Curriculum Vitae

Lucas Sabalka

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Education

- Ph.D. in Mathematics, U of Illinois at Urbana-Champaign, May 2006. Advisor: Ilya Kapovich. Thesis title: *Braid Groups on Graphs.*

- B.S. with highest distinction and with honors, in Mathematics, Computer Science, and History and minors in Psychology and Physics, U of Nebraska-Lincoln, August 2002. Advisors: Susan Hermiller and John Meakin.
  Thesis title: *Geodesics in the Braid Group on Three Strands.*

Academic Positions Held

- August 2006 to December 2008: Krener Assistant Professor at the U of California, Davis. Postdoctoral Advisor: Michael Kapovich.

- January 2009 to present: Riley Assistant Professor at Binghamton U. Postdoctoral Advisor: Ross Geoghegan.

Research Interests

- Geometric group theory, low dimensional topology, metric and computational geometry. In particular, $Out(F_n)$, graph braid groups, braid groups and Artin groups, boundaries of spaces, configuration spaces, robot motion, and expanders.

Papers

Most papers available online: see webpage.

(1) Geodesics in the braid group on three strands. In *Group theory, statistics, and cryptography*, volume 360 of *Contemporary Mathematics*, pages 133-150. Amer. Math. Soc., Providence, RI, 2004.

(2) Discrete Morse theory and graph braid groups, with Daniel Farley. *Algebraic and Geometric Topology*, 5:1075-1109, 2005.

(3) Embeddings of right-angled Artin groups into graph braid groups. *Geometriae Dedicata*, 124:191-198, 2007.

(4) On the cohomology rings of tree braid groups, with Daniel Farley. *Journal of Pure and Applied Algebra*, 212(1):53-71, 2007.

(5) On rigidity and the isomorphism problem for tree braid groups. *Groups, Geometry, and Dynamics*, 3(3):469-523, 2009.

(6) Multidimensional online mobile robot navigation, with Joshua Brown Kramer. To appear, *International Journal of Computational Geometry and Applications.*

(7) Projection-forcing multisets of weight changes, with Joshua Brown Kramer. To appear, *Journal of Combinatorial Theory, Series A.*

(8) Presentations of graph braid groups, with Daniel Farley. Submitted, 2009.

(9) Tessera expanders and Lipschitz cohomology, with Jerry Kaminker. In progress.

(10) f-Vectors of simplicial complexes, with Emanuele Delucchi. In progress.

Selected Honors

- 2006 - Recipient of the UIUC Mathematics Department Irving Reiner Memorial Award for outstanding graduate scholastic achievement in the field of algebra
- 2002-present - National Science Foundation Graduate Research Fellowship
- 2002-present - VIGRE Graduate Fellowship from the UIUC Mathematics Department
- Member of Phi Beta Kappa national undergraduate honorary society
- 2001-2002 - Recipient of the Barry M. Goldwater Scholarship for American undergraduate students with outstanding potential in science and mathematics
- 1999, 2001 - Participated in the International Collegiate Programming Contest; team received Honorable Mention both times

Talks Given

- Geometric and Combinatorial Methods in Group Theory and Semigroup Theory (invited), U Nebraska-Lincoln, planned for May 2009.
- Special Session on Geometric Group Theory, U of Illinois at Urbana-Champaign, March 2009.
- Colloquium (invited), Lafayette C, March 2009.
- Colloquium (invited), San Jose State U, October 2008.
- Math Circle junior high program (invited), U of California, Davis, May 2008.
- Special Session on Geometric Group Theory (invited), Louisiana State U, Baton Rouge, Louisiana, March 2008.
- Spring Topology and Dynamics Conference (invited), Milwaukee, Wisconsin, March 2008.
- Colloquium (invited), Miami U of Ohio, October 2007.
- Postdoctoral Research Seminar, MSRI Program in Geometric Group Theory, October 2007.
- Special Session on Combinatorial and Geometric Group Theory (invited), AMS meeting, Miami U of Ohio, March 2007.

- Conference on Topology and Robotics, 2006 (invited), ETH Zurich, July 2006.
- Conference on Combinatorial and Geometric Group Theory, in honor of A. Yu. Olshanskii, Vanderbilt U, May 2006.
- Special Session on Geometric Topology and Geometric Group Theory (invited) at the Spring Topology and Dynamics Conference, U of North Carolina-Greensboro, March 2006.
- Geometric Groups on the Gulf Coast Conference, U of Southern Alabama, March 2006.
- Conference on Geometric and Probabilistic Methods in Group Theory and Dynamical Systems, Texas A&M U, November 2005.
- Special Session on Geometric Methods in Group Theory and Semigroup Theory, AMS Meeting, U of Nebraska-Lincoln, October 2005.
- Conference on Asymptotic and Probabilistic Methods in Geometric Group Theory, U of Geneva, Switzerland, June 2005.
- Special Session on Curvature in Group Theory and Combinatorics, AMS Meeting, U of California-Santa Barbara, April 2005.
- Special Session on Braids and Knots (invited), AMS Meeting, U of New Mexico-Albuquerque, October 2004.
- Albany Group Theory Conference, Albany, New York, October 2004.
- Special Session on Combinatorial and Statistical Group Theory, AMS Meeting, Courant Institute, New York, October 2003.
- Hudson River Undergraduate Mathematics Conference, Hamilton College, New York, April 2002.
- Spring Topology and Dynamics Conference, U of Texas at Austin, March 2002.
- Numerous seminar talks given at the following universities: U. of Illinois at Urbana-Champaign; U. of Nebraska-Lincoln; U. of California-Davis; The Ohio State U.; San Fransisco State U; Miami U. of Ohio; Binghamton U; Cornell U.

Activities

- 2009 - Invited speaker at New Approches to Scholarly Communications and Publishing Symposium, hosted by the Binghamton University Libraries.
- 2009 - Postdoctoral participant in Binghamton Toeholds in Geometry and Topology graduate seminar series.
- 2007-2008 Principle organizer of Davis Geometric Group Theory Research Focus Group, including graduate seminar series
  (see http://www.math.ucdavis.edu/∼sabalka/RFG)
- 2007 - Participant in MSRI's programs in Geometric Group Theory, and Teichmuller Theory and Kleinian Groups, including all related workshops.
- August 2007 - Co-organizer, Davis Algebra Preliminary Exam Review Workshop, meeting 3.5 hours per day for 5 days.

- 2006-2007 - Co-organizer of Davis Geometric Group Theory Research Focus Group graduate seminar series
(see http://www.math.ucdavis.edu/~mduchin/ggt/rfg-seminar.html)
- 2006-present - Co-organizer of weekly Geometry/Topology Faculty/Student Lunch at UC Davis
- 2006-2007 - Committee member for the AMS Initiative on the Doctorate, a follow-up of the Carnegie Initiative on the Doctorate
- 2003-2005 - UIUC Mathematics graduate representative for Carnegie Initiative on Doctorate; attended national convening in San Francisco
- 2004-2005 - Graduate Student Representative on UIUC Mathematics Department Graduate Affairs Committee
- 2003-2005 - Graduate Employees Organization health care data analyst and Working Group chairman
- 2002-present - Member of the American Mathematical Society
- Fall 2001 - Nebraska nominee for Rhodes Scholarship
- Fall 2001 - Semi-finalist for the Winston Churchill Scholarship
- 2000-2001 - President, Pi Mu Epsilon Honorary National Mathematics Society, Nebraska Alpha (UNL) chapter
- Summer 2000 - Attended the Park City Mathematics Institute's summer program in Computational Complexity Theory
- Fall 1999 - Attended the Mathematics Advanced Study Semester at Pennsylvania State U; graduated with distinction

Mentorship

- Summer 2008-present - 2 students in a Research Experience for Undergraduates (REU) on open computational questions with braid groups on graphs, resulting in a research paper submitted for publication
- Winter 2008-Spring 2008 - 2 students, 1 grad & 1 undergrad, in extended mentorship for Research Focus Group
- Summer 2007 - 1 student in REU on online mobile robot navigation, resulting in a programmed simulation of a robot motion algorithm
- Spring 2007-Summer 2007 - 2 students in REU on the symmetric groups, including Spring reading course and Summer REU component

Teaching Experience

- Riley Assistant Professor, Binghamton U:
  - Fall 2009 - Math 222 Calculus II, using Stewart; 2 sections, 44 and 45 students.
  - Spring 2009 - Math 222 Calculus II, using Stewart; 35 students.
  - Spring 2009 - Math 375 Complex variables; 18 students.
- Krener Assistant Professor, UC Davis:

  - Fall 2008 - Math 295 Graduate reading course on Burago, Burago, & Ivanov's A course on metric geometry; 5 students.
  - Fall 2008 - Math 16A Basic calculus I; 262 students.
  - Spring 2008 - Math 147 Basic topology; 30 students.
  - Winter 2008 - Math 16A Basic calculus I; 203 students.
  - Spring 2007 - Math 141 Euclidean and non-Euclidean geometry; 55 students.
  - Spring 2007 - Math 147 Basic topology; 35 students.
  - Winter 2007 - Math 295 Graduate reading course on braid groups; 6 students.
  - Winter 2007 - Math 16B Basic calculus II; 90 students.
  - Fall 2006 - Math 210A Graduate topics in geometric group theory; 12 students.

- Graduate Teaching Assistant, UIUC:

  - 2006 Received Graduate Teaching Certificate.
  - Spring 2006 - Math 221 Introductory Matrix Theory (instructor).
    * Qualified for the Incomplete List of Teachers Ranked as Excellent (ILTRE), published by the Center for Teaching Excellence at UIUC.
  - Fall 2005 - Math 221 Introductory Matrix Theory (instructor).
    * Qualified for the ILTRE

- Undergraduate Teaching Assistant, UNL:

  - Fall 2000-Spring 2002 - Math Resource Center consultant.
  - Fall 2000 - Honors calculus II (assistant).
  - Spring 2001 - Honors calculus III (assistant).
  - Fall 2001 - Honors calculus II (assistant).
  - Spring 2002 - Honors calculus III (assistant).

- Other Relevant Experience:

  - Summer 1999 - Counselor for JD Edwards Honors Program Summer Camp in computer science.
  - Summer 1998 - Junior Counselor for the Canada/USA MathCamps; created and ran minicourses.