

Igor Pak
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Employment:

July 2009 – present	UCLA , Department of Mathematics <i>Full Professor of Mathematics</i>
August 2007 – June 2009	UMN , Department of Mathematics <i>Associate Professor of Mathematics</i>
July 2005 – June 2008	MIT , Department of Mathematics <i>Associate Professor of Applied Mathematics</i>
July 2000 – June 2005	MIT , Department of Mathematics <i>Assistant Professor of Applied Mathematics</i>
Spring of 2001	MSRI , Berkeley, CA <i>Postdoctoral Fellow</i>
Jan. 1998 – June 2000	Yale University , Department of Mathematics <i>J. W. Gibbs Instructor of Mathematics</i>
Fall of 1997	MIT , Department of Mathematics <i>NSF Postdoctoral Fellow</i>

Education:

1994 – 1997	Harvard University , Department of Mathematics Graduate student, Ph.D. awarded in June 1997 <u>Advisor</u> : <i>Persi Diaconis</i> (currently at Stanford)
1993 – 1994	New York University , Department of Mathematics Visiting scholar
1989 – 1993	Moscow State University , Department of Mathematics Undergraduate student <u>Advisor</u> : <i>Alexandre Kirillov</i> (currently at UPenn)

Thesis:

“*Random walks on groups: Strong uniform time approach*”
Committee: Persi Diaconis, Agoston Pisztora
Harvard University, 1997

Research Interests:

Algebraic, Enumerative, Probabilistic and Geometric
Combinatorics, Random Walks, Probabilistic Group Theory

Publications: Over 65 research articles in journals and refereed conference proceedings. One book in print.

Postgraduate Grants and Fellowships:

2004-2009 NSF Grant in Mathematical Sciences
“*Combinatorial Enumeration and Random Generation*”

2008-2010 NSA Grant in Mathematical Sciences
“*Combinatorics of Partition Bijections*”

2001-2004 NSF Grant in Mathematical Sciences
“*Combinatorics, Probability and Computation on groups*”

2001-2004 NSA Grant in Mathematical Sciences
“*Combinatorics, Probability and Computation on groups*”

Spring 2001 Mathematical Sciences Research Institute (MSRI) Fellowship
MSRI, Berkeley, California

1997 – 2000 NSF Postdoctoral Research Fellowship in Mathematical Sciences

Undergraduate and Graduate Fellowships:

1995 – 1997 Hertz Foundation Fellowship in Mathematics,
Fannie and John Hertz Foundation

1996 – 1997 James Whittemore Fellowship, Harvard University

1994 – 1996 Harvard Mathematics Fellowship, Harvard University

1992 – 1993 French Mathematical Society Fellowship, Moscow, Russia

1989 – 1993 Moscow State University Mathematics Scholarship, Russia

Teaching:

“*Elementary Probability*” (Fall 2008), UMN, Math 4653

“*Discrete and Polyhedral Geometry*” (Fall 2008), UMN, Math 5248
(based on the book in print)

“*Cryptography and Number Theory*” (Fall 2007), UMN, Math 5245

“*Introduction to Combinatorics and Graph Theory*” (Fall 2007)
UMN, Math 4707

“*Combinatorics, Probability and Computation on Finite Groups,*”
innovative course (Fall 2001, 03, Spring 2006), MIT
(lectures notes by students are available on the course web page),
part of the MIT *OpenCourseWare* (OCW) project

“*Convex Polytopes and Combinatorial Geometry*”, topics course
(Spring 2005), MIT (lectures notes are being written as part of a book)

This course is similar to “*Geometric Combinatorics*” (Fall 2006), MIT
 “*Modern Combinatorics*”, topics course (Fall 2005), Hebrew University
 “*Combinatorial Theory*” (Fall 2000, 01, 03, 05), MIT
 part of the MIT *OpenCourseWare* (OCW) project
 “*Combinatorial Analysis*” (Fall 2002, 06), MIT
 “*Linear Algebra*” (Recitations, Spring 2003, 04), MIT
 “*Probability Theory*” (Spring 2003, 05), MIT
 “*Differential Equations*” (Recitations, Spring 2002), MIT
 “*Calculus*” (Recitations, Fall 2000), MIT
 “*Discrete Mathematics*” (Fall 1999, 1998), Yale University
 “*The Theory of Random Walks*” (Fall 1998), Yale University
 “*Linear Algebra and Matrix Theory*” (Spring 1998), Yale University
 “*Functions of a Real Variable*” (TA, Fall 1996), Harvard University

Research Supervision:

Ph.D. students: **Mike Korn**, MIT (Ph.D. in Mathematics, June 2004)
 Sergiy Sidenko, MIT (Ph.D. in Mathematics, June 2008)
 Matjaz Konvalinka, MIT (Ph.D. in Mathematics, June 2008)

Undergraduate: 7 undergraduate summer research students over 6 years:
 (Summer UROP **Maksym Fedorchuk** (Harvard graduate school, now Columbia postdoc)
 program at MIT) **Igor Ganichev** (ΦBK, now a CS grad student at Berkeley)
 Isabel Lugo (now a grad. student at UPenn)
 Karola Meszados (now a grad. student at MIT)
 Shubhangi Saraf (now a grad student at MIT CS)
 Abhiram Vijayarathy (ΦBK, graduated from MIT in 2004)
 Zhongtao Wu (now a grad. student at Princeton)

Editorial: “*Discrete Mathematics*”, Associate Editor
 (responsible for Enumerative and Geometric Combinatorics)

Refereeing:

Journals: Advances of Applied Math, Advances of Math, American Mathematical Monthly,
 Annals of Applied Probability, ARS Combinatorica, Discrete Mathematics,
 Combinatorica, Combinatorics, Probability & Computing, European J.
 Combinatorics, Functional Analysis and its Applications, Inventiones,
 Israel J. Mathematics, Journal of Algebra, Journal of Combinatorial Theory
 (Ser. A), J. of Algebraic Combinatorics, Journal of Symbolic Computation,
 Journal of Theoretical Probability, Linear Algebra & Applications, Memoirs of the

