

Department of Mathematics
 Oden Institute for Computational Engineering and Sciences
 University of Texas at Austin
 jkileel@math.utexas.edu | web.ma.utexas.edu/users/jkileel/
 Offices: PMA 12.154 and POB 3.434 | Austin, TX 78712-1199, USA

RESEARCH INTERESTS

Applied mathematics and computational algebra: tensor decomposition, data analysis and compression, nonconvex optimization landscapes, applied algebraic geometry, and the method of moments; applications to cryo-electron microscopy, computer vision, scientific machine learning, digital twins, and AI for mathematics.

ACADEMIC APPOINTMENTS

2026–present **Associate Professor** (with tenure), Department of Mathematics and Oden Institute, University of Texas at Austin.

2020–2026 **Assistant Professor**, Department of Mathematics and Oden Institute, University of Texas at Austin.

2017–2020 **Postdoctoral Fellow**, Program in Applied and Computational Mathematics, Princeton University.
 Advisor: Amit Singer. Supported by the Simons Collaboration on Algorithms and Geometry.

EDUCATION

2012–2017 **Ph.D. in Mathematics**, University of California, Berkeley.
 Dissertation: Algebraic Geometry for Computer Vision. Advisor: Bernd Sturmfels.

2008–2012 **M.Math. and B.A. in Mathematics**, University of Cambridge.

HONORS AND AWARDS

2026–2027 Moncrief Grand Challenge Faculty Award, University of Texas at Austin.

2025–2029 Peter O'Donnell Distinguished Researcher Award, University of Texas at Austin.

2025–2027 **Alfred P. Sloan Research Fellowship in Mathematics.**

2023 ACHA Charles Chui Young Researcher Best Paper Award, for “Estimation under group actions: Recovering orbits from invariants.”

2017–2020 Simons Collaboration on Algorithms and Geometry Postdoctoral Fellowship.

2017 Bernard Friedman Memorial Prize for Best Thesis in Applied Mathematics, University of California, Berkeley.

Summer 2016 Chateaubriand Fellowship, Embassy of France in the United States.

2008–2011 Blyth Cambridge Commonwealth Scholarship (two scholarships in Canada).

Awarded grants

Alfred P. Sloan Foundation

Sloan Research Fellowship in Mathematics

Principal investigator | September 15, 2025–September 14, 2027 (expected).

Award budget: \$75,000; under my supervision: \$75,000.

National Science Foundation · DMS 2436499

FDT-BioTech: A Digital Twin Framework for Developing and Analyzing Virtual Patient Cohorts to Enable Virtual Clinical Trials

Co-principal investigator | December 15, 2024–November 30, 2027 (expected).

Award budget: \$952,867; under my supervision: \$74,848. PI: David Hormuth. Other co-PIs: Karen Willcox, Thomas Yankeelov, and Anirban Chaudhuri (all at UT Austin).

Department of Energy · DE SC0025312

Adaptive, Efficient, and Safe: General Tools for Streaming Large-Scale Tensors

Principal investigator | September 1, 2024–August 31, 2027 (expected).

Award budget: \$495,000; under my supervision: \$446,829. Co-PI: Gunnar Martinsson (UT Austin).

National Science Foundation · IIS 2312746

Collaborative Research: RI: Medium: Bridging the Semantic-Metric Gap via Multinocular Image Integration

Principal investigator | September 1, 2023–August 31, 2027 (expected).

Award budget: \$90,671; under my supervision: \$90,671. PIs on corresponding collaborative grants: Benjamin Kimia (Brown University) and Ahmad Abdelfattah (University of Tennessee).

National Science Foundation · DMS 2309782

NSF-BSF: Computational Methods for Shape Space Analysis in Structural Biology

Principal investigator | June 15, 2023–May 31, 2027 (after a no-cost extension).

Award budget: \$275,000; under my supervision: \$275,000. PI on corresponding BSF grant in Israel: Amit Moscovich (Tel Aviv University).

Pending proposals and nominations

National Science Foundation CAREER

Principal investigator; application pending, 2026.

Schmidt Sciences Polymaths

Selected as one of two University of Texas at Austin institutional nominees; application pending, 2026.

