

# Joshua N. Cooper

Department of Mathematics  
LeConte College  
1523 Greene Street, Room 314D  
University of South Carolina  
Columbia, SC 29208, USA

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Consulting Faculty Member of USC Jewish Studies Program  
<http://www.cas.sc.edu/jstp/>

Areas of Interest: *Quasirandomness, Spectral Hypergraph Theory, Discrete Geometry, Universal Cycles, Combinatorial Number Theory, Coding Theory, Extremal Graphs and Permutations.*

## Education

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**Ph.D. Mathematics**, University of California, San Diego. *Jun 2003*

*Thesis Title:* Quasirandom Permutations.

*Advisors:* Professors Fan Chung and Ronald L. Graham.

**B.S. Mathematics** (GPA 5.0/5.0), MIT, Cambridge, MA. *Dec 1998*

**High School Diploma**, Mass. Acad. of Math. and Sci., Worcester, MA. *May 1995*

## Research Publications Accepted/Printed

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26. J. N. Cooper, A. Dutle, Greedy Galois Games, *American Mathematical Monthly*, to appear.
25. J. N. Cooper, C. Heitsch, Generalized Fibonacci Recurrences and the Lex-Least de Bruijn Sequence, *Advances in Applied Mathematics*, to appear.
24. J. N. Cooper, A. Dutle, Spectra of Hypergraphs, *Linear Algebra and its Applications*, to appear.
23. J. N. Cooper, J. Lenz, T. D. LeSaulnier, P. S. Wenger, D. B. West, Uniquely  $C_4$ -Saturated Graphs, *Graphs and Combinatorics* **28** no. 2 (2012), 189–197.
22. J. N. Cooper, A. Petrarca, Symmetric and Asymptotically Symmetric Permutations, *Contributions to Disc. Math.*, to appear.
21. J. N. Cooper, S. Fenner, S. Purewal, Monochromatic Boxes in Colored Grids, *SIAM Journal of Discrete Mathematics*, *SIAM J. Discrete Math.* **25** no. 3 (2011), 1054–1068.
20. J. N. Cooper, L. Lu, Graphs with Asymptotically Invariant Degree Sequences under Restriction, *Internet Mathematics*, **7**, no. 1 (2011), 67–80.

19. J. N. Cooper, R. Ellis, Linearly Bounded Liars, Adaptive Covering Codes, and Deterministic Random Walks, *J. Combinatorics* Special Issue Dedicated to Joel Spencer, **1** no. 3–4 (2010), 307–334.
18. J. N. Cooper, B. Doerr, T. Friedrich, J. Spencer, Deterministic Random Walks on Regular Trees, *Random Structures & Algorithms*, **37**, no. 3 (2010), 353–366.
17. J. N. Cooper, M. Walters, Iterated Point-Line Configurations Grow Doubly-Exponentially, *Discrete & Computational Geometry*, **43**, no. 3 (2010), 554–562.
16. J. N. Cooper, C. Heitsch, The Discrepancy of the Lex-Least de Bruijn Sequence, *Discrete Mathematics* **310** (2009), no. 6–7, 1152–1159.
15. J. N. Cooper, B. Doerr, T. Friedrich, J. Spencer, Deterministic Random Walks on Regular Trees, in S. Teng (Ed.), Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA 2008), San Francisco, USA, 766–772.
14. J. N. Cooper, B. Doerr, T. Friedrich, J. Spencer, Deterministic Random Walks on Regular Trees (extended abstract), *Electronic Notes in Discrete Mathematics* **29** (2007), 509–513.
13. J. N. Cooper, B. Doerr, J. Spencer, G. Tardos, Deterministic Random Walks on the Integers, *European Journal of Combinatorics*, **28** (2007), no. 8, 2072–2090.
12. J. N. Cooper, D. Eichhorn, K. O’Byrant, Reciprocals of Binary Power Series, *International Journal of Number Theory*, **2** (2006), no. 4, 499–522.
11. J. N. Cooper, B. Doerr, J. Spencer, G. Tardos, Deterministic Random Walks, *Proceedings of the Workshop on Analytic Algorithmics and Combinatorics (ANALCO 2006)*, 185–197, Philadelphia, PA, SIAM 2006.
10. J. N. Cooper, A Permutation Regularity Lemma, *Electronic J. Comb.* **13** (2006), #R22.
9. J. N. Cooper and J. Spencer, Simulating a Random Walk with Constant Error, *Combinatorics, Probability, and Computing*, **15** (2006), no. 06, 815–822.
8. J. N. Cooper, Continued Fractions with Partial Quotients Bounded in Average, *Fibonacci Quarterly* **44** (2006), no. 4, 297–301.
7. J. N. Cooper, B. Doerr, J. Spencer, G. Tardos, Deterministic Random Walks on the Integers, in S. Felsner (Ed.), European Conference on Combinatorics, Graph Theory and Applications (EuroComb) 2005, volume AE of Discrete Mathematics & Theoretical Computer Science, pages 73–76.
6. J. N. Cooper and J. Solymosi, Collinear Points in Permutations, *Ann. Comb.* **9** (2005), no. 2, 169–175.
5. J. N. Cooper, Quasirandom Arithmetic Permutations, *Journal of Number Theory* **114** (2005), no. 1, 153–169.
4. J. N. Cooper and R. L. Graham, Generalized de Bruijn Cycles, *Annals of Combinatorics* **8** (2004), no. 1, 13–25.

