

# Curriculum Vitae: Apoorva Khare

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## Education

- 2000 – 2006      **University of Chicago**, Chicago, IL  
Ph.D. in Mathematics, June 2006  
(Thesis Advisor: Professor Victor Ginzburg)
- M.S. in Mathematics, December 2001  
Topic Exam passed in Spring 2002, on *Semisimple Lie algebras and their representations*
- 1997 – 2000      **Indian Statistical Institute**, Kolkata, India  
B.Stat. (Hons.), June 2000: Graduated First Class with Distinction

## Employment

- 2009 – present      **Yale University**  
Lecturer in Mathematics  
**Visa:** H1B (since Fall 2007; valid until Summer 2011)
- 2006 – 2009      **University of California at Riverside**, Riverside, CA  
Visiting Assistant Professor in Mathematics
- 2002 – 2006      **University of Chicago**  
Lecturer in Mathematics (Graduate Student) in the College

## Awards and Scholarships

- 2009      I have applied for an NSF Grant in “Algebra, Number Theory and Combinatorics”
- 2000-2002      McCormick Fellowship, from the University of Chicago
- 1998-1999      Awards from the National Board of Higher Mathematics, India
- 1998      Award from the Indian Statistical Institute, Kolkata, for academic excellence
- 1997-2000      Student Fellowship, from the Indian Statistical Institute, Kolkata
- 1996      Indian National Mathematical Olympiad (INMO) Scholarship
- 1995-1997      National Talent Search (NTSE) Scholarship, from the NCERT, India
- 1995, 1996      Awards from the Orissa Mathematical Society, for securing the first rank in the Regional Mathematics Olympiads

## Synergistic activities

- 2009      **Organized** the Lie Theory Seminar at UC Riverside.
- 2008      Gave a **mini-course** on *Quivers, with a view toward Gabriel’s theorem* in the Lie Theory Seminar, November and December 2008.

### Synergistic activities (continued)

- 2006 – 2009      **Mentored** graduate and undergraduate students at University of California, Riverside, through and outside of the Lie Theory Seminar.
- 2005 – 2006      **Mentor** in the Directed Reading Program, Fall 2005 and Spring 2006  
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.
- 2001 – 2002      **Organized** a weekly graduate student seminar, University of Chicago.

### Research interests

Representation theory, Lie algebras, quantum groups, Hopf algebras, non-commutative and homological algebra, quivers, Koszul algebras, convexity (and polytopes), combinatorics, number theory

### Relevant publications

- 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      *Quantized symplectic oscillator algebras of rank one*, joint with Wee Liang Gan; Journal of Algebra **310** No. 2 (2007), 671–707.
- 2009      *Functoriality of the BGG Category  $\mathcal{O}$* , Communications in Algebra **37** No. 12 (2009), 4431–4475.

### Other publications

- 1997      *Divisibility tests*, Furman University Electronic Journal of Undergraduate Mathematics, Vol. **3**, Pages 1–5.
- 2007      *Divisibility tests and recurring decimals in Euclidean domains*, JP Journal of Algebra, Number Theory, and Applications (JPANTA) **7** No. 1 (2007), 1–32.
- 2009      *Vector spaces as unions of proper subspaces*, Linear Algebra and its Applications **431** No. 9 (2009), 1681–1686.

### Accepted

- To appear      *The BGG Category  $\mathcal{O}$* , to appear in the Encyclopedia of Mathematics (Michiel Hazewinkel, Ed.), Kluwer Academic Publishers.
- 2008      *Center and representations of infinitesimal Hecke algebras of  $\mathfrak{sl}_2$* , joint with Akaki Tikaradze; accepted for publication in *Communications in Algebra*; arxiv:0807.4776.

### Work in progress

- 2009      *Faces of polytopes and Koszul algebras*, joint with V. Chari and T.B. Rideour.
- 2009      *Work in progress*, joint with A. Tikaradze.

### Preprints

- 2007      *The sum of a finite group of weights of a Hopf algebra*, math.RA/0701467.

### Preprints (continued)

- 2007 *Drinfeld-Hecke algebras over cocommutative algebras*, [arxiv:0705.2067](#).  
2008 *Axiomatic framework for the BGG Category  $\mathcal{O}$* , [arxiv:0811.2080](#).  
2009 *Abelian groups as unions of proper subgroups*, [arxiv:0906.1023](#).

### 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 (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

### (Older) Invited Lectures

- Dec 20, 2004 Tata Institute of Fundamental Research (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 South-eastern Section Meeting

### (Older) Invited Lectures (continued)

May 3, 2008 Claremont McKenna College: “Special Session on Hopf Algebras and Quantum Groups” in the AMS 2008 Spring Western Section Meeting

### Teaching Experience

2009 – present **Lecturer** in Mathematics, Yale University  
Mathematics 115a: Integral Calculus  
Mathematics 225a: Linear Algebra and Matrix Theory

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: First Year Calculus  
Mathematics 9C: First Year Calculus  
Mathematics 10A: Calculus: Several Variables  
Mathematics 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)

## Conferences attended (continued)

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
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) (I attended on Jan 18)
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
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

## References

Research	Professor Victor Ginzburg, University of Chicago, <a href="mailto:ginzburg@math.uchicago.edu">ginzburg@math.uchicago.edu</a>
	Professor Vyjayanthi Chari, University of California at Riverside, <a href="mailto:chari@math.ucr.edu">chari@math.ucr.edu</a>
	Professor Roger Howe, Yale University, <a href="mailto:howe@math.yale.edu">howe@math.yale.edu</a>
	Professor Wee Liang Gan, University of California at Riverside, <a href="mailto:wlgan@math.ucr.edu">wlgan@math.ucr.edu</a>
	Professor Alexander Premet, University of Manchester, <a href="mailto:sashap@ma.man.ac.uk">sashap@ma.man.ac.uk</a>
	Professor Robert Kottwitz, University of Chicago, <a href="mailto:kottwitz@math.uchicago.edu">kottwitz@math.uchicago.edu</a>

## References (continued)

Teaching

Dr. Diane Herrmann, University of Chicago,  
[diane@math.uchicago.edu](mailto:diane@math.uchicago.edu)

Professor Al Stralka, University of California at Riverside,  
[stralka@math.ucr.edu](mailto:stralka@math.ucr.edu)