

# Amritanshu Prasad

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## Personal

Born on 5th July 1975.

Citizen of India.

## Areas of specialization

Representation theory, combinatorics, harmonic analysis, number theory, group theory.

## Education

B. Stat.(hons.), Indian Statistical Institute, Kolkatta, 1995.

M.S. Mathematics, The University of Chicago, 1996.

Ph.D. Mathematics, The University of Chicago 2001 (supervised by Prof. Robert E. Kottwitz).

## Employment

Professor H, The Institute of Mathematical Sciences (since 2016).

Professor G, The Institute of Mathematical Sciences (since 2011-2016).

Reader F, The Institute of Mathematical Sciences (2007-2011).

Fellow E, The Institute of Mathematical Sciences (2003-2007).

CRM-CICMA fellow, University of Montréal (2001-2003).

## Visiting positions

University of Stuttgart, May 2017.

Australian National University, Canberra. October 2006 and September 2015.

Institut des Hautes Études Scientifiques, Bures-sur-Yvette. Summer 2003 and December 2008.

Tata Institute of Fundamental Research, Mumbai. Summer 2004.

Max-Planck Institut für Mathematik, Bonn. Summer 2002.

## Honours and distinctions

Swarnajayanti Fellowship, Department of Science & Technology (2014-15).

Young Scientist Medal, Indian National Science Academy (2010).

Associate, The Indian Academy of Sciences (2005-2010).

## Publications

### Books

*Representation Theory: A Combinatorial Viewpoint*, Cambridge Studies in Advanced Mathematics, vol. 147, Cambridge University Press, 2015.

### Papers

1. Residues modulo powers of two in the Young-Fibonacci lattice, with N. Karimilla Bi and P. Giftson Santhosh (submitted).
2. Comparison of Gelfand-Tsetlin Bases for Alternating and Symmetric Groups, with T. Geetha, to appear in *Algebr. Represent. Theory*, 2017.
3. Representations of symmetric groups with non-trivial determinant, with Arvind Ayyer and Steven Spallone, *J. Combin. Th. Ser. A*, 150:208–232, 2017.
4. Odd partitions in Young's lattice, with Arvind Ayyer and Steven Spallone, *Sém. Lothar. Combin.*, 75:B75g, 2016.
5. The centre of the Schur algebra, with T. Geetha, *Asian-Eur. J. Math.*, 9, 1650006, 2016.
6. Similarity of matrices over local rings of length two, with Pooja Singla and Steven Spallone, *Indiana Univ. Math. J.*, 64:471–514, 2015.
7. Combinatorics of finite abelian groups and Weil representations, with Kunal Dutta, *Pacific J. Math.*, 275:295–324, 2015.
8. Graphic interpretation of the structure constants of the Schur algebra, with T. Geetha, *Proceedings of International Congress of Women Mathematicians*, abstract no. 20140020, 2014.
9. Orbits of pairs in abelian groups, with C. P. Anilkumar, *Sém. Lothar. Combin.*, 70:B70h, 2014.
10. Buildings, extensions, and volume growth entropy, with Jayadev Athreya and Anish Ghosh, *New York J. Math.*, 19:1-11, 2013.
11. Degeneration and orbits of tuples and subgroups in an Abelian group, with Wesley Calvert and Kunal Dutta, *J. Group Theory* 16:221-233, 2013.
12. Ultrametric logarithm laws II, with Jayadev Athreya and Anish Ghosh, *Monatsh. Math.*, 167:333-356, 2012.
13. The Cartan matrix of a centralizer algebra, with Umesh V. Dubey and Pooja Singla, *Proc. Indian Acad. Sci. Math. Sci.*, 122(1):63-73, 2012.
14. Degenerations and orbits in finite abelian groups, with Kunal Dutta, *J. Combin. Th. Ser. A*, 118(6):1685-1694, 2011.

15. An easy proof of the Stone-von Neumann-Mackey theorem, *Exposition. Math.*, 29(1):110-118, 2011.
16. Counting subspaces of a finite vector space - 2, *Resonance*, 15(12):1074-1083, 2010.
17. Counting subspaces of a finite vector space - 1, *Resonance*, 15(11):977-987, 2010.
18. Inductive algebras and homogeneous shifts, with M. K. Vemuri, *Compl. Anal. Oper. Theory*, 4:1015-1027, 2010.
19. Locally compact abelian groups with symplectic self-duality, with Ilya Shapiro and M. K. Vemuri, *Adv. Math.*, 225:2429-2454, 2010.
20. Iwahori-Hecke algebras, with Tom Haines and Robert Kottwitz, *J. Ramanujan Math. Soc.*, 25:113-145, 2010.
21. On Cuspidal representations of general linear groups over discrete valuation rings, with Anne-Marie Aubert, Uri Onn and Alexander Stasinski, *Israel J. Math.*, 175:391-420, 2010.
22. Inductive algebras for finite Heisenberg groups, with M. K. Vemuri, *Comm. Algebra*, 38:509-514, 2010.
23. On character values and decomposition of the Weil representation, *J. Anal.*, 17:73-86, 2009.
24. Ultrametric logarithm laws I, with J. S. Athreya and Anish Ghosh, *Discrete Contin. Dynam. Systems*, 2:337-348, 2009.
25. Similarity classes of  $3 \times 3$  matrices over a principal local ring, with Nir Avni, Uri Onn and Leonid Vaserstein, *Comm. Algebra*, 37:2601-2615, 2009.
26. Eigenfunctions of the Laplace-Beltrami operator on hyperboloids, with Murali Vemuri, *Tamkang J. Math.*, 39:335-339, 2008.
27. Representations of a finite group in positive characteristic, *Math. Newslet. Ramanujan Math. Soc.*, 16:73-78, 2007.
28. A note on Bruhat decomposition of  $GL(n)$  over local principal rings, with Uri Onn and Leonid Vaserstein. *Comm. Algebra*, 34:4119-4130, 2006.
29. On Bernstein's presentation of Iwahori-Hecke algebras and representations of split reductive groups over non-Archimedean local fields. *Bull. Kerala Math. Assoc.*, special issue on harmonic analysis and quantum groups, 31-51, 2005.
30. Reduction theory for a rational function field. *Proc. Indian Acad. Sci. Math. Sci.*, 113:153-163, 2003.
31. Almost unramified automorphic representations for split groups over  $\mathbb{F}_q(t)$ . *J. Algebra*, 262:253-261, 2003.
32. Almost unramified discrete spectrum for split groups over  $\mathbb{F}_q(t)$ . *Duke Math. J.*, 113:237-257, 2002.