3. F. Chung and J. N. Cooper, De Bruijn Cycles for Covering Codes, *Random Structures and Algorithms* **25** (2004), no. 4, 421–431.
2. J. N. Cooper, Quasirandom Permutations, *Journal of Combinatorial Theory, Series A* **106** (2004), no. 1, 123–143.
1. J. N. Cooper, R. B. Ellis, A. B. Kahng, Asymmetric Binary Covering Codes, *Journal of Combinatorial Theory, Series A* **100** (2002), no. 2, 232–249.

## Research Publications in Process

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37. J. N. Cooper, E. Lundberg, B. Nagle, Generalized Pattern Frequency in Large Permutations, submitted.
36. J. N. Cooper, A. Riasanovsky, On the Reciprocal of the Binary Generating Function for the Sum of Divisors, submitted.
35. J. N. Cooper, B. Kay, Graham’s Tree Reconstruction Conjecture and a Waring-Type Problem on Partitions, submitted.
34. T. Carroll, J. N. Cooper, P. Tetali, Counting Antichains and Linear Extensions in Generalizations of the Boolean Lattice, submitted.
33. J. N. Cooper, Deducing Vertex Weights from Empirical Occupation Times, submitted.
32. J. N. Cooper, Collinear Triple Hypergraphs and the Finite Plane Kakeya Problem, submitted.
31. J. N. Cooper, Polynomial Interpolation Matroids, in preparation.
30. T. Carroll, J. N. Cooper, High Convolution-Powers of a Discrete Uniform Distribution, in preparation.
29. F. Chung and J. N. Cooper, De Bruijn Codes for Rooted Hypergraphs, in revision.
28. J. N. Cooper, Erdős-Hajnal Sets and Semigroup Decompositions, in revision.
27. J. N. Cooper, C. Poirel, Note on the Pythagorean Triple System, in revision.

## Employment

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### Associate Professor

Department of Mathematics, University of South Carolina.

*Aug 2010 – Present*

### Palmetto Assistant Professor

Department of Mathematics, University of South Carolina.

*Aug 2006 – Present*

### Post-doctoral Researcher

*Apr 2006 – Aug 2006*

Department of Mathematics, UCSD.

**Senior Scientist** *Sep 2005 – Mar 2006*  
Combinatorial Structures and Algorithms Group, ETH-Zürich.

**Instructor** *Oct 2005 – Dec 2005*  
Quasirandomness and Regularity, ETH-Zürich.

**Instructor, Vector Analysis** *Jun 2005 – Aug 2005*  
Courant Institute of Mathematical Sciences, NYU.

**Instructor, Calculus I** *Oct 2004 – Dec 2004*  
Courant Institute of Mathematical Sciences, NYU.

**NSF Mathematical Sciences Post-Doc. Research Fellow** *Sep 2003 – Aug 2005*  
Courant Institute of Mathematical Sciences, NYU.  
*Sponsor:* Professor Joel Spencer.

**Consultant** *Sep 2003 – Dec 2003*  
Microsoft Research (Theory Group), Redmond, WA.

**Research Associate** *Sep 2003 – Dec 2003*  
University of Washington, Seattle, WA.

**Research Assistant** *Jun 2003 – Sep 2003*  
University of California, San Diego.  
*Supervisor:* Professor Ronald L. Graham.

**Teaching Assistant** *Sep 1999 – Jun 2003*  
University of California, San Diego.  
Instructor for sections in courses including Linear Algebra, Introductory Calculus, Multivariable Calculus, Algorithms, Cryptography, Financial Mathematics. Also served as grader, tutor, and occasional lecturer.

**Research Assistant** *Jun 2002 – Sep 2002*  
University of California, San Diego.  
*Supervisor:* Professor Ronald L. Graham.

**Research Assistant** *Jun 2001 – Sep 2001*  
University of California, San Diego.  
*Supervisor:* Professor Fan Chung Graham.

**Researcher/Programmer** *Jun 2000 – Sep 2000*  
DTAI, Inc. (now Kratos Defense & Security Solutions), San Diego, CA.  
Application of computational geometry to spatiotemporal data storage/query, interfacing in-house software with open source code, evaluating applications of constraint logic programming to geospatial data systems. Programming in Java, XIS, PROLOG.

**Quality Assurance Programmer** *Jun 1999 – Sep 1999*  
Curl Corporation, Cambridge, MA.  
Quality Assurance testing of Curl language and development environment. Programming in Curl, C++.

**Webmaster/Software Developer/Graphics Designer** *Jul 1996 – Sep 1998*  
Sanjeonics, Inc, South Boston, MA.  
Website design/management, development of software for small business valuation and credit reporting, systems administration. Programming in TurboPascal, C++, HTML, Perl, Java, 80x86 Assembly.

