

# THOMAS MICHAEL KOBERDA

Current as of April 14, 2015

## 1. PERSONAL DATA

- Born: November 4<sup>th</sup>, 1984, Evanston, IL, USA.
- Citizenship: USA.
- Email: thomas.koberda@gmail.com
- Website: <http://users.math.yale.edu/users/koberda/>

## 2. EDUCATION

- University of Chicago 2003 – 2007: Bachelor of Science in Mathematics with Honors.
- Harvard University 2007 – 2012: Master of Arts in Mathematics, 2008. Ph.D., 2012.
- Ph.D. Advisor: Curtis T. McMullen.
- Secondary Advisor (unofficial): Benson Farb

## 3. EMPLOYMENT

- NSF Postdoctoral Fellow, Yale University, 2012 – 2014.
- Gibbs Assistant Professor, Yale University, 2014 – 2015 (projected).
- Assistant Professor of Mathematics, University of Virginia, 2015 – 2019 (projected).

## 4. RESEARCH INTERESTS

- Topology and geometry in two and three dimensions
- Geometric group theory
- Mapping class groups
- Right-angled Artin groups
- Line arrangements

## 5. THESIS

- Title: *Mapping class groups, homology and finite covers of surfaces*
- Defense date: April 13, 2012.
- Thesis committee:
  - (1) Curtis T. McMullen
  - (2) Benson Farb
  - (3) Vaibhav Gadre

## 6. BIBLIOGRAPHY

- (1) Measurable sensitivity. Joint with J. James, K. Lindsey, C.E. Silva and P. Speh. *Proc. Amer. Math. Soc.* 136 (2008), no. 10, 3549–3559.
- (2) On ergodic transformations that are both weakly mixing and uniformly rigid. Joint with J. James, K. Lindsey, C.E. Silva and P. Speh. *New York Journal of Mathematics* 15 (2009) 393–403.
- (3) Asymptotic linearity of the mapping class group and a homological version of the Nielsen–Thurston classification. *Geom. Dedicata* (2012) 156:13–30.
- (4) Effective indices of subgroups in one–relator groups with free quotients. *Comm. Alg.* 39 (2011), no.11, 4336–4341.
- (5) Residual properties of fibered and hyperbolic 3–manifolds. *Topology Appl.* 160 (2013), no. 7, 875–886.
- (6) Right-angled Artin groups and a generalized isomorphism problem for finitely generated subgroups of mapping class groups. *Geom. Funct. Anal.* 22 (2012), no. 6, 1541–1590.
- (7) Entropy of automorphisms, homology and the intrinsic polynomial structure of nilpotent groups. *In the tradition of Ahlfors-Bers. VI*, 87–99, Contemp. Math., 590, *Amer. Math. Soc., Providence, RI*, 2013.
- (8) Faithful actions of automorphisms on the space of orderings of a group. *New York J. Math.* 17 (2011) 783–798.
- (9) Ping–pong lemmas with applications to geometry and topology. *Geometry, topology and dynamics of character varieties*, 139–158, Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap., 23, *World Sci. Publ., Hackensack, NJ*, 2012.
- (10) Embedability between right-angled Artin groups. Joint with Sang-hyun Kim. *Geom. Topol.* 17 (2013), no. 1, 493–530.
- (11) Alexander varieties and largeness for finitely presented groups. *J. Homotopy Rel. Struc.* 9 (2014), no. 2, 513–531.
- (12) An obstruction to embedding right-angled Artin groups in mapping class groups. Joint with Sang-hyun Kim. *Int. Math. Res. Notices* 2014, no. 14, 3912–3918.
- (13) The geometry of the curve complex for a right-angled Artin group. Joint with Sang-hyun Kim. *Internat. J. Algebra Comput.* 24 (2014), no. 2, 121–169.
- (14) Right-angled Artin groups and finite subgraphs of curve graphs. Joint with Sang-hyun Kim. Submitted.
- (15) An effective algebraic detection of the Nielsen–Thurston classification of mapping classes. Joint with Johanna Mangahas. *J. Top. Analysis* 7 (2015), no. 1, 1–21.
- (16) Anti-trees and right-angled Artin subgroups of planar braid groups. Joint with Sang-hyun Kim. To appear in *Geom. Top.*
- (17) Right-angled Artin subgroups of the interval diffeomorphism group. Joint with Hyungryul Baik and Sang-hyun Kim. To appear in *Israel J. Math.*

