

DHRUV MUBAYI

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PERSONAL

- Born on August 20, 1973 in Bombay (now Mumbai), India

MATHEMATICAL INTERESTS

- Combinatorics, especially extremal problems on graphs and hypergraphs, with applications to Theoretical Computer Science

EMPLOYMENT HISTORY

- 2007-2008: Visiting Associate Professor, Department of Mathematical Sciences, Carnegie Mellon University
- 2005-: Associate Professor (with tenure), Department of Mathematics, Statistics, and Computer Science, University of Illinois at Chicago
- 2002-2005: Assistant Professor, Department of Mathematics, Statistics, and Computer Science, University of Illinois at Chicago
- 2001-2002: Postdoctoral Researcher, Theory Group, Microsoft Research
- 1998-2001: Visiting Assistant Professor, School of Mathematics, Georgia Institute of Technology

EDUCATION

- Ph.D. in Mathematics, University of Illinois at Urbana-Champaign, October 1998
- B.S. in Mathematics, Magna cum Laude, Davidson College, May 1995
Second person in the history of Davidson College to graduate with High Honors in mathematics

AWARDS/GRANTS

- 2007-10: National Science Foundation grant DMS-0653946
- 2005-07: Alfred P. Sloan Research Fellowship
- 2004-07: National Science Foundation grant DMS-0400812
- 2003: Campus Research Board grant, University of Illinois at Chicago
- 1999-03: National Science Foundation grant DMS-9970325
- 1998: Phi Kappa Phi, University of Illinois
Trjitzinski and Parker Fellowships, University of Illinois
- 1996: Liberal Arts Scholarship and Trjitzinski Fellowship, University of Illinois
- 1995: Phi Beta Kappa, Davidson College

PROFESSIONAL SERVICE

- Editorial work:
 - Associate Editor, *Discrete Mathematics* (9/2007-9/2010)
 - Member of Advisory Board, *Journal of Combinatorial Theory, Series A* (11/2007-11/2010)
- Conference organizing:
 - (with Jozsef Balogh) Special Session on Extremal and Probabilistic Combinatorics, AMS Central Section Meeting (#1030), October 2007, Chicago, Illinois
 - Minisymposium, SIAM Discrete Mathematics conference, June 2006, Victoria, Canada
 - (with Yi Zhao) Special Session on Extremal Combinatorics, AMS Central Section Meeting (#1001), October 2004, Evanston, Illinois
 - (with André Kündgen) Minisymposium, SIAM Discrete Mathematics conference, June 2004, Nashville, Tennessee
 - (with Jozef Skokan) Special Session on Extremal Combinatorics, AMS Central Section Meeting (#985), April 2003, Bloomington, Indiana
 - (with Robin Thomas) Special Session on Graph Theory, AMS Southeastern Section Meeting (#954), April 2000, Lafayette, Louisiana
- Refereeing
 - Journals:
 - Advances in Mathematics, Combinatorica, Journal of Combinatorial Theory, Series A and Series B, Journal of Graph Theory, SIAM Journal on Discrete Mathematics, Discrete Mathematics, Discrete Applied Mathematics, Electronic Journal of Combinatorics, Information Processing Letters, Graphs and Combinatorics, Discussiones Mathematicae Graph Theory, Journal of Internet Mathematics, Acta Cybernetica, Combinatorics Probability and Computing, European Journal of Combinatorics, Journal of Combinatorial Designs, Random Structures and Algorithms, Mathematical Research Letters*
 - Conference Proceedings:
 - 2006: *6th Conference on Algorithms and Complexity*, Rome
 - 2005: *European Conference on Combinatorics, Graph Theory and Applications*, Berlin
 - 1999: *Foundations of Computer Science*, New York
 - 1999: *Symposium on Discrete Algorithms*, Baltimore
 - 1999: *Twelfth Cumberland Conference*, Louisville
- Reviewer of grant proposals for National Science Foundation (NSF), National Security Agency (NSA), U.S.-Israel Binational Science Foundation (BSF) and Israel Science Foundation (ISF); served on NSF panel in combinatorics
- Judge for orals competition, Illinois Council of Teachers of Mathematics (ICTM) annual high school mathematics contest (2005 and 2006)
- Co-taught a workshop in Discrete Mathematics to K-8 Chicago public school teachers (2006)