AMS, Ramanujan Journal, Russian Mathematical Surveys, Theor. Comp. Sci,
Trans. AMS

Conferences: FOCS, FPSAC, ICALP, SODA, STACS, STOC, Grigorchuk Conf. Proceedings

Grant evaluations: NSF, NSA, Israel-USA Binational Science Foundation

Panel Work: NSF Combinatorics Panel, NSA Discrete Mathematics Panel,
SODA Program Committee

Books: “*Discrete Geometry and Convex Polyhedra*”, Cambridge U. Press
to be printed in Fall 2009 (430 pp., available from my web page)

Journal Publications:

1. (with A.E. Postnikov) “*Enumeration of the spanning trees of some graphs*” (Russian) Uspekhi Mat.Nauk **45** (1990), no. 3(273), 193-194; translated in Russian Math. Surveys **45** (1990), no. 3, 220-221
2. (with A.A. Kirillov) “*Covariants of the symmetric group and its analogues in A. Weil algebras*” (Russian) Funktsional. Anal. i Prilozhen. **24** (1990), no. 3, 9-13; translated in Functional Anal. Appl. **24** (1990), no. 3, 172-176
3. (with A.V. Stoyanovskii) “*Bijjective proof of the hook formula and its analogues*”(Russian) Funktsional. Anal. i Prilozhen. **26** (1992), no. 3, 80-82; translated in Functional Anal. Appl. **26** (1992), no. 3, 216-218
4. (with A.E. Postnikov) “*Resolvents for S_n -modules that correspond to skew hooks, and combinatorial applications*” (Russian) Funktsional. Anal. i Prilozhen. **28** (1994), no. 2, 72-75; translated in Functional Anal. Appl. **28** (1994), no. 2, 132-134
5. (with A.G. Kuznetsov, A.E. Postnikov) “*Increasing trees and alternating permutations*” (Russian) Uspekhi Mat. Nauk **49** (1994), no. 6(300), 79-110; translated in Russian Math. Surveys **49** (1994)
6. (with A.E. Postnikov) “*Transversal matroids and strata on a Grassmannian*” (Russian) Funktsional. Anal. i Prilozhen. **29** (1995), no. 2, 84-88; translated in Funct. Anal. Appl. **29** (1995), no. 2, 140-143
7. (with A.G. Kuznetsov, A.E. Postnikov) “*Trees associated with the Motzkin numbers*”, J. Combin. Theory (Ser. A) **76** (1996), no. 1, 145-147
8. (with A.E. Postnikov) “*A generalization of Sylvester's identity*”, Discrete Math. **178** (1998), no. 1-3, 277-281
9. (with J.-C. Novelli, A.V. Stoyanovskii) “*A direct bijective proof of the hook-length formula*”, Discrete Math. Theor. Comput. Sci. **1** (1997), no. 1, 53-67 (first invited issue)
10. “*Random walks on finite groups with few random generators*”, Electron. J. Probab. **4** (1999), 11 pp.
11. “*Reduced decompositions of permutations in terms of star transpositions, generalized Catalan numbers and k -ary trees*”, Discrete Math. **204** (1999), no. 1-3, 329-335 (Special volume dedicated to J. Gould)
12. “*Ribbon tile invariants*”, Trans. Amer. Math. Soc. **352** (2000), no. 12, 5525-5561

13. (with S. Bratus) “Fast constructive recognition of a black box group isomorphic to S_n or A_n using Goldbach conjecture” (1997), J. Symbolic Comp. **29** (2000), no. 1, 33-57
- 13a “On the fraction of Goldbach elements in a symmetric group”, appendix to the previous paper, *ibid.*
14. (with R. Muchnik) “On tilings by ribbon tetrominoes”, J. Combin. Theory (Ser. A) **88** (1999), no. 1, 188-193
15. “Two random walks on upper triangular matrices”, J. Theor. Probab. **13** (2000), 1083-1100
16. (with Van H. Vu) “On finite geometric random walks and probabilistic combinatorics”, Discrete Appl. Math. **110** (2001), 251-272
17. (with D. Coppersmith) “Random walk on upper triangular matrices mixes rapidly”, Theor. Probab. Related Fields **117** (2000), no. 3, 407-417
18. (with R. Muchnik) “On growth of Grigorchuk groups” Intern. J. Algebra Comp. **11** (2001), 1-17
19. (with R. Muchnik) “Percolation on Grigorchuk groups” (1999), Comm. Algebra, **29** (2001), 661-671
20. “Four questions on Birkhoff polytope”, Ann. Comb. **4** (2000), no. 1, 83--90
21. “On the number of faces of certain transportation polytopes”, Europ. J. Comb. **21** (2000), 689-694
22. “Hook length formula and geometric combinatorics”, Sém. Lothar. Combin. **46** (2001/02), Art. B46f.
23. (with T. Smirnova-Nagnibeda) “On non-uniqueness of percolation on nonamenable Cayley graphs” Comptes Rendus de l'Académie des Sciences (Series I - Mathematics) **330** (2000), no. 6, 495-500
24. (with A. Lubotzky) “The product replacement algorithm and Kazhdan's property (T)”, Journal of AMS, vol. **52** (2000), no. 12, 5525-5561”,
25. “Tile invariants: New horizons”, Theor. Comp. Sci **303** (2003), 303-331
26. (with C. Moore) “Ribbon tile invariants from signed area”, J. Comb. Theory, Ser A. **98** (2002), 1-16
27. (with N. Lulov) “Rapidly mixing random walks and bounds on characters of the symmetric group”, J. Algebraic Comb. **16** (2002), 151-163
28. “On Fine's partition theorems, Dyson, Andrews, and missed opportunities”, Math. Intelligencer **25** (2003), 10-16
29. (with R. Guralnick) “On a question of B. H. Neumann”, Proc. Amer. Math. Soc. **131** (2003), 2021-2025
30. (with A. Zuk) “On Kazhdan constants and mixing of random walks”, Int. Math. Res. Not. **36** (2002), 1891-1905
31. (with S. Elizalde) “Bijections for refined restricted permutations”, J. Comb. Theory Ser. A., **105** (2004), 207-219
32. “Partition Bijections, A Survey”, Ramanujan Journal **12** (2006), 5-75.
33. “Partition Identities and Geometric Bijections”, Proc. A.M.S. **132** (2004), 3457-3462
34. (with C. Bessenrodt) “Partition congruences by involutions”, Europ. J. Combin. **25** (2004), 1139-1149

