*, Algebra seminar, Wesleyan University, Middletown, CT
- Sept. 2011 *Ramanujan bigraphs associated with  $SU(3)$  over a  $p$ -adic field*, AWM Anniversary Conference, Brown University, Providence, RI
- Mar. 2011 *Powers of the Vandermonde determinant, Schur functions and the dimension game*, post-baccalaureate student seminar, Smith College, Northampton, MA
- Oct. 2010 *Powers of the Vandermonde determinant, Schur functions and the dimension game*, colloquium, Dartmouth College, Hanover, NH
- June 2009 *Expander graphs - algebraic and combinatorial constructions*, Potsdam, NY, REU at SUNY Potsdam
- Apr. 2009 *Blaschke Product Mappings: Visualization and Automorphic Properties*, Worcester, MA, Special Session on Number Theory, AMS Eastern Sectional Meeting
- Nov. 2008 *Expander graphs - Algebraic and combinatorial constructions*, Bard College, NY, Discrete Math Days in the Northeast
- Mar. 2008 *Biregular expanders and the Ramanujan Conjecture*, Montreal, QE, Québec-Vermont Number Theory Seminar
- Mar. 2008 *Combinatorics and representation theory of  $p$ -adic groups*, New York, NY, Special Session on L-Functions and Automorphic Forms, AMS Eastern Sectional Meeting
- Feb. 2008 *Biregular expanders and the Ramanujan Conjecture*, Los Angeles, CA, IPAM Workshop on Expanders in Pure and Applied Mathematics

- Jan. 2008 *Determinants associated to Zeta matrices of posets and their relation to graph theory*, San Diego, CA, Special Session on Zeta Functions of Graphs, Ramanujan Graphs, and Related Topics, Joint Meetings of the AMS.
- Sept. 2007 *Biregular expanders and the Ramanujan Conjecture*, Orono, ME  
Maine/Québec Number Theory Conference
- Jan. 2007 *Combinatorics and Representation Theory of  $p$ -adic Groups*, Ottawa, Canada  
Workshop on the Representation Theory of Reductive Algebraic Groups
- Apr. 2007 *The Zeta Function and the Riemann Hypothesis for Graphs*, Worcester, MA  
Worcester Undergraduate Mathematics Symposium
- July 2006 *Combinatorics and Representation Theory of  $p$ -adic Groups*,  
University of Victoria, BC
- Oct. 2005  *$GL_n(\mathbb{Q}_p)$  - From Buildings to Representations and Back*, Orono, Maine  
Maine/Québec Number Theory Conference
- Nov. 2004 *On the Kronecker Product  $s_{(n-p,p)} * s_\lambda$* , Hannover, Germany  
Algebra Seminar, Universität Hannover
- Feb. 2004 *Ramanujan Type Graphs and Bigraphs*, IPAM, Los Angeles  
Workshop on Automorphic Forms, Group Theory and Graph Expansion
- May 2002 *Ramanujan Type Graphs and Bigraphs*, Wilmington, NC  
Fourth International Conference on Dynamical Systems  
and Differential Equations
- Apr. 2001 *Spectra of Graphs and Automorphic Forms*  
Univ. of Massachusetts Amherst
- Oct. 2000 *Hypergraphs and Automorphic Forms*  
Five College Number Theory Seminar
- Oct. 1999 *Expander Graphs and Automorphic Forms*, Orono, Maine  
Second Annual Maine-Québec Number Theory Conference

### Other Presentations

- June 2020 *The minimal excludant and colored partitions*, (poster) FPSAC 2020, Ramat-Gan, Israel (virtual)
- Feb. 2020 *The Minimal Excludant of a Partition*, Faculty Seminar, College of the Holy Cross
- Nov. 2019 *Almost Partition Identities*, WPI Discrete Mathematics Seminar, Worcester, MA
- June 2019 *Almost Partition Identities*, Clavius Seminar, College of the Holy Cross
- Nov. 2018 *Modeling with Ramanujan Graphs*, Honors Seminar, College of the Holy Cross



