CURRICULUM VITA AND PUBLICATIONS LIST[1]

Prof. Joseph Maurice Rojas

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PERSONAL INFORMATION

Born: Los Angeles, California, U.S.A.
Citizenship: USA
Current Institution: Texas A&M University (College Station), Mathematics Department

EDUCATION

Ph.D. in Applied Mathematics, University of California, Berkeley (Advisor: Steve Smale) May '95
M.S. in Computer Science, University of California, Berkeley (Advisor: John F. Canny) Dec. '91
M.A. in Mathematics, University of California, Berkeley Dec. '91
B.S. in Math/Appl. Sci. (Electrical Engineering emphasis), University of California, Los Angeles June '88

RESEARCH INTERESTS

- Algorithmic Algebraic Geometry (including real and arithmetic methods) and Complexity Theory
- Cryptography and Scientific Computation

RESEARCH/TEACHING EXPERIENCE

Executive Associate Head of Teaching Operations, Department of Mathematics, Texas A&M University, Sep. '24 – Present
Associate Head of Graduate Programs, Department of Mathematics, Texas A&M University, Sep. '22 – Aug. '24
Professor of Mathematics, Texas A&M University Aug. '07 – Present
Affiliate Professor of Computer Science and Engineering,[2] Texas A&M University, Dec. '13 – Aug. '24
NSF Program Director, Algorithmic Foundations Program, Division of Computing and Communication Foundations, Computer and Information Science and Engineering Directorate Sep. 3, '19 – Sep. 2, '20
Research Director, MSRI-UP Summer Program for Undergraduates June 24 – Aug. 6, '17
Invited participant, Dagstuhl Seminar on Algorithms and Effectivity in Tropical Mathematics and Beyond, Schloss Dagstuhl, Germany, Nov. 27 – Dec. 2, '16
John von Neumann Visiting Professor, Technische Universitat München Oct-Nov, '15
Consultant, Viz and Scientific Computation Group, Sandia National Laboratories Dec. '08 – Dec. '11
Consultant, Combustion Research Laboratory, Sandia National Laboratories Aug. & Dec. 2007
Workshop Organizer and Visiting Member, Institute for Mathematics and its Applications, Minneapolis, MN April–May '07
JAMI Visiting Professor, Johns Hopkins University, Baltimore, MD March '07
Associate Professor with Tenure, Texas A&M University, College Station, TX Sept. '04 – Aug. '07
Consultant, Computational Biology Group, CCIM Center, Sandia National Laboratories Oct.–Nov. 2005
Visiting Member, Mathematical Sciences Research Institute (Berkeley, Calif.) April '04
JAMI Visiting Professor, Johns Hopkins University, Baltimore, MD March '04
Assistant Professor (Tenure Track), Texas A&M University January '01 – August '04
New Directions Cellular Physiology Course Participant, Institute for Mathematics and its Applications June '03
Research Assistant Professor, City University of Hong Kong January '98 – December '00
National Science Foundation Postsdoctoral Fellow and Applied Mathematics Instructor, MIT Fall '96 – Fall '97
Summer Staff Member, MIT Lincoln Laboratories, Lexington, Massachusetts Summer '97
Research Mathematician, NAWCAD (Office of Naval Research), Warminster, Pennsylvania Summer '96
Visiting Professor, City University of Hong Kong May '96
National Science Foundation Postdoctoral Fellow, Mathematical Sciences Research Institute Spring '96
National Science Foundation Postdoctoral Fellow (mentor: Alan Edelman), MIT Fall '95
Research Mathematician, AT&T Bell Laboratories, Murray Hill, NJ August '95
Research Mathematician, NAWCAD (Office of Naval Research), Warminster, Pennsylvania July '95
Chateaubriand Fellow (mentor: Marie-Francoise Roy), IRMAR, Université de Rennes I, France Spring '95
Visiting Professor (Tenure Track), Universitat Pompeu Fabra, Barcelona Fall '94
Research Mathematician, IBM T. J. Watson Research Center, Yorktown Heights, NY Summer '94
Research Mathematician, AT&T Bell Laboratories, Naperville, IL Summer '93
Research Mathematician, Institute for Defense Analyses (CCR, Princeton, New Jersey) Summer '92
Research Mathematician, Institute for Defense Analyses (CCR, La Jolla, California) Summer '91
Member of the Technical Staff, Hughes Research Laboratories, Malibu Summers of '90, '89, '87, '86, '85

[1] As of February 6, 2025.
[2] This is in addition to Rojas' full professor position in mathematics. Position was by courtesy during Dec. 1, 2013 – Oct. 31, 2018, and was an affiliate position during Nov. 1 2018 – Aug. 31, 2024.