- Ph.D. Students:
 - Reshma Ramadurai (2006-), University of Illinois at Chicago and Carnegie Mellon University (expected graduation 2008/09)
 - Despina Stasi (2007-), University of Illinois at Chicago
- Ph.D. thesis committees:
 - 2004: Ken Takata, University of Illinois at Chicago
 - 2000: Christopher Heckman, Georgia Institute of Technology
 - 1999: Barrett Walls, Georgia Institute of Technology
- Masters thesis committee:
 - 2006: Irina Perepelitsa, University of Illinois at Chicago

INVITED TALKS

- 06/2008: Joint AMS/Brazilian Mathematical Society Special Session on extremal and probabilistic combinatorics, Rio de Janeiro, Brazil
- 06/2008: SIAM conference in Discrete Mathematics, Burlington, Vermont
- 01/2008: Colloquium, Monday Lecture (75 mins) of the Research Training Group *Methods for Discrete Structures*, Freie Universität Berlin, Germany
- 01/2008: Workshop in Combinatorics, Oberwolfach, Germany
- 06/2007: CMS-MITACS Joint Conference 2007, Winnipeg, Canada
- 05/2007: 1st Canadian Discrete and Algorithmic Mathematics Conference (CANADAM 2007), Banff, Canada
- 04/2007: Colloquium, Carnegie Mellon University, Pittsburgh
- 03/2007: AMS Special Session on graph theory, Miami University, Ohio
- 03/2007: Combinatorics Seminar, McGill University
- 01/2007: Colloquium, Georgia State University, Atlanta
- 11/2006: Pure Mathematics Seminar, Queen Mary University of London
- 11/2006: Pure Mathematics Seminar, University College London
- 11/2006: Combinatorics Seminar, University of Cambridge
- 11/2006: EXCILL: Conference on Extremal Combinatorics at Illinois, Urbana
- 10/2006: Workshop in Combinatorics, Probability and Computing, Oberwolfach, Germany
- 06/2006: SIAM conference in Discrete Mathematics, Victoria, Canada
- 05/2006: Colloquium, Indian Institute of Technology (IIT), Bombay, India
- 04/2006: Colloquium, Iowa State University
- 04/2006: Workshop em Fundamentos da Ciencia da Computacao: Algoritmos Combinatorios e Estruturas Discretas, IMPA, Rio de Janeiro, Brazil
- 03/2006: Paul Erdős lecture series, Memphis
- 01/2006: Workshop in Combinatorics, Oberwolfach, Germany