## PhD supervision

Uday Bhaskar Sharma, Counting similarity classes of tuples of commuting matrices over a finite field (2017).

C. P. Anilkumar, Orbits of pairs in finite modules over discrete valuation rings and permutation representations (2014).

Pooja Singla, Representations and conjugacy classes of general linear groups over principal ideal local rings of length two (2010).

## MSc supervision

Kamalakshya Mahatab, Geometry of Linear Diophantine equations (2012).

Venkata Raghu Tej Pantangi, Representation Theory of Symmetric Groups (2012).

## Selected talks at conferences and meetings

*Securing Information in the Internet Era*, Science at the Sabha (Science popularization event held at the Music Academy, Chennai), February 2017.

Colloquium talk at IIT Madras, October 2016.

31st Annual Conference of the Ramanujan Mathematical Society, Trichy, June 2016.

*Experimental Mathematics with Python and Sage*, Chennai python use group meeting, IMSc Chennai, February 2016.

*Pingala's Meru Prastaara, Integer Partitions, and Young's Lattice*, workshop on the influence of Ramanujan's contributions in Mathematics, University of Madras, February 2016.

National Conference on Algebra and its Applications, Pondicherry University, February 2016.

India Taiwan Conference on Discrete Mathematics, IIT Madras, July 2015.

Discussion meeting on Group Theory, IISER Mohali, May 2014.

Current trends in Algebra, IISER Bhopal, August 2014.

One day colloquium sponsored by the Dr. R. Vaidyanathaswamy Mathematics Trust, University of Madras, Chennai, March 2011.

Non-commutative Rings and Combinatorial Representation Theory, Pondicherry University, September 2010.

Algebraic and Combinatorial Aspects of Representation Theory, National Institute of Advanced Studies (ICM satellite), Bangalore, August 2010.

11th Discussion Meeting in Harmonic Analysis, NISER Bhubaneswar, January 2010.

Workshop on Perspectives in Mathematics, Homi Bhabha Centre for Science Education, Mumbai, December 2009.

16th Ramanujan Symposium on Fourier Analysis and its Applications, Ramanujan Institute of Advanced Studies in Mathematics, Chennai, February 2009.

## Teaching Experience

### *Graduate courses at IMSc*

Programming for Mathematicians, Aug-Dec 2016.

Measure Theory, Aug-Dec 2015.

Classic Representation Theory, Jan-Apr 2013.

Topology I, Aug-Dec 2012.  
Combinatorics in Representation Theory, Jan-Apr 2011.  
Topology II, Jan-Apr 2010.  
Locally Compact Abelian Groups, Aug-Dec 2009.  
Functional Analysis, Jan-Apr 2008.  
Topics in Representation Theory, Aug-Dec 2006.  
Complex Analysis, Jan-Apr 2004.

### *Undergraduate teaching*

Representation Theory (Chennai Mathematical Institute), Aug-Dec 2011.  
Spirit of Enquiry Lectures on Calculus (weekend course for college students), Aug-Dec 2009.  
Lie-Theoretic Methods in Analysis (Chennai Mathematical Institute), Jan-Apr 2007.  
Analysis (Chennai Mathematical Institute), Aug-Dec 2004 and 2005.  
Number theory (McGill University), Winter 2003.  
Linear algebra and multivariate calculus (Concordia University and McGill University), 2002-2003.  
Freshman calculus (University of Chicago), 1997-2001.

### *Workshop courses*

*The Fourier transform on locally compact Abelian groups*, Discussion Meeting on Harmonic Analysis, Chennai Mathematical Institute, December 2013.  
*Green's work on  $GL(n)$* , Advanced Training in Mathematics Workshop held at TIFR on Deligne-Lusztig Theory, December 2011.  
*Selberg's trace formula for a cocompact discrete subgroup in a locally compact topological group*, workshop on Analytic Number Theory, Feb 2010.  
*Representations of  $GL_2(\mathbf{F}_q)$ ,  $SL_2(\mathbf{F}_q)$ , and some remarks about  $GL_n(\mathbf{F}_q)$* , AIS in Pune on Representation Theory and its Applications, July 2007.  
*Basics of algebraic groups*, ISI workshop on Lie Groups, Dec 2006.

## Software Development and Programming

Contributor to Sage mathematical software ([www.sagemath.org](http://www.sagemath.org)).