

# Amarpreet Rattan

Department of Mathematics  
University of Bristol  
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Citizenship: Canadian  
UK immigration status: EEA Family  
Permit

EMPLOYMENT ◇ **Postdoc, Heilbronn Institute and the University of Bristol**, January 2008 - present  
Bristol, UK  
Parental leave taken July 2008.

◇ **Postdoc, Massachusetts Institute of Technology**, January 2006 - December 2007  
Cambridge, MA, USA  
Department of Mathematics  
Adviser: Richard Stanley

EDUCATION ◇ **Ph.D., Combinatorics and Optimization, University of Waterloo**, 2006  
Waterloo, ON, Canada  
Thesis title: *Character Polynomials and Lagrange Inversion*  
Adviser: Ian Goulden

◇ **M.Math, Combinatorics and Optimization, University of Waterloo**, 2001  
Thesis title: *Parking Functions and Related Combinatorial Structures*  
Adviser: Ian Goulden

◇ **B.Sc. Mathematics, Queen's University**, 1999  
Kingston, ON, Canada  
Physics minor

ARTICLES IN  
REFEREED  
JOURNALS ◇ The number of lattice paths below a cyclically shifting boundary. *J. Combin. Theory Ser. A*, 116(3):499–514, April 2009. (with J. Irving)

◇ Minimal factorizations of permutations into star transpositions. *Discrete Math.*, 309(6):1435–1442. April 2009. (with J. Irving)

◇ Upper bound on the characters of the symmetric group for balanced Young diagrams and a generalized Frobenius formula. *Adv. Math.*, 218(3):673–695, 2008. (with P. Śniady)

◇ Stanley's character polynomials and coloured factorizations in the symmetric group. *J. Combin. Theory Ser. A*, 115(4):535–546, May 2008.

◇ Positivity results for Stanley's character polynomials. *J. Algebra*, 308(1):26–47, Feb. 2007.

◇ An explicit form for Kerov's character polynomials. *Trans. Amer. Math. Soc.*, 359(8):3669–3685, 2007. (with I.P. Goulden)

◇ Permutation factorizations and prime parking functions. *Ann. Comb.*, 10(2):237–254, Sept. 2006.

◇ Goldbach's Conjecture in  $\mathbb{Z}[x]$ . *C. R. Math. Acad. Sci. Soc. R. Can.*, 20(3):83–85, 1998. (with C. Stewart)

PREPRINTS ◇ Enumeration of noncrossing pairings on bit strings. (with T. Kemp, K. Mahlburg, and C. Smyth)

- THESES
- ◇ Character Polynomials and Lagrange Inversion, Ph.D. Thesis, University of Waterloo, 2005
  - ◇ Parking Functions and Related Combinatorial Structures, Master's Thesis, University of Waterloo, 2001
- TEACHING
- ◇ **Lecturer**  
*Linear Algebra and Geometry*, Math 11005  
 Department of Mathematics, University of Bristol, Winter 2008  
 Duties: organizing and giving lectures, writing assignments and solutions, marking the final exam.  
*Introduction to Linear Algebra for Engineers*, Math 115  
 Faculty of Mathematics, University of Waterloo, Fall 2004  
 Duties: organizing and giving lectures, writing assignments and solutions, writing and marking the final exam.
  - ◇ **Recitation Instructor**  
*Differential Equations*, Math 18.03  
 Department of Mathematics, Massachusetts Institute of Technology, Winter 2007  
 Duties: leading tutorials and problem solving sessions, marking the final exam.
  - ◇ **Guest Lecturer**, Fall 2002  
*Algebraic Enumeration* C&O 630  
 Department of Combinatorics and Optimization, University of Waterloo.  
 Duties: gave three one-hour lectures for the graduate course *Algebraic Enumeration*.
  - ◇ **Teaching Assistant**  
 Faculty of Mathematics, University of Waterloo, 1999-2005  
 Duties: leading tutorials, marking assignments and exams.  
*Linear Programming* (C&O 350).  
*Introduction to Graph Theory* (C&O 342).  
*Introduction to Enumeration* (C&O 330).  
*Introduction to Combinatorics* (Math 239, C&O 102).  
*Linear Algebra I and II for Honours Mathematics Students* (Math 136/235).  
*Integral and Differential Calculus* (Math 137/118).  
*Introduction to Abstract Algebra* (Math 135).
- SELECTED AWARDS
- ◇ *Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellowship* (NSERC PDF), Massachusetts Institute of Technology (2005 Competition)
  - ◇ *Ontario Graduate Scholarship, Science and Technology*, (OGSST) University of Waterloo (Winter 2004 - Summer 2005)
  - ◇ *NSERC Postgraduate Scholarship B*, University of Waterloo (2001 Competition)
  - ◇ *Outstanding Achievement in Graduate Studies*, University of Waterloo. Awarded annually to five students (one per faculty) at the Master's level (2001)
  - ◇ *NSERC Postgraduate Scholarship A*, University of Waterloo (1999 Competition)
  - ◇ *University of Waterloo Graduate Scholarship*, University of Waterloo (Fall 1999 - 2005)
  - ◇ *NSERC Undergraduate Summer Research Award*, Memorial University of Newfoundland, St. John's, Newfoundland, Canada (Summer 1998)
  - ◇ *Dean Honour List*, Faculty of Arts and Science, Queen's University (1998 and 1999)
  - ◇ *Jeffery Award in Mathematics*, Department of Mathematics, Queen's University. Awarded to the top undergraduate student in each year (1998)

- ADMINISTRATIVE EXPERIENCE
- ◇ **Member Graduate Affairs Committee** Summer 2002 - Fall 2005  
Department of Combinatorics and Optimization, University of Waterloo  
This committee, which comprised of faculty members of the department and myself, met once or twice a term, to discuss and modify aspects of the graduate program in our department (curriculum changes, comprehensive exam changes, etc.) A major issue was the addition of quantum computing stream into the department and how this will affect the program.
  - ◇ **Committee to choose a new department chair**, Winter 2003 - Summer 2003  
Department of Combinatorics and Optimization, University of Waterloo  
Only voting student member of this committee.
  - ◇ **Organizer: NSERC Undergraduate Research Assistants Seminars**, Summer 2002  
Department of Combinatorics and Optimization, University of Waterloo  
Organized weekly talks for NSERC Undergraduate Research Assistant Seminar Series. The first half of the summer was devoted to talks for the research assistants and the second half by the research assistants. Duties included: organizing talks, obtaining speakers, coaching research assistants on presentation skills.
  - ◇ **Refereeing Experience**  
Discrete Mathematics, Journal Combinatorial Theory Series A, Séminaire Lotharingien de Combinatoire, Mathematical Research Letters
- WORKSHOPS ORGANIZED
- ◇ **Co-organizer** *Techniques and Problems in Graph Theory*, Jul 2009. University of Bristol.  
Duties: inviting speakers, organizing talks and lecture rooms, organizing accomodation for the invited speakers etc.
- INVITED WORKSHOPS AND TALKS
- ◇ Quantum Information and Combinatorics, Seville, Spain, Nov 2009
  - ◇ Talk given: *Lattice paths below a cyclically shifting boundary*  
Combinatorics Seminar, Lab. d'Informatique, École Polytechnique, France, Dec 2007
  - ◇ Talk given: *Lattice paths below a cyclically shifting boundary*  
Discrete Maths and Optimization Seminar, McGill University, Canada, Feb 2008
  - ◇ Talk given: *Permutation factorization problems*  
School of Maths, Queen Mary University of London, UK, June 2007
  - ◇ Talk given: *Permutation factorization problems and asymptotics of characters of the symmetric group*  
School of Mathematics, University of Bristol, UK, June 1007
  - ◇ Talk given: *Character Polynomials, Free Probability and Combinatorics*  
Non-commutative and Harmonic Analysis Workshop, Będlewo, Poland, Oct 2006
  - ◇ Talk given: *Positivity Results for Character Polynomials*  
Applied Algebra Seminar, York University, Toronto, Canada, February 2006
- TALKS
- ◇ Talk given: *Lattice paths below a cyclically shifting boundary*  
Combinatorics Seminar, University of Bristol, Oct 2008
  - ◇ Talk given: *Lattice paths below a cyclically shifting boundary*  
Combinatorics Seminar, Massachusetts Institute of Technology, Dec 2007
  - ◇ Talk given: *Recent results for Kerov's and Stanley's character polynomials*  
Combinatorics Seminar, Massachusetts Institute of Technology, March 2006
  - ◇ Talk given: *Character polynomials and Lagrange inversion*  
University of Waterloo, November 2005

- ◇ Talk given: *Character polynomials*  
Algebraic Combinatorics Seminar, University of Waterloo, July 2004
- ◇ Talk given: *Parking functions and permutation factorizations*  
Algebraic Combinatorics Seminar, University of Waterloo, July 2002
- ◇ Talk given: *Parking functions*  
Short Attention Math Seminar, University of Waterloo, November 2000

TECHNICAL EXPERTISE Proficient with Maple, Magma, Sage, L<sup>A</sup>T<sub>E</sub>X, Linux and Unix

LANGUAGES Primary: English  
Others: French (intermediate written and basic spoken) and Punjabi (spoken)

- REFERENCES
- ◇ Richard Stanley, Professor  
Department of Mathematics  
Massachusetts Institute of Technology, Cambridge, MA, 02139-4307, USA  
Tel: +1 617 253-7930  
rstan@math.mit.edu  
<http://math.mit.edu/~rstan>
  - ◇ Ian Goulden, Professor  
Department of Combinatorics and Optimization  
University of Waterloo, Waterloo, ON, N2L 3G1, Canada  
Tel: +1 519 888-4567 x5592  
ipgoulde@math.uwaterloo.ca  
<http://www.math.uwaterloo.ca/~ipgoulde>
  - ◇ Philippe Biane, Researcher, Centre national de la recherche scientifique (France)  
Laboratoire d'Informatique, Institut Gaspard Monge  
Universit de Marne la Valle  
5 bd Descartes, Champs-sur-Marne  
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