35. “*The nature of partition bijections I. Involutions*”, Adv. in Applied Math **33** (2004), 263-289
36. (with M. Korn) “*Tilings of rectangles with T-tetrominoes*”, Theor. Comp. Science **319** (2004), 3-27
37. (with L. Babai) “*Strong bias of group generators: an obstacle to the "product replacement algorithm"*”, J. Algorithms **50** (2004), 215-231 (special invited SODA volume)
38. (with M. Korn) “*Combinatorial evaluations of the Tutte polynomial*”, (2006) submitted to Proc. L.M.S.
39. (with E. Miller) “*Metric combinatorics of convex polyhedra: cut loci and nonoverlapping unfoldings*”, Discrete and Comp. Geometry **39** (2008), 339-388, special 30th anniversary issue.
40. (with E. Vallejo) “*Combinatorics and geometry of Littlewood-Richardson cones*”, Europ. J. Combinatorics, **26** (2005), 995-1008.
41. (with Maksym Fedorchuk) “*Rigidity and polynomial invariants of convex polytopes*”, Duke J. Mathematics **129** (2005), 371-404.
42. “*Periodic permutations and the Robinson-Schensted correspondence*” (2006), Journal of Algebraic Comb. (?)
43. (with S. Chmutov) “*The Kauffman bracket and the Bollobas-Riordan polynomial of ribbon graphs*”, Moscow Math. Journal **7** (2007), 409-418; special issue dedicated to *A. Khovanskii*.
44. (with E. Vallejo) “*Reductions of Young tableau bijections*” , to appear in SIAM Disc. Math
45. “*Stability of partition bijections*” (2007), preprint
46. (with C. Boulet) “*A combinatorial proof of the Rogers-Ramanujan and Schur identities*” J. Comb. Theory Ser. A, **113** (2006), 119-130.
47. “*A short proof of rigidity of convex polytopes*”, Siberian J. Mathematics **47** (2006), 859-864.
48. “*The area of cyclic polygons: Recent progress on Robbins conjecture*”, Adv. in Applied Math **34** (2005), 690-696; special issue in memory of *David Robbins*.
49. (with C. Malon) “*Percolation on Finite Cayley Graphs*”, Combinatorics, Probability and Computing **15** (2006), 571-588.
50. (with A. Gamburd) “*Expansion of product replacement graphs*” , Combinatorica **26** (2006), 411-429.
51. (with P. Etingof) “*An algebraic extension of the MacMahon Master Theorem*” Proc. A.M.S. **136** (2008), 2279-2288
52. “*Inflating the cube without stretching*”, Amer. Math. Monthly, **115** (2008) 443-445.
53. (with R. Radoicic) “*Hamiltonian paths in Cayley graphs*”, to appear in Discrete Math. (special issue)
54. (with R. Grigorchuk) “*Groups of Intermediate Growth: an Introduction for Beginners*”, to appear in L’Enseignement Mathématique
55. “*Inflating polyhedral surfaces*”, Math. Ann., under revision
56. (with M. Konvalinka) “*Non-commutative extensions of the MacMahon Master Theorem*”, Adv. Math. **216** (2007), 29-61.

57. (with M. Konvalinka) “*Geometry and Complexity of O'Hara's Algorithm*” Adv. Applied Math. 42 (2009), 157-172
58. (with A. Redlich) “*Long cycles in abc-permutations*”, FAOM 2 (2008), 87-92.
59. (with S. Sidenko) “*Convergece of Kac's random walk*” (2008), submitted to RSA.
60. (with J.-M. Schlenker) “*Profiles of inflated surfaces*” (2008), to appear in Journal of Nonlinear Mathematical Physics.
61. “*The discrete square peg problem*” (2008), preprint

Refereed Conference Proceedings:

1. (with A. Postnikov) “*Enumeration of trees and one amazing Representation of S_n* ”, Proc. Eighth Formal Power Series and Algebraic Combinatorics (FPSAC'96) Conf., 1996, Minneapolis, Minnesota, 385-389
2. (with A. Postnikov) “*Oscillating Tableaux, $(S_p \times S_q)$ -modules, and Robinson-Schensted-Knuth correspondence*”, *ibid.*, 391-402
3. “*When and how n choose k* ”, Proc. DIMACS Workshop on Randomization Methods in Algorithm Design (P. Pardalos et. al. Eds.), AMS DIMACS Series, vol. 43, 1998, AMS, Providence, 191-238
4. “*Ribbon tile invariants*”, Proc. Tenth Formal Power Series and Algebraic Combinatorics (FPSAC'98) Conf., 1996, Field Institute, Toronto, Canada, 505-512
5. “*Using stopping times to bound mixing times*”, Proc. Tenth ACM-SIAM Symposium on Discrete Algorithms (SODA'99), Baltimore, Maryland
6. (with F. Chen, L. Lovasz) “*Lifting Markov Chains to Speed up Mixing*”, Proc. Thirty-First Annual ACM Symposium on Theory of Computing (STOC'99), Atlanta, Georgia, 275-281
7. (with S. Bratus) “*On sampling generating sets of finite groups and product replacement algorithm*”, Proc. International Symposium on Symbolic and Algebraic Computation (ISSAC'99), Vancouver, Canada
8. “*Random walks on finite groups with few random generators are expanders*”, Proc. Seventh European Symposium on Algorithms (ESA'99), Prague, Czech Republic, in Lecture Notes in Computer Science (J. Nešetřil, Ed.), vol. 1643, Springer, Berlin, 1999
9. (with L. Babai) “*Strong bias of group generators: an obstacle to the "product replacement algorithm"*”, Proc. Eleventh ACM-SIAM Symposium on Discrete Algorithms (SODA'00), San Francisco, California
10. “*The product replacement is polynomial*”, Proc. IEEE 41st Annual Symposium on Foundations of Computer Science (FOCS'00), Redondo Beach, California
11. (with A. Gamburd) “*Expansion of product replacement graphs*”, Proc. Thirteenth ACM-SIAM Symposium on Discrete Algorithms (SODA'02), 691-696
12. “*Mixing time and long paths in graphs*”, Proc. Thirteenth ACM-SIAM Symposium on Discrete Algorithms (SODA'02), 321-328
13. (with C. Malon) “*Percolation on Finite Cayley Graphs*”, Proc. “Random Structures and Algorithms” Conference (RANDOM 2002), 91-104

14. “*On sampling integer points in polyhedra*”, in “Foundations of Computational Mathematics: Proceedings of Smalefest 2000” (F. Cucker and J. M. Rojas, Editors), World Scientific, Singapore, 2002
15. “*What do we know about product replacement algorithm?*”, in “Groups and Computation III” (W. Kantor, A. Seress, eds.), deGruyter, Berlin, 2000, 301-347
16. (with Matjaz Konvalinka) “*Non-Commutative Extensions of Classical Determinantal Identities*”, Proc. 19th Formal Power Series and Algebraic Combinatorics (FPSAC’07) Conf., 2007, Tianjin, China

Unpublished Manuscripts (mostly dated):

1. (with A. Postnikov, V. Retakh) “*Noncommutative Lagrange Inversion*” (1996), unpublished manuscript, available from the Home Page.
2. (with A. Postnikov) “*Hyperplane arrangements and higher Bruhat orders*” (1995), unpublished manuscript in Russian
3. (with A. Astashkevich) “*Random walks on nilpotent and solvable groups*” (1997), unpublished manuscript
4. “*On the graph of generating sets of a simple group*” (1999), unpublished manuscript
5. “*On probability of generating a finite group*” (1999), preprint
6. (with A. Kelmans, A. Postnikov) “*Tree and forest volumes of graphs*” (1999), DIMACS preprint
7. (with G. Cooperman) “*The product replacement graph on generating triples of permutations*” (2000), preprint.
8. “*Testing commutativity of a group and a power of randomization*” (2001), preprint
9. (with A. Henriques) “*Volume-preserving PL-maps between polyhedra*” (2004), preprint
10. (with T. Lam and E. Miller) “*On the complexity of computing the tiling group*”, a draft
11. “*Young tableau bijections. A survey*”, a manuscript

Papers in preparation:

1. (with E. Miller) “*Immersion and submersions of polyhedral surfaces*”, in preparation
2. “*Quasigeodesics on convex polyhedra*”, in preparation
3. (with J.-M. Schlenker) “*Every convex polyhedral surface has three quasigeodesics*”, in preparation
4. (with S. Saraf) “*Immersion of polyhedral surfaces in \mathbf{R}^3* ”, in preparation (tentative title)

Invited Talks:

- September 2009 IPAM Semester in Combinatorics Combinatorics Tutorials, UCLA
Lecture 1: *“Tree bijections”*
Lecture 2: *“Partition bijections”*
Lecture 3: *“Young tableaux bijections”*
- August 2009 3rd Latin American Congress of Mathematicians, Santiago, Chile
“Acute triangulations of convex polytopes”

Oded Schramm Memorial Conference, Microsoft Research
“Caged eggs and the rigidity of convex polyhedra”
- May 2009 Theory Computer Science Seminar, University of Chicago, IL
“Geometry and complexity of partition bijections”
- April 2009 Discrete Geometry Workshop, San Padre Island, Texas
“Folding and unfolding of convex polyhedra”

Colloquium, Temple University, Philadelphia, PA
“Inflating polyhedral surfaces”

Combinatorics Seminar, Texas A & M, College Station, TX
“MacMahon's master theorem and its generalizations”
- March 2009 Combinatorics Seminar, University of Bordeaux, France
“MacMahon's master theorem and its generalizations”

Geometry Seminar, University of Toulouse, France
“The algebra and geometry of finite tilings”

Combinatorics Seminar, Ecole Polytechnique, Paris, France
“Geometry and complexity of partition bijections”

Combinatorics Seminar, Marne-le-Vallée University, France
“MacMahon's master theorem and its generalizations”

Colloquium in Algebra and Combinatorics, University of Lisbon
“Geometry and complexity of partition bijections”

Combinatorics Seminar, University of Coimbra, Portugal
“Geometry and complexity of partition bijections”
- February 2009 Colloquium, Georgia Institute of Technology
“Geometry and complexity of partition bijections”

Colloquium and **Fejes Tóth Lecture**, University of Calgary, Canada
“Inflating polyhedral surfaces”

Discrete Mathematics Seminar, University of Calgary, Canada
“Rigidity of polytopes, areas of polygons, and the Robbins conjectures”

