

JON MCCAMMOND

ADDRESS

Department of Mathematics
University of California, Santa Barbara
Santa Barbara, California 93106
Email: jon.mccammond@math.ucsb.edu
Webpage: <http://www.math.ucsb.edu/~jon.mccammond>

PROFESSIONAL EMPLOYMENT

Full Professor, U. C. Santa Barbara, 2006-present
Associate Professor, U. C. Santa Barbara, 2004-2006
Assistant Professor, U. C. Santa Barbara, 2002-2004
Assistant Professor, Texas A&M University, 1999-2002
Visiting Assistant Professor, Texas A&M University, 1997-1999
Instructor, Chabot College, Hayward, California, 1991-1997

EDUCATIONAL BACKGROUND

Ph.D. Mathematics, University of California, Berkeley, 1991
B.A. Mathematics, Bethel College, North Newton, Kansas, 1988
B.S. Physics, Bethel College, North Newton, Kansas, 1988
B.A. German, Bethel College, North Newton, Kansas, 1988

DISSERTATION

Title: “The Word Problem for Burnside Semigroups: A Positive Solution for $a \geq 6$ ”
Committee Members: John Rhodes (chair), John Stallings, Latif Zadeh (Computer Science)

FUNDING

NSF, Principal Investigator: “Discrete and continuous geometry in group theory”, Standard grant DMS-0805716, July 1, 2008 to June 30, 2011.
NSF, Principal Investigator: “Geometric Group Theory via Geometric Combinatorics”, Standard grant DMS-0405k783, July 15, 2004 to June 30, 2008 (extended).
NSF, Principal Investigator with L. Anderson, N. Brady, and R. Forman Co-PIs: “The Role of Curvature in Combinatorics”, Focused Research Group DMS-0101506, July 1, 2001 to June 30, 2004.
NSF, Principal Investigator: “Geometric Group Theory”, Standard grant DMS-9971682, July 15, 1999 to June 30, 2002.
Institute for Mathematics and its Applications, Principal Investigator with L. Anderson (Co-PI): “CombinaTexas 2001”, Conference grant, March 2001.
NSF, Principal Investigator with L. Anderson (Co-PI): “CombinaTexas”, Conference grant DMS-0070834, May 1, 2000 to June 30, 2000.

NSF, Faculty Associate: “Algebraic and Analytic Methods in the Mathematical Sciences”, Research Experience for Undergraduates, E. Letzter and A. Boggess Co-PIs, DMS-9912192, June 1, 2000 to May 31, 2003.

PUBLICATIONS

- “Constructing non-positively curved spaces and groups” in *Geometric and cohomological methods in group theory*, LMS Lecture Note Series **358** (2009), 162–224.
- “Geometric presentations for pure braid group” (with Dan Margalit), *Journal of Knot Theory and its Ramifications* **18** (2009), 1–20.
- “Order independence in asynchronous cellular automata” (with M. Macauley and H. Mortveit) *Journal of Cellular Automata* **3** (2008), 37–56.
- “Locally quasiconvex small cancellation groups” (with D. Wise) *Transactions of the AMS*, **360** (2008), 237–271.
- “The Euler characteristic of the Whitehead automorphism group of a free product,” (with C. Jensen and J. Meier) *Trans. AMS*, **359** (2007), 2577–2595.
- “h-vectors of generalized associahedra and noncrossing partitions” (with C. Athanasiadis, T. Brady and C. Watt) *International Mathematics Research Notices*, (2006), Article ID 69705, 1–28. (electronic)
- “The integral cohomology of the group of loops” (with C. Jensen and J. Meier) *Geometry and Topology* **10** (2006), 759–784.
- “Noncrossing partitions in surprising locations,” *American Math. Monthly* **113** (2006) 598–610.
- “The length spectrum of a compact constant curvature complex is discrete,” (with N. Brady) *Geometriae Dedicata* **119** (2006) 159–167.
- “Non-commutative Groebner bases for the commutator ideal,” (with S. Hermiller) *Inter. J. of Algebra and Computation* **16** (2006), 187–202.
- “Coherence, local quasiconvexity, and the perimeter of 2-complexes,” (with D. Wise) *GAFSA* **15** (2005), 859–927.
- “CAT(0) is algorithmic,” (with M. Elder) *Geometriae Dedicata* **107** (2004), no. 1, 25–46.
- “The hypertree poset and the ℓ^2 -Betti numbers of the motion group of the trivial link,” (with J. Meier) *Mathematische Annalen* **328** (2004), no. 4, 633–652.
- “Bounding edge degrees in triangulated 3-manifolds,” (with N. Brady and J. Meier) *Proceedings of the AMS* **132** (2004), no. 1, 291–298.
- “Local-to-asymptotic topology for cocompact CAT(0) complexes” (with N. Brady and J. Meier) *Topology and its Applications* **131** (2003), no. 2, 177–188.
- “Combinatorial conditions that imply word-hyperbolicity for 3-manifolds” (with M. Elder and J. Meier) *Topology* **42** (2003), no. 6, 1241–1259.
- “Rigidity of Coxeter groups and Artin groups” (with N. Brady, B. Muehlherr, and W. Neumann) *Geometriae Dedicata* **94** (2002), no. 1, 91–109.
- “Curvature testing in 3-dimensional metric polyhedral complexes,” (with M. Elder) *Experimental Mathematics* **11** (2002), no. 1, 143–158.
- “Fans and ladders in small cancellation theory,” (with D. Wise) *Proc. London Math. Soc.* **84** (2002), no. 3, 599–644.