- 12/2005: Joint AMS/Taiwanese Mathematical Society Special Session on graph coloring, Taichung, Taiwan
- 11/2005: Combinatorics Seminar, Mumbai University, Mumbai, India
- 11/2005: Discrete Math Seminar, Princeton University, Princeton
- 10/2005: Discrete Math Seminar, Carnegie Mellon University, Pittsburgh
- 10/2005: AMS Special Session on extremal and probabilistic combinatorics, Annandale-on-Hudson
- 10/2005: AMS Special Session on graph theory, Lincoln
- 09/2005: Colloquium, Tata Institute of Fundamental Research, Mumbai, India
- 05/2005: WaterMellon workshop on extremal graph theory, Carnegie Mellon University, Pittsburgh
- 02/2005: Combinatorics Seminar, California Institute of Technology, Pasadena
- 05/2004: Combinatorics Seminar, University of Delaware, Newark
- 03/2004: Colloquium, Emory University, Atlanta
- 03/2004: Combinatorics Seminar, Georgia Tech, Atlanta
- 03/2004: Colloquium, University of Louisville, Louisville
- 11/2003: Seminar, Ohio State University, Columbus
- 10/2003: Seminar, Carnegie Mellon University, Pittsburgh
- 08/2003: Seminar, Indian Institute of Technology (IIT), Bombay, India
- 06/2003: Conference in honor of Miklós Simonovits, Csopak, Hungary
- 05/2003: Focused Research Group, Banf Center, Alberta, Canada
- 03/2003: Combinatorics Seminar, Rényi Institute, Budapest, Hungary
- 01/2003: Combinatorics Seminar, Microsoft Research, Redmond
- 10/2002: Combinatorics Seminar, University of Illinois, Urbana
- 08/2002: SIAM Conference in Discrete Mathematics, San Diego
- 01/2002: Workshop in Combinatorics, Oberwolfach, Germany
- 06/2001: Conference on Hypergraphs, Rényi Institute, Budapest
- 02/2001: Colloquium, Colorado State University, Fort Collins
- 02/2001: Colloquium, Drexel University, Philadelphia
- 02/2001: Colloquium, University of Kentucky, Lexington
- 02/2000: Combinatorics Seminar, University of Waterloo, Canada
- 02/2000: Colloquium, Clemson University
- 02/2000: Colloquium, University of Pittsburgh
- 08/1999: DREI workshop on graphs, posets, and algorithms, DIMACS
- 05/1999: Twelfth Cumberland Conference, University of Louisville
- 03/1999: AMS Special Session in Graph Theory, University of Illinois, Urbana

PUBLICATIONS

(unpublished papers available at <http://www.math.cmu.edu/~mubayi/papers.html>)

1. Edge-Coloring Cliques with Three Colors on all 4-cliques, *Combinatorica*, 18 (1998), no. 2, 293–296.
2. Connectivity and Separating Sets of Cages (with T. Jiang), *J. Graph Theory*, 29 (1998), no. 1, 35–44.
3. Signed Domination in Regular Graphs and Set-Systems, (with Z. Füredi), *J. Comb. Theory, Ser. B*, 76 (1999), no. 2, 223–239.
4. Edge Bandwidth of Graphs (with T. Jiang, A. Shastri, D. B. West), *SIAM J. Discrete Math.* 12 (1999), no. 3, 307–316.
5. Graphic Sequences that have a Realization with Large Clique Number, *J. Graph Theory*, 34 (2000), no. 1, 20–29.
6. On generalized Ramsey theory: the bipartite case (with M. Axenovich, Z. Füredi), *J. Comb. Theory, Ser. B*, 79 (2000), no. 1, 66–86.
7. New Upper Bounds for a Canonical Ramsey Problem (with T. Jiang), *Combinatorica*, 20 (1) (2000) 141–146.
8. Multiple Vertex Coverings by Specified Induced Subgraphs (with Z. Füredi, D. B. West), *J. Graph Theory*, 34 (2000), no. 2, 180–190.
9. Edge-Coloring Cliques with Many Colors on Subcliques (with D. Eichhorn), *Combinatorica*, 20 (3) (2000) 441–444.
10. Edge-Bandwidth of Theta Graphs (with D. Eichhorn, K. O’Byrant, D. B. West), *J. Graph Theory*, 35 (2000) 89–98.
11. On the Number of Vertices with Specified Eccentricity (with D. B. West), *Graphs and Combinatorics*, 16 (4) (2000) 441–452.
12. Minimal Completely Separating Systems of k -Sets (with A. Kündgen, P. Tetali), *J. Combin. Theory Ser. A*, 93 (2001), no. 1, 192–198.
13. Large induced forests in sparse graphs (with N. Alon, R. Thomas), *J. Graph Theory*, 38 (2001), no. 3, 113–123.
14. On the chromatic number of set-systems (with A. Kostochka, V. Rödl, P. Tetali), *Random Structures and Algorithms*, 19 (2001), no. 2, 87–98.
15. Asymptotically optimal tree-packings in regular graphs (with A. Kelmans, B. Sudakov), *Electron. J. Combin.* 8 (2001), no. 1, Research Paper 38, 8 pp. (electronic).
16. Realizing Degree Imbalances in Directed Graphs (with D. B. West, T. G. Will), *Discrete Math.* 239 (2001), no. 1-3, 147–153.