- Colloquium, University of Texas, Brownsville, TX
"Inflating polyhedral surfaces"
- Geometry Lecture Series, University of Texas, Brownsville, TX
 Lecture 1: *Connectivity of triangulations by elementary flips*
 Lecture 2: *Piecewise-linear Monge maps*
- January 2009 Discrete Differential Geometry Workshop, MFO, Obervolfach, Germany
"Discrete square peg problem"
- Geometry and Topology Seminar, University of Chicago, Chicago, IL
"Realization of polyhedral surfaces"
- November 2008 Combinatorics Seminar, Penn State, State College, PA
"Geometry and complexity of O'Hara's bijection"
- MASS Colloquium, Penn State, State College, PA
"The square peg problem"
- October 2008 Colloquium, UCLA, Los Angeles, CA
"Geometry and complexity of partition bijections"
- Univerisyt of Minnesota colloquium, Minneapolis, MN
"Rigidity of polytopes, areas of polygons, and the Robbins conjectures"
- March 2008 Geometry and Topology Conference, UT Brownsville
"The square peg problem"
- January 2008 Colloquium, University of Illinois Urbana-Champaign
"Inflating polyhedral surfaces"
- December 2007 Discrete and Polyhedral Geometry Workshop, AIM, Palo Alto, CA
"Rigidity and Polyhedral Geometry"
- June 2007 Discrete Differential Geometry Workshop, Berlin, Germany
"Inflating and realization of polyhedral surfaces"
- February 2007 Geometric Combinatorics, Oberwolfach Meeting, Germany
"Inflating polyhedral surfaces"
- January 2007 Special Colloquium, University of Minnesota, Minneapolis, MN
"Inflating polyhedral surfaces"
- November 2007 Colloquium, Northwestern University, Evanston, IL
"The nature of partition bijections"
- November 2006 Invited plenary talk, 16th Fall Workshop on *Computational Geometry*
 Smith College, Northampton, MA
"Inflating polyhedral surfaces"
- October 2006 Invited plenary talk, HMC Conference on *Enumerative Combinatorics*
 Harvey Mudd College, Claremont, CA
"The MacMahon Master Theorem"
- Colloquium, University of Texas, Austin
"The nature of partition bijections"

- “Geometric Combinatorics” Special Session,
AMS meeting, Cincinnati, OH
“Inflating polyhedral surfaces”
- MIT Physical Mathematics Seminar, Cambridge, MA
“The ideal pillow shape”
- September 2006 Probability Seminar, Cornell University, Ithaca, NY
“Generating random group elements”
- Combinatorics and Geometry Seminar, Cornell University
“Inflating polyhedral surfaces”
- May 2006 Discrete Mathematics and Knot Theory Seminar, GWU, Washington, DC
“The Tutte polynomial, generalizations, and connections to knots”
- April 2006 “Discrete and Convex Geometry” Special Session,
AMS Session, Durham, NH
“Isometric submersion of polyhedral surfaces”
- February 2006 “Lie Groups, Representations and Discrete Mathematics” Conference
IAS, Princeton, NJ, *“Generating random group elements”*
- January 2006 Colloquium, University of Minnesota, Minneapolis, MN
“The nature of partition bijections”
- Berlin Colloquium in Discrete Mathematics
Freie Universität Berlin, Germany
“Combinatorics and geometry of convex polyhedra”
- October 2005 “Algebraic and Geometric Combinatorics” Special Session,
AMS meeting, Annandale-on-Hudson, NY
“Something old and something new on rigidity of convex polyhedra”
- “Invariants of Graphs” Special Session,
AMS meeting, Annandale-on-Hudson, NY
“Evaluations of the Tutte polynomial”
- Discrete Geometry Seminar, NYU, New York, NY
“The geometry of convex polyhedra”
- May 2005 Colloquium, Tel Aviv University, Tel Aviv, Israel
“Convex polytopes, rigidity, and classical geometry”
- Workshop on permutation patterns, Haifa University, Haifa, Israel
“RSK revisited”
- April 2005 Discrete Mathematics Seminar, Princeton University, Princeton, NJ
“The nature of partition bijections”
- March 2005 Discrete Geometry Seminar, NYU, New York, NY
“Convex polytopes, rigidity, and classical geometry”
- February 2005 Discrete Mathematics Day Conference, Wesleyan University, CT
“The nature of partition bijections”
- January 2005 “East Coast Combinatorics Conference”, UNB, Fredericton, NB, Canada

- “The nature of partition bijections”*
- Colloquium, Institute of Mathematics (UNAM), Morelia, Mich. MEXICO
“Introduction to finite tilings”
- University of Geneva Colloquium, Geneva, Switzerland
“The nature of partition bijections”
- December 2004 Computer Science Colloquium, Haifa University, Haifa, Israel
“What do combinatorialists do?”
- Probability Seminar, The Technion, Haifa, Israel
“Random walks on finite groups”
- Colloquium, Ben Gurion University, Beer Sheba, Israel
“Generating random groups elements”
- November 2004 Basic Notions Seminar, Hebrew University, Jerusalem, Israel
“The nature of partition bijections” (a series of 2 lectures)
- Amitsur Algebra Seminar, Hebrew University, Jerusalem, Israel
“The bias of group generators”
- October 2004 Combinatorics Seminar, The Technion, Haifa, Israel
“Finite tilings on a plane”
- Combinatorics Seminar, Bar-Ilan University, Israel
“Combinatorial proofs of Euler’s and Rogers-Ramanujan’s identities”
- Colloquium, Hebrew University, Jerusalem, Israel
“Convex polytopes, rigidity, and classical geometry”
- Combinatorics Seminar, Hebrew University, Jerusalem, Israel
“Finite tilings on a plane”
- September 2004 Combinatorics Seminar, Moscow Independent University, Moscow, Russia
“The nature of partition bijections”
- “Globus Seminar”, a colloquium at Moscow Independent University, Russia
“Finite tilings on a plane”
- Combinatorics and Representation Theory Seminar,
 POMI, Russian Academy of Sciences, St. Petersburg, Russia
“The nature of partition bijections”
- June 2004 Richard Stanley Birthday Conference, MIT, Cambridge, MA
“Rigidity and polynomial invariants of convex polytopes”
- Algebra and Combinatorics Seminar, University of Rome 2, Italy
“Hook length formula and geometric combinatorics”
- Combinatorics Seminar, University of Florence, Italy
“The nature of Partition Bijections”