- “The pure symmetric automorphisms of a free group form a duality group,” (with N. Brady, J. Meier, A. Miller) *J. of Algebra* **246** (2001) 881–896.
- “Normal forms for free aperiodic semigroups,” *Inter. J. of Algebra and Computation*, **11** (2001) pp.581–625.
- “Three-generator Artin groups of large type are biautomatic,” (with T. Brady) *J. of Pure and Applied Algebra*, **151** (2000), pp. 1–9.
- “A General Small Cancellation Theory,” *Inter. J. of Algebra and Computation*, **10** (2000), pp. 1–172.
- “The Burnside Groups and Small Cancellation Theory,” in C.M.Campbell et.al., editors, *Groups St Andrews 1997 in Bath, II*, vol. **261** LMS Lecture Notes Series, Cambridge University Press, 1999, pp. 538–559.
- “Gaps in the Categories of Finite Directed and Finite Transitive Graphs” (with R. Baldinger), *Inter. J. of Algebra and Computation* **8** (1998), pp. 35–60.
- “Gaps Between Connected Finite Graphs” (with R. Baldinger), *Inter. J. of Algebra and Computation* **2** (1992), pp. 19–32.
- “The Solution to the Word Problem for the Relatively Free Semigroups Satisfying $T^a = T^{a+b}$ with $a \geq 6$,” *Inter. J. of Algebra and Computation* **1** (1991), pp. 1–32.
- “Gaps in Categories,” in J. Rhodes, editor, *Monoids and Semigroups with Applications*, pp. 83–85. World Scientific, Singapore, 1991.

PUBLICATIONS TO APPEAR

- “Braids, posets and orthoschemes” (with T. Brady) to appear in *Algebraic and Geometric Topology*, (33 pages).
- “Dynamics groups of asynchronous cellular automata” (with M. Macauley and H. Mortveit) to appear in the *Journal of Algebraic Combinatorics*, (22 pages).
- “Combinatorial descriptions of multi-vertex 2-complexes” to appear in the *Illinois Journal of Mathematics* special issue in honor of Paul Schupp, (18 pages).
- “Windmills and extreme 2-cells” (with D. Wise) to appear in the *Illinois Journal of Mathematics* special issue in honor of Paul Schupp, (16 pages).

PUBLICATIONS SUBMITTED

- “Triangles, squares and geodesics” (with Rena Levitt), 34 pages.

PREPRINTS

- “Geometric Semigroup Theory,” (with J. Rhodes) 40 pages.
- “An introduction to Garside structures,” 27 pages.

OTHER PUBLICATIONS

- “Integrating Polynomials in Secant and Tangent,” *American Mathematical Monthly*, **106**, (1999), 856–859.