- (18) Injective maps between flip graphs. Joint with Javier Aramayona and Hugo Parlier. To appear in *Ann. Inst. Fourier*.
- (19) The geometry of purely loxodromic subgroups of right-angled Artin groups. Joint with Johanna Mangahas and Samuel Taylor. Submitted.
- (20) Residual properties of arrangement complements. Joint with Alexander I. Suci. In preparation.

#### 7. RESEARCH COLLABORATORS

- Cesar E. Silva.
- Kathryn Lindsey.
- Peter Speh.
- Jennifer James.
- Sang-hyun Kim.
- Johanna Mangahas.
- Hyungryul Baik.
- Javier Aramayona.
- Hugo Parlier.
- Samuel Taylor.
- Alexander I. Suci.

#### 8. OTHER WRITINGS

- (1) Class field theory and the MKR dictionary for knots. Minor thesis, April 2008.
- (2) Notes on recent work of Dani Wise. Expository notes + new theorem which appears in newest version of “Residual properties of fibered and hyperbolic 3-manifolds”. December 2009.
- (3) Representations of Galois Groups on the Homology of Surfaces. Joint with A. Silberstein. Available at arXiv:0905.3002.
- (4) On some of the residual properties of finitely generated nilpotent groups. Available at arXiv:1002.3203.

#### 9. AWARDS AND HONORS

- University Scholar, University of Chicago, all quarters.
- Dean’s List, University of Chicago, all quarters.
- Paul R. Cohen Memorial Prize, University of Chicago, 2007.
- NSF Graduate Research Fellowship, 2007.
- de Valpine Fellowship, Harvard University, 2010.
- Bok Center Teaching Award, Spring 2010.
- NSF Postdoctoral Fellowship in Mathematics Sciences, 2012.

#### 10. CONFERENCES AND TALKS

- (1) Joint Mathematics Meetings. Submitted paper session. New Orleans, LA. January 2007.
- (2) Topics in Teichmüller theory and Kleinian groups. MSRI Workshop. Berkeley, CA. November 2007.
- (3) Trivial Notions graduate student seminar. Invited talk. Harvard University, Cambridge, MA. May 2008.

- (4) Fifty Years Since Fox and Milnor: A conference on knot concordance in memory of Jerry Levine. Brandeis University, Waltham, MA. June 2008.
- (5) SMALL/Williams 20<sup>th</sup> anniversary reunion. Invited talk. Williams College, Williamstown, MA. June 2008.
- (6) Things You Can Do With  $SL(2)$ . Technion University, Haifa, Israel. September 2008.
- (7) Geometric Group Theory and Topology seminar at Tufts. Invited talk. Tufts University, Medford, MA. October 2008.
- (8) Trivial Notions graduate student seminar. Invited talk. Harvard University, Cambridge, MA. December 2008.
- (9) University of Michigan Topology Seminar. Invited talk. Ann Arbor, MI. April 2009.
- (10) RTG Workshop on geometric group theory. University of Michigan. Ann Arbor, MI. April 2009.
- (11) Informal Dynamics and Geometry Seminar. Invited talk. Harvard University. Cambridge, MA. May 2009.
- (12) Dynamics and Geometry of Teichmüller Space, honoring the 60<sup>th</sup> birthday of Howard Masur. CIRM, Luminy, France. June 2009.
- (13) Weil-Petersson Geometry. Central Connecticut State University, New Britain, CT. July 2009.
- (14) University of Maryland Geometry and Topology Seminar. Invited talk. College Park, MD. September 2009.
- (15) Trivial Notions graduate student seminar. Invited talk. Harvard University, Cambridge, MA. October 2009.
- (16) University of Chicago Geometry and Topology Seminar. Invited talk. University of Chicago, Chicago, IL. October 2009.
- (17) Columbia University Geometry and Topology Seminar. Invited talk. New York, NY. October 2009.
- (18) Geometric Group Theory and Topology seminar at Tufts. Invited talk. Medford, MA. November 2009.
- (19) Wasatch Topology Conference. Invited talk. Park City, UT. December 2009.
- (20) University of Michigan Topology Seminar. Invited talk. Ann Arbor, MI. January 2010.
- (21) Yale University Geometry and Topology Seminar. Invited talk. New Haven, CT. February 2010.
- (22) Worldwide Center of Mathematics. Invited talk. Cambridge, MA. March 2010.
- (23) Informal Dynamics and Geometry Seminar, Harvard University. Invited talk. Cambridge, MA. March 2010.
- (24) University of Virginia Algebra Seminar. Invited talk. Charlottesville, VA. March 2010.
- (25) Western Sectional Meeting of the American Mathematical Society. Invited talk. Albuquerque, NM. April 2010.
- (26) Virtual properties of 3-manifolds. Montreal, QC, Canada. April 2010.