**Teacher** *Mar 1996 – May 1998*  
Combinatorics, MIT High School Studies Program (HSSP), Cambridge, MA.  
Teaching basic combinatorics to high school students in ten weekly classes each Spring. Course development and student evaluation.

### **Conferences/Workshops Attended**

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**2012 International Conference on the Spectral Theory of Tensors** *Jun 2012*  
Chern Institute, Nankai University, Tianjin, China.

**2012 Joint Mathematics Meeting** *Jan 2012*  
Hynes Convention Center, Boston, MA.

**Atlanta Lecture Series in Combinatorics and Graph Theory IV** *Nov 2011*  
Georgia State University, Atlanta, GA.

**AMS Southeastern Sectional Meeting** *Sep 2011*  
Wake Forest University, Winston-Salem, NC.

**Random Structures & Algorithms 2011** *May 2011*  
Emory University, Atlanta, GA.

**SIAM-SEAS 2011** *Apr 2011*  
University of North Carolina at Charlotte, Charlotte, NC.

**AMS Southeastern Sectional Meeting** *Mar 2011*  
Georgia Southern University, Statesboro, GA.

**Atlanta Lecture Series in Combinatorics and Graph Theory II** *Feb 2011*  
Georgia State University, Atlanta, GA.

**AMS-MAA Joint Mathematics Meeting** *Jan 2011*  
New Orleans, LA.

**Atlanta Lecture Series in Combinatorics and Graph Theory I** *Nov 2010*  
Emory University, Atlanta, GA.

<b>25th Mini-Conference on Discrete Mathematics and Algorithms</b> Clemson University, Clemson, SC.	<i>Oct 2010</i>
<b>Triangle Lectures in Combinatorics</b> Duke University, Durham, NC.	<i>Sep 2010</i>
<b>SIAM Conference on Discrete Mathematics</b> Hyatt Regency, Austin, TX.	<i>Jun 2010</i>
<b>41st Southeastern Combinatorics, Graph Theory, &amp; Computing</b> Florida Atlantic University, Boca Raton, FL.	<i>Mar 2010</i>
<b>Palmetto Number Theory Series XI</b> University of South Carolina, Columbia, SC.	<i>Dec 2009</i>
<b>24th Mini-Conference on Discrete Mathematics and Algorithms</b> Clemson University, Clemson, SC.	<i>Oct 2009</i>
<b>Research Experience for Graduate Students</b> University of Illinois, Urbana-Champaign, Urbana, IL.	<i>Jul 2009</i>
<b>CanADAM 2009</b> Centre de Recherches Mathématiques, Montréal, Quebec, Canada.	<i>May 2009</i>
<b>SERMON 2009</b> University of North Carolina, Greensboro, Greensboro, NC.	<i>Apr 2009</i>
<b>SIAM-SEAS 2009 Conference</b> University of South Carolina, Columbia, SC.	<i>Apr 2009</i>
<b>Ulam Centennial Conference</b> University of Florida, Gainesville, FL.	<i>Mar 2009</i>
<b>AMS-MAA Joint Mathematics Meeting #1046</b> Washington, DC.	<i>Jan 2009</i>
<b>23th Mini-Conference on Discrete Mathematics and Algorithms</b> Clemson University, Clemson, SC.	<i>Oct 2008</i>
<b>AMS Southeastern Section Meeting #1044</b> University of Alabama, Huntsville, AL.	<i>Oct 2008</i>
<b>SIAM Conference on Discrete Mathematics</b> University of Vermont, Burlington, VT.	<i>Jun 2008</i>
<b>Int. Conf. on Interdisciplinary Math. &amp; Stat. Techniques</b> University of Memphis, Memphis, TN.	<i>May 2008</i>

<b>New Directions in Algorithms, Combinatorics, and Optimization</b> Georgia Tech, Atlanta, GA.	<i>May 2008</i>
<b>MAA Southeastern Sectional Meeting</b> The Citadel, Charleston, NC.	<i>Mar 2008</i>
<b>SAMSI CDI Workshop: Cyber-enabled Discovery and Innovation</b> Radisson RTP, Research Triangle Park, NC.	<i>Nov 2007</i>
<b>22th Mini-Conference on Discrete Mathematics and Algorithms</b> Clemson University, Clemson, SC.	<i>Oct 2007</i>
<b>Mini-Conference on Applied Combinatorics</b> University of South Carolina, Columbia, SC.	<i>Oct 2007</i>
<b>2007 AMS Fall Central Section Meeting</b> DePaul University, Chicago, IL.	<i>Oct 2007</i>
<b>First Joint International Meeting of the AMS and PTM</b> University of Warsaw, Warsaw, Poland.	<i>Jul-Aug 2007</i>
<b>Random Combinatorial Structures Conference</b> University of Nebraska, Lincoln, NE.	<i>Apr 2007</i>
<b>2007 AMS Spring Southeastern Section Meeting</b> Davidson College, Davidson, NC.	<i>Mar 2007</i>
<b>Workshop on Complex Networks and their Applications</b> Georgia Institute of Technology, Atlanta, GA.	<i>Jan 2007</i>
<b>2006 AMS Fall Southeastern Section Meeting</b> University of Arkansas, Fayetteville, AR.	<i>Nov 2006</i>
<b>DIMACS/DIMATIA/Renyi Combinatorial Challenges Meeting</b> Rutgers/DIMACS, Piscataway, NJ.	<i>Apr 2006</i>
<b>Conference on Probabilistic Combinatorics &amp; Algorithms: A Conference in Honor of Joel Spencer's 60th Birthday</b> Rutgers/DIMACS, Piscataway, NJ.	<i>Apr 2006</i>
<b>Workshop on Analytic Algorithmics &amp; Combinatorics (ANALCO06)</b> Radisson Hotel Miami Downtown, Miami, FL.	<i>Jan 2006</i>
<b>Combinatorial and Additive Number Theory 2005</b> City University of New York, New York, NY.	<i>May 2005</i>
<b>AMS 2005 Spring Eastern Section Meeting</b>	<i>Apr 2005</i>