Peer-reviewed and accepted publications

1. Mohammed Abouzaid, Andrew Blumberg, Martin Hairer, **Joe Kileel**, Tamara Kolda, Paul Nelson, Daniel Spielman, Nikhil Srivastava, Rachel Ward, Shmuel Weinberger, Lauren Williams. *First proof*. Bulletin of the American Mathematical Society, accepted, pp. 1–73.
2. Bobby Shi, Julia Lindberg, **Joe Kileel**. *Efficient tensor decomposition via moment matrix extension*. Journal of Symbolic Computation, 139, 102612 (2027), pp. 1–56.
3. **Joe Kileel**, Oscar Mickelin, Amit Singer, Sheng Xu. *Two datasets are better than one: Method of double moments for 3-D reconstruction in cryo-EM*. Inverse Problems, 42, 075016 (2026), pp. 1–36.
4. Daniel Miao, Gilad Lerman, **Joe Kileel**. *QuadSync: Quadrifocal tensor synchronization via Tucker decomposition*. IEEE Conference on Computer Vision and Pattern Recognition (2026), 30 pages including supplement [oral presentation].
5. Adriana Duncan, **Joe Kileel**. *Higher-order group synchronization*. Research in the Mathematical Sciences 13, 48 (2026), pp. 1–40.
6. Michael Fraiman, Paulina Hoyos, Tamir Bendory, **Joe Kileel**, Oscar Mickelin, Nir Sharon, Amit Singer. *$SO(3)$ -invariant PCA with application to molecular data*. IEEE International Symposium on Biomedical Imaging (2026), 5 pages [oral presentation].
7. Yossi Arjevani, Joan Bruna, **Joe Kileel**, Elzbieta Polak, Matthew Trager. *Geometry and optimization of shallow polynomial networks*. SIAM Journal on Applied Algebra and Geometry 10(2) (2026), pp. 174–209.
8. Hongyi Fan, **Joe Kileel**, Benjamin Kimia. *Condition numbers in multiview geometry, instability in relative pose estimation, and RANSAC*. IEEE Transactions on Pattern Analysis and Machine Intelligence 48 (2026), pp. 2855–2869.
9. Yifan Zhang, **Joe Kileel**. *Covering number of real algebraic varieties and beyond: Improved bounds and applications*. Foundations of Computational Mathematics (2025), pp. 1–48.
10. **Joe Kileel**, Kathlen Kohn. *Snapshot of algebraic vision*. Combinatorial, Computational, and Applied Algebraic Geometry: A Tribute to Bernd Sturmfels, AMS Proceedings of Symposia in Pure Mathematics 111 (2025), pp. 323–363 [refereed book chapter].
11. **Joe Kileel**, João Pereira. *Subspace power method for symmetric tensor decomposition*. Numerical Algorithms (2025), pp. 1–38.
12. **Joe Kileel**, Nicholas Marshall, Oscar Mickelin, Amit Singer. *Fast expansion into harmonics on the ball*. SIAM Journal on Scientific Computing 47(2) (2025), pp. A1117–A1144.
13. Eitan Levin, **Joe Kileel**, Nicolas Boumal. *The effect of smooth parametrizations on nonconvex optimization landscapes*. Mathematical Programming 209(1) (2025), pp. 63–111.
14. Daniel Miao, Gilad Lerman, **Joe Kileel**. *Tensor-based synchronization and the low-rankness of the block trifocal tensor*. Advances in Neural Information Processing Systems (2024), pp. 1–28.
15. Ruhui Jin, **Joe Kileel**, Tamara Kolda, Rachel Ward. *Scalable symmetric Tucker tensor decomposition*. SIAM Journal on Matrix Analysis and Applications 45(4) (2024), pp. 1746–1781.
16. Tommi Muller, Adriana Duncan, Eric Verbeke, **Joe Kileel**. *Algebraic constraints and algorithms for common lines in cryo-EM*. Biological Imaging 4, E9 (2024), pp. 1–30.