- (27) Workshop on pseudo-Anosovs with small dilatation. Invited talk. Madison, WI. April 2010.
- (28) Teichmüller Dynamics and Geometry Trimester Program Conference. Invited talk. Hausdorff Institute of Mathematics, Bonn, Germany. June 2010.
- (29) Geometry, Topology and Dynamics of Character Varieties. Invited talk. Institute for Mathematical Sciences, Singapore. July 2010.
- (30) Workshop on Geometric Group Theory, Satellite of the International Congress of Mathematicians. Invited talk. Goa, India. August 2010.
- (31) Tufts University Geometric Group Theory and Topology Seminar. Invited talk. Medford, MA. September 2010.
- (32) Scottfest: Scott Wolpert's 60<sup>th</sup> birthday conference. College Park, MD. September, 2010.
- (33) Brown University Geometry and Topology Seminar. Invited talk. Providence, RI. October 2010.
- (34) Brandeis University Geometry and Topology Seminar. Invited talk. Waltham, MA. November 2010.
- (35) Joint Mathematics Meeting. Submitted paper session. New Orleans, LA. January 2011.
- (36) Southeastern Sectional Meeting of the American Mathematical Society. Invited talk. Statesboro, GA. March 2011.
- (37) Spring Topology and Dynamics Conference. Invited talk. Tyler, TX. March 2011.
- (38) Ahlfors–Bers Colloquium. Invited seminar talk. Houston, TX. March 2011.
- (39) Western Sectional Meeting of the American Mathematical Society. Invited talk. Las Vegas, NV. April 2011.
- (40) Workshop on Geometric Group Theory, Part II. Invited Talk. Louisiana State University, Baton Rouge, LA. July 2011.
- (41) Series of invited talks. KAIST, Daejeon, Korea. July and September 2011.
- (42) Series of invited talks. Chiang Mai University, Chiang Mai, Thailand. August 2011.
- (43) Invited talk, Suzhou University, Suzhou, China. August 2011.
- (44) Geometric topology and group theory seminar at Tufts. Invited talk. Medford, MA. November 2011.
- (45) University of Chicago Geometry and Topology Seminar. Invited talk. Chicago, IL. November 2011.
- (46) University of Illinois Urbana–Champaign Group Theory Seminar. Invited talk. Urbana, IL. November 2011.
- (47) Cornell University Dynamics Seminar. Invited talk. Ithaca, NY. December 2011.
- (48) Brown University Geometry and Topology Seminar. Invited talk. Providence, RI. December 2011.
- (49) Ohio State University Geometric Group Theory Seminar. Invited talk. Columbus, OH. December 2011.
- (50) Joint Mathematics Meeting. Special Session Invited talk. Boston, MA. January 2012.