University of Delaware, Newark, Delaware.

**Learn & Workshop: Random Graphs and Probabilistic Methods** *Mar 2005*  
Humboldt-Universität, Berlin, Germany.

**DOCCOURSE: Modern Ramsey Theory** *Feb 2005*  
Prague, Czech Republic.

**2005 Annual AMS/MAA Joint Mathematics Conference** *Jan 2005*  
Atlanta, GA.

**Generalizations of de Bruijn Cycles and Gray Codes**  
BIRS, Banff, Alberta, Canada. *Dec 2004*

**DIMACS/DIMATIA/Rényi Working Group on Extremal Combinatorics II**  
Rutgers/DIMACS, Piscataway, NJ. *Oct 2004*

**Graph Drawing 2004** *Oct 2004*  
CCNY, New York, NY.

**Mini-Workshop on Harmonic Analysis of Boolean Functions** *Sep 2004*  
Yale University, New Haven, CT.

**SIAM Conference on Discrete Mathematics** *Jun 2004*  
Loews Vanderbilt Plaza Hotel, Nashville, TN.

**NSF/CBMS Regional Research Conference in Mathematical Sciences on The  
Combinatorics of Large Sparse Graphs** *Jun 2004*  
Cal State San Marcos, San Marcos, CA.

**Combinatorial and Additive Number Theory 2004** *May 2004*  
CUNY Graduate Center, New York, NY.

**2004 CombinaTexas** *Apr 2004*  
Texas A&M, College Station, TX.

**2003 West Coast Number Theory Conference** *Dec 2003*  
Asilomar Conference Center, Monterey, CA.

**Integers 2003 Conference** *Nov 2003*  
State University of West Georgia, Carrollton, GA.

**Introductory Workshop in Discrete and Computational Geometry** *Aug 2003*  
MSRI, Berkeley, CA.

**2003 Annual AMS/MAA Joint Mathematics Conference** *Jan 2003*  
Baltimore Convention Center, Baltimore, MD.



<b>West Coast Number Theory Conference</b> San Francisco State University, San Francisco, CA.	<i>Dec 2002</i>
<b>DIMACS Workshop on Geometric Graph Theory</b> Rutgers University, Piscataway, NJ.	<i>Oct 2002</i>
<b>SIAM Conference on Discrete Mathematics</b> Handlery Hotel & Resort, San Diego, CA.	<i>Aug 2002</i>
<b>NSF/CBMS Regional Research Conference in Mathematical Sciences on Geometric Graph Theory</b> University of North Texas, Denton, TX.	<i>May 2002</i>
<b>2002 Annual AMS/MAA Joint Mathematics Conference</b> San Diego Convention Center, San Diego, CA.	<i>Jan 2002</i>
<b>42nd Annual Symposium on Foundations of Computer Science</b> Tropicana Hotel, Las Vegas, NV.	<i>Oct 2001</i>
<b>26th Annual Combinatorics, Graph Theory, and Computing</b> Florida Atlantic University, Boca Raton, FL.	<i>Mar 1995</i>
<b>25th Annual Combinatorics, Graph Theory, and Computing</b> Florida Atlantic University, Boca Raton, FL.	<i>Mar 1994</i>

## Activities and Honors

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- Editorial Board member of *Involve*.
- Organizer of USC Combinatorics Seminar (Aug. 2009–Present).
- Co-organizer of Special Session on New Developments in Graph Theory at AMS Southeastern Sectional, Sep. 2011.
- Proposal reviewer for National Science Foundation (Fall '10), National Security Agency (Fall '10), and Fonds Québécois de la Recherche sur la Nature et les Technologies (Fall '10).
- Co-PI (with Linyuan Lu) of National Science Foundation (NSF) Division of Undergraduate Education: Course, Curriculum, and Laboratory Improvement (Type 2), “Collaborative Research: STEM Real World Applications of Mathematics” (DUE-TUES-1020692) 2010-2012.
- PI of National Science Foundation (NSF) Division of Mathematical Sciences: Algebra, Number Theory, and Combinatorics Award, “Combinatorial Quasirandomness and its Applications” (DMS-ANTC-1001370) 2010–2013.
- University of South Carolina Distinguished Undergraduate Research Mentor 2009.