“Monoids, Semigroups, and Infinite Groups” (with J. Rhodes), 150 page unpublished manuscript used as a text in graduate classes at UC-Berkeley, 1994

“The 0/1 Borsuk conjecture is generically true for each fixed diameter” (with G. Ziegler) unpublished (8 pages)

SHORT COURSES

“Coxeter groups and Artin groups,” a series of four talks, Workshop on combinatorial, algorithmic and cryptographic aspects of group theory, Luminy, CIRM, Marseille, France, February 2007

“The geometry of groups defined geometrically,” a series of four talks, Workshop on Geometric Methods in Group Theory, Fields Institute, Ottawa, Canada, August 2006

“Constructing nonpositively curved spaces and groups,” a series of four talks, Durham Symposium on geometry and cohomology in group theory, Durham, England, July 2003

INVITED RESEARCH PRESENTATIONS

“Instability in Triangle-Square Complexes,” Topics in geometric group theory conference: CAT(0) cubical and systolic complexes, Mathematical Research and Conference Center, Bedlewo, Poland, June 2007

“The Intrinsic Geometry of Groups,” *Modern Mathematics: An Introduction to 2007-08 Programs at MSRI*, SACNAS conference, Tampa, Florida, October 2006

“Pulling apart orthogonal groups to find continuous braids,” Conference on Geometric Group Theory, Centre de recherches mathématiques, Montreal, Canada, July 2006

“Coxeter groups and Artin groups in geometric group theory,” Flavors of Groups, Banff Workshop, Banff, Canada, November 2005

“Artin groups and polytopes” Wasatch topology conference, Park City, Utah, June 2005

“The integral cohomology of the group of loops and a conjecture of Brownstein and Lee,” Sixth UCB-UCSB Algebra Day, June 2005

“Noncrossing partitions for arbitrary Coxeter groups,” Institute for Advanced Studies / Park City Mathematics Institute on Geometric Combinatorics, Park City, Utah, July 2004

“Expansions of semigroups,” International meeting on Semigroup Theory and Related Topics, Braga, Portugal, June 2003

“Finding parking when not commuting,” Workshop in Geometric Topology, Park City, Utah, June 2003

“The role of curvature in combinatorics,” Conference on topological and geometric combinatorics, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, April 2003

“A geometric approach to semigroup theory,” International Conference on Semigroups and Groups, Porto, Portugal, June 2002

“A geometric approach to semigroup theory,” AMS-UMI Joint meeting in Pisa, Italy, June 2002

“A new class of nonpositively-curved 3-manifolds,” Spring topology conference, Austin, Texas, March 2002

“Algorithmic aspects of nonpositive curvature,” CRM Groups and Low-dimensional topology conference, Montreal, Canada, July 2001

- “Calculating the curvature of concrete complexes,” SUNY-Albany Topology and Group Theory conference, Albany, New York, Oct 2000
- “The curvature of posets associated to the braid groups,” International Conference on Geometric and Combinatorial Methods in Groups and Semigroups, Lincoln, Nebraska, May 2000
- “Curvature and quasiconvexity in geometric group theory, I: curvature,” Wasatch Topology Conference, Park City, Utah, August 1999
- “Curvature and quasiconvexity in geometric group theory, II: quasiconvexity,” Wasatch Topology Conference, Park City, Utah, August 1999
 - o “Extending Stallings’ algorithm to 2-complexes,” AMS-IMS-SIAM Joint Summer Research Conference on Geometric Group Theory and Computer Science, Mt. Holyoke College, July 1998
- “General versions of small cancellation theory,” Topology Festival, Cornell University, May 1998
- “The solution of the word problem for the Burnside semigroups,” Marquette Symposium on Semigroup Theory and Its Applications, Marquette University, March 1991