March 2004 Combinatorics and Geometry Seminar, Steklov Institute and
Moscow State University, Moscow, Russia
"Nonoverlapping unfoldings of convex polyhedra"

 Geometry Seminar, Moscow State University, Moscow, Russia
"Rigidity of polytopes, Sabitov polynomials and the Robbins' Conjecture"

February 2004 Combinatorics and Geometry Seminar, Cornell University
"Nonoverlapping unfoldings of convex polyhedra"

 Everyperson Seminar, Brandeis, Waltham, MA
"The nature of Partition Bijections"

 Fellowship of Ring Seminar, Brandeis
"Nonoverlapping unfoldings of convex polyhedra"

January 2004 "Groups and Expanders", IPAM workshop
"The Product Replacement Algorithm: an update"

 AMS Joint Meeting, Phoenix, Arizona
"Combinatorial evaluations of the Tutte polynomial"

October 2003 Geometry and Topology Seminar, University of Chicago, IL
"Nonoverlapping unfoldings of convex polyhedra"

 Basic Notions, Northeastern University, Boston, MA
"The nature of partition bijections"

September 2003 Colloque des Sciences Mathematiques du Quebec, Montreal, Canada
"The nature of partition bijections"

 Combinatorics Seminar, UQAM, Montreal, Canada
"Hook length formula and geometric combinatorics"

July 2003 "Groups and Probability" Conference, Budapest, Hungary
"Percolation on finite Cayley graphs"

 "XV Coloquio Latinoamericano de Algebra", Mexico City
"Young tableau bijections"

March 2003 "Groups and Computation IV" Conference, Columbus, Ohio
"Combinatorics and Probability on finite groups"

January 2003 Algebra and Number Theory Seminar, Penn State
"The nature of partition bijections"

 Probability Seminar, UCLA, Los Angeles, CA
"Combinatorics and Probability on finite groups"

December 2002 Invited lecture series, "Percolation on Groups" Conference,
Neuchatel, Switzerland, *"Percolation on finite groups"*

June 2002 CMS Summer Meeting, Quebec City, Canada
"Combinatorics and Algebra of Partitions Bijections"

May 2002 Algebra Seminar, Rutgers University, New Brunswick, NJ

- “Combinatorics of finite Cayley Graphs”*
- Combinatorics Seminar, Princeton University, Princeton, NJ
“Hook length formula and geometric combinatorics”
- Group Theory and Topology Seminar, Vanderbilt University, Nashville, TN
“Combinatorics of finite Cayley graphs”
- March 2002 Colloquium, Department of Mathematics, SUNY Albany, New York
“Graphs, groups and expanders”
 AMS Special Section on Algebraic Combinatorics, Atlanta, Georgia
“Combinatorics of Product Replacement Graphs”
- Invited plenary talk, CombinaTexas Conference, Dayton, Texas
“Groups, graphs, and random walks”
- February 2002 Colloquium, Department of Mathematics, University of Toronto, Canada
“Graphs, groups and expanders”
- January 2002 Twelfth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)
“Mixing Time and Long Paths in Graphs”
- Twelfth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)
“Expansion of Product Replacement Graphs” (joint with A. Gamburd)
- December 2001 Everyperson Seminar, Brandeis University, Waltham, MA
“Graphs, groups and expanders”
- October 2001 Invited presentation at “Teoria Dei Gruppi e Applicazioni”, Brescia, Italy
“Cayley graphs and expanders”
- Combinatorics Seminar, MIT, Cambridge, MA
“Hook length formula and geometric combinatorics”
- July 2001 Durham Symposium “Groups, Geometry and Combinatorics”, Durham, UK
“The product replacement algorithm”
- May 2001 Colloquium, Institute of Mathematics (UNAM), Morelia, Mich. MEXICO
“Computation on Groups: A Survey”
- Algebra Seminar, Institute of Mathematics (UNAM), Morelia, MEXICO
“Hook length formula and geometric combinatorics”
- Fifth Joint AMS-SMM meeting, Morelia, Mich. MEXICO
 “Combinatorics and Graph Theory” Special Session
“Ribbon Tile Invariants”
- Theory Seminar, Microsoft Research, Microsoft Corp., Redmont, WA
“Blind algorithms and Markov chains”
- Joint session of Algebra and Combinatorics Seminar
 University of Washington, Seattle, WA
“Hook length formula and geometric combinatorics”
- April 2001 Algebra Seminar, Department of Mathematics, Caltech, Pasadena, CA