- Co-organizer of Probabilistic and Extremal Combinatorics mini-symposium at SIAM–SEAS 2009.
- Invitation as Plenary Speaker at “Random Combinatorial Structures” conference, University of Nebraska, Lincoln, 4/07.
- USC Organizer for Virginia Tech Regional Mathematics Contest (VTRMC) 2010 & 2011.
- Carolina Scholar Mentor for 2008–09, 2009–10, 2010–11, 2011–12.
- Mentor for Magellan Scholar Anna Kirkpatrick, Nicholas Smith, Bill Kay, and Andrew Mamroth.
- Mentor for Magellan Scholar Joshua King, awarded First Prize at poster session of USC Discovery Day '11.
- Mentor for Magellan Scholar Chris Poirel, awarded First Prize at poster session of USC Discovery Day '08.
- Member of the Interdisciplinary Mathematics Institute IMI–USC (9/06–Present).
- Honors College Mathematics Major Adviser (9/06–Present).
- IMI Executive Committee (9/07–12/08), USC Math Web Committee (9/06–Present), USC Math Undergraduate Advisor (9/06–Present), USC Math Hiring Committee (9/07–5/08, 9/10–5/11), USC Math Qualifying Exam Committee (9/07–5/08), USC Math Undergraduate Advisory Council (9/08–Present), USC Faculty Senator (9/08–5/11), USC Math Event Planning Committee (9/08–Present), USC Math Grant Mentoring Committee (8/11–Present).
- Co-organizer of the “Extremal and Probabilistic Combinatorics” AMS Special Session at the 2006 Fall Southeastern Section Meeting, Fayetteville, AR, November 3–4, 2006.
- Co-organizer of the “Probabilistic Paradigms in Combinatorics” AMS Special Session at the 2005 Spring Eastern Section Meeting, Newark, DE, April 2–3, 2005.
- Two months invited visit to the Rényi Institute, Budapest, Feb 2005–Mar 2005.
- Second-place winner (with Reid Andersen and Robert Ellis) of Graph Drawing Contest at the 2004 Graph Drawing Conference in New York, NY.
- Recipient of National Science Foundation (NSF) Mathematical Sciences Postdoctoral Research Fellowship (MSPRF-0303272) 2003–2006 to study at New York University (NYU) with Professor Joel Spencer.
- Graduate Assistance in Areas of National Need (GAANN) Fellow, 2001.
- Co-organizer of the Combinatorial Structures from Discrete Geometry Mini-Symposium at the August 2002 SIAM Conference on Discrete Mathematics, San Diego, CA.
- Referee for Elec. J. Comb., Comp. Geom.: Theory and Appl., J. Comb. Theory Series A, SIAM J. Comp., SIAM J. Disc. Math., J. Integer Sequences, Math. Research Letters, Ars Combinatoria, Combinatorica, J. Design Theory, Discrete Math., Discrete Appl. Math., Ann. Comb., J. Comb., Networks, American Math. Monthly, Random

Structures & Alg., Graphs & Comb., Integers, Disc. & Comp. Geom., Comb. Prob. & Comp., Inf. Proc. Letters, Appl. Anal. & Disc. Math., STOC, SODA, ALENEX, LAGOS.

- Invited Representative for Graduate Students to January 2002 Mathematical Association of America Board of Governors Meeting, San Diego, CA.
- Administrator of MathStorm, a student-run mathematics consulting service for researchers at UCSD.
- Recipient of National Merit Scholarship Award, 1995.

## Presentations

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<b>Spectra of Hypergraphs</b> Zhejiang University, Hangzhou, China.	<i>Jun 2012</i>
<b>Spectra of Hypergraphs</b> International Conference on the Spectral Theory of Tensors, Tianjin, China.	<i>Jun 2012</i>
<b>Spectra of Hypergraphs</b> Tsinghua University, Beijing, China.	<i>May 2012</i>
<b>The Minimum Number of Givens in a Fair Sudoku Puzzle is 17</b> Hudson Colloquium, Armstrong Atlantic State University, Savannah, GA.	<i>Mar 2012</i>
<b>Deterministic Random Walks</b> Wake Forest University, Winston-Salem, NC.	<i>Mar 2012</i>
<b>The Minimum Number of Givens is 17!</b> Pi Mu Epsilon / Gamecock Math Club Sudoku Contest, Columbia, SC.	<i>Jan 2012</i>
<b>Spectra of Hypergraphs</b> Atlanta Lecture Series in Combinatorics and Graph Theory, Atlanta, GA.	<i>Nov 2011</i>
<b>Hall's Theorem for Hypergraphs</b> USC Combinatorics Seminar, Columbia, SC.	<i>Oct 2011</i>
<b>Expander Graphs: Prep. for Dinur's Proof of the PCP Theorem</b> USC Algebra & Logic Seminar, Columbia, SC.	<i>Oct 2011</i>
<b>Spectra of Hypergraphs</b> AMS Southeastern Sectional Meeting, Winston-Salem, NC.	<i>Sep 2011</i>
<b>The Polynomial Interpolation Matroid</b> USC Combinatorics Seminar, Columbia, SC.	<i>Sep 2011</i>
<b>Spectra of Hypergraphs</b> Random Structures & Algorithms 2011, Atlanta, GA.	<i>May 2011</i>

