

Curriculum Vitae: Apoorva Khare

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Citizenship: Indian

Employment

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

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
- 1995 – 1997 **B.J.B. College**, Bhubaneswar, India
June 1997 Fifth in the state in the CHSE (+2 Science) State Board Examination
- 1985 – 1995 **Demonstration Multipurpose School**, Bhubaneswar, India
Given the Best Student Award in 1990, 1993, 1995

Synergistic activities

- 2009 Helped organize the Lie Theory Seminar at UC Riverside.
- 2008 Gave a series of lectures on *Quivers, with a view toward Gabriel's theorem* in the Lie Theory Seminar, November and December 2008.
- 2006 – 2008 Mentored graduate students at University of California, Riverside, through (but not limited to) 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 Helped **organize** a weekly graduate student seminar, University of Chicago.

Awards and Scholarships

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

Programs attended

Summers of 1996, 1997	<i>Homi Bhabha Center for Science Education, Mumbai, India:</i> International Mathematical Olympiad Training Camp
Summers of 1998–2000	<i>Tata Institute of Fundamental Research, Mumbai, India:</i> Nurture Program in Mathematics
December 1999	<i>Tata Institute of Fundamental Research, Mumbai, India:</i> 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
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

Conferences attended (continued)

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

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 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
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

Invited Lectures (continued)

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): Special Seminar in Combinatorics and Lie theory
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

Seminar Talks

May 26, 2004	Robert Kottwitz’s student seminar, University of Chicago
Nov 19 and Dec 3, 2004	Victor Ginzburg’s student seminar, University of Chicago
Oct 12 and 17, 2006	Lie Theory Seminar, University of California at Riverside
March 15, 2007	Lie Theory Seminar, University of California at Riverside
May 22, 2007	Lie Theory Seminar, University of California at Riverside
October 30, 2007	Lie Theory Seminar, University of California at Riverside
April 4, 2008	Commutative Algebra Seminar, University of California at Riverside
October 23, 2008	Lie Theory Seminar, University of California at Riverside
October 12, 2009	Geometry, Symmetry and Physics Seminar, Yale University

Teaching Experience

2009 – present	Lecturer in Mathematics, Yale University Mathematics 115a: Integral Calculus Mathematics 225a: Linear Algebra and Matrix Theory
2008 – 2009	Visiting Assistant Professor in Mathematics, University of California at Riverside Mathematics 8B (2 Sections): Introduction to College Mathematics for Science Mathematics 10B: Calculus: Several Variables Mathematics 9B: First Year Calculus
2007 – 2008	Visiting Assistant Professor in Mathematics, University of California at Riverside Mathematics 8B: Introduction to College Mathematics for Science Mathematics 10B: Calculus: Several Variables Mathematics 9C (2 Sections): First Year Calculus Mathematics 132: Linear Algebra - II

Teaching Experience (continued)

2006 – 2007	Visiting Assistant Professor in Mathematics, University of California at Riverside Mathematics 9B: First Year Calculus Mathematics 46: Ordinary Differential Equations Mathematics 8B: Introduction to College Mathematics for Science Mathematics 23: Applied Matrix Algebra Mathematics 9C: First Year Calculus Mathematics 10A: Calculus: Several Variables
2005 – 2006	Lecturer in Mathematics, University of Chicago Mathematics 153: Calculus - III Mathematics 195, 196: Math. Methods for the Social Sciences - I,II
2004 – 2005	Lecturer in Mathematics, University of Chicago Mathematics 151, 152: Calculus - I, II Mathematics 195: Mathematical Methods for the Social Sciences - I
2003 – 2004	Lecturer in Mathematics, University of Chicago Mathematics 151, 152, 153: Calculus - I, II, III
2002 – 2003	Lecturer in Mathematics, University of Chicago Mathematics 151, 152, 153: Calculus - I, II, III
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

Miscellaneous

Summer 1997	Selected (ranked in 900-1000) in the IIT JEE '97
February 1994	Attended the first SAARC Children's Friendship Camp in Delhi

Extracurricular

1997	Passed the Sangeet Visharad Purna (6th Year) in Hindustani Vocal (north Indian classical music) in the First Division, from the Gandharva Mahavidyalaya, Mumbai
November 5, 2005	Sang on the Diwali show of the Indian Channel, Lotus Beat, of WNUR, the radio of Northwestern University. Raag Shyam Kalyan is found at http://www.math.ucr.edu/~apoorva/personal/ShyamKalyan.mp3
Winter 2006	Sang with the student group <i>Sapthak</i> for the background vocals, of the Student Movie shot by Kara Schoonmaker, in the University of Chicago. I also have a youtube video at http://www.youtube.com/watch?v=o75IDVNFgbg .
Passion	Singing - Hindustani classical, and old Hindi film songs - is my passion. I have performed (Hindustani Classical) in various concerts in the University of Chicago, apart from singing in numerous house concerts and cultural shows.
Other interests	Reading books, playing the harmonium, table tennis, and following sports.

Research interests

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

Publications and Preprints

- 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; [math.RT/0309251 v3](#).
- 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; [math.RT/0405176 v3](#).
- 2007 *Divisibility tests and recurring decimals in Euclidean domains*, JP Journal of Algebra, Number Theory, and Applications (JPANTA) **7** No. 1 (2007), 1–32; [math.NT/0406025 v3](#).
- 2009 *Vector spaces as unions of proper subspaces*, Linear Algebra and its Applications **431** No. 9 (2009), 1681–1686; [arxiv:0803.2746](#).
- To appear *The BGG Category \mathcal{O}* , to appear in the Encyclopedia of Mathematics (Michiel Hazewinkel, Ed.), Kluwer Academic Publishers.
- Preprint, 2007 *The sum of a finite group of weights of a Hopf algebra*, [math.RA/0701467](#).
- Preprint, 2007 *Drinfeld-Hecke algebras over cocommutative algebras*, [arxiv:0705.2067](#).
- Accepted *Functoriality of the BGG Category \mathcal{O}* , accepted for publication in *Communications in Algebra*; [arxiv:0811.2073](#).
- Accepted *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](#).
- Preprint, 2008 *Axiomatic framework for the BGG Category \mathcal{O}* , [arxiv:0811.2080](#).
- Preprint, 2009 *Abelian groups as unions of proper subgroups*, [arxiv:0906.1023](#).