OTHER INVITED PRESENTATIONS

- “Non-crossing partitions in surprising locations,” Kieval Lecture Series Talks, Southern Oregon University, Ashland, Oregon, May 2007
- “Using Curvature to average trees,” Kieval Lecture Series Talks, Southern Oregon University, Ashland, Oregon, May 2007
- “Roots, Ratios and Ramanujan,” Sigma Xi Invited Lecture, Southern Oregon University, Ashland, Oregon, May 2007
- “Keeping your research program active,” *Project Next panel discussion*, Joint Math Meetings, New Orleans, Louisiana, January 2007
- “Mission Impossible: learning what cannot be done,” Sigma Xi lecture, Lafayette College, Easton, Pennsylvania, September 2006
- “Regular polytopes are everywhere,” Graduate student colloquium, University of California, Santa Barbara, September 2006
- “Square dancing in the pure braid group,” Putnam reunion, Bethel College, Kansas, March 2005
- “Non-crossing partitions in surprising locations,” Eastern Pennsylvania and Delaware Section of the MAA, November 2004
- “From Differential Geometry to Word Hyperbolic Groups: A combinatorial model of an analytic concept”, Survey talk, University of California, Santa Barbara, October, 2002
- “Metric trees in topology, geometry, and group theory,” Workshop in Linear Analysis and Probability, College Station, Texas, August 2001
- “The tea-kettle on the table by the stove: a talk in honor of Dr. Arnold M. Wedel,” Bethel College Fall Festival, October 1997
- “From Differential Geometry to Word Hyperbolic Groups: A combinatorial approach to an analytic concept,” Mathematics Graduate Student Organization, Texas A&M University, October 1998
- “Roots, ratios, and Ramanujan,” Pi Mu Epsilon, Texas University, April 2001

CONFERENCE PRESENTATIONS

- “Dual presentations for Artin groups,” *AMS Special session on geometric group theory*, Joint Math Meetings, New Orleans, Louisiana, January 2007
- “Möbius inversion and combinatorial curvature”, *AMS Special session on geometric combinatorics*, Cincinnati, Ohio, October 2006
- “Artin groups in a continuous context,” *AMS Special session on Geometric Methods in Group Theory and Semigroup Theory*, Lincoln, Nebraska, October 2005
- “Square dancing in the pure braid groups”, *AMS Special session on curvature in group theory and combinatorics*, Santa Barbara, April 2005
- “An introduction to Garside structures,” *American Institute of Mathematics*, conference on braid groups, clusters and free probability, Palo Alto, California, January 2005
- “Non-crossing partitions for arbitrary Coxeter groups”, Institute for Advanced Studies / Park City Mathematics Institute on Geometric Combinatorics, Park City, Utah, July 2004
- “Garside structures for (some more) Artin groups”, Conference on geometric group theory , Bedlewo, Poland, April 2004
- “Hypertrees and the l^2 betti numbers of the pure symmetric automorphism groups”, AMS Special session on Asymptotic aspects of group theory, Athens, Ohio, March 2004
- “Garside structures for free groups (and other Artin groups),” Special session on geometric group theory, AMS Sectional Meeting, Binghamton, New York, October 2003
- “Existence of CAT(0) structures for finite-type Artin groups,” RSME-AMS Joint Meeting, Special session on geometric methods in group theory, Seville, Spain, June 2003
- “Hypertrees, the pure symmetric automorphism groups, and their l^2 -Betti numbers,” Wasatch topology conference, Park City, Utah, June 2002
- “Cube complexes for groups and manifolds,” AMS special session on geometry and topology, Salt Lake City, Utah, October 2002
- “Cube complexes for groups and manifolds,” AMS special session on geometric and combinatorial group theory, Montreal, Canada, May 2002
- “Algorithmic aspects of nonpositive curvature,” AMS-SMF Joint Meeting, Special session on geometric group theory, Lyon, France, July 2001
- “An algorithm to detect a nonpositively-curved metric simplicial complex,” Special session on geometric group theory, New Orleans, Louisiana, January 2001
- “The curvature of posets associated to the braid groups,” International conference on geometric and combinatorial group theory, Haifa, Israel, June 2000
- “Fans, ladders, and the coherence of groups,” Symposium on computation in group theory and geometry, Warwick, England, July 1999
- “Fans, ladders, and the coherence of groups,” Geometric groups on the gulf conference, Mobile, Alabama, May 1999
- “The coherence and quasiconvexity of Coxeter groups,” Special session on combinatorial topology, Joint Math Meetings, San Antonio, January 1999
- “Biautomaticity of various Artin groups,” SUNY-Albany Topology and Group Theory Conference, Albany, New York, October 1998
- “The perimeter of 2-complexes and the coherence of groups,” Computational and Geometric Aspects of Modern Algebra, Heriot-Watt University, Edinburgh, Scotland, July 1998