- Nov. 2018 *Partitions decorated with bit strings and Watson type identities*, Faculty Seminar, College of the Holy Cross
- Sept. 2018 *Partitions decorated with bit strings*, WPI Discrete Mathematics Seminar, Worcester, MA
- July 2018 *Proofs with no (or very few) words*, Summer Research Program, College of the Holy Cross
- June 2018 *A combinatorial proof of Andrews' theorem related to Euler's identity*, Combinatory Analysis 2018, A conference in honor of George Andrews' 80th birthday, Penn State University, State College, PA
- Apr. 2018 *Quasisymmetric power sums*, WPI Discrete Mathematics Seminar, Worcester, MA
- Nov. 2017 *Bisected theta series*, WPI Discrete Mathematics Seminar, Worcester, MA
- Apr. 2017 *The Kronecker product for symmetric group representations indexed by a hook and a rectangle*, WPI Discrete Mathematics Seminar, Worcester, MA
- Feb. 2017 *A brief introduction to integer partitions (biased toward parity results)*, WPI Discrete Mathematics Seminar, Worcester, MA
- July 2016 *A brief introduction to integer partitions*, Clavius Seminar, College of the Holy Cross
- Apr. 2015 *Partitions and Divisors*, Faculty Seminar, College of the Holy Cross
- July 2014 *Easy to state, hard to prove*, Summer Research Program, College of the Holy Cross
- July 2014 *Polynomials over finite fields vs. polynomials over the reals*, Summer Research Seminar, College of the Holy Cross
- Feb. 2014 *Schur Positivity in a Square*, Faculty Seminar, College of the Holy Cross
- Aug. 2012 *Unitary groups over  $p$ -adic fields and biregular Ramanujan graphs*, Building Bridges: 1<sup>st</sup> EU-US Conference on Automorphic Forms and Related Topics, Aachen, Germany
- June 2011 *Powers of the Vandermonde determinant, Schur functions and the dimension game*, (poster) FPSAC11, Reykjavik, Iceland
- June 2010 *Infinite families of regular expanders of arbitrary constant degree obtained via the modified zig-zag product*, Conference on  $\mathbf{0} - \mathbf{1}$  Matrix Theory and Related Topics, University of Coimbra, Portugal
- Apr. 2010 *Combinatorial results about  $\langle \mathbf{a}_\delta^{2k}, \mathbf{s}_\lambda \rangle$* , University of Seville, Department of Algebra, Seville, Spain
- July 2009 *Global Mapping Properties of Rational Functions* ISAAC, Imperial College, London, UK

- Mar. 2008 *Biregular expanders and the Ramanujan Conjecture*  
College of the Holy Cross
- June 2007 *Ramanujan Graphs and Representation Theory of  $p$ -adic Groups*  
6th Congress of Romanian Mathematicians, Bucharest, Romania
- July 2006 *Combinatorics and Representation Theory of  $p$ -adic Groups*  
College of the Holy Cross, Clavius Seminar
- July 2006 *From Buildings to Representations and Back Via Hecke Operators*  
Canadian Number Theory Association IX Meeting, Vancouver, BC
- May 2006 *Zeta Functions of Graphs, Buildings and Ramanujan Graphs*, IAS, Princeton  
Program for Women and Mathematics
- Mar. 2006  *$GL_n(\mathbb{Q}_p)$  - From Buildings to Representations and Back Via Hecke Operators*  
20th Annual Workshop on Automorphic Forms, Boulder, CO
- Mar. 2006 *Zeta Functions of Finite Graphs, the Graph Theoretic Riemann Hypothesis  
and Ramanujan Graphs*, College of the Holy Cross
- June 2005 *On the Kronecker Product  $s_{(n-p,p)} * s_\lambda$*  (poster), Taormina, Italy  
17th Annual International Conference on Formal Power Series and  
Algebraic Combinatorics
- June 2005 *On the Kronecker Product  $s_{(n-p,p)} * s_\lambda$* , Mainz, Germany  
Joint Meetings of the AMS, DMV and ÖMG
- June 2005 *Towards a  $p$ -adic Langlands Program*, Münster, Germany  
Oberseminar, Universität Münster
- Apr. 2005 *Bounded Spherical Functions for  $GL_2(\mathbb{Q}_p)$* , Münster, Germany  
Number Theory Seminar, Universität Münster
- Nov. 2004  *$p$ -adic Differential Equations*, Münster, Germany  
Oberseminar, Universität Münster
- Oct. 2004 *Ramanujan Graphs*, Münster, Germany  
Number Theory Seminar, Universität Münster
- Nov. 2003 *Rolle's Theorem Over Finite and Local Fields*, Wellesley, MA  
MAA/NES regional meeting
- Oct. 2002 *Rolle's Theorem over Finite and Local Fields*, College of the Holy Cross
- Jan. 2002 *A Simple Proof of Rolle's Theorem for Finite Fields*, San Diego  
Joint Mathematics Meetings, General Contributed Paper Session
- Nov. 2001 *Expander Graphs and Automorphic Forms*, Dartmouth College
- Mar. 2001 *Spectra of Graphs and Automorphic Forms*, Palo Alto, CA  
15th Annual Workshop on Automorphic Forms and Related Topics