17. Eitan Rosen, Paulina Hoyos, Xiuyuan Cheng, **Joe Kileel**, Yoel Shkolnisky. *The G -invariant graph Laplacian Part I: Convergence rate and eigendecomposition*. Applied and Computational Harmonic Analysis 71 (2024), pp. 1–35.
18. Andy Zhang, Oscar Mickelin, **Joe Kileel**, Eric Verbeke, Nicholas Marshall, Marc Aurele Gilles, Amit Singer. *Moment-based metrics for molecules computable from cryo-EM images*. Biological Imaging 4, E3 (2024), pp. 1–22.
19. Yifan Zhang, **Joe Kileel**. *Moment estimation for nonparametric mixture models through implicit tensor decomposition*. SIAM Journal on Mathematics of Data Science 5(4) (2023), pp. 1130–1159.
20. Yulia Alexandr, **Joe Kileel**, Bernd Sturmfels. *Moment varieties for mixtures of products*. ACM International Symposium on Symbolic and Algebraic Computation (2023), pp. 53–60.
21. Tamir Bendory, Yuehaw Khoo, **Joe Kileel**, Oscar Mickelin, Amit Singer. *Autocorrelation analysis for cryo-EM with sparsity constraints: Improved sample complexity and projection-based algorithms*. Proceedings of the National Academy of Sciences 120(18) (2023), e2216507120; 18 pages including supplement.
22. Afonso Bandeira, Ben Blum-Smith, **Joe Kileel**, Jonathan Niles-Weed, Amelia Perry, Alexander Wein. *Estimation under group actions: Recovering orbits from invariants*. Applied and Computational Harmonic Analysis 66 (2023), pp. 236–319.
23. Eitan Levin, **Joe Kileel**, Nicolas Boumal. *Finding stationary points on bounded-rank matrices: A geometric hurdle and a smooth remedy*. Mathematical Programming 199(1) (2023), pp. 831–864.
24. Hongyi Fan, **Joe Kileel**, Benjamin Kimia. *On the instability of relative pose estimation and RANSAC’s role*. IEEE Conference on Computer Vision and Pattern Recognition (2022), pp. 8935–8943.
25. **Joe Kileel**, Timo Klock, João Pereira. *Landscape analysis of an improved power method for tensor decomposition*. Advances in Neural Information Processing Systems (2021), pp. 6253–6265.
26. **Joe Kileel**, Amit Moscovich, Nathan Zelesko, Amit Singer. *Manifold learning with arbitrary norms*. Journal of Fourier Analysis and Applications 27, 82 (2021), pp. 1–56.
27. Nathan Zelesko, Amit Moscovich, **Joe Kileel**, Amit Singer. *Earthmover-based manifold learning for analyzing molecular conformation spaces*. IEEE International Symposium on Biomedical Imaging (2020), pp. 1715–1719.
28. Nir Sharon, **Joe Kileel**, Yuehaw Khoo, Boris Landa, Amit Singer. *Method of moments for 3-D single particle ab initio modeling with non-uniform distribution of viewing angles*. Inverse Problems 36(4) (2020), pp. 1–40.
29. **Joe Kileel**, Matthew Trager, Joan Bruna. *On the expressive power of deep polynomial neural networks*. Advances in Neural Information Processing Systems (2019), pp. 10310–10319.
30. Justin Chen, **Joe Kileel**. *Numerical implicitization*. Journal of Software for Algebra and Geometry 9(1) (2019), pp. 55–63.
31. Eitan Levin, Tamir Bendory, Nicolas Boumal, **Joe Kileel**, Amit Singer. *3D ab initio modeling in cryo-EM by autocorrelation analysis*. IEEE International Symposium on Biomedical Imaging (2018), pp. 1569–1573 [oral presentation].
32. **Joe Kileel**, Zuzana Kukelova, Tomas Pajdla, Bernd Sturmfels. *Distortion varieties*. Foundations of Computational Mathematics 18 (2018), pp. 1043–1071.
33. Gunnar Fløystad, **Joe Kileel**, Giorgio Ottaviani. *The Chow form of the essential variety in computer vision*. Journal of Symbolic Computation 86 (2018), pp. 97–119.
34. **Joe Kileel**. *Minimal problems for the calibrated trifocal variety*. SIAM Journal on Applied Algebra and Geometry 1 (2017), pp. 575–598.

35. Zuzana Kukelova, **Joe Kileel**, Bernd Sturmfels, Tomas Pajdla. *A clever elimination strategy for efficient minimal solvers*. IEEE Conference on Computer Vision and Pattern Recognition (2017), pp. 3605–3614.
36. Michael Joswig, **Joe Kileel**, Bernd Sturmfels, André Wagner. *Rigid multiview varieties*. International Journal of Algebra and Computation 26 (2016), pp. 775–788.
37. Cristiano Bocci, Enrico Carlini, **Joe Kileel**. *Hadamard products of linear spaces*. Journal of Algebra 448 (2016), pp. 595–617.

Preprints

38. Yeari Vigder, Paulina Hoyos, David Thong, Joakim Andén, **Joe Kileel**, Amit Moscovich. *Group invariant spectral embedding*. arXiv:2607.08987, pp. 1–28.
39. March Boedihardjo, **Joe Kileel**, Vandy Tombs. *Testing the mixture model hypothesis via spectral gap*. arXiv:2603.03245, pp. 1–29.
40. Kexin Wang, Salil Bhate, João Pereira, **Joe Kileel**, Matylda Figlerowicz, Anna Seigal. *Multi-context principal component analysis*. arXiv:2601.15239, pp. 1–47.
41. Kexin Wang, João Pereira, **Joe Kileel**, Anna Seigal. *Multi-subspace power method for decomposing partially symmetric tensors*. arXiv:2510.18627, pp. 1–36.
42. Yifan Zhang, **Joe Kileel**. *Norming sets for tensor and polynomial sketching*. arXiv:2506.05174, pp. 1–16.
43. Gabriel Brown, **Joe Kileel**, Tamara Kolda. *The fascinating world of $2 \times 2 \times 2$ tensors: Its geometry and optimization challenges*. arXiv:2504.03937, pp. 1–33.
44. João Pereira, **Joe Kileel**, Tamara Kolda. *Tensor moments of Gaussian mixture models: Theory and applications*. arXiv:2202.06930, pp. 1–42.

Citation metrics as of October 2026: >1300 citations; h-index 19. Publication list: 37 peer-reviewed or accepted works; 7 preprints.

PATENTS AND PATENT APPLICATIONS

1. *Method of moments for 3-D reconstruction in cryo-electron microscopy from multiple datasets with different viewing angle distributions*. Amit Singer, **Joe Kileel**, Oscar Mickelin, Sheng Xu. United States application 63/816,313; filed June 2, 2025.
2. *Trifocal block tensor-based synchronization and applications to computer vision systems*. Gilad Lerman, **Joe Kileel**, Daniel Miao. United States application 19/328,427; filed September 15, 2025.
3. *Fully automatic, template-free particle picking for electron microscopy*. Amit Singer, Ayelet Heimowitz, Joakim Anden, Yuehaw Khoo, **Joe Kileel**. United States patent 11,557,034 B2, January 17, 2023; China patent ZL201880046702.X, April 28, 2023.

RESEARCH SUPERVISION

Postdoctoral researchers

Paul Beckman | September 2025–present

Peter O'Donnell Jr. Postdoctoral Fellow, Oden Institute. Ph.D.: New York University. Co-mentored with Gunnar Martinsson.

Julia Lindberg | January 2023–July 2025

Bing Instructor, Department of Mathematics. Ph.D.: University of Wisconsin–Madison. First placement: tenure-track Assistant Professor of Mathematics, Georgia Institute of Technology.

João Pereira | January 2021–May 2022

Postdoctoral Fellow, Oden Institute. Ph.D.: Princeton University. Co-mentored with Rachel Ward. First placement: tenure-track Assistant Professor, IMPA, Brazil.

Completed doctorates

Three sole-advised doctorates and one co-advised doctorate.

Adriana Duncan · Mathematics; sole advisor; completed Ph.D. in five years.

Research: Higher-order group synchronization, with applications to computer vision and cryo-EM. Frank Gerth III Outstanding Dissertation Award. First placement: Data Scientist, Samsung Austin Semiconductor.

Yifan Zhang · Oden Institute; sole advisor; completed Ph.D. in six years.

Research: Tensor decomposition, method of moments, and randomized dimension reduction of real algebraic varieties. UT Continuing Fellowship awardee, 2024–2025. First placement: Quantitative Researcher, Citadel Securities.

Elzbieta Polak · Mathematics; sole advisor; completed Ph.D. in six years.

Research: Discriminants in polynomial optimization, with applications to image processing and neural-network training. First placement: Data Scientist, Travelers.

George Torres · Mathematics; co-advisor with Ngoc Tran (main advisor); completed Ph.D. in six years.

Research: Tropical geometry for ReLU neural networks and optimization of polytopes. First placement: Research Scientist, Striveworks.

Current doctoral students

The four students listed below are solely advised.

Paulina Hoyos · Mathematics, Ph.D. candidate; sixth year.

Research: Manifold learning under group actions, tensor-structured linear systems, t-product, and cryo-ET. UT Continuing Fellowship awardee, 2024–2025.

Gabriel Brown · Oden Institute, Ph.D. candidate; fifth year.

Research: Tensor decomposition, ill-posedness, and data compression for scientific simulations. DOE Office of Science Graduate Student Research awardee, Fall 2026.

Mina Parast · Mathematics, Ph.D. student; fourth year.

Research: Multimarginal optimal transport, low-rank methods, and representation learning.

Michael Liu · Oden Institute, Ph.D. student; third year.

Research: Equivariant machine learning, and applications of invariant theory to constitutive modeling.

Visiting doctoral students

Alexandru Crăciun | Fall 2026

Visiting Ph.D. student from Technical University of Munich, Theoretical Foundations of AI group.

Research: Optimization landscapes and dynamics for polynomial neural networks.

Undergraduate research and thesis supervision

- **Lohit Jagarapu**. Second reader, senior thesis in Mathematics. Research: generative modeling over functional maps. First placement: Ph.D. student in Computer Science, Courant Institute, New York University.
- **John Breedis**. Second reader, scientific computing certificate, Oden Institute. Research: approximation theory and neural networks. First placement: M.Eng. student in Computational Science and Engineering, Harvard University.
- **Bryan Doan**. Advisor, scientific computation and data sciences certificate, Department of Statistics and Data Science. Research: 3-D steerable principal component analysis. First placement: industry.
- **Bronson Zhou**. Advisor, summer research in Mathematics. Research: fast transforms and computing with molecules. Babuška scholarship. First placement: Ph.D. student in Statistics and Data Science, Yale University.

- **Eitan Levin.** Co-advisor, undergraduate thesis, Princeton University. Research: numerical optimization on varieties. Princeton thesis prize. First placement: Ph.D. student in Applied and Computational Mathematics, California Institute of Technology.
- **Changshuo Liu.** Co-advisor, undergraduate thesis, Princeton University. Research: method of moments and cryo-EM. Princeton thesis prize. First placement: Quantitative Financial Researcher, GTS.

PROFESSIONAL SERVICE

Research programs, workshops, and schools

Spring 2027	Co-organizer, approved semester-long program “Metric Algebraic Geometry,” Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University.
April 2027	Co-organizer, approved weeklong workshop “Extended Systems and Boundary Conditions,” part of the “Numerical Algebraic Geometry and Correlated Electrons” program, Institute for Pure and Applied Mathematics (IPAM), UCLA.
February 2027	Co-organizer, approved workshop “Algebraic Distance Optimization,” part of “Metric Algebraic Geometry,” ICERM, Brown University.
November 2026	Co-organizer, approved minisymposium “Tensor Methods in Data Science,” SIAM Conference on Mathematics of Data Science.
July 2026	Co-organizer, weeklong workshop “Mathematics of 3D Reconstruction,” ICERM, Brown University.
March 2026	Lead organizer , SQuaRE “Randomized Numerical Linear Algebra for Tensor Applications,” American Institute of Mathematics, California Institute of Technology; first session.
March 2025	Co-organizer, minisymposium “Tensors in Scientific Computing and Engineering,” SIAM Conference on Computational Science and Engineering, Fort Worth.
February 2025	Co-organizer, two-day workshop “Mathematics of Deep Learning,” Institute for Foundations of Machine Learning, UT Austin.
October 2024	Co-organizer, minisymposium “Processing Data with Geometric Structure,” SIAM Conference on Mathematics of Data Science, Atlanta.
October 2024	Co-organizer, minisymposium “Algebraic Methods for Data Science,” SIAM TX–LA Section annual meeting, Baylor University.
January 2024	Co-organizer, weeklong school “Winter Program in ML,” Department of Mathematics, UT Austin.
January 2024	Co-organizer, weeklong workshop “Connecting Higher-Order Statistics and Symmetric Tensors,” ICERM, Brown University.
June 2023	Co-organizer, minisymposium “Parameterizations and Nonconvex Landscapes,” SIAM Conference on Optimization, University of Washington.
March 2021	Co-organizer, minisymposium “Data-Driven Scientific Computing,” SIAM Conference on Computational Science and Engineering, Fort Worth (virtual).
June 2020	Co-organizer, minisymposium “Theoretical and Computational Aspects of the Method of Moments,” SIAM Conference on Mathematics of Data Science, Cincinnati (virtual).

Grant and prize service

- **NSF panel service:** Computational Mathematics (2024, 2025); Mathematical Biology (2025).
- **Ad hoc proposal reviews:** German Research Foundation (2026); NSF Computational Mathematics (2024, 2025); United States–Israel BSF (2025); National Science Centre, Poland (2025); Czech Science Foundation (2025).

- **Invited nominator**, Shaw Prize in Mathematical Sciences (2026, 2027).

Journal, conference, and book reviewing

Journals: SIAM Journal on Mathematics of Data Science; SIAM Journal on Applied Algebra and Geometry; SIAM Journal on Matrix Analysis and Applications; SIAM Journal on Imaging Sciences; Mathematical Programming; Advances in Mathematics; Advances in Computational Mathematics; Experimental Mathematics; Journal of Machine Learning Research; Nature Communications; Linear Algebra and its Applications; Foundations of Computational Mathematics; Applied and Computational Harmonic Analysis; Journal of Fourier Analysis and Applications; Algebraic Statistics; Acta Crystallographica Section D; Journal of Mathematical Imaging and Vision; Annals of Statistics; Journal of Algebra; International Journal of Computer Vision; Courant Journal of Pure and Applied Mathematics.

Quick opinions: Communications on Pure and Applied Mathematics; Memoirs of the AMS; Journal of the AMS.

Conferences: NeurIPS, ICML, ICLR, CVPR, STOC, COLT, MEGA, FOCS, ECCV, ACCV, BMVC, MLSB.

Books: Springer's Applied and Numerical Harmonic Analysis series.

Professional memberships

American Mathematical Society; Society for Industrial and Applied Mathematics.

TEACHING

University of Texas at Austin

Foundational Techniques of Machine Learning and Data Sciences. Graduate. Preliminary examination course. Spring 2026, Spring 2024, Fall 2023.

Tensor Methods. Graduate. Topics course. Fall 2025.

Geometric Methods in Data Science. Graduate. Topics course. Fall 2021.

Scientific Computation in Numerical Analysis. Undergraduate. Upper-division course. Fall 2026, Fall 2023, Spring 2022.

Real Analysis I. Undergraduate. Upper-division course. Spring 2021.

Differential and Integral Calculus. Undergraduate. Lower-division course. Spring 2025, Fall 2024.

UNIVERSITY AND DEPARTMENTAL SERVICE

Academic leadership and faculty recruitment

- Co-organizer, Math and AI Working Lunches, Mathematics (2026–2027).
- **Co-chair**, Ph.D. Admissions Committee, Oden Institute (2025–2026).
- Member, Scientific Machine Learning Faculty Search Committee: Mathematics, Computer Science, and Oden Institute (2025–2026); Mathematics and Oden Institute (2024–2025).
- Co-organizer, Computational and Applied Mathematics Seminar, Department of Mathematics (since Fall 2025); Oden Institute Seminar (since Spring 2025).
- Member, Bing Instructor (postdoctoral) Search Committee, Department of Mathematics (2024–2025, 2025–2026).
- Member, Ph.D. Admissions Committee: Mathematics (2021–2022, 2024–2025); Oden Institute (2021–2022, 2023–2024, 2024–2025).
- Member, CSEM Graduate Studies Subcommittee, Oden Institute (2024–2027).
- Member, Professional-Track Faculty Chair's Committee, Mathematics (2023–2025); Professional-Track Faculty Annual Review Committee, Mathematics (2023–2024).