- (51) Young Geometric Group Theory Meeting. Invited talk. Bedlewo, Poland. January 2012.
- (52) MPI Topology Seminar. Invited talk. Bonn, Germany. January 2012.
- (53) Informal Geometry and Dynamics Seminar, Harvard University. Invited talk. Cambridge, MA. February 2012.
- (54) UBC Topology Seminar. Invited talk. Vancouver, BC, Canada. February 2012.
- (55) Ordered Groups and Topology at BIRS. Invited talk. Banff, AB, Canada. February 2012.
- (56) Temple University Topology Seminar. Invited talk. Philadelphia, PA. February 2012.
- (57) Boston College Geometry and Topology Seminar. Invited talk. Boston, MA. April 2012.
- (58) Harvard Gauge Theory Seminar. Invited talk (thesis defense). Cambridge, MA. April 2012.
- (59) Bloomington Geometry Workshop. Invited talk. Bloomington, IN. April 2012.
- (60) RTG Conference: Progress in Hyperbolic 3-manifolds. Invited talk. Ann Arbor, MI. May 2012.
- (61) Stanford Geometry and Topology Seminar. Two invited talks. Palo Alto, CA. May 2012.
- (62) Park City Mathematics Institute Summer Session in Geometric Group Theory. Invited talk. Park City, UT. July 2012.
- (63) CUNY Graduate Center Geometry Topology Seminar. Invited talk. New York, NY. September 2012.
- (64) PATCH Seminar. Invited talk. Philadelphia, PA. September 2012.
- (65) KAIST Invited Lecture Series of four talks. Daejeon, Korea. September–October 2012.
- (66) NUS Geometry and Topology Seminar. Invited talk. Singapore. October 2012.
- (67) Yale Geometry and Topology Seminar. Invited talk. New Haven, CT. December 2012.
- (68) Canadian Mathematical Society Winter Meeting. Invited talk. Montreal, QC, Canada. December 2012.
- (69) Young Geometric Group Theory Meeting II. Haifa, Israel. February 2013.
- (70) Suzhou University, Informal invited talk. Suzhou, China. March 2013.
- (71) Mapping Class Groups and Categorification at BIRS. Banff, AB, Canada. April 2013.
- (72) Fudan University Geometry and Topology Seminar. Invited talk. Shanghai, China. June 2013.
- (73) NUS Geometry and Topology Seminar. Invited talk. Singapore. June 2013.
- (74) Joint International Meeting of the American Mathematical Society and the Romanian Mathematical Society. Invited talk. Alba Iulia, Romania. June 2013.

- (75) Interactions between low dimensional topology and mapping class groups. Invited talk. MPI, Bonn, Germany. July 2013.
- (76) KAIST Invited Lecture Series of two talks. Daejeon, Korea. July 2013.
- (77) Geometric Topology in New York. Invited talk. New York, NY. August 2013.
- (78) UIUC Group Theory Seminar. Invited talk. Urbana, IL. October 2013.
- (79) University of Virginia Mathematics Colloquium. Invited talk. Charlottesville, VA. January 2014.
- (80) Joint Mathematics Meetings. Special Session invited talk. Baltimore, MD. January 2014.
- (81) Yale Geometry and Topology Seminar. Invited talk. New Haven, CT. February 2014.
- (82) Binghamton Geometry and Topology Seminar. Invited talk. Binghamton, NY. March 2014.
- (83) Spring Topology and Dynamics Conference. Semi-plenary talk. Richmond, VA. March 2014.
- (84) Spring Southeastern Sectional Meeting. Invited talk. Knoxville, TN. March 2014.
- (85) Eastern Sectional Meeting. Invited talk. Baltimore, MD. March 2014.
- (86) Western Sectional Meeting. Invited talk. Albuquerque, NM. April 2014.
- (87) UBC Geometry and Topology seminar. Invited talk. Vancouver, BC, Canada. April 2014.
- (88) UBC Mathematics Colloquium. Invited talk. Vancouver, BC, Canada. April 2014.
- (89) Teichmüller Theory and Mapping Class Groups. Invited talk. Ramat Hanadiv, Israel. May 2014.
- (90) Cube Complexes and Groups. Invited talk. Copenhagen, Denmark. July 2014.
- (91) ICM Satellite: Geometry on Groups and Spaces. Invited Plenary Talk. Daejeon, Korea. August 2014.
- (92) Yale University Geometry and Topology seminar. Invited talk. New Haven, CT. November 2014.
- (93) GATSBY seminar introductory talk. Providence, RI. December 2014.
- (94) SNU Geometric Group Theory seminar. Invited series of talks. Seoul, Korea. January 2015.
- (95) University at Buffalo Geometry and Topology seminar. Invited talk. Buffalo, NY. February 2015.
- (96) Columbia University Geometry and Topology seminar. Invited talk. New York, NY. February 2015.
- (97) Oklahoma University Geometry and Topology seminar. Invited talk. Norman, OK. March 2015.
- (98) Oklahoma University Mathematics Colloquium. Invited talk. Norman, OK. April 2015.