- Apr. 2000 *The Langlands Program*, Bowdoin College
- Jan. 2000 *Ramanujan Type Buildings*, Joint Mathematics Meetings, Washington, D.C.  
Special Session on Modular Forms and Elliptic Functions
- Dec. 1999 *The Endoscopy Theory for the Unitary Group in Three Variables*  
Waldspurger Seminar (held at Harvard University)
- Dec. 1999 *Ramanujan Type Buildings*, Bowdoin College
- Nov. 1999 *Buildings*, Bowdoin College
- Sept. 1999 *Characterization of Nilpotent and Regular Orbits in Classical Lie Algebras*  
Waldspurger Seminar (held at Harvard University)
- Mar. 1999 *Ramanujan Type Buildings*, Santa Barbara, CA  
13th Annual Workshop on Automorphic Forms and Related Topics
- Mar. 1999 *Applications of Number Theory to Subjects From Music to Physics*  
University of Wyoming
- Feb. 1999 *The Hecke Algebra and the Satake Isomorphism*  
Algebra–Combinatorics Seminar, University of Wyoming
- Nov. 1998 *Affine Buildings*  
Joint Seminar on Algebraic Combinatorics, Colorado State University
- Oct. 1998 *Buildings as Hypergraphs and Their Spectra*  
Joint Seminar on Algebraic Combinatorics, Colorado State University
- Oct. 1998 *On the Problem of Classifying Automorphic Representations* (after J. Arthur)  
Algebra–Combinatorics Seminar, University of Wyoming
- Sept. 1998 *Partial Laplacians, Hypergraphs and Telephone Networks*  
Colloquium, University of Wyoming

### Panels

- Feb. 2013 *Job Applications in Academia*  
ICERM, Providence, RI
- Feb. 2013 *Hiring Process*  
ICERM, Providence, RI
- Feb. 2005 *The Role of the Exchanging Scholar*  
Fulbright Berlin Seminar, Berlin, Germany
- Jan. 2001 *Keeping Active in Research*  
Joint Meetings of the AMS, New Orleans, LA

## Conference Organization and Administration

- Mar. 2020 *Special Session on special Sets of Integers in Modern Number Theory* (with H. Graves) AMS Spring Southeastern Sectional Meeting, Charlottesville, VA (canceled due to COVID19 -rescheduled for March 2022)
- Jan. 2018 *A Gathering of Worcester Mathematicians*, Joyce Contemplative Center, College of the Holy Cross
- June 2015 *Special Session on Algebraic Combinatorics and Representation Theory* (with O. Azenhas, University of Coimbra, Portugal) AMS-EMS-SPM International Meeting, Porto, Portugal
- Oct. 2014 *Special Session on Combinatorial Representation Theory* (with R. Orellana and M. Rosas) AMS Fall Sectional Meeting, Halifax, Canada
- Apr. 2011 *Special Session on Combinatorial Representation Theory* (with R. Orellana) AMS Spring Sectional Meeting, Worcester, MA
- Nov. 2006 *Discrete Math Day in the Northeast* (with S. Frechette and J. Little), College of the Holy Cross
- Mar. 2006 *20th Annual Workshop on Automorphic Forms*, Boulder, CO (session chair)
- Jan. 2003 *Special Session on Elliptic Curves, Modular Forms and Related Topics* (with S. Frechette and H. Rosson) Joint Meetings of the AMS, Baltimore, MD

