

Alden Walker

- CONTACT INFORMATION Department of Mathematics
University of Chicago
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- ACADEMIC POSITIONS
- L.E. Dickson Instructor, University of Chicago, 2012–2015
 - NSF Postdoc, 2012–2015
- PERSONAL
- Born January 31, 1985. US citizen.
- RESEARCH INTERESTS
- Low dimensional geometry and topology, including geometric group theory and dynamics.
- EDUCATION
- California Institute of Technology, Pasadena, CA.
Ph.D. in Mathematics, 2012.
- Thesis: *Surface maps into free groups*.
 - Advisor: Danny Calegari
- Haverford College, Haverford, PA
B.A. Summa Cum Laude, 2007. Majors:
- Mathematics with high honors
 - Computer Science with high honors
 - Linguistics (at Swarthmore College)
- AWARDS
- NSF Mathematical Sciences Postdoctoral Research Fellowship, 2012
- Caltech
- Scott Russell Johnson dissertation award, 2012.
 - ASCIT teaching award
(1 of 4 selected by the undergraduate student body across all departments), 2011.
 - Scott Russell Johnson award for excellence in research and teaching, 2011.
 - Apostol Award for Excellence in Teaching, 2010.
 - Special Institute Fellowship, 2007.
- Phi Beta Kappa Society
Inducted May 2006 (as a junior).
- PAPERS
- Danny Calegari, Sarah Koch, and Alden Walker, *Roots, Schottky semigroups, and a proof of Bandt's conjecture*,
preprint: arxiv:1410.8542
 - Alden Walker, *Stable immersions in orbifolds*,
to appear in Algebraic and Geometric Topology
 - Danny Calegari and Alden Walker, *Surface subgroups from linear programming*,
to appear in Duke Mathematical Journal.
 - Danny Calegari and Alden Walker, *Random groups contain surface subgroups*,
to appear in Journal of the American Mathematical Society.
 - Sean A. Weaver, Katrina J. Ray, Victor W. Marek, Andrew J. Mayer, and Alden K. Walker, *Satisfiability-based set membership filters*,
Journal on Satisfiability, Boolean Modeling and Computation **8** (2014), 129–148.

- Alden Walker, *Stable commutator length in free products of cyclic groups*
Experimental Math **22** (2013), no. 3, 282–298.
- Danny Calegari and Alden Walker, *Random rigidity in the free group*
Geometry and Topology **17** (2013), no. 3, 1707–1744.
- Danny Calegari and Alden Walker *Integer hulls of linear polyhedra and scl in families,*
Transactions of the American Mathematical Society **365** (2013), no. 10, 5085–5102.
- Danny Calegari and Alden Walker, *Zigurrats and rotation numbers*
Journal of Modern Dynamics **5** (2011), no. 4, 711–746.
- Danny Calegari and Alden Walker, *Isometric endomorphisms of free groups*
New York Journal of Math **17** (2011), 713–743.
- G. Civan, J. Etnyre, P. Koprowski, J. Sabloff, and A. Walker, *Product Structures for Legendrian Contact Homology*
Math. Proc. Camb. Phil. Soc. **150** (2011), no. 2, 391–211.

INVITED TALKS

- Chicago summer school in geometry and topology (minicourse), Chicago, June, 2015
Finding surface subgroups
- Harvard Dynamics and Geometry Seminar, Boston, March, 2015
Circle actions on the boundary of Schottky space (scheduled)
- Young Geometric Group Theory Conference, Spa, Belgium, January, 2015
Surface subgroups
- UW Madison Colloquium, December, 2014
Gromov’s surface subgroup question
- UIC Colloquium, November, 2014
Gromov’s surface subgroup question
- Seoul National University, November, 2014
Visiting lecturer on random groups
- Cornell Topology and Geometric Group Theory Seminar, November, 2014
Gromov’s surface subgroup question
- Cornell Dynamical Systems Seminar, November, 2014
Further exploring the parameter space of an IFS
- UMichigan Dynamics Seminar, October, 2014
Roots, Schottky semigroups, and a proof of Bandt’s conjecture
- UW Madison Geometry and Topology Seminar, October, 2014
Roots, Schottky semigroups, and a proof of Bandt’s conjecture
- UChicago Dynamics Seminar, October, 2014
Roots, Schottky semigroups, and a proof of Bandt’s conjecture
- Orderable Groups, Cajon del Maipo, Chile, September, 2014
Transfers of quasimorphisms
- Geometry on Groups and Spaces, Daejeon, South Korea, August, 2014
Homologically essential surface subgroups of random groups
- Research Cluster in Random Groups, Tufts, June, 2014
Visiting lecturer
- AMS/IMU Joint Meetings, Tel Aviv, June, 2014
Schottky semigroups
- Redbud Topology Conference, OU, April, 2014
Constructing quasimorphisms
- Geometric Groups on the Gulf Coast, Pensacola, March, 2014
Constructing quasimorphisms
- Spring Topology and Dynamics Conference, Richmond, March, 2014
Stable immersions in orbifolds
- IU Bloomington Seminar, December, 2013
Surface subgroups of random groups