- Spectra of Hypergraphs** *Apr 2011*  
SIAM-SEAS 2011, Charlotte, NC.
- The Smooth Digraph Theorem II** *Apr 2011*  
USC Algebra and Logic Seminar, Columbia, SC.
- The Smooth Digraph Theorem I** *Apr 2011*  
USC Algebra and Logic Seminar, Columbia, SC.
- Spectra of Hypergraphs** *Mar 2011*  
AMS Southeastern Sectional Meeting, Statesboro, GA.
- Playing Fair at Sudoku** *Feb 2011*  
Pi Mu Epsilon / Gamecock Math Club Sudoku Contest, Columbia, SC.
- The Kun-Szegedy Proof of the Hell-Nešetřil Theorem III** *Jan 2011*  
USC Algebra and Logic Seminar, Columbia, SC.
- The Kun-Szegedy Proof of the Hell-Nešetřil Theorem II** *Jan 2011*  
USC Algebra and Logic Seminar, Columbia, SC.
- The Kun-Szegedy Proof of the Hell-Nešetřil Theorem I** *Jan 2011*  
USC Algebra and Logic Seminar, Columbia, SC.
- The Mathematics of Sudoku** *Oct 2010*  
Gathering for Gardner (G4G), Columbia, SC.
- Reconstructing Trees and a Waring-type Problem on Partitions** *Sep 2010*  
USC-Sumter Mathematics Seminar, Sumter, SC.
- Reconstructing Trees and a Waring-type Problem on Partitions** *Jun 2010*  
SIAM Conference on Discrete Mathematics, Austin, TX.
- Intro. to Expander Graphs & their Appl. to Compressed Sensing III** *Mar 2010*  
USC Compressed Sensing Seminar, Columbia, SC.
- Intro. to Expander Graphs & their Appl. to Compressed Sensing II** *Mar 2010*  
USC Compressed Sensing Seminar, Columbia, SC.
- Intro. to Expander Graphs & their Appl. to Compressed Sensing I** *Mar 2010*  
USC Compressed Sensing Seminar, Columbia, SC.
- Tree Reconstruction and a Waring-Type Problem on Partitions** *Mar 2010*  
41st Southeastern Combinatorics, Graph Theory, & Computing Conf., Boca Raton, FL.
- Uniquely  $C_4$ -Saturated Graphs II** *Mar 2010*  
USC Combinatorics Seminar, Columbia, SC.

- Uniquely  $C_4$ -Saturated Graphs I** *Feb 2010*  
USC Combinatorics Seminar, Columbia, SC.
- Tree Reconstruction and a Waring-Type Problem on Partitions** *Dec 2009*  
PANTS XI, Columbia, SC.
- How to Choose a Random Sudoku Board** *Nov 2009*  
PME/GMC 3rd Annual Sudoku Championship, Columbia, SC.
- Linearly Bounded Liars, Adaptive Covering Codes, and Deterministic Random Walks** *Sep 2009*  
USC Combinatorics Seminar, Columbia, SC.
- The Discrepancy of the Lexicographically Least de Bruijn Cycle** *Apr 2009*  
SERMON 2009, Greensboro, NC.
- Liar Games, Optimal Codes, and Deterministic Simulation of Random Walks** *May 2009*  
Georgia Tech Combinatorics Seminar, Atlanta, GA.
- Roto-Router Analysis of the Liar Game** *Apr 2009*  
SIAM-SEAS 2009, Columbia, SC.
- Roto-Router Analysis of the Liar Game** *Mar 2009*  
Ulam Centennial Conference, Gainesville, FL.
- The Discrepancy of the Lexicographically Least de Bruijn Cycle** *Feb 2009*  
USC Combinatorics Seminar, Columbia, SC.
- The Mathematics of Sudoku** *Nov 2008*  
USC Gamecock Math Club/IIME 2008 Sudoku Contest, Columbia, SC.
- Monochromatic Boxes in Colored Grids** *Oct 2008*  
2008 Fall AMS Southeastern Section Meeting, Huntsville, AL.
- Monochromatic Boxes in Colored Grids** *Oct 2008*  
The 23rd Clemson Mini-Conference, Clemson, SC.
- Pythagorean Partition-Regularity and Triple Systems with the Sum Property** *Sep 2008*  
USC Combinatorics Seminar, Columbia, SC.
- Triple Systems with the Sum Property** *Jul 2008*  
ETSU-REU Seminar, Johnson City, TN.
- Learning Vertex Weights from Sample Mean Occupation Times** *May 2008*  
Int. Conf. on Interdisciplinary Mathematical & Statistical Techniques, Memphis, TN.