## Other Conferences Attended

- May 2021 *New connections in number theory and physics*, Newton Institute, virtual
- 2020-21 *Vanderbilt Number Theory Seminar*, virtual
- June 2020 FPSAC, virtual
- June 2020 AlCoVe (*An Algebraic Combinatorics Virtual Experience*), virtual
- June 2020 CANT, virtual
- 2016-20 *Discrete Mathematics Seminar*, WPI, Worcester MA (regular participant)
- July 2019 *FPSAC, Formal Power Series and Algebraic Combinatorics*, University of Ljubljana, Slovenia
- Oct. 2019 *MPS Conference on High-Dimensional Expanders*, Simons Foundation, New York, NY
- May 2019 *Transient Transcendence in Transylvania*, Brasov, Romania
- Apr. 2019 *Discrete Math Days in the Northeast*, University of Massachusetts, Amherst, MA

- Oct. 2018 *Srinivasa Ramanujan: in celebration of the centenary of his election as FRS*, The Royal Society, London, UK
- June 2018 *FPSAC, Formal Power Series and Algebraic Combinatorics*, Dartmouth College, Hanover, NH
- March 2018 *SUMS* (undergraduate conference), Brown University, Providence, RI
- May 2017 *Algebraic Combinatorics 2*, BIRS, Banff, Canada (all local expenses funded by the institute)
- Apr. 2017 *Arithmetic Golden Gates*, AIM, San Jose, CA (fully funded)
- Apr. 2016 *Discrete Math Days in the Northeast*, Smith College, Northampton, MA
- Sept. 2015 *WIMIN15*, Smith College, Northampton, MA
- Sept. 2015 *Discrete Math Days in the Northeast*, WPI, Worcester, MA
- Aug. 2015 *Arithmetic 2015: Silvermania*, Brown University, Providence, RI
- May 2015 *Automorphic Forms: Advances and Applications*, Luminy, France (all local expenses funded by the institute)
- Nov. 2014 *Combinatorics and Complexity of Kronecker Coefficients*, AIM, Palo Alto, CA (fully funded)
- Sept. 2014 *WIMIN14*, Smith College, Northampton, MA
- June 2014 *Stanley@70*, MIT, Cambridge, MA
- May 2014 *Workshop on Polynomials over Finite Fields*, CRM, Barcelona, Spain
- Apr. 2014 *Discrete Math Days in the Northeast*, Dartmouth College, Hanover, NH
- Oct. 2013 *WIN-E (Women in Numbers, Europe)*, Luminy, France (fully funded)
- Sept. 2013 *WIMIN13*, Smith College, Northampton, MA
- Dec. 2012 *Rational Catalan Combinatorics*, AIM, Palo Alto, CA (fully funded)
- Sept. 2012 *WIMIN12*, Smith College, Northampton, MA
- Sept. 2012 *Discrete Math Day in the NE*, Middlebury College, Ripton, VT
- March 2012 *New York Women in Mathematics and Computing, "Forward to Professorship Workshop"*, City Tech, CUNY, New York
- March 2007 *Buildings and Combinatorial Representation Theory*, AIM, Palo Alto, CA (fully funded)
- March 2006 *Discrete Math Day*, SUNY, Albany, NY
- Nov. 2005 *Lie Groups, Representations and Discrete Mathematics* IAS, Princeton, NJ (partially funded)

Sept. 2005 *Discrete Math Day*, WPI, Worcester, MA

Oct. 2004 *Conference on Automorphic Forms and the Trace Formula*, in honor of James Arthur on the occasion of his 60th birthday, Toronto, Canada (fully funded)

### Courses Taught

At Holy Cross:

MATH 110: Topics in Discrete Mathematics  
MATH 136: Advanced Placement Calculus  
MATH 135: Calculus I  
MATH 136: Calculus II  
MATH 241: Multivariable Calculus  
MATH 242: Principles of Analysis  
MATH 243: Mathematical structures  
MATH 243: Algebraic structures  
MATH 244: Linear Algebra  
MATH 357: Combinatorics  
MATH 351: Abstract Algebra I  
MATH 352: Abstract Algebra II  
MATH 353: Number Theory  
MATH 392: Seminar on Expander Graphs  
MATH 392: Seminar on the Theory of Partitions  
Passport - Functions  
ITQ (Improving Teacher Quality)

At Dartmouth College:

Calculus, Honors Calculus, Multivariable Calculus, Honors Multivariable Calculus, Honors Number Theory, Topics in Algebra (graduate)

At Bowdoin College:

Integral Calculus, Advanced Topics in Algebra, Statistical Reasoning

At the University of Wyoming:

Finite Mathematics, Multivariable Calculus, Theory of Numbers

At the University of Toronto:

Calculus

At Santa Rosa Junior College:

Finite Mathematics

### Tutorials, Internships, Honor Theses

At Holy Cross:

Honors Thesis, HNRS 494-495: Amy Borbely '07

*The Mathematics of Patterns: Symmetry in the Plane* (2006-2007)

Honors Thesis, HNRS 494-495: Clarice Ferolito '09  
*Analogue of the Littlewood Conjecture* (2008-2009)

Honors Thesis, HNRS 494-495: Kate Donovan '09  
*A Combined Graph Theory and Number Theory Approach to Ramanujan Graphs* (2008-2009)

Honors Thesis, HNRS 494-495: Bill Hallahan '15  
*Stability of Coefficients in the Kronecker Product of a Hook and a Rectangle* (2014-2015)

Honors Thesis, HNRS 494-495: Sarah Ober '15  
*On the Theory of Partitions* (2014-2015)

Honors Thesis, HNRS 494-495: Richard Bielak '18  
*Euler Type Identities for Integer Partitions* (2017-2018)

Honors Thesis, HNRS 494-495: John Graf '20  
*Partitions With Distinct Parts and the Parity of Their Rank* (2019-2020)

Directed Reading, MATH 400: Courtney Jason '03, and Kathleen Leahy '04  
*Cryptography and Number Theory* (Spring 2003)

Directed Reading, MATH 400: Jonathan Root '10  
*Groups, Rings, Fields* (Fall 2007)

Directed Reading, MATH 400: Lauren Chenarides '08  
*Combinatorics* (Spring 2008)

Directed Reading, MATH 400: James Antonio '09  
*Groups, Rings, Fields* (Fall 2008)

Directed Project, MATH 410: Sarah Orchard '13  
*Combinatorics and Biology* (Fall 2012)

Directed Reading, MATH 400: Toluwalope Akinosho '20  
*Ramanujan Graphs* (Spring 2020)

At Dartmouth College: Independent Reading: Gabriela Dumitrascu (Master student)  
*Lie Groups* (Spring 2002)

### College, Department and Professional Service

#### College Service:

Community Standards Board (Sept. 2020 - May 2023)

Gateways Advising (2003, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2016, 2017, 2018, 2020)

Selection of Marlon Chair (Spring 2020)

Picture a Scientist - panelist (Spring 2020)

Committee on Graduate Studies and Fellowships (Sept. 2006 - June 2009,  
 Sept. 2017 - June 2020)

Sexual Respect and Conduct Planning Group (March - April 2019)

Committee on Tenure and Promotion (Sept. 2013 - May 2015)

Faculty Compensation Committee (January - May 2013)

Committee on Faculty Scholarship (Sept. 2010 - June 2012; chair in 2011 - 2012)  
Committee on Faculty Affairs (Sept. 2005 - August 2007)  
Committee on the Economic Status of the Faculty (Sept. 2005 - May 2006)  
Curriculum Committee on Capstone Experiences (January-May 2004)  
Committee on Study Abroad (Sept. 2003 - August 2006)  
Search Committee - Director of Sponsored Research (July - September 2013)  
Search Committee - Director of Libraries (January - March 2016)  
Myths and Facts about promotion to Professor, panelist (2018)  
Mentor in the *Reach One Teach One* program (Judicial Affairs) (2003-2004)  
Mentor in the *Faculty Mentorship* program (2007-2008, 2011-2012, 2015-2016, 2018-2019)  
Mentor in the *Student Mentorship* program (2008-2009)  
Mock interviews for the Truman scholarship (Graduate Studies and Fellowships) (March 2016)