- “Probability on generating sets of groups”*
- Discrete Mathematics and Optimization Seminar, UC Davis, CA
“Mixing of Markov chains and their liftings”
- Mathematical Physics Seminar, Department of Mathematics, UC Davis, CA
“Everything you always wanted to know about RSK”
- Joint session of Group Algorithms and Probability Seminars
Department of Mathematics, University of Oregon, Eugene, OR
“Generating random group elements”
- March 2001
- Geometric Group Theory Seminar, Department of Mathematics, UC Berkeley
“Graphs on generating sets of groups”
- Probability and Statistics Seminar, Stanford University, CA
“Blind algorithms and Markov chains”
- Number Theory Seminar, Department of Mathematics, UC Berkeley
“Computation on groups and Goldbach conjecture”
- Probability Seminar, Department of Statistics, UC Berkeley, Berkeley, CA
“Mixing of self-reducible Markov chains”
- Combinatorics Seminar, UC Berkeley, Berkeley, CA
“The hook length formula”
- February 2001
- Random Walks and Statistical Physics Workshop
Erwin Schrödinger Institute (ESI), Vienna, AUSTRIA
“Random walks on groups and stopping times”
- Combinatorics Seminar, Graduate Center, CUNY, New York, NY
“Ribbon Tile Invariants”
- January 2001
- Colloquium, Statistics Department, Harvard University, Cambridge, MA
“Mixing of Markov Chains: What Can Be Proved”
- IAP Lecture Series, Department of Mathematics, MIT, Cambridge, MA
“Combinatorics of Tilings”
- December 2000
- Workshop “Probabilistic Methods in Group Theory”, CCNY, New York, NY
“Testing group properties: Probabilistic and algorithmic approaches”
- Magnus Group Theory Seminar, Graduate Center, CUNY, New York, NY
“Probability on finite groups”
- November 2000
- IEEE 41st Annual Symposium on Foundations of Computer Science (FOCS)
Redondo Beach, CA, *“The product replacement algorithm is polynomial”*
- October 2000
- Combinatorics Seminar, Department of Mathematics, MIT, Cambridge, MA
“Ribbon tile invariants. The prequel and the sequel.” The series of two lectures.
- September 2000
- Theory of Computation Seminar, Laboratory of Computer Science,
MIT, Cambridge, MA, *“Generating random elements in finite groups
And the product replacement algorithm”*

July 2000 Research Seminar, IAS/Park City Mathematics Institute, Princeton, NJ
“Computation on groups: birds eye view”

 “International Conference on Foundations of Computational Mathematics
Celebrating Steve Smale's 70th birthday”, City University of Hong Kong, HK
“Generating random group elements”

 Number Theory Seminar, University of Bordeaux-I, France
“Computation on groups and Goldbach Conjecture”

June 2000 Combinatorics Colloquium, Laboratory for Research in Computer Science
University of Bordeaux-I, France, *“Ribbon Tile Invariants”*

 The Fifth International Petrozavodsk Conference "Probabilistic Methods
in Discrete Mathematics", Petrozavodsk, Russia
“Combinatorics and Probability on Finite Groups”

May 2000 “Asymptotic Group Theory and Related Topics” Conference, Institute
of Advanced Studies, Hebrew University of Jerusalem, Israel
“On the product replacement algorithm”

April 2000 Probability Seminar, Duke University, Durham, NC
“Probability and computation on groups”

February 2000 Colloquium, Rutgers University, New Brunswick, NJ
“Combinatorics, probability and computation on groups”

 Invited Presentation, University of Cambridge, UK
“Recent progress on Product Replacement Algorithm”

 Colloquium, University of Utah, Salt Lake City, UT
“Combinatorics, probability and computation on groups”

January 2000 MSRI Workshop on Noncommutative Algebra, Berkeley, California
“Generating random elements in finite groups”

 Colloquium, University of California at Davis
“Combinatorics, probability and computation on groups”

 Colloquium, Rice University, Houston, TX
“Combinatorics, probability and computation on groups”

 Colloquium, University of Washington at Seattle
“Combinatorics, probability and computation on groups”

 Theory Seminar, Microsoft Research, Redmond, WA
“On Product Replacement Algorithm”

 Colloquium, University of Illinois at Chicago
“Combinatorics, probability and computation on groups”

 Eleventh Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)
*“Strong Bias of Group Generators: an Obstacle to the “Product Replacement
Algorithm”* (joint with L. Babai)

December 1999 Colloquium, Texas A&M University

- “Combinatorics, probability and computation on groups”*
- November 1999 Series of Lectures at CUNY and New York Algebra Seminar, New York City
“Probability on finite and infinite groups”
- October 1999 Mathematics Department Colloquium, Cornell University, Ithaca, New York
“Probability of generating a group”
- DIMACS Workshop on Pseudorandomness and Explicit Combinatorial
 Constructions, Rutgers University, New Brunswick, New Jersey
“Generating random group elements by product replacement algorithm”
- July 1999 International Symposium on Symbolic and Algebraic Computation (ISSAC)
“On sampling generating sets of finite groups product replacement algorithm”
(joint with S. Bratus)
- Seventh European Symposium on Algorithms, Prague, Czech Republic
“Random Cayley graphs with $O(\log G)$ generators are expanders”
- Symposium on Computation in Group Theory and Geometry,
 University of Warwick, Coventry, UK
“Probability and growth of groups”
- June 1999 “Groups and Computation” Conference, Ohio State U, Columbus, Ohio
“What do we know about product replacement algorithm?”
- Eleventh Formal Power Series and Algebraic Combinatorics Conference
(FPSAC) Barcelona, Spain: *“Mixing of finite geometric random walks
and cutoff phenomenon”* (joint with Van Vu)
- May 1999 Thirty-First Annual ACM Symposium on Theory of Computing (STOC)
Atlanta, Georgia: *“Lifting Markov Chains to Speed up Mixing”*
- April 1999 Combinatorics Seminar, Royal Institute of Technology, Stockholm, Sweden
“Ribbon Tile Invariant and Thurston’s Algorithm”
- Algebra Seminar, Hebrew University of Jerusalem, Jerusalem, Israel
“On probability of generating a finite group”
- Combinatorics Seminar, Department of Mathematics, Bar Ilan University, Israel
“Hook-length formula and Robinson-Schensted-Knuth correspondence”
- Colloquium, Department of Mathematics, Bar Ilan University, Israel
“Old and New Results on Domino Tilings”
- March 1999 Theoretical Computer Science Seminar, University of Chicago, Illinois
“Generating random group elements by random walks”
- Algebra Seminar, University of Chicago, Illinois
“Probability on groups”
- February 1999 Dynamical Systems Seminar, Yale University, New Haven, Connecticut
“Product replacement algorithm and random walks on $SL(n, \mathbb{Z})$ ”
(a series of two talks)

