

Thomas Church

Employment

- 2013– **Assistant Professor**, Stanford University.
- 2011–2013 **Szegő Assistant Professor**, Stanford University.

Education

- 2011 **Ph.D. Mathematics**, University of Chicago. Advisor: Benson Farb.
- 2007 **M.S. Mathematics**, University of Chicago.
- 2006 **B.A. Mathematics**, Cornell University, *summa cum laude*.

Recognition and Grants

- 2016–2017 **Member, Institute for Advanced Study**.
- 2016–2018 **Sloan Research Fellowship**, Alfred P. Sloan Foundation, FG-2016-6419 (\$55,000).
- 2015–2018 **Terman Fellowship** (\$180,000).
 - 2015 **Kamil Duszenko Prize**, Fundacja Matematyków Wrocławskich.
for outstanding achievement in mathematics
- 2014–2019 **NSF CAREER Award**, DMS 1350138 (\$433,078).
- 2014–2016 **AIM SQuaRE Grant**, “Fast matrix multiplication via representation theory of finite groups”.
- 2011–2014 **NSF Mathematical Sciences Postdoctoral Research Fellowship**, DMS 1103807 (\$135,000).
- 2010–2011 **William Rainey Harper Dissertation Fellowship**.
highest honor awarded to a graduate student by the University of Chicago
 - 2010 **Lawrence and Josephine Graves Teaching Prize**, University of Chicago.
 - 2008 **Wayne C. Booth Graduate Student Prize for Excellence in Teaching**, University of Chicago.
- 2006–2008 **Robert R. McCormick Fellowship**, University of Chicago.
- 2006 **Harry S. Kieval Prize in Mathematics**, awarded to best graduating math major, Cornell University.

Teaching Experience

- 2017 **Math 210A (Commutative and Homological Algebra)**.
- 2015/16/18 **Math 101 (Math Discovery Lab)**, created and taught new discovery-based project course in mathematics.
- 2015, 2018 **Math 120 (Groups and Rings)**.
- 2013, 2015 **Math 113 (Linear Algebra and Matrix Theory)**.
 - 2012 **Math 283 (Representation Stability and FI-modules)**, graduate course.
- 2011/15/19 **Math 51 (Linear Algebra and Multivariable Calculus)**.
 - 2011 **Math 343 (Representation stability)**, graduate course, with Benson Farb.
 - 2010 **Stable homology through scanning**, graduate-level seminar, 10 lectures.
 - 2010 **Math 175 (Number Theory)**, Inquiry Based Learning course, with Shmuel Weinberger.
 - 2010 **Math 522 (SESAME Algebra II)**, Mathematical training for high school math teachers.
- 2009–2010 **Math 112-3 (Number Theory and Geometry)**.

2009 **Math 196 (Linear Algebra)**.

2008–2009 **Math 152-3 (Calculus)**.

Publications

24. **Which groups are amenable to proving exponent two for matrix multiplication?**
with Jonah Blasiak, Henry Cohn, Joshua Grochow, and Chris Umans, arXiv:1712.02302
23. **On finite generation of the Johnson filtrations.**
with Mikhail Ershov and Andrew Putman, arXiv:1711.04779
22. **Linear and quadratic ranges in representation stability.**
with Jeremy Miller, Rohit Nagpal, and Jens Reinhold, to appear in *Advances in Mathematics*
21. **Bounding the homology of FI-modules.**
arXiv:1612.07803
20. **On cap sets and the group-theoretic approach to matrix multiplication.**
with Jonah Blasiak, Henry Cohn, Joshua Grochow, Eric Naslund, Will Sawin, and Chris Umans, *Discrete Analysis* 2017:3
One of 11 papers selected for invited plenary talk at STOC 2017
19. **The codimension-one cohomology of $SL_n\mathbb{Z}$.**
with Andrew Putman, *Geometry & Topology* 21-2 (2017), 999–1032
18. **Homology of FI-modules.**
with Jordan Ellenberg, *Geometry & Topology* 21-4 (2017), 2373–2418
17. **Integrality in the Steinberg module and the top-dimensional cohomology of $GL_n(\mathcal{O}_K)$.**
with Benson Farb and Andrew Putman, arXiv:1501.01307
16. **Generating the Johnson filtration.**
with Andrew Putman, *Geometry & Topology* 19-4 (2015), 2217–2255
15. **Representation stability in cohomology and asymptotics for families of varieties over finite fields.**
with Jordan Ellenberg and Benson Farb, *Contemporary Mathematics* 620 (2014), 1–54
14. **Rotor-routing and spanning trees on planar graphs.**
with Melody Chan and Joshua Grochow, *IMRN* 2015 (2015) 11, 3225–3244.
13. **FI-modules over Noetherian rings.**
with Jordan Ellenberg, Benson Farb, and Rohit Nagpal, *Geometry & Topology* 18-5 (2014), 2951–2984
12. **A stability conjecture for the unstable cohomology of $SL_n\mathbb{Z}$, mapping class groups, and $\text{Aut}(F_n)$.**
with Benson Farb and Andrew Putman, *Contemporary Mathematics* 620 (2014), 55–70
11. **FI-modules and stability for representations of symmetric groups.**
with Jordan Ellenberg and Benson Farb, *Duke Mathematical Journal* 164 (2015) 9, 1833–1910
10. **Invariance properties of Miller–Morita–Mumford characteristic numbers of fibre bundles.**
with Martin Crossley and Jeffrey Giansiracusa, *Quarterly Journal of Mathematics* 64 (2013) 3, 729–746
9. **The rational cohomology of the mapping class group vanishes in its virtual cohomological dimension.**
with Benson Farb and Andrew Putman, *IMRN* (2012) 21, 5025–5030
8. **Orbits of curves under the Johnson kernel.**
American Journal of Mathematics 136 (2014), 943–994
7. **Homological stability for configuration spaces of manifolds.**
Inventiones Mathematicae 188 (2012) 2, 465–504
6. **On the geometric nature of characteristic classes of surface bundles.**
with Benson Farb and Matthew Thibault, *Journal of Topology* 5 (2012) 3, 575–592