### **Department Service:**

Leonard C. Sulski Memorial Lecture Committee (2007, 2011-2016, 2019, 2020, 2021)  
Departmental liaison for the Study Abroad program  
(2007-2008, 2012-2013, 2017-2018, 2019-2020, 2020-2021)  
Colloquium organizer (20018-2021)  
Search Committee (visiting position) (2016, 2018, 2019, 2020, Spring 2021)  
Academic Integrity Hearing Panel, Spring 2021  
Hewlett-Mellon - Preparing for departmental review (June 2018)  
Hewlett-Mellon - Assessment of project courses (June 2016)  
Search Committee (TT position) (2017-2018)  
Session leader (with Steven J. Miller) at the meeting of the Committee on Education  
of the AMS (Oct. 2015)  
Gateways Browsing Session (Summer 2017, Summer 2018)  
Admissions Open House (Fall 2017, Fall 2018, Fall 2019)  
Y2O Extravaganza department representative (2015)  
Departmental Honors advisor (2010 - 2016)  
Graduate Fellowships Program Liaison (2014-2016)  
Student Engagement in Conferences (2014-2015)  
Faculty Seminar organizer (2010-2012, fall 2013)  
Graduate studies / Departmental Honors advisor (2005-2009)  
Departmental Representative to AMS, MAA, AWM (2005-2007)  
Library liaison for the Mathematics and Computer Science Department  
(2002 - 2004, 2007-2008, 2016, Spring 2018)  
Interviewer for the Study Abroad Program (April 2003, January 2007)  
Avon Scholarship Committee (May 2003, May 2004)



Departmental representative for the United Way/Holy Cross giving campaign (2003)  
Examiner for the German exam (Ph.D. requirement), Dartmouth College (2000 - 2003)

### **Service to the Profession:**

Research group leader WIN5 (2020-2021) virtual  
External examiner preliminary Ph.D. examination at WPI (fall 2020) virtual  
NSF panel (December 2020) virtual  
Volunteer *Women and Mathematics* Institute for Advanced Study, (May 2021) virtual  
External reviewer for promotion to full professor (2020)  
MAA Mentor Network for Early Career Mathematicians (2018-2019)  
AWM mentor at the Joint Mathematics Meetings  
*Mathematical Reviews* contributor  
Research group leader at WINE - Women in Numbers, Luminy France, Oct. 2013)  
Subject Reviewer for the Fulbright Commission (2011-2013)  
External examiner for two Ph.D. thesis at Dartmouth College  
Alison Setyadi (April 2007) and Christopher Storm (May 2007)  
Mentor in the *Program for Women and Mathematics*  
Institute for Advanced Study, Princeton, NJ (May 2006)  
*Knobelaufgaben in kleinen Gruppen* (Challenge problems in small groups)  
Theresien Grundschule, Münster, Germany (January-May 2005)  
Interviewee for *AWM Essay Contest on Biographies of Contemporary Women in Mathematics* (2003, 2005)  
Judge for the Science Fair at the University of Wyoming (Spring 1999)  
Co-organizer *Discover Science Day*  
an event for female high school students at the University of Toronto (April 1997)

Refereeing: Proceedings of the AMS, Ramanujan Journal, Experimental Mathematics,  
European Journal of Combinatorics, Journal of Physics A,  
Journal of Combinatorial Theory, Series A,  
Kyungpook Mathematical Journal, Contributions to Discrete Mathematics,  
Journal of Mathematical Analysis and Applications,  
Integers, Applied Analysis and Discrete Mathematics, Fibonacci Quarterly,  
Canadian Journal of Mathematics, Acta Arithmetica,  
Electronic Journal of Combinatorics, Discrete Mathematics, FPSAC,  
Annals of Combinatorics, American Mathematical Monthly,  
Journal of Algebra, Acta Mathematica U,  
Illinois Journal of Mathematics, Journal of Algebraic Combinatorics,  
Journal of Number Theory, Linear and Multilinear Algebra,  
College Mathematics Journal, Konuralp Journal of Mathematics,  
Textbooks for Prentice Hall

Grant refereeing: NSF, NSERC, Israel Science Foundation

## Professional Experience

- 1995 *Freelance Translator*: English, German, Romanian  
Performed simultaneous and written translations
- Aug. 1989—Sept. 1991 Allianz Life Insurance, Stuttgart, Germany  
*Software analyst and project manager* for data base  
transfer of East German state insurance to Allianz
- Jul. 1988—Aug. 1989 Fraunhofer Research Institute, Stuttgart, Germany  
*Scientific assistant*