- “Coherence of groups and the perimeter of 2-complexes,” International conference on nonpositive curvature in group theory, topology, and geometry, Vanderbilt University, May 1998
- “Coherence of groups and the perimeter of 2-complexes,” International conference on algorithmic problems in groups and semigroups, University of Nebraska-Lincoln, May 1998
- “Torus knots and Artin groups of large type,” SUNY-Albany Topology and Group Theory Conference, Albany, New York, October 1997
- “Small cancellation theory and the Burnside groups,” Groups St. Andrews 1997 in Bath, University of Bath, August 1997
- “Torus knots and Artin groups of large type,” London Sussex Southampton Topology Conference and Geometric Group Theory Workshop, University of Southampton, July 1997
- “A general small cancellation theory approach to the Burnside groups,” SUNY-Albany Topology and Group Theory Conference, Albany, October 1996

COLLOQUIA

- “Artin groups and polytopes,” Equipe Algebre-Géométrie-Topologie, Université de Bourgogne, Dijon, France, June 2005
- “Constructing non-positively curved spaces and groups”, California Polytechnic State University, San Luis Obispo, May 2004
- “Algorithmic aspects of curvature”, University of California, Santa Barbara, March 2002
- “Calculating curvatures of concrete complexes”, University of Texas, December 2000
- “Calculating curvatures of concrete complexes”, Karcher Colloquium, University of Oklahoma, October 2000
- “Calculating curvatures of concrete complexes”, Vanderbilt University, September 2000
- “General versions of small cancellation theory”, Texas A&M University, January 1999
- “Constructing compact cores in negatively-curved 3-manifolds”, University of California, Davis, January 1999
- “Constructing compact cores in negatively-curved 3-manifolds”, State University of New York, Binghamton, February 1999
- “Constructing compact cores in negatively-curved 3-manifolds”, Rice University, December 1998
- “From differential geometry to word hyperbolic groups: a combinatorial approach to an analytic idea,” Graduate Student Colloquium, Texas A & M University, October 1998
- “Roots, ratios, and Ramanujan,” Lafayette College, Easton, Penn., October 1998
- “From differential geometry to word hyperbolic groups: a combinatorial approach to an analytic idea,” Special Colloquium, University of Kentucky, Lexington, Kentucky, February 1998

SEMINAR PRESENTATIONS

- “Pulling apart orthogonal groups to find continuous braids,” Geometry/Topology Seminar, Cal Tech, Pasadena, California, March 2007
- “Pulling apart orthogonal groups to find continuous braids,” Geometry/Topology Seminar, University of Chicago, Chicago, Illinois, March 2006
- “Noncrossing partitions in surprising locations,” Séminaire Général, Université de Bourgogne, Dijon, France, June 2005