5. **Representation theory and homological stability.**
with Benson Farb, *Advances in Mathematics* (2013), 250–314
4. **Parametrized Abel–Jacobi maps and abelian cycles in the Torelli group.**
with Benson Farb, *Journal of Topology* 5 (2012) 1, 15–38
3. **Infinite generation of the kernels of the Magnus and Burau representations.**
with Benson Farb, *Algebraic and Geometric Topology* 10 (2010), 837–851
2. **Some groups of mapping classes not realized by diffeomorphisms.**
with Mladen Bestvina and Juan Souto, *Commentarii Mathematici Helvetici* 88 (2013) 1, 205–220
1. **Separating twists and the Magnus representation of the Torelli group.**
with Aaron Pixton, *Geometriae Dedicata* 155 (2011) 1, 177–190

Service

AMS–Simons Travel Grants Committee, 2018–2021
 Organizer, 2019 MSRI Summer Graduate School on “Representation Stability”
 Served on Stanford thesis committee for 11 Ph.D. students
 Math advisor for 17 Stanford undergraduates
 Founding co-organizer of Beatrice Yormark Distinguished Lecture Series
 Co-organizer, Stanford Topology Seminar
 Directed Reading Program mentor for 9 students at UChicago and Stanford
 REU mentor for 16 students at UChicago
 Referee for *Annals*, *JAMS*, *Inventiones*, *Duke*, *Geometry & Topology*, NSF panels, etc.

Department Colloquia

2017 Harvard University, Joint Brandeis–Harvard–MIT–Northeastern Colloquium
 2017 Purdue University
 2017 Haverford College
 2017 Temple University
 2016 University of Minnesota
 2014 University of Arkansas
 2014 University of Southern California
 2014 San Jose State University
 2013 University of Michigan
 2013 Santa Clara University
 2013 University of British Columbia
 2012 Harvard University, Joint Brandeis–Harvard–MIT–Northeastern Colloquium
 2012 University of California, Los Angeles
 2012 University of Oregon
 2011 Indiana University

Masterclasses and Lecture Series

2013 Masterclass on “Homological stability via FI-modules”, University of Copenhagen (5 lectures)
 2013 Minicourse on “Arithmetic groups in topology and number theory”, Northwestern University (4 lectures)
 2011 RTG Lecture Series on “Representation stability”, University of Michigan (3 lectures)

Invited Talks

2017 MIT, Notre Dame, Penn, Michigan, Stanford, Berkeley

2016 IAS, Johns Hopkins, Penn, Warsaw, Wrocław, Stanford, MIT
2015 UC Davis
2014 Caltech, MIT, Northeastern, Columbia, Brandeis, Boston C., Johns Hopkins, Harvard, Stanford, MIT (x3)
2013 U. Chicago, Michigan, U. British Columbia
2012 UCLA, U. Chicago, Stanford, Berkeley, Stanford, Purdue, Princeton, Temple, Berkeley
2011 Berkeley, Stanford, Northwestern, Utah, Cornell, Indiana, Michigan, Michigan State
2010 UIUC, Caltech, Stanford, UW-Madison, OSU, Brandeis
2009 Columbia, Michigan, Tufts

Conference Talks

2018 Cornell Topology Festival
2017 Mathematical Congress of the Americas (Montreal)
Georgia International Topology Conference (octennial conference, UGA)
“Representation Stability” (AMS Special Session)
“No Boundaries” (Chicago)
2016 Geometric Group Theory (MSRI),
“Free Resolutions, Representations, and Asymptotic Algebra” (Banff)
2015 Topology and Geometry Conference (HIM, Bonn)
2014 Redbud Topology Conference (U. Arkansas)
GEAR Network Retreat (U. Maryland)
Algebraic Topology (MSRI)
2013 Atkin Workshop on “Cohen–Lenstra heuristics” (UIUC)
2012 “Cohomological methods in geometric group theory” (Banff)
Texas Geometry and Topology Conference (Rice)
Algebraic Topology: Applications and New Directions (Stanford)
“Geometric Group Theory” (PCMI), “Torsion in the homology of arithmetic groups” (Banff)
Topology Students Workshop (Georgia Tech)
2011 “Moduli Spaces of Riemann Surfaces” (PCMI)
Cascade Topology Conference (U. Victoria), “Torelli group” (OSU)
2010 “Arithmetic, Groups, and Geometry” (AMS Special Session)
2009 RTG Workshop on Geometric Group Theory (Michigan)
2008 Wasatch Topology Conference (Utah)