17. The Chromatic Spectrum of Mixed Hypergraphs (with T. Jiang, Z. Tuza, V. Voloshin, D. B. West), *Graphs and Combinatorics*, 18 (2002), no. 2, 309–318.
18. New lower bounds for Ramsey numbers of graphs and hypergraphs (with F. Lazebnik), *Advances in Applied Mathematics*, 28 (2002), no. 3-4, 544–559.
19. Some exact results and new asymptotics for hypergraph Turán numbers, *Combinatorics Probability and Computing*, 11 (2002), no. 3, 299–309.
20. On Restricted Edge-Colorings of Bicliques (with D. B. West), Kleitman and combinatorics: a celebration (Cambridge, MA, 1999). *Discrete Math.* (2002), no. 2-3, 513–529.
21. Generalizing the Ramsey Problem through Diameter, *Electronic Journal of Combinatorics*, 9 (2002), no. 1, Research Paper 42, 10 pp. (electronic).
22. On the Turán number of Triple Systems (with V. Rödl), *J. Comb. Theory, Ser. A*, 100 (2002), no. 1, 136–152.
23. Intersecting Curves in the Plane, *Graphs and Combinatorics*, 18 (2002), no. 3, 583–589.
24. Coloring with three-colored subgraphs, *J. Graph Theory* 42 (2003), no. 3, 193–198.
25. On hypergraphs with every four points spanning at most two triples, *Electronic Journal of Combinatorics*, 10 (2003), no. 1, Research Paper N10, 4 pp. (electronic).
26. On a two-sided Turán problem (with Y. Zhao), *Electronic Journal of Combinatorics*, 10 (2003), no. 1, Research Paper R42, 17 pp. (electronic).
27. How many disjoint 2-edge paths must a cubic graph have? (with A. Kelmans), *J. Graph Theory*, 45 (2004), no. 1, 57–79.
28. A hypergraph extension of the Bipartite Turán problem (with J. Verstraëte), *J. Comb. Theory, Ser. A*, 106 (2004), no. 2, 237–253.
29. An explicit construction for a Ramsey problem, *Combinatorica*, 24 (2004), no. 2, 313–324.
30. Stability results for cancellative hypergraphs (with P. Keevash), *J. Comb. Theory, Ser. B*, 92 (2004) 163–175.
31. Uniform edge distribution in hypergraphs is hereditary (with V. Rödl), *Electronic Journal of Combinatorics*, 11 (2004) Research Paper R55, 32 pp (electronic).
32. A family of switch equivalent graphs (with B. Guenin, P. Tetali), *Discrete Math.*, 288 (2004), no. 1-3, 29–35.
33. Efficient Algorithms for the Inverse Protein Folding Problem on 2D and 3D Lattices (with P. Berman, B. DasGupta, R. Sloan, G. Turán, Y. Zhang), *Fifteenth Annual Combinatorial Pattern Matching (CPM) Symposium LNCS 3109*, C. S. Sahinalp, S. Muthukrishnan and U. Dogrusoz (editors), pp. 244-253, July 2004.