- Special Lecture, Stanford University, Palo Alto, California
"Random walks on groups: Stopping time technique"
- MIT Combinatorics Seminar, MIT, Cambridge, Massachusetts
"Mixing of random walks and random matroid processes"
- Mathematics Colloquium, University of Arizona, Tucson
"Mixing of Random Walks"
- Algebra & Number Theory Seminar, University of Arizona, Tucson
"Random Walks on Groups"
- January 1999 Tenth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)
"Using Stopping Times to Bound Mixing Times"
- Joint Mathematics Meeting (AMS, MAA, SIAM) San Antonio, Texas
"Random walks on groups: how fast they mix and how to speed them up"
- November 1998 Mathematical Physics Seminar, Rutgers University, New Jersey
"Random walk on finite groups and asymmetric exclusion processes"
- Mathematical Sciences Seminar, IBM Research, Yorktown Heights, New York
"Mixing of random walks"
- October 1998 Probability Seminar, City University of New York (CUNY)
"Stopping time technique"
- September 1998 Discrete Mathematics Seminar, Yale University, New Haven, Connecticut
"Random walks of finite groups with few random generators mix rapidly"
- July 1998 Probability Seminar, University of Wisconsin, Madison, Wisconsin
"Random walks on groups: strong uniform time approach"
- June 1998 Tenth International Conference on Formal Power Series and Algebraic
 Combinatorics (FPSAC), Fields Institute, Toronto, Canada
"Ribbon tile invariants"
- April 1998 Princeton University Combinatorics Seminar, Princeton, New Jersey
"Ribbon Tile Invariants"
- March 1998 Theory Seminar in Computer Science, UC Berkeley, California
"Random walks on groups: new results and applications"
- Discrete Mathematics Seminar, Yale University, New Haven, Connecticut
"Tilings problems and invariants of ribbon tiles"
- February 1998 Algebra Seminar, Yale University, New Haven, Connecticut
"Old and new results in representation theory of symmetric groups"
 (the series of two talks)
- December 1997 DIMACS Workshop on Randomized Algorithms,
 Rutgers University New Brunswick, New Jersey
"Recognition of the black box group isomorphic to symmetric group"
- October 1997 Northeastern University Theory Seminar in Computer Science
 Boston, Massachusetts: *"Stopping times and random walk on groups"*

- Combinatorics Seminar, MIT, Cambridge, Massachusetts
"Ribbon Tile Invariants"
- March 1997 DIMACS Workshop in Discrete Probability, Rutgers University, New Jersey
"Random walks on finite groups"
- January 1997 Joint Mathematics Meeting (AMS, MAA, SIAM) San Diego, California
"Strong uniform time approach" (cancelled due to the weather conditions)
- November 1996 Combinatorics Seminar, Northeastern University, Boston, Massachusetts
"Partition identities, bijections and Groebner bases"
- Combinatorics Seminar, MIT, Cambridge, Massachusetts
"New Bijective Proof of the Hook Length Formula"
- October 1996 Theory Seminar in Computer Science, Cornell University, Ithaca, New York
"Generating random matrices over the finite field"
- Probability Seminar, Cornell University, Ithaca, New York
"Random walks on groups: strong uniform time approach"
- AT&T Laboratories, Murray Hill, New Jersey
"Random walks on groups: strong uniform time approach"
- September 1996 Combinatorics Seminar, University of Michigan, Ann Arbor, Michigan
"All you always wanted to know about the Parking Representation"
- June 1996 Eighth Formal Power Series and Algebraic Combinatorics Conference (FPSAC)
 University of Minnesota, Minneapolis, Minnesota
"One Amazing Representation of the Symmetric Group"
- Eighth SIAM Conference in Discrete Mathematics (DM)
 John Hopkins University, Baltimore, Maryland
"New Bijective Proof of the Hook Length Formula"
- June 1995 Seventh Formal Power Series and Algebraic Combinatorics Conference
 (FPSAC) Paris, France: *"Noncommutative Lagrange Inversion"*
- February 1994 Combinatorics Seminar, MIT, Cambridge, Massachusetts
"Resolution for Young diagrams associated with hooks and inversion polynomial"
- April 1993 Representation Theory Seminar, Moscow State University, Moscow, Russia
"Combinatorics and Group Representation Theory"
- October 1992 Gelfand Combinatorics Seminar, Moscow State University, Moscow, Russia
"Tutte Polynomial and enumeration of trees"
- February 1992 Moscow State University Combinatorics Seminar, Moscow, Russia
"Generalization of Prufer's code and Enumeration of Labeled Trees"

Conference Organizing:

- May 2010 *"Discrete Differential Geometry"*, University of Tennessee, Knoxville

November 2007 “Discrete and Polyhedral Geometry”, AIM Workshop, Palo Alto, CA
January 2007 SODA’07 (program committee), New Orleans, LA
October 2006 “Geometric Combinatorics” Special Section, AMS meeting, Cincinnati, OH
January 2005 “The Mathematics of Persi Diaconis” Conference, UCSD, San Diego, CA
June 2004 “Richard Stanley Birthday Conference”, MIT, Cambridge, MA
May 2001 “Algebraic Combinatorics” Special Section,
Joint AMS-SMM Meeting, Mexico City, Mexico

Long Term Visits: Fall 2004 Sabbatical at Hebrew University, Jerusalem, ISRAEL

Service: Graduate committee, UMN (Academic year 2008-09)
Hiring Committee, UMN (Academic year 2008-09)
Postdoctoral Search Committee, UMN (Academic year 2007-08)
MIT Combinatorics Seminar Organizer (twice a week, 2001-07)
Johnson Prize Committee, MIT (Spring 2003, 04)
Graduate Admissions, MIT (Spring 2003, 04, 05)
Thesis committees (Boulet, Bushueva, Elizalde, Korn, Liu, Radoicic, Varvak)
Senior thesis: Timothy Justin, UMN (Fall 2008)

Personal: Born in Moscow, Russia
Naturalized US citizen
Married

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