

Research interests (continued)

Algebra Number theory and commutative algebra, Koszul algebras

Synergistic activities

Undergraduate teaching **Spring 2011:** Designed and taught a Math course in Quantitative Reasoning at Yale University, which was approved by Yale College, and continues to be taught at Yale. *Mathematics 107: Math in the Real World* teaches undergraduates with no prior calculus experience to use mathematics to solve real-world problems including mortgage payments, present value of money, amortization of loans, and false positives in drug testing.

Reviewer Discrete Mathematics, Pacific Journal of Mathematics.

Conference organization **Feb 4-5, 2012:** Lie Theory Workshop on Quantum Groups, Stanford University. Co-organizers: Daniel Bump (Stanford) and Anne Schilling (UC Davis).

May 26-27, 2012: Young Researchers Meet (Mathematics and Computer Science), Stanford University. Co-organizer: Govindan Rangarajan (Indian Institute of Science, India).

Seminars **2009:** Organized the Lie Theory Seminar at the University of California, Riverside.

2001–02: Organized a weekly graduate student seminar, University of Chicago.

Graduate teaching **Fall 2008:** Designed and taught a **mini-course** on *Quivers, with a view toward Gabriel's theorem* in the Lie Theory Seminar, UC Riverside.

Mentoring **2006–09:** Mentored graduate and undergraduate students at UC Riverside, through and outside of the Lie Theory Seminar.

2005–06: Mentor in the Directed Reading Program: Mentored Philip M. Brunetti on selected topics in elementary number theory (including Mobius functions on partially ordered sets); and Gabriel Gaster on the Banach Tarski Paradox and related topics.

Publications

1997 *Divisibility tests*, Furman University Electronic Journal of Undergraduate Mathematics, Vol. **3**, Pages 1–5.

2005 *Category \mathcal{O} over a deformation of the symplectic oscillator algebra*, Journal of Pure and Applied Algebra **195** No. 2 (2005), 131–166.

2006 *Category \mathcal{O} over the symplectic oscillator algebra*, Ph. D. Thesis, University of Chicago, June 2006.

2007 *Divisibility tests and recurring decimals in Euclidean domains* (final section with Pieter Moree), JP Journal of Algebra, Number Theory, and Applications (JPANTA) **7** No. 1 (2007), 1–32.

2007 *Quantized symplectic oscillator algebras of rank one*, joint with Wee Liang Gan; Journal of Algebra **310** No. 2 (2007), 671–707.

2009 *Vector spaces as unions of proper subspaces*, Linear Algebra and its Applications **431** No. 9 (2009), 1681–1686.

2009 *Functoriality of the BGG Category \mathcal{O}* , Communications in Algebra **37** No. 12 (2009), 4431–4475.

Publications (continued)

- 2010 *Center and representations of infinitesimal Hecke algebras of \mathfrak{sl}_2* , joint with Akaki Tikaradze; *Communications in Algebra* **38** No. 2 (2010), 405–439.
- 2012 *Faces of weight polytopes and a generalization of a theorem of Vinberg*, joint with T.B. Ridenour; *Algebras and Representation Theory* **15** No. 3 (2012), 593–611.
- 2012 *Faces of polytopes and Koszul algebras*, joint with V. Chari and T.B. Ridenour; *Journal of Pure and Applied Algebra* **216** No. 7 (2012), 1611–1625.

Accepted

- To appear *The BGG Category \mathcal{O}* , to appear in the *Encyclopedia of Mathematics* (Michiel Hazewinkel, Ed.), Kluwer Academic Publishers.

Preprints

- 2007 *The sum of a finite group of weights of a Hopf algebra*, [math.RA/0701467](https://arxiv.org/abs/math/0701467).
- 2007 *Drinfeld-Hecke algebras over cocommutative algebras*, [arxiv:0705.2067](https://arxiv.org/abs/0705.2067).
- 2008 *Axiomatic framework for the BGG Category \mathcal{O}* , [arxiv:0811.2080](https://arxiv.org/abs/0811.2080).
- 2009 *The covering problem for Chinese rings*, [arxiv:0906.1023v2](https://arxiv.org/abs/0906.1023v2).