- Symmetric and Asymptotically Symmetric Permutations II** *Mar 2008*  
USC Combinatorics Seminar, Columbia, SC.
- Symmetric and Asymptotically Symmetric Permutations I** *Mar 2008*  
USC Combinatorics Seminar, Columbia, SC.
- Ladner's Theorem** *Feb 2008*  
USC Algebra & Logic Seminar, Columbia, SC.
- Klee's Measure Problem, Multiobjective Optimization, and Monotone Boolean Functions** *Feb 2008*  
USC Combinatorics Seminar, Columbia, SC.
- Discrete Stochastic Differentiation** *Oct 2007*  
Mini-Conference on Applied Combinatorics, Columbia, SC.
- Discrete Stochastic Differentiation** *Oct 2007*  
2007 AMS Fall Central Section Meeting, Chicago, IL.
- Discrete Stochastic Differentiation** *Sep 2007*  
USC Combinatorics Seminar, Columbia, SC.
- Discrete Stochastic Differentiation** *Jul 2007*  
First Joint International Meeting of the AMS and PTM, Warsaw, Poland.
- Deterministic Random Walks: Recent Developments** *Apr 2007*  
Random Combinatorial Structures Conference, Lincoln, NE.
- Where do power laws come from?** *Apr 2007*  
Georgia Tech Seminar, Atlanta, GA.
- Finite Plane Kakeya Problem & Collinear Points in Permutations** *Apr 2007*  
Georgia Tech Combinatorics Seminar, Atlanta, GA.
- Deterministic Random Walks** *Mar 2007*  
Howard University Mathematics Department Colloquium, Washington, DC.
- Quasirandom Permutations** *Mar 2007*  
IIT Mathematics Department Colloquium, Chicago, IL.
- Random Linear Extensions of Grids** *Mar 2007*  
IIT Combinatorics Seminar, Chicago, IL.
- Finite Field Kakeya Problem and Collinear Triples in Permutations** *Mar 2007*  
2007 AMS Spring Southeastern Section Meeting, Davidson, NC.
- Where Do Power Laws Come From?** *Mar 2007*

2007 AMS Spring Southeastern Section Meeting, Davidson, NC.

**Where Do Power Laws Come From?** *Jan 2007*  
 Workshop on Complex Networks and their Applications, Atlanta, GA.

**Random Linear Extensions of Grids** *Dec 2006*  
 Georgia Tech Combinatorics Seminar, Atlanta, GA.

**Random Linear Extensions of Grids** *Nov 2006*  
 2006 AMS Fall Southeastern Sectional Meeting, Fayetteville, AR.

**Collinear Triple Hypergraphs and the Finite Plane Kakeya Problem** *Oct 2006*  
 USC Number Theory Seminar, Columbia, SC.

**Random Linear Extensions of Grids** *Sep 2006*  
 USC Combinatorics Seminar, Columbia, SC.

**Collinear Points in Permutations and the Finite Plane Kakeya Problem** *Jul 2006*  
 UCSD Combinatorics Seminar, San Diego, CA.

**Random Linear Extensions of Grids** *Jun 2006*  
 UCSD Combinatorics Seminar, San Diego, CA.

**Foundations of Quasirandomness** *Apr 2006*  
 DIMACS/DIMATIA/Renyi Combinatorial Challenges Meeting, Piscataway, NJ.

**Deterministic Random Walks on the Integers** *Apr 2006*  
 Joel Spencer's 60th Birthday Conference, Piscataway, NJ.

**Deterministic Random Walks on the Integers** *Mar 2006*  
 Mittagsseminar, ETH-Zürich.

**Deterministic Random Walks** *Jan 2006*  
 ANALCO '06, Miami, FL.

**Missing Induced Subgraphs** *Oct 2005*  
 Mittagsseminar, ETH-Zürich.

**What Keeps Me Up At Night** *Oct 2005*  
 Mittagsseminar, ETH-Zürich.

**Inverting Power Series Mod 2** *May 2005*  
 Combinatorial and Additive Number Theory 2005, New York, NY.

**A Permutation Regularity Lemma** *Apr 2005*  
 AMS 2005 Spring Eastern Section Meeting, Newark, DE.

**Erdős-Hajnal Sets and Semigroup Decompositions** *Mar 2005*

Learn & Workshop: Random Graphs and Probabilistic Methods, Berlin, Germany.

**Quasirandom Permutations** *Feb 2005*

DOCCOURSE: Modern Ramsey Theory, Prague, Czech Republic.

**Cycles for Other Shapes of Sliding Window** *Dec 2004*

Courant Institute Geometry Seminar, New York, NY.

**Erdős-Hajnal Sets and Semigroup Decompositions** *Nov 2004*

Princeton Combinatorics Seminar, Princeton, NJ.

**Erdős-Hajnal Sets and Semigroup Decompositions** *Nov 2004*

Courant Institute Geometry Seminar, New York, NY.

**Erdős-Hajnal Sets and Semigroup Decompositions** *Oct 2004*

DIMACS/DIMATIA/Rényi Working Group on Extremal Combinatorics II, Piscataway, NJ.

**Generalized de Bruijn Cycles** *Sep 2004*

CUNY Combinatorics Seminar, New York, NY.