GRANTS AND AWARDS[3]

• "REU Site Grant: Undergraduate Research in the Mathematical Sciences and their Applications," ($350,000, Anne Shiu is PI and Rojas is co-PI), NSF, DMS-2150094, 5/1/2022–4/30/2025.
• Member, AMS Fellow Selection Committee (Feb. 1, 2021 – Jan. 31, 2024)
• Fellow of the American Mathematical Society (Class of 2019)
• "Arithmetic Geometry Methods for Complexity and Communication", ($308,005, PI at Texas A&M U: Rojas) Collaborative Research (with separately funded PIs Qi Cheng at U Oklahoma and Daqing Wan at UC Irvine), NSF, CCF-1900881, 4/1/2019-8/31/2023.
• Winner of 2018 Texas A&M University College of Science Undergraduate Mentoring Award
• "REU Site Grant: Undergraduate Research in the Mathematical Sciences and their Applications," ($350,000, PIs J. Maurice Rojas and Anne Shiu), NSF, DMS-1757872, 6/1/2018–5/31/2021.
• "REU Site Grant: Undergraduate Research in the Mathematical Sciences and their Applications," ($343,408, PIs J. Maurice Rojas and Anne Shiu), NSF, DMS-1460766, 6/1/2015–5/31/2018.
• "Sparse Polynomials, Complexity, and Algorithms", ($250,000, PI at Texas A&M U: Rojas) Collaborative Research (with separately funded PIs Qi Cheng at U Oklahoma, Shuhong Gao at Clemson U, and Daqing Wan at UC Irvine), NSF, CCF-1409020, 9/1/2014–8/31/2018.
• AIM SQuaRes grant, for collaboration between Qi Cheng, Shuhong Gao, J. M. Rojas, and Daqing Wan, on Arithmetic Approaches to **P** vs. **NP** (first visit: Aug. 18-22, 2014; second visit: Aug. 10–14, 2015; third visit: May 8–12, 2017).
• Co-Winner (with Jingguo Bi and Qi Cheng) of the 2013 ISSAC Distinguished Paper Award. (See Publication #12 below.)
• Summer Research Grant ($6,000, to visit Pascal Koiran at ENS de Lyon, June, 2013), Labex MILYON.
• Summer Research Grant ($8,000, to visit Pascal Koiran at ENS de Lyon, July, 2012), Labex MILYON.
• TAGS (Texas Algebraic Geometry Seminar) 2012, ($13,820, PI: Laura Matusevich, co-PIs: J. M. Landsberg, Paulo Lima-Filho, J. Maurice Rojas, Frank Sottile), conference proposal, NSF, DMS-1203175, 3/1/2012-2/28/2013
• MCS: Randomization in Algorithmic Fewnomial Theory Over Complete Fields, ($400,001, PI: Rojas, co-PIs: Martin Avendano, Scott Zrebiec) Mathematics/Computer Science Interface Program, NSF, DMS-0915245, 9/1/2009–8/31/2013.
• ASCR: Topology for Statistical Modeling of Petascale Data, (joint with U Utah and Sandia Labs; TAMU amount is $214,795, Rojas is sole Texas co-PI), Advanced Scientific Computing Research (Mathematics for Analysis of Petascale Data), Department of Energy, DE-SC0002505, 9/1/2009-8/31/2012.
• Wenner-Gren Foundation Visiting Researcher Grant ($75000 Swedish Kroner), to visit and work with M. Passare and B. Shapiro at Stockholm University, Sweden (Mar.–Jun. 2009)
• TAGS (Texas Algebraic Geometry Seminar) 2009, ($8690, PI: Rojas, co-PIs: J. M. Landsberg, P. Lima-Filho, L. Matusevich, F. Sottile), conference proposal, NSF, DMS-0915235, 4/1/2009–3/31/2010
• NSF CAREER Award: DMS-0349309: Complexity, Reality, and Rationality in Large Nonlinear Equation Solving (jointly funded by the Computational Mathematics and Algebra/Number Theory/Combinatorics programs), 2004–2009, $400,000.
• Outstanding Teaching Award, Department of Mathematics, Texas A&M University (awarded Dec. 2007)
• Senior personnel on Texas A&M Mathematics Department's Research Experiences for Undergraduates grant (DMS-0552610), 2005–2008, $45,000.
• Texas MTC Grant: Curriculum Alignment, 2006–2007, $10,000 (Rojas is a consultant under this grant).
• Real Solving and Protein Structures: Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences, (supplement to DMS-0211458, jointly funded by the Directorate for Biological Sciences and the Division of Mathematical Sciences), 2003–2005, $99,760.
• Robust Output Sensitive Algorithms for Subanalytic Geometry: Individual NSF Grant DMS-0211458 (jointly funded by the Computational Mathematics and Algebra/Number Theory/ Combinatorics programs), 2002–2005, $98,800.
• Degeneracy Detection for Curved Solids (co-PI with John Keyser): Incubation grant from the NSF CARGO (Computational and Algorithmic Representation of Geometric Objects) program, 2002–2003, $103,6360, DMS-0138446.
• CBMS Lecture Series (co-PI with Paulo Lima-Filho and Hal Schenck): NSF Grant DMS-0122220 for public lecture series by Bernd Sturmfels during May 17–24, 2002, $27,492.
• Journal of Complexity 2000 Best Paper Award (awarded at FoCM 2002, August 6, University of Minnesota), $3000.
• Texas A&M University Faculty of Science Grant: Computational Algebraic Geometry ($44,000, 2001–2003)