Recent invited lectures

- Jul 2, 2008 Institut Fourier at Grenoble: “Junior Seminar” at the “2008 Summer School on Geometric Methods in Representation Theory”
- Jul 21, 2008 De Paul University: Algebra Seminar
- Aug 29, 2008 Cornell University: Lie Groups Seminar
- Sep 03, 2008 Yale University: Algebra and Lie Groups Seminar
- Sep 04, 2008 Rutgers University: Algebra Seminar
- Nov 24, 2008 University of Illinois at Chicago: Algebra Seminar
- Nov 25, 2008 University of Chicago: Representation Theory Seminar
- Dec 17, 2008 Indian Institute of Science (India)
- Dec 18, 2008 Tata Institute of Fundamental Research (Mumbai, India)
- Mar 9, 2009 University of Southern California: Algebra Seminar
- Sep 2, 2009 National Institute of Science Education and Research (Bhubaneswar, India): Special Seminar
- Sep 9, 2009 Institute of Mathematical Sciences (Chennai, India): Colloquium
- Sep 10–11, 2009 Institute of Mathematical Sciences (Chennai, India): Algebra Seminar
- Nov 6, 2009 California Institute of Technology (CalTech): Combinatorics Seminar
- Nov 7, 2009 University of California at Riverside: “Special Session on Representation Theory” in the AMS 2009 Fall Western Section Meeting
- Nov 16, 2009 University of Massachusetts at Amherst: Representation Theory Seminar
- Nov 20, 2009 Boston University: Special Geometry Seminar
- Dec 7, 2009 University of Michigan at Ann Arbor: Group theory, Number theory, and Representation theory seminar

Recent invited lectures (continued)

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| Jan 8, 2010 | Tata Institute of Fundamental Research (Mumbai, India) |
| Apr 11, 2010 | Macalester College (St. Paul): “Special Session on Hecke Algebras and Deformations in Geometry and Topology” in the AMS 2010 Spring Central Section Meeting |
| Oct 14, 2010 | University of California at Riverside: Lie Theory Seminar |
| Nov 15, 2010 | University of Michigan at Ann Arbor: Group theory, Number theory, and Representation theory seminar |
| Feb 18, 2011 | Iowa State University; Colloquium |
| Jun 29, 2011 | Indian Statistical Institute (Delhi, India) |
| Jul 7, 2011 | Indian Institute of Science Education and Research (IISER, Pune, India) |

(Older) invited Lectures

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| Dec 20, 2004 | Tata Institute of Fundamental Research (Mumbai, India) |
| May 19, 2005 | North Carolina State University: Conference on “Lie Algebras, VOAs and their applications” |
| May 27, 2006 | Kansas State University: Graduate Student Conference on “Algebra And Representation Theory” |
| Nov 4, 2006 | University of Arkansas at Fayetteville: “Special Session on Combinatorial Representation Theory” in the AMS 2006 Fall Southeastern Section Meeting |
| May 9, 2007 | University of California at Berkeley: “Workshop on Representation Theory and Geometry 2007” |
| Dec 18,20, 2007 | National Institute of Science Education and Research, and Institute of Mathematics and Applications (Bhubaneswar, India): Seminars of general interest |
| Mar 29, 2008 | Louisiana State University at Baton Rouge: “Special Session on Geometric and Combinatorial Representation Theory” in the AMS 2008 Spring Southeastern Section Meeting |
| May 3, 2008 | Claremont McKenna College: “Special Session on Hopf Algebras and Quantum Groups” in the AMS 2008 Spring Western Section Meeting |

Teaching Experience

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| 2009 – 2011 | Lecturer in Mathematics, Yale University Mathematics 107: Math in the Real World (developed, proposed, and taught this course at Yale; it continues to be taught at Yale) Mathematics 115a: Integral Calculus Mathematics 118: Introduction to Functions of Several Variables Mathematics S120: Calculus - Several Variables (Summer Session) Mathematics 120: Calculus - Several Variables (Special Section with Mathematica) Mathematics 225a: Linear Algebra and Matrix Theory Mathematics 370: Fields and Galois Theory |
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Teaching Experience (continued)

- 2006 – 2009 **Visiting Assistant Professor** in Mathematics, University of California at Riverside: I taught multiple sections of:
Mathematics 8B: Introduction to College Mathematics for Science
Mathematics 9B, 9C: First Year Calculus
Mathematics 10A, 10B: Calculus: Several Variables
Mathematics 23: Applied Matrix Algebra
Mathematics 46: Ordinary Differential Equations
Mathematics 132: Linear Algebra - II
- 2002 – 2006 **Lecturer** in Mathematics, University of Chicago: I have taught multiple sections of:
Mathematics 151, 152, 153: Calculus - I, II, III
Mathematics 195, 196: Mathematical Methods for the Social Sciences - I, II
- 2001 – 2002 **College Fellow** in Mathematics, University of Chicago
Math. 175: Elementary Number Theory, Mentor: R. Narasimhan
Math. 203: Analysis in \mathbb{R}^n - I, Mentor: S. Webster
Math. 204: Analysis in \mathbb{R}^n - II, Mentor: Y. Yuan

Programs attended

- Summers of 1996, 1997 *Homi Bhabha Center for Science Education, Mumbai, India:*
International Mathematical Olympiad Training Camp
- Summers of 1998–2000 *Tata Institute of Fundamental Research, Mumbai, India:*
Nurture Program in Mathematics
- December 1999 *Tata Institute of Fundamental Research, Mumbai, India:*
Visiting Students' Research Program in Mathematics

Conferences attended

- Aug 31 – Sep 4, 2003 An International Conference on “The Unity of Mathematics” (in honor of I.M. Gelfand), Harvard University
- Dec 17–19, 2003 Joint AMS-India Conference, I.I.Sc., Bangalore, India
- May 18–22, 2004 Conference on Infinite-Dimensional Aspects of Representation Theory and Applications, University of Virginia (Charlottesville)
- May 17–21, 2005 Lie Algebras, VOAs and their applications: A conference in honor of Robert L. Wilson and James Lepowsky (on their 60th birthdays), North Carolina State University (Raleigh)
- May 26–27, 2006 Algebra And Representation Theory - Graduate Student Conference, Kansas State University (Manhattan, KS)
- Nov 3–4, 2006 AMS 2006 Fall Southeastern Section Meeting - Special Session on Combinatorial Representation Theory, University of Arkansas (Fayetteville)
- Apr 21–22, 2007 Conference on Lie groups, Lie algebras, and their representations, University of California at Santa Barbara
- May 9–11, 2007 Workshop on Representation Theory and Geometry 2007, University of California at Berkeley

Conferences attended (continued)

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| Oct 5–6, 2007 | AMS 2007 Fall Central Section Meeting - Special Session on Hopf Algebras and Related Areas, De Paul University (Chicago) |
| Jan 18–20, 2008 | Symmetry in Mathematics and Physics - Professor Varadarajan's 70th birthday conference, UCLA (Los Angeles) |
| Mar 10–14, 2008 | Workshop on Lie Theory, Mathematical Sciences Research Institute (MSRI) at Berkeley |
| Mar 28–30, 2008 | AMS 2008 Spring Southeastern Section Meeting - Special Session on Geometric and Combinatorial Representation Theory, Louisiana State University (Baton Rouge) |
| May 3–4, 2008 | AMS 2008 Spring Western Section Meeting - Special Session on Hopf Algebras and Quantum Groups, Claremont McKenna College |
| Jun 16–Jul 4, 2008 | 2008 Summer School on <i>Geometric Methods in Representation Theory</i> , Institut Fourier (Grenoble, France) |
| Jul 7–11, 2008 | International Conference on vertex operator algebras and related areas (in honor of Geoffrey Mason's 60th birthday), Illinois State University (Normal) |
| Jan 17–18, 2009 | University of California Lie Theory Workshop, University of California at Riverside |
| Oct 9–11, 2009 | Southeastern Lie Theory Workshop on Combinatorial Lie Theory and Applications, North Carolina State University (Raleigh) |
| Oct 24–27, 2009 | Representation Theory and Mathematical Physics: Conference in honor of Gregg Zuckerman's 60th birthday, Yale University |
| Nov 7–8, 2009 | AMS 2009 Fall Western Section Meeting - Special Session on Representation Theory, University of California at Riverside |
| Apr 10–11, 2010 | AMS 2010 Spring Central Section Meeting - Special Session on Hecke Algebras and Deformations in Geometry and Topology, Macalester College (St. Paul) |
| May 17–21, 2010 | Workshop on Double Affine Hecke Algebras and Algebraic Geometry, MIT |
| May 21–22, 2011 | Workshop on Lie Groups, Lie Algebras and their Representations, University of California at Riverside |

References

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| Research | Professor Victor Ginzburg, University of Chicago, ginzburg@math.uchicago.edu |
| | Professor Vyjayanthi Chari, University of California at Riverside, chari@math.ucr.edu |
| | Professor Bala Rajaratnam, Stanford University, brajarat@stanford.edu |
| | Professor Wee Liang Gan, University of California at Riverside, wlgan@math.ucr.edu |
| | Professor Roger Howe, Yale University, howe@math.yale.edu |
| | Professor Alexander Premet, University of Manchester, sashap@ma.man.ac.uk |

References (continued)

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| Research | Professor Robert Kottwitz, University of Chicago, kottwitz@math.uchicago.edu |
| Teaching | Dr. Diane Herrmann, University of Chicago, diane@math.uchicago.edu Professor Al Stralka, University of California at Riverside, stralka@math.ucr.edu |
| Additional reference | Professor Steven Orszag, Yale University, steven.orszag@yale.edu |