**A Permutation Regularity Lemma** *Jun 2004*

SIAM Conference on Discrete Mathematics, Nashville, TN.

**A Permutation Regularity Lemma** *Jun 2004*

NSF/CBMS Regional Research Conference in Mathematical Sciences on The Combinatorics of Large Sparse Graphs, San Marcos, CA.

**Simulating a Random Walk with Constant Error** *Apr 2004*

CombinaTexas, Texas A&M, College Station, TX.

**Quasirandom Permutations** *Mar 2004*

Courant Institute Probability and Mathematics Physics Seminar, New York, NY.

**Partial Quotients Bounded in Average** *Dec 2003*

2003 West Coast Number Theory Conference, Monterey, CA.

**Quasirandom Permutations** *Nov 2003*

University of Washington, Seattle, WA.

**Quasirandomness and Fourier Coefficients** *Nov 2003*

Texas A&M, College Station, TX.

**A Generalization of Zaremba's Conjecture** *Nov 2003*

Texas A&M, College Station, TX.

**De Bruijn Covering Codes** *Nov 2003*

Texas A&M, College Station, TX.



<b>Quasirandomness and Continued Fractions</b> Integers 2003 Conference, Carrollton, GA.	<i>Nov 2003</i>
<b>Quasirandom Permutations</b> Microsoft Research, Redmond, WA.	<i>Oct 2003</i>
<b>Quasirandom Permutations</b> Thesis Defense, UCSD, San Diego, CA.	<i>Jun 2003</i>
<b>Quasirandom Permutations</b> Graph Theory Seminar, Georgia Tech, Atlanta, GA.	<i>Feb 2003</i>
<b>Abstract Line Configurations and the Milnor-Thom Theorem</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Oct 2002</i>
<b>Forbidden Subgraphs and Large Discrepancy</b> SIAM Conference on Discrete Mathematics, San Diego, CA.	<i>Aug 2002</i>
<b>Asymmetric Covering Codes</b> SIAM Conference on Discrete Mathematics, San Diego, CA.	<i>Aug 2002</i>
<b>Quasirandom Permutations</b> AMS Joint Mathematics Meetings (# 973), San Diego, CA.	<i>Jan 2002</i>
<b>4-cycle-free Graphs and Homogeneous Subsets</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Apr 2002</i>
<b>Directed Covering Codes - An Update</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Jan 2002</i>
<b>The Theory of Quasirandom Permutations</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Oct 2001</i>
<b>Matroids and Heart-Shaped Lattices</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Feb 2001</i>
<b>Constructing Small Sets Uniform in Arithmetic Progressions</b> Combinatorics Seminar, UCSD, San Diego, CA.	<i>Apr 2001</i>
<b>Flawed Subgraphs and Primitive Partitions</b> 26th Annual Combinatorics, Graph Theory, and Computing, Florida Atlantic University, Boca Raton, FL.	<i>Mar 1995</i>

## **Research Advisement**

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### 1. Post-doc

- (a) Kevin Milans (8/2010–6/2012)

## 2. PhD

- (a) Chair: David Collins (USC, Mathematics PhD Candidate), Danny Rorabaugh (USC, Mathematics PhD Candidate), Aaron Dutle (USC, Mathematics PhD Recipient 2012), Mark Walters (USC, Mathematics PhD Recipient 2009)
- (b) Committee: Kamala Diefenthaler (USC, Mathematics PhD Candidate), Austin Mohr (USC, Mathematics PhD Recipient 2012), Xing Peng (USC, Mathematics PhD Recipient 2012), Andrew Vincent (USC, Mathematics PhD Recipient 2012), Virginia Johnson (USC, Mathematics PhD Recipient 2012), Andrew Dove (USC, Mathematics PhD Candidate), Travis Johnston (USC, Mathematics PhD Candidate), Jessica Nelson (USC, Mathematics PhD Recipient 2012).

## 3. MS

- (a) Chair: Bill Kay (USC, Mathematics MS Recipient 2012), Bonny Riemer (USC, Mathematics MS Recipient 2008)
- (b) Cochair: Brett Ermer (USC, Statistics MS Recipient 2008, joint with John Grego, USC Department of Statistics)
- (c) Committee: Tatiana Orlova (USC, Mathematics MS Recipient 2010), Charles Cavalier (USC, Mathematics MS Recipient 2009)

## 4. BS

- (a) Anna Kirkpatrick (USC, BS Mathematics), Christopher Boyd (USC, BS Mathematics), Ralph Overstreet (USC, BS Mathematics), De'Shara Gadson (USC, BS Mathematics), Artem Aleshin (USC, BS Mathematics), Oliver Holmes (Morris College, BS Mathematics), Nicholas Smith (USC, BS Mathematics), Bill Kay (USC, BS Mathematics), Andrew Mammoth (USC, BS Mathematics), Andrew Petrarca (USC, BS Nuclear Engineering), Chris Poirel (USC, BS Mathematics), Josh King (USC, BS Mathematics).

## 5. High School

- (a) Alexander Neal (South Carolina Governor's School for Science and Mathematics, diploma June 2012)