34. Constructions of bipartite graphs from finite geometries (with K. Mellinger), *J. Graph Theory*, 49 (2005), no. 1, 1–10.
35. Nonuniform Turán-type problems (with Y. Zhao), *J. Comb. Theory, Ser. A*, 111 (2005), 106–110.
36. Proof of a conjecture of Erdős on triangles in set systems (with J. Verstraëte), *Combinatorica*, 25 (2005), no. 5, 599–614.
37. The Co-degree density of the Fano plane, *J. Comb. Theory, Ser. B*, 95 (2005), no. 2, 333–337.
38. A hypergraph extension of Turán’s theorem, *J. Comb. Theory, Ser. B*, 96 (2006) 122–134.
39. Erdős-Ko-Rado for three sets, *J. Comb. Theory, Ser. A*, 113 (2006), no. 3, 547–550.
40. The DNF exception problem (with G. Turán, Y. Zhao), *Theoret. Comput. Sci.* 352 (2006), no. 1-3, 85–96.
41. Supersaturation for Ramsey-Turán Problems (with V. Rödl), *Combinatorica*, 26 (2006), no. 3, 315–332.
42. Explicit constructions of triple systems for Ramsey-Turán problems (with V. T. Sós), *J. Graph Theory*, 52 (2006), no. 3, 211–216.
43. On the edge-bandwidth of graph products (with J. Balogh, A. Pluhar), *Theoret. Comput. Sci.*, 359 (2006) 43–57.
44. Set systems with no singleton intersection (with P. Keevash, R. Wilson), *SIAM J. Discrete Math.*, 20 (2006), 1031–1041.
45. Structure and Stability of triangle-free set systems, *Transactions of the American Mathematical Society*, 359 (2007), 275-291.
46. Rainbow Turán Problems (with P. Keevash, B. Sudakov, J. Verstraete), *Combinatorics Probability and Computing*, 16 (2007), 109–126.
47. On the chromatic number and independence number of hypergraph products (with V. Rödl), *J. Combin. Theory, Ser. B*, 97 (2007) no. 1, 151–155.
48. On the VC-dimension of Uniform Hypergraphs (with Y. Zhao), *J. Algebraic Combin.*, 25 (2007) no. 1, 101–110.
49. A new generalization of Mantel’s theorem to k -graphs (with O. Pikhurko), *J. Combin. Theory Ser. B* 97 (2007), no. 4, 669–678.
50. The inverse protein folding problem on 2D and 3D lattices (with P. Berman, B. DasGupta, R. Sloan, G. Turán, Y. Zhang), *Discrete Appl. Math.* 155 (2007), no. 6-7, 719–732.
51. Minimal paths and cycles in set-systems (with J. Verstraëte), *European J. Combin.* 28 (2007), no.6, 1681–1693.

52. Co-degree density of hypergraphs (with Y. Zhao), *J. Combin. Theory, Ser. A* 114 (2007), no. 6, 1118–1132.

ACCEPTED FOR PUBLICATION

53. Constructions of non-principal families in extremal hypergraph theory (with O. Pikhurko), *Discrete Math., Special Volume in honor of Miklos Simonovits' 60th Birthday* (11 pages).
54. An intersection theorem for four sets, *Advances in Mathematics* (16 pages).
55. On the independence number of the Erdős-Rényi and Projective Norm graphs, and a related hypergraph (with J. Williford), *J. Graph Theory* (12 pages).
56. A new short proof of a theorem of Ahlswede and Khachatrian (with J. Balogh), *Journal of Combinatorial Theory, Series A* (5 pages).
57. Forbidding complete hypergraphs as traces (with Y. Zhao), *Graphs and Combinatorics*. (16 pages).
58. Combinatorial problems for horn clauses (with M. Langlois, R. Sloan, G. Turan), *Tenth International Symposium on Artificial Intelligence and Mathematics*, ISAIM 2008, Fort Lauderdale, Florida

SUBMITTED FOR PUBLICATION

59. When is an almost monochromatic K_4 guaranteed? (with A. Kostochka), (9 pages).
60. Turán's theorem with colors (with A. Diwan), (12 pages).
61. Quadruple systems with independent neighborhoods (with Z. Füredi, O. Pikhurko), (10 pages).
62. Set systems without a simplex or a cluster (with P. Keevash), (23 pages).
63. Two-regular subgraphs of hypergraphs (with J. Verstraëte), (14 pages).
64. Extremal problems for t -partite and t -colorable hypergraphs (with J. Talbot), (10 pages).
65. Set systems with union and intersection constraints (with R. Ramadurai), (5 pages).
66. Hypergraphs with independent neighborhoods (with T. Bohman, A. Frieze, O. Pikhurko), (11 pages)