- CMS Winter Meeting, December, 2013
Surface subgroups of random groups
- Topology, Geometry, and Group Theory, Informed by Experiment, ICERM, October, 2013
Surface maps into orbifolds
- Bi-College Colloquium, Haverford College, April, 2013
Topologically minimal surface maps
- Hot topics: surface subgroups and cube complexes, MSRI, March, 2013
Surface subgroups from linear programming
- U Chicago Dynamics Seminar, January, 2013
Surface subgroups from linear programming
- Caltech Geometry and Topology Seminar, May, 2012
Traintracks and endomorphisms
- The Park School of Baltimore, April, 2012
Math for fun and profit
- IHP Trimester on Surface Group Representations, Paris, March 2012
Zigurrats and rotation numbers
- IDA/CCR-La Jolla, November, 2011
Stable commutator length in free products of cyclic groups
- Caltech Combinatorics Seminar, November, 2011
Integer hulls of linear polyhedra and scl in families
- Caltech Graduate Student Seminar, November, 2011
Rotation numbers of positive words
- U Chicago Dynamics Seminar, November, 2011
Zigurrats and rotation numbers
- Max Dehn Seminar, U of Utah, September, 2011
Random rigidity in the free group
- Geometry and Topology Down Under (Hyamfest), U of Melbourne, August 2011
Teaching assistant (five one-hour problem sessions) for the short course:
Ergodic Theory of Hyperbolic Groups by Danny Calegari
- AMS Spring Western Section Meeting,
Special Session on Geometric Group Theory and Dynamics, Las Vegas, May 2011
Isometric endomorphisms of free groups
- Caltech Geometry and Topology Seminar, April 2011.
Random rigidity in the free group
- Conference on geometry, analysis, and surfaces, Autrans, March 2011.
Random rigidity in the free group
- U Chicago Geometry and Topology Seminar, January 2011.
Isometric endomorphisms of free groups
- Caltech Geometry and Topology Seminar, January 2011.
Isometric endomorphisms of free groups
- Caltech Geometry and Topology Seminar, January 2011.
Integer hulls of linear polyhedra and scl in families
- UC Santa Barbara Topology Seminar, November 2010.
Integer hulls of linear polyhedra and scl in families
- Caltech Geometry and Topology Seminar, February 2009.
Product Structures for Legendrian Contact Homology
- Conference at IDA/CCR-Princeton, October, 2007.
- CS Colloquium, Bryn Mawr College, May 2007.
Natural Language Interaction with Robots
- IDA/CCR-La Jolla, March 2007.
(Covering essentially my undergraduate thesis, *Filters*)
- Haverford Math Colloquium, Haverford, December 2006.
Lower Bounds on Algorithm Complexity Using Topology

TEACHING EXPERIENCE	<p>Classes taught, UChicago:</p> <ul style="list-style-type: none"> • Spring 2014: Math 204 (Analysis in \mathbb{R}^{n-2}) • Winter 2013: Math 203 (Analysis in \mathbb{R}^{n-1}) • Summer 2013: Co-taught the geometry REU • Spring 2013: Math 203 • Winter 2012: Math 203 <p>Teaching Assistant (weekly one-hour recitations, plus grading), Caltech († denotes lead TA):</p> <ul style="list-style-type: none"> • Math 1a - calculus, 2007 • Math 1b - linear algebra, 2008 • Math 1c - vector calculus, 2008, 2009†, 2010†, 2011†, 2012† • Math 2a - differential equations, 2008, 2009, 2010†, 2011† • Math 2b - probability and statistics, 2009, 2010†, 2011†, 2012† <p>Produced weekly lecture notes.</p> <p>Tutor and grader, Haverford Math and Computer Science Departments 2003-2007</p>
SERVICE	<p>Scientific committee for the conference: Young Geometric Group Theory V</p> <p>Reviewer for: Zentralblatt math</p> <p>Referee for:</p> <ul style="list-style-type: none"> • Geometriae Dedicata • Geometry and Topology • Journal of Topology and Analysis • Pacific Journal of Mathematics • Topology and its Applications
PROFESSIONAL RESEARCH EXPERIENCE	<p>SCAMP summer conference, IDA/CCR-La Jolla, La Jolla, CA. Summer 2007 and summer 2012.</p> <p>Participated in cryptographic research and collaborated on multiple projects. Currently an adjunct staff member (2007–present).</p> <p>Director’s Summer Program, National Security Agency, Fort Meade, MD. Summer 2006 Worked on a signals analysis problem in a small team, and wrote many C, Python, and Mathematica programs to assist research, including C programs designed for massively parallel systems. Presented to the Director of the NSA.</p>
OTHER	<p>Proficient in C, C++, Python, Mathematica, and MATLAB, as well as HTML, \LaTeX, and other things, especially on UNIX/Linux. Written numerous software programs to support research, including optimization and visualization in low-dimensional topology.</p>