[3]Unless otherwise noted, Rojas is the Principal Investigator on any grant listed.

- Hong Kong CERG Grant: Complexity and Geometric Recognition ($397,000 (HK), 2000–2002)
- Joint France/Hong Kong PROCORE Grant (Co-PI with Ioannis Z. Emiris of INRIA Sophia-Antipolis): Efficient Numeric and Symbolic Methods for Solving Sparse Polynomial Systems and Their Applications in Economics ($58,400 (HK), 2000–2001)
- City U Grant (Co-investigator, with 10 other faculty from the Mathematics and Computer Science Departments): Group Research in Learning, Theory, and Applications ($2,000,000 (HK), 2000–2001)
- Hong Kong CERG Grant: Polyhedral Entropy and Random p-adic Varieties ($445,500 (HK), 1999–2001)
- Hong Kong CERG Grant: Toric Geometric Methods for Large Real Solving ($467,500 (HK), 1998–2000)
- City University of Hong Kong Quality Enhancement Project Grant: Algebra, Algorithms, and Applications ($50,000 (HK), '98–'99)
- City University of Hong Kong Small Scale Grant: Polyhedral Algorithms for Fast and Stable Equation Solving ($49,000 (HK), '98–'99)
- U.S. National Science Foundation Postdoctoral Fellow, '95–'98
- Chateaubriand Fellow, '95
- Winner of the 1992 SIAM Student Paper Competition
- Placed 52nd (out of 2170 contestants) in the 1987 William Lowell Putnam Mathematical Competition

TEACHING EXPERIENCE

(*At Texas A&M University, as full professor*)	
Math 478: (Undergraduate) Topological Data Analysis	Fall 2024
Math 673: (Graduate, Online) Modern Cryptography	Fall 2023
REU[4] in Algorithmic Algebraic Geometry	Summer 2023
Math 470: (Undergraduate, Online) Communications and Cryptography	Spring 2023
Math 648: (Graduate) Algorithmic Algebraic Geometry	Fall 2022
REU[4] in Algorithmic Algebraic Geometry	Summer 2022
Math 470: (Undergraduate, Online) Communications and Cryptography	Summer 2022
Math 416: (Undergraduate Stacked) Modern Algebra II	Spring 2022
Math 415H: (Undergraduate Honors) Modern Algebra I	Fall 2021
Math 411: (Undergraduate) Mathematical Probability	Fall 2021
REU[4] in Algorithmic Algebraic Geometry (online due to COVID)	Summer 2021
Math 648: (Graduate) Algorithmic Algebraic Geometry	Fall 2020
Math 470: (Undergraduate) Communications and Cryptography	Fall 2020
REU[4] in Algorithmic Algebraic Geometry	Summer 2019
Math 673: (Graduate) Information, Security, and Authentication I	Spring 2019
Math 415: (Undergraduate) Modern Algebra I	Fall 2018
Math 689: (Graduate) Semidefinite Programming and Algebraic Optimization	Fall 2018
REU[4] in Algorithmic Algebraic Geometry	Summer 2018
Math 620: (Graduate) Algebraic Geometry I	Spring 2018
Math 304: (Undergraduate) Communications and Cryptography	Fall 2017
(*As Reseach Director of MSRI-UP Program at MSRI (now SLMath), Berkeley*)	
REU[5] in Algorithmic Algebraic Geometry	Summer 2017
(*At Texas A&M University, as full professor*)	
Math 689: (Graduate) Semidefinite Programming and Algebraic Optimization	Spring 2017
Math 470: (Undergraduate) Communications and Cryptography	Spring 2017
Math 673: (Graduate) Information, Security, and Authentication I	Fall 2016
Math 470H: (Undergraduate Honors) Communications and Cryptography	Fall 2016
REU[4] in Algorithmic Algebraic Geometry	Summer 2016
Math 423: (Undergraduate) Linear Algebra II	Spring 2016
Math 416: (Undergraduate) Modern Algebra II	Spring 2016
(*As von Neumann Visiting Professor, Technical University of Munich*)	
Research Course (for M.S. students) in Algorithmic Fewnomial Theory	Fall 2015
(*At Texas A&M University, as full professor*)	
REU[4] in Algorithmic Algebraic Geometry	Summer 2015
Math 653: (Graduate) Algebra II	Spring 2015
Math 304: (Undergraduate) Linear Algebra	Fall 2014
Math 323: (Undergraduate) Linear Algebra I	Fall 2014