## 11. TEACHING EXPERIENCE

- Teaching Assistant, University of Chicago, Calculus, 2004 – 2005.
- Counselor, University of Chicago, Young Scholar’s Program, 2003 – 2005, 2006 – 2007.
- Grader, University of Chicago, honors calculus, elementary number theory, basic analysis, complex analysis, point-set topology, topics in geometry, set theory, 2005 – 2007.
- Course Assistant, Harvard University, Algebraic topology, 2008, 2009, 2011.
- Teaching Apprentice, Harvard University, Multivariable calculus, 2008.
- Tutorial, Harvard University, Combinatorial and Geometric Group Theory, spring 2010.
- Course Assistant, Harvard University, Algebraic Geometry, 2010.
- Multivariable Calculus Instructor, Harvard University, Fall 2010.
- Topics course on right-angled Artin groups, Yale University, Spring 2013.
- Multivariable Calculus Instructor, Yale University, Fall 2014.
- Introduction to Abstract Algebra, Yale University, Fall 2014.
- Undergraduate advisee at Yale, Tommy Tang (tommy.tang@yale.edu), Spring 2013–current. Topics: analytic number theory, modular forms,  $p$ -adic analysis.
- Topics course on hyperplane arrangements, Yale University, Spring 2015.

## 12. MEMBERSHIPS

- American Mathematical Society

## 13. PROFESSIONAL SERVICE

- Organizer of Trivial Notions graduate student seminar, Harvard University, 2008 – 2009.
- Organizer of Yale Geometry and Topology seminar, Yale University, 2012 – 2014.
- Refereed papers for:
  - (1) *Geometriae Dedicata*
  - (2) *Journal of Pure and Applied Algebra*
  - (3) *New York Journal of Mathematics*
  - (4) *Algebraic and Geometric Topology*
  - (5) *Mathematical Proceedings of the Cambridge Philosophical Society*
  - (6) *Mathematical Research Letters*
  - (7) *Journal of Topology and Analysis*
  - (8) *Geometry and Topology*
  - (9) *Bulletin of the London Mathematical Society*
  - (10) *International Journal of Algebra and Computation*
  - (11) *Journal of Topology*
  - (12) *Order*



(13) *International Mathematical Research Notices*

- Reviewer for *Zentralblatt*.
- Reviewer for *Mathematical Reviews*.
- Co-organizer of ICM Satellite Conference: “Geometry on Groups and Spaces”, KAIST, Daejeon, August 2014. Website: [icm.cayley.kr](http://icm.cayley.kr).
- Co-organizer of the 2015 Spring Topology and Dynamics Conference.

## 14. GRANTS RECEIVED

- (1) NSF Postdoctoral Fellowship DMS-1203964. July 2012-May 2014, \$120,000.
- (2) Conference grant “Geometry on Groups and Spaces”, DMS-1431070. July-August 2014, \$42,000.

## 15. REFERENCES

- Curtis T. McMullen. [ctm@math.harvard.edu](mailto:ctm@math.harvard.edu).
- Benson Farb. [farb@math.uchicago.edu](mailto:farb@math.uchicago.edu).
- Ursula Hamenstädt. [ursula@math.uni-bonn.de](mailto:ursula@math.uni-bonn.de).
- Mladen Bestvina. [bestvina@math.utah.edu](mailto:bestvina@math.utah.edu).
- Yair Minsky [yair.minsky@yale.edu](mailto:yair.minsky@yale.edu).
- Oliver Knill (Teaching reference). [knill@math.harvard.edu](mailto:knill@math.harvard.edu).

## 16. MISCELLANEOUS

- Languages: In decreasing competence: English (native), Polish (native), French, Mandarin.
- Music: Piano: 9 years of private instruction.