Curriculum, assessment, and outreach

- **Chair**, Foundations for AI Curriculum Design Committee, Oden Institute (2026–2027).
- Member, Statistics/Probability Courses Reform Committee, Mathematics (2026–2027).
- Member, Calculus/AI Education Committee, College of Natural Sciences and Cockrell School of Engineering (2025–2026).
- Project member, CALCx: UT Math/STEMx Initiative to redesign first-year calculus sequences (2024–2025).
- Member, Mathematics Website Development Committee (2024–2025).
- Member, Oden Institute Ph.D. Dissertation Award Committee (Spring 2023) and Dissertation Writing Fellowship Committee (Spring 2024).
- Member, Oden Institute Preliminary Examination Committee: Data Science examination (Spring 2023, Spring 2024); retest (Summer 2021, Summer 2024).
- Leader of reading courses in computational algebraic geometry, Gröbner bases, group synchronization, manifold learning, data compression, low-rank tensor and matrix optimization, and 3-D reconstruction.
- Quantitative Reasoning flag proposer for M 348, Scientific Computation in Numerical Analysis (2023).
- Marshal, College of Natural Sciences undergraduate commencement (2023); undergraduate outreach presentation, UT Dean’s Scholars (2023).

Dissertation and proposal committees (non-advisor)

UT Austin: Youguang Chen (Biros); Jeffrey Cochran (Hughes and Bui-Thanh; forthcoming); Yijung Dong (Martinsson and Ward); Patrícia Muñoz Ewald (Chen); Zhou Fang (Israel and Xu); Rodrigo González Hernandez (Gamba); Lewis Liu (Tsai); Andrew Moore (Chen); Minh Nguyen (Bajaj); Tiffany Phan (Jah); Will Ruys (Biros); Bobby Shi (Ward); Zachary Stoebner (Tamir; forthcoming); Casey Stowers (Yankeelov); Xin Tang (Baldea); Lukas Taus (Tsai); Zheyu Wen (Biros); Yuege Xie (Ward); Yi Wang (Bajaj); Jinpai Zhao (Dawson). Advisors are in parentheses.

External: Alessandro Tamai, Ph.D. thesis committee, Scuola Internazionale Superiore di Studi Avanzati, Italy; Daniel Miao, Ph.D. thesis and proposal committee, University of Minnesota, Twin Cities.

Forthcoming invitations

April 2027	Workshop on Extended Systems and Boundary Conditions in Numerical Algebraic Geometry and Correlated Electrons Program, IPAM, UCLA.
February 2027	Workshop on Algebraic Geometry: A Window into Machine Learning, IPAM, UCLA.
January 2027	Joint Mathematics Meeting, Special Session on Mathematics of Data Science and Machine Learning, Chicago.
January 2027	Joint Mathematics Meeting, Special Session on Algebraic, Topological and Geometric Methods in Machine Learning, Chicago.
January 2027	Joint Mathematics Meeting, Special Session on Algebra and Geometry in Computations, Chicago.
December 2026	Workshop on Matrix Optimization, Institute for Mathematical Sciences, National University of Singapore.
December 2026	Seminar on AI/Mathematics/Statistics, Harvard University.
November 2026	SIAM Mathematics of Data Science Conference, Minisymposium on Algebraic Approaches to Generalization in Machine Learning, Salt Lake City.
November 2026	Applied Mathematics Seminar, Texas Tech University. Virtual.
October 2026	Annual Meeting of SIAM TX-LA Section, Minisymposium on Applications of Algebraic Geometry, Southern Methodist University.
October 2026	Annual Meeting of SIAM TX-LA Section, Minisymposium on Tensor Computations, Data Science and Applications, Southern Methodist University.
October 2026	Wallenberg Advanced Scientific Forum on Symmetries in Neural Networks, Stockholm, Sweden.

2026

September	Conference of Italian Network for Applied and Birational Algebraic Geometry, Siena, Italy. Virtual.
July	Workshop on Rigidity Theory and Geometric Data Science, ICERM, Brown University.
June	Workshop on Metric Algebraic Geometry, Institut Mittag-Leffler, Sweden.
June	Kolloquium, Osnabrück University, Germany.
May	Conference of International Linear Algebra Society, Virginia Tech.
April	Texas Algebraic Geometry Symposium, Texas A&M.
Spring	Young Mathematician Lecture Series, National University of Singapore.
January	Joint Mathematics Meeting, Special Session on Algebraic Methods in Machine Learning and Optimization, Washington, D.C.

2025

November	Applied Mathematics Seminar, University of California, Berkeley / Lawrence Berkeley Laboratory.
November	Workshop on Randomness, Invariants and Complexity, Simons Institute, University of California, Berkeley.
September	Annual Meeting of SIAM TX-LA Section, Minisymposium on Geometric Data Analysis, UT Austin.
September	Annual Meeting of SIAM TX-LA Section, Minisymposium on Scientific Machine Learning, UT Austin.
July	International Conference on Continuous Optimization, Minisymposium on Optimization on Stratified Sets, University of Southern California.

July	SIAM Conference on Applied Algebraic Geometry, Minisymposium on Algebraic Approaches to Machine Learning, University of Wisconsin-Madison.
July	SIAM Conference on Applied Algebraic Geometry, Minisymposium on Algebraic Approaches to Computational Optimization, University of Wisconsin-Madison. Substitute speaker.
June	Conference of International Linear Algebra Society 2025, Minisymposium on Numerical Multilinear Algebra, Kaohsiung, Taiwan.
April	Colloquium, Department of Mathematics, University of Texas at San Antonio.
March	Sophex Seminar, Department of Mathematics, UT Austin.
March	DOE Advanced Scientific Computing Research CS PI Meeting, Lightning Talk, Frisco, TX.
March	Babuška Forum, Oden Institute for Computational Engineering and Sciences, UT Austin.
March	SIAM Conference on Computational Science and Engineering, Minisymposium on Tensors, Fort Worth. Co-organizer and speaker.
February	Mathematics of Machine Learning Seminar, Max Planck Institute for Mathematics in the Sciences and UCLA. Virtual.
January	One World Mathematics of INformation, Data, and Signals (1W-MINDS) Seminar. Virtual.
January	Joint Mathematics Meeting, Special Session on Algebraic Statistics, Seattle.
January	Joint Mathematics Meeting, Special Session on Nonlinear Algebra for Machine Learning, Seattle.
January	Joint Mathematics Meeting, Special Session on Geometric Methods in Deep Learning, Seattle.

2024

December	IMS International Conference on Statistics and Data Science, Session on Tensor Methods, Nice, France.
November	Colloquium, Department of Mathematics, Michigan State University.
October	SIAM Conference on Mathematics of Data Science, Minisymposium on Algebraic Geometry and Machine Learning, Atlanta.
September	BIRS-CMO Workshop on Computational Harmonic Analysis in Data Science and Machine Learning, Casa Matemática Oaxaca, Mexico.
September	AMS Central Sectional Meeting, Special Session on Applications of Algebraic Geometry, University of Texas at San Antonio.
July	International Symposium on Mathematical Programming, Special Session on Moment, Polynomial and Tensor Optimization, Montreal, Canada.
July	NSF CompMath PI meeting, Special Session on Data Science, University of Washington. Contributed.
March	Joint Mathematics of Data & Decisions (MADDD) and Algebraic Geometry Seminar, University of California, Davis.
March	Codes and Expansions (CodEx) Seminar. Virtual.
January	Winter Program in ML, Minicourse on Tensor Methods in Data Science, Department of Mathematics, UT Austin. Co-organizer and instructor.
January	Topical Workshop on Higher-Order Statistics and Symmetric Tensors, ICERM, Brown University. Co-organizer and speaker.
January	Joint Mathematics Meeting, Special Session on Mathematics of Computer Vision, San Francisco. Virtual.

2023

December	Bayesian Statistics and Statistical Learning Workshop, Institute for Mathematical and Statistical Innovation, University of Chicago.
November	PSU-Purdue-UMD Joint Seminar on Mathematical Data Science. Virtual.
November	Annual Meeting of SIAM TX-LA Section, University of Louisiana at Lafayette.
October	FFT Conference, Norbert Wiener Center for Harmonic Analysis and Applications, Charles Chui Prize Lecture, University of Maryland, College Park.
September	Workshop on Invitation to Algebraic Statistics and Applications, Tutorial Lecture, Institute for Mathematical and Statistical Innovation, University of Chicago.
September	Workshop on Mathematical Methods for Exploring and Analyzing Morphological Shapes Across Biological Scales, Banff International Research Station, Canada. Virtual.
August	International Council for Industrial and Applied Mathematics, Minisymposium on Randomized Numerical Linear Algebra, Tokyo, Japan.
July	SIAM Conference on Applied Algebraic Geometry, Minisymposium on Applications of Tensors, Eindhoven, Netherlands.
June	SIAM Conference on Optimization, Minisymposium on Nonconvex Landscapes, Seattle. Co-organizer and speaker.
May	Oden Institute Seminar, Oden Institute for Computational Engineering and Sciences, UT Austin.
February	SIAM Conference on Computational Science and Engineering, Minisymposium on 3D Reconstruction, Amsterdam, Netherlands.
February	Topics in Algebra, Topology, Etc., Research Seminar (TATERS), Boise State University. Virtual.
January	Alan Turing-Oden Institutes Workshop, Short Talk, London, United Kingdom.
January	Colloquium, Department of Mathematics, University of Missouri.
January	Joint Mathematics Meeting, Special Session on Data Science, Boston.
January	Joint Mathematics Meeting, Special Session on Numerical Homotopy Continuation, Boston.
January	Joint Mathematics Meeting, Special Session on Tensors, Boston.

2022

December	Colloquium, Department of Mathematics, UT Austin.
November	Colloquium, Program in Applied and Computational Mathematics, Princeton University.
November	Cryo-Electron Microscopy and Beyond Workshop, IPAM, UCLA.
November	Data and Learning Seminar, IMPA, Rio de Janeiro, Brazil.
October	Mathematical Machine Learning Seminar, Max Planck Institute for Mathematics in the Sciences and UCLA. Virtual.
September	SIAM Conference on Mathematics of Data Science, Minisymposium on Optimal Transport, San Diego. Virtual.
September	ML+X Seminar, Institute for Foundations of Machine Learning, UT Austin.
June	Combinatorial, Computational, and Applied Algebraic Geometry Conference, University of Washington.
May	Workshop on Mathematical and Computational Challenges in Cryogenic Electron Microscopy, University of British Columbia, Vancouver, Canada.

March	AMS Special Session on Data Science, Tufts University. Virtual.
February	IMA Data Science Seminar, University of Minnesota.
2021	
November	Applied Mathematics Seminar, Yale University. Virtual.
November	SIAM Texas-Louisiana Sectional Meeting, Minisymposium on Algorithmic Algebra and Geometry, University of Texas at Rio Grande Valley. Virtual.
October	BIRS-CMO Workshop on Geometry & Learning from Data, Casa Matemática Oaxaca, Mexico. Virtual.
October	Computational and Applied Mathematics Colloquium, University of Chicago.
August	SIAM Conference on Applied Algebraic Geometry, Minisymposium on Algebraic Geometry and Machine Learning, Texas A&M University. Virtual.
June	Data Science Seminar, University of Oxford. Virtual.
May	Tensors Seminar Series, IPAM, UCLA. Virtual.
March	Applied and Computational Mathematics Seminar, National University of Singapore. Virtual.
January	Algebraic Geometry Seminar, University of California, Davis. Virtual.
January	Tsinghua Sanya International Mathematics Forum, Workshop on Algebraic Geometry and Machine Learning. Virtual.
2020	
November	Geometry Seminar, Texas A&M University. Virtual.
November	Babuška Forum, Oden Institute for Computational Engineering and Sciences, UT Austin. Virtual.
October	SIAM Texas-Louisiana Section, Minisymposium on Applications of Algebraic Geometry, Texas A&M University. Virtual.
October	SIAM Texas-Louisiana Section, Minisymposium on Algebraic, Geometric, and Combinatorial Methods in Mathematical Biology, Texas A&M University. Virtual.
September	Algebraic Statistics Online Seminar. Virtual.
June	SIAM Conference on Mathematics of Data Science, Special Session on Algebraic Geometry and Machine Learning, Cincinnati. Virtual.
March	Colloquium, School of Mathematics, Georgia Institute of Technology.
February	Colloquium, Division of Applied Mathematics, Brown University.
February	Colloquium, Courant Institute of Mathematical Sciences, New York University.
February	Colloquium, Department of Mathematics, University of Wisconsin-Madison.
January	Colloquium, Department of Mathematics, Duke University.
January	Colloquium, Department of Mathematics, Rutgers University-New Brunswick.
January	Analysis Seminar, Department of Mathematics, UT Austin.
January	Colloquium, Oden Institute for Computational Engineering and Sciences, UT Austin.
January	Colloquium, Department of Mathematics, University of Toronto, Canada.
2019	
December	Joint Applied Mathematics / Statistics & Data Science Seminar, Yale University.
November	Novel Medical Imaging Workshop, Texas A&M University.

November	Linear Algebra Seminar, Auburn University.
October	Algebra Seminar, University of Washington.
October	SIAM Pacific Northwest Section, Special Session on Algebra, Geometry and Applications, Seattle University.
September	AMS Sectional Meeting, University of Wisconsin-Madison, Special Session on Applications of Algebra and Geometry.
August	Big Data Conference, Center of Mathematical Sciences and Applications, Harvard University.
August	NYC Computational Cryo-EM Summer Workshop, Center for Computational Mathematics, Flatiron Institute.
July	SIAM Conference on Applied Algebraic Geometry, Universität Bern, Switzerland, Minisymposium on Algebraic Vision.
May	Computational and Applied Mathematics Colloquium, University of Chicago.
May	Applied Algebra Seminar, University of Wisconsin.
April	Algebra Seminar, Georgia Institute of Technology.
March	AMS Sectional Meeting, Auburn University, Special Session on Applications of Algebraic Geometry.
January	Algebraic Vision Research Cluster, ICERM, Brown University.

2018

December	Joint CUNY Graduate Center-Courant Seminar, Symbolic-Numeric Computing, City University of New York.
November	Mathematics, Information and Computation Seminar, Center for Data Science, New York University.
November	Nonlinear Algebra Seminar, ICERM, Brown University.
October	Math and Data Working Group at Center for Data Science, New York University.
October	AMS Sectional Meeting, Special Session on Extensions-Interpolation-Shape Matching in $\mathbb{R}^d$, Symmetry-Invariance, Algorithms and Related Topics, University of Michigan, Ann Arbor.
October	Dagstuhl Seminar, Shape Analysis: Euclidean, Discrete and Algebraic Geometric Methods, Leibniz-Zentrum für Informatik, Germany.
October	Joint KMS-DMV Mathematics Conference, Special Session on Algebraic Geometry and Computer Vision, Seoul, South Korea.
March	Simons Collaboration on Algorithms and Geometry, Simons Foundation, New York.
March	SIAM Southeastern Atlantic Sectional Conference, Special Session on Topics in the Mathematics of Data Analysis, University of North Carolina at Chapel Hill.