[4]Research course for 3-5 undergraduates, competitively recruited from across the US.
[5]This REU involved 18 students and 3 graduate student assistants.

REU[4] in Algorithmic Algebraic Geometry	Summer 2014
Math 423: (Undergraduate) Linear Algebra II	Summer 2014
Math 689: (Graduate) Statistical Algebraic Geometry	Spring 2014
Math 470: (Undergraduate) Communications and Cryptography	Spring 2014
Math 648: (Graduate) Algorithmic Algebraic Geometry	Fall 2013
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2013
Math 470: (Undergraduate) Communications and Cryptography	Spring 2013
Math 491: (Undergraduate) Introduction to Algebraic Geometry	Fall 2012
Math 470: (Undergraduate) Communications and Cryptography	Fall 2012
Math 415: (Undergraduate) Modern Algbra I	Fall 2012
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2012
Math 648: (Graduate) Algorithmic Algebraic Geometry	Fall 2011
Math 311: (Undergraduate) Topics in Applied Mathematics I	Fall 2011
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2011
Math 489: (Undergraduate) Introduction to Algebraic Geometry	Spring 2011
Math 220: (Undergraduate) Foundations of Mathematics	Fall 2010
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2010
Math 648: (Graduate) Algorithmic Algebraic Geometry	Fall 2009
Math 171: (Undergraduate) Calculus I	Fall 2009
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2009
Math 171: (Undergraduate) Calculus I	Fall 2008
Math 323: (Undergraduate) Linear Algebra	Fall 2008
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2008
Math 289: (Undergraduate) Linear Algebra	Spring 2008
Math 289: (Undergraduate) Mathematics of Modern Life	Fall 2007

(*At Texas A&M University, as associate professor*)

REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2007
Math 689: (Graduate) Randomized Algebraic Algorithms	Fall 2006
Math 431: (Undergraduate) Combinatorics	Spring 2006
Math 304: (Undergraduate) Linear Algebra	Spring 2006
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2006
Math 648: (Graduate) Algorithmic Algebraic Geometry	Spring 2005
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2005

(*At Texas A&M University, as assistant professor*)

Math 689: (Graduate) Introduction to Computational Algebraic Geometry	Fall 2004
Math 302: (Undergraduate) Discrete Mathematics	Fall 2004
REU: (Undergraduate Research Course) Algorithmic Algebraic Geometry	Summer 2004
Math 302: (Undergraduate) Discrete Mathematics	Summer 2003
Math 662: (Graduate) Algorithmic Number Theory and Applications	Summer 2003
Math 304: (Undergraduate) Linear Algebra	Spring 2001

Research Assistant Professor, City University of Hong Kong

MA 3515: Linear and Integer Programming	Fall 2000
MA5605: Advanced Mathematics Laboratory	Spring 2000
MA3515: Optimization I	Fall '99
MA4524: Algebra, Algorithms, and Applications	Spring '99
MA2202/MA3515: Optimization I	Spring/Fall '98

Applied Mathematics Instructor, Massachusetts Institute of Technology

Math 18.325: Polyhedral Methods in Optimization and Equation Solving (Graduate Course)	Fall '97
Math 18.410J: Introduction to Algorithms (3 recitation sections)	Spring '97
Math 18.099: A Simple Introduction to Polynomial Equations	Winter Break '97
Math 18.06: Linear Algebra (2 recitation sections)	Fall '96
Math 18.04: Complex Variables with Applications (recitation section)	Fall '96

Distinguished Faculty Member, MathCamp! (Summer Program for Exceptional High School Students), Babson College, Wellesley, MA.