- “Artin groups and polytopes,” Geometry and Topology seminar, Cal Tech, Pasadena, California, May 2005
- “Garside-like structures for arbitrary Artin groups,” Magnus group theory seminar, CUNY-graduate center, New York, November 2004
- “The role of curvature in combinatorics,” Combinatorics seminar, M.I.T., Boston, Massachusetts, October 2003
- “Garside structures for free groups (and other Artin groups),” Topology seminar, Columbia University, New York, New York, October 2003
- “Calculating curvatures in concrete complexes,” Topology seminar, Cal Tech, Pasadena, California, March 2002
- “Algorithmic aspects of nonpositive curvature,” Group theory seminar, University of Illinois, Champagne-Urbana, Illinois, November 2001
- “Calculating the curvature of concrete complexes,” Topology seminar, The Ohio State University, Columbus, Ohio, April 2001
- “Rigidity of Coxeter groups,” Topology seminar, The Ohio State University, Columbus, Ohio, April 2001
- “Rigidity of Coxeter groups,” Topology seminar, Rice University, Houston, February 2001
- “Rigidity of Coxeter groups,” Magnus group theory seminar, CUNY-graduate center, New York, February 2001
- “Rigidity of Coxeter groups,” Topology seminar, University of Oklahoma, Norman, October 2000
- “Calculating the curvature of concrete complexes,” Topology seminar, State University of New York, Binghamton, October 2000
- “Rigidity of Coxeter groups,” Topology seminar, Vanderbilt University, Nashville, September 2000
- “Normal forms for free aperiodic groups,” Semigroup seminar, University of Porto, Porto, Portugal, November 1999
- “The perimeter of 2-complexes and the coherence of groups,” Topology Seminar, University of Porto, Porto, Portugal, November 1999
- “An asymptotically sharp theorem about the coherence and local quasiconvexity of 2-complexes,” Topology Seminar, University of Texas, Austin, November 1999
- “The combinatorial Gauss-Bonnet theorem and the consequences of curvature in group theory,” Group theory seminar, University of Nebraska, Lincoln, April 1999
- “The perimeter of 2-complexes and the coherence of groups,” Topology Seminar, University of California, Santa Barbara, November 1998
- “The geometry and topology of Artin groups and braid groups,” Topology Seminar, Rutgers University, Newark, New Jersey, October 1998
- “General versions of small cancellation theory,” Topology Seminar, The Ohio State University, Columbus, Ohio, February 1998
- “The perimeter of 2-complexes and the coherence of groups,” Topology Seminar, University of Michigan, Ann Arbor, Michigan, February 1998
- “Braid groups, torus knots and Artin groups of large type,” Topology Seminar, University of Texas, Austin, Texas, November 1997

“Artin groups of large type,” Geometric Group Theory Seminar, University of California, Berkeley, California, March 1997

“A general small cancellation theory approach to the Burnside groups,” Geometric Group Theory Seminar, University of California, Berkeley, California, October 1996

“Small cancellation theory and the Burnside groups,” Algebra Seminar, San Jose State University, April 1996

“General small cancellation theory and the Burnside groups,” Geometric Group Theory Seminar, University of California, Berkeley, Spring 1995 (a series of three talks)

“Small cancellation theory and the Burnside groups” Topics in Automata Theory, University of California, Berkeley, Spring 1995 (a series of two talks)

RESEARCH INTERESTS

Geometric Group Theory (Artin groups, Coxeter groups, braid groups, Burnside groups and semi-groups, non-positive curvature, word hyperbolic groups, small cancellation theory)

Discrete Mathematics (Polytopes, graph theory, automata theory, regular languages)

Low-dimensional Topology (Knots, hyperbolic 3-manifolds, mapping class groups of surfaces)

CONFERENCES ORGANIZED

Co-organizer (with K. Bux and K. Wortman) *AMS Special Session on Lattices, Coxeter groups and Buildings*, Western sectional meeting, Santa Barbara, October 2009

Co-organizer (with L. Anderson, N. Brady and R. Forman) *AMS Special Session on Curvature in group theory and combinatorics*, Western sectional meeting, Santa Barbara, April 2005

Co-organizer (with A. Nica and V. Reiner) Braid groups, clusters and free probability, American Institute of Mathematics, January 2005

Co-organizer (with N. Brand, J. Kung, and C. Yan) CombinaTexas: a combinatorics conference for the south-central U.S., University of North Texas, March 2002

Co-organizer (with L. Anderson) CombinaTexas: a combinatorics conference for the south-central U.S., Texas A&M University, March 2001

Co-organizer (with L. Anderson) CombinaTexas: a combinatorics conference for the south-central U.S., Texas A&M University, April 2000

Co-organizer (with L. Anderson) *AMS Special Session in Combinatorial Topology*, Joint Meetings, San Antonio, January 1999

INSTITUTES ORGANIZED

Co-organizer (with M. Bestvina, M. Sageev, and K. Vogtmann) Mathematical Sciences Research Institute (MSRI) semester on geometric group theory, Fall 2007

PROFESSIONAL MEMBERSHIPS

American Mathematical Society

Mathematical Association of America