Thomas Church

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US Citizen

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

2018–2020 **AIM SQuaRE Grant**, "Fast matrix multiplication, additive combinatorics, and modular representations".

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

23. **Which groups are amenable to proving exponent two for matrix multiplication?**.
with Jonah Blasiak, Henry Cohn, Joshua Grochow, and Chris Umans, arXiv:1712.02302

22. **On finite generation of the Johnson filtrations**.
with Mikhail Ershov and Andrew Putman, arXiv:1711.04779

21. **Linear and quadratic ranges in representation stability**.
with Jeremy Miller, Rohit Nagpal, and Jens Reinhold, Advances in Mathematics 333 (2018), 1–40

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 $\mathbf{SL}_n\mathbb{Z}$**.
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 $\mathbf{GL}_n(\mathcal{O}_K)$**.
with Benson Farb and Andrew Putman, to appear in American Journal of Mathematics

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 $\mathbf{SL}_n\mathbb{Z}$, mapping class groups, and $\mathbf{Aut}(F_n)$**.
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)