Introduction to Computational Algebraic Geometry	Summer '97

Visiting Professor (Tenure Track), Universitat Pompeu Fabra, Barcelona

Matematicas I: Freshman Calculus (taught in Spanish)	Fall '94

CONFERENCES ORGANIZED

• *"Algorithmic Algebra and Geometry,"* (2-day minisymposium at SIAM Texas-Louisiana Sectional Meeting, University of Texas, Rio Grande Valley, Nov. 5–7, 2021, South Padre Island, Texas (co-organized with Alperen Ergür and Frank Sottile)

• *"Arithmetic Aspects of Numerical Solving,"* (2-day minisymposium at 2011 SIAM Conference on Applied Algebraic Geometry), North Carolina State University, Raleigh, North Carolina, Oct. 6–9, 2011.

• *"Mathematical Aspects of* **P** *vs.* **NP** *and its Variants",* (5-day workshop, co-organized with S. Basu and J. M. Landsberg), Institute for Computational and Experimental Research in Mathematics, Brown University, Rhode Island, Aug. 1–5, 2011.

• *"Randomization, Relaxation, and Reality",* (5-day workshop, co-organized with L. Gurvits and P. Parrilo), Banff Institute Research Station, Banff, Calgary, Canada, Feb. 28 - Mar. 5, 2010.

• *Complexity,* (special session co-organized with G. Malajovich and M. Shub), joint SMB-AMS meeting, Rio de Janeiro, June 4–7, 2008

• *Complexity, Coding, and Communication* (co-organized with Peter Buergiesser, Ketan Mulmuley, Joachim Rosenthal, and Madhu Sudan): Spring 2007 period of Special Year on Applications of Algebraic Geometry, Institute for Mathematics and its Applications.

• *Random Analytic Functions and Surfaces,* Workshop at the American Institute of Mathematics (co-organized with Amir Dembo, Bernie Shiffman, and Steve Zelditch), January 16–20, 2006.

• *Effective Analytic Geometry Over Complete Fields* (co-organized with L.-M. Pardo): Special Session, Joint AMS-RSME Meeting in Seville, June 18–21, 2003.

• *CBMS Lectures Series* (co-organized with Paulo Lima-Filho and Hal Schenck): Presented by Bernd Sturmfels at Texas A&M University, May 20-24, 2002.

• *CBMS Preconference* (co-organized with Paulo Lima-Filho, Hal Schenck, and Peter Stiller): Introductory lectures on computational algebraic geometry, May 17-19, 2002.

• *Foundations of Computational Mathematics 2000,* (co-organized with F. Cucker): International Conference in Honor of Steve Smale's 70$^{\underline{\text{th}}}$Birthday, City University of Hong Kong, Hong Kong, July 13–17, 2000.

• *Sparse Elimination Methods in Polynomial System Solving,* (co-organized with I. Emiris): Special Session at the Spring Eastern Meeting of the American Mathematical Society, Temple University, Philadelphia, Pennsylvania, April 4–6, 1998.

PUBLICATIONS[6] (Please see my web-page at `http://www.math.tamu.edu/~rojas` for updates and downloads.)

BOOKS EDITED

1. Randomization, Relaxation, and Complexity in Polynomial Equation Solving, (edited by Leonid Gurvits, Philippe Pébay, J. Maurice Rojas, and David C. Thompson), selected papers from a 5-day BIRS workshop on Randomization, Relaxation, and Complexity (co-organized by L. Gurvits, J. Maurice Rojas, and P. Parrilo),Contemporary Mathematics, vol. 556, AMS Press, 2011.

2. Proceedings of Smalefest 2000: Papers From an International Conference in Honor of Steve Smale's 70th Birthday (July 2000, City University of Hong Kong), (edited by J. M. Rojas and F. Cucker), World Scientific, 2002.

REFEREED RESEARCH PUBLICATIONS

3. "Counting Real Roots in Polynomial-Time via Diophantine Approximation," (by J. Maurice Rojas), Journal of Foundations of Computational Mathematics, Vol. 24, pp. 639–681 (2024).

4. "Quickly Computing Isotopy Type for Exponential Sums over Circuits (Extended Abstract)," (by Frederic Bihan, Erika Croy, Weixun Deng, Kaitlyn Phillipson, Robert J. Rennie, and J. Maurice Rojas), ACM Communications in Computer Algebra, Volