CURRICULUM VITAE

Aaron Abrams
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Education

Ph.D., **University of California, Berkeley**, Mathematics, 2000.
Advisor: Andrew Casson.
Dissertation: "Configuration spaces and braid groups of graphs."

B.S. with highest honors, **University of California, Davis**, Mathematics, 1993.

Positions

Visiting Research Fellow, Department of Mathematics, University of California, Berkeley, August 2003–present.

NSF VIGRE Postdoctoral Fellow, Department of Mathematics, University of Georgia, August 2001–present.

Mathematics Consultant, Ember Corporation, June–August 2002.

Franklin Postdoctoral Fellow, Department of Mathematics, University of Georgia, Aug. 2000–Aug. 2001.

Research Interests

Geometry and Topology: Configuration spaces and their compactifications; braid groups and their generalizations; knots and 3-manifolds

Applications: Geometric and topological methods in robotics; graph theory and networks

Combinatorics: Probabilistic and topological methods.

Awards

Mathematics Department Fellowship, UC Berkeley, 1999.
Outstanding Graduate Student Instructor Award, UC Berkeley, 1995-1996.
Department of Education National Need Fellowship, UC Berkeley, 1993-1994.

Papers

"State complexes for metamorphic systems," with R. Ghrist, to appear in *International Journal of Robotics Research.*

"Distances of Heegaard splittings," with S. Schleimer, submitted.

"Configuration spaces of colored graphs," *Geometriae Dedicata,* vol. 92 (2002), pp. 185–194.

"Circles Minimize Most Knot Energies," with J. Cantarella, J. Fu, M. Ghomi, and R. Howard. *Topology,* vol. 42 no. 2 (2002), pp. 381–394.

"Finding topology in a factory: configuration spaces," with R. Ghrist, *American Mathematical Monthly,* vol. 109 no. 2 (2002), pp. 140–150.

"An iterated random function with Lipschitz number 1," with H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, *Theory of Probability and its Applications,* vol. 47 no. 2 (2002), pp. 286–300.

"Evasive random walks and the clairvoyant demon," with H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, *Random Structures & Algorithms,* vol. 20 no. 2 (2002), pp. 239–248.

"Connectivity of EmberNets: a general discussion," Technical report, Ember Corporation, July 2002.

"Connectivity of weighted graphs: a glossary," Technical report, Ember Corporation, July 2002.

"Connectivity of EmberNets: mathematical models," Technical report, Ember Corporation, August 2002.

"Yet another species of forbidden distances chromatic number," with P. Johnson, Jr., *Geombinatorics,* vol. 10 no. 3 (2001), pp. 89–95.

"Configuration Spaces and Braid Groups of Graphs," Ph.D. thesis, University of California, Berkeley, 2000.

"Upper chromatic numbers: an update," *Geombinatorics,* vol. 10 no. 1 (2000), pp. 4–11.

"Evasive random walks," in Paul Erdős and his Mathematics (Budapest, 1999), János Bolyai Math. Soc., Budapest, 1999, pp. 1–3.

"The k^{th} upper chromatic number of the line," *Discrete Mathematics,* vol. 169 (1997), pp. 157–162.

"The probability that $(a, b) = 1$," with M. Paris, *College Mathematics Journal,* vol. 23 no. 1 (1992), pg. 47.

Selected Invited Presentations

AMS meeting (held at Tallahassee, FL), March 2004. Special session on Results in 3-Manifolds and Related Topics.

University of Oregon Mathematics Colloquium, December 2003.

Mathematics Advanced Study Semesters Colloquium, Penn State University, October 2003.

UC Davis Topology Seminar, October 2003.

Mathematical Sciences Research Institute Postdoc Lecture, September 2003.

UC Berkeley Topology Seminar, September 2003.

Topology and Robotics (a conference held at ETH Zürich, Switzerland), June 2003.

Emory University Mathematics Colloquium, April 2003.

AMS meeting (held at Baton Rouge, LA), March 2003. Special session on "Arrangements in Topology and Algebraic Geometry."

University of Illinois Computational Topology Seminar, December 2002.

University of Georgia VIGRE Seminar, October 2002.

AMS-MAA joint national meetings (held at New Orleans, LA), January 2001. AMS special session on "Braid Groups and Configuration Spaces."

Georgia International Topology Conference, July 2000.

University of Georgia Topology Seminar, various dates 2002–2003.

UGA-Georgia Tech-Emory joint Topology Seminar, several dates 2000–2002.

University of Georgia Geometry Seminar, March–April 2003.

Georgia Tech Combinatorics Seminar, October 2000.

UGA-Georgia Tech-Emory joint Combinatorics and Topology Seminar, December 2000.

University of Georgia CATS (Combinatorics, Algorithms, and Theory Seminar), several dates 2000–2002.

University of Georgia Math Club Lecture, various dates 2000–2002.

UC Davis Topology Seminar, June 2000.

UC Berkeley Geometric Group Theory Seminar, January 2000.

Canada/USA Mathcamp Colloquium, July 2000.

UC Berkeley Topology Seminar, various dates 1993-2000.

Paul Erdős and his Mathematics (a conference held at the Hungarian Academy of Sciences in Budapest, Hungary), July 1999 (poster session).

AMS-MAA joint meetings (held at Eugene, Oregon), June 1994. Special session on Undergraduate Research.

AMS-MAA-CMS joint national meetings (held at Vancouver, B. C.), August 1993. Special session on Undergraduate Research.

UC Berkeley Hyperbolic Geometry Seminar, November 1997.

Teaching Experience

- **Teaching:** I have over 10 years of experience teaching courses from the advanced high school level through the advanced graduate level. Some courses I have taught:

  High school courses:
  Ramsey theory (Hampshire College Summer Studies in Mathematics, 1993)
  Group theory (HCSSiM, 1993)
  Algebraic number theory (HCSSiM, 1993, TA)
  Introduction to Advanced Mathematics (Davis High School, 1992, TA)

  Lower division courses:
  Mathematical Modeling (University of Georgia, 2001)
  Precalculus (University of California, Berkeley, 1998)
  Differential calculus (UGA, 2000)
  Integral calculus (UCB, 1996, TA)
  Multivariable calculus (UCB, 2000, TA)
  Discrete mathematics (UCB, 1995)

  Upper division courses:
  Combinatorics (UGA, 2002)
  Graph theory (UGA, 2002)
  Number theory (UGA, 2003)
  Seminar on low-dimensional topology (UCB, 1997)
  Knot theory (Summer Institute for the Mathematical Sciences, 1997, TA)
  Real analysis (UCB, 1997, TA)
  Linear algebra (UCB, 1998, TA)
  Abstract algebra (UCB, 1998, TA)

  Graduate courses:
  Topics in topology and group theory (UGA, 2002)
  Calculus on manifolds (UGA, 2003)
  Algebraic topology (UCB, 1999, TA)

- **Curriculum Development:** I have designed and taught topology courses at both the un-

dergraduate level (UC Berkeley) and the graduate level (University of Georgia). I also designed, created, and published materials for new lower division Linear Algebra and Integral Calculus courses at UC Berkeley.

Professional and Community Service

Strahan Award Committee, University of Georgia, 2003.

Organizer, Georgia International Topology Conference, 2002.

Mathematics consultant for Manitoba Theater Company's production of David Auburn's play "Proof," 2002.

Mentor for underrepresented mathematics students, Professional Development Program, UC Berkeley, 1998–2000.

Referee for Discrete Mathematics, 1998.

Co-organizer, Undergraduate Seminar on Low-dimensional Topology, UC Berkeley, Spring 1996.

Assistant Site Coordinator, American Regions Math League, 1995-1999.

Undergraduate Program Committee, Math Department, UC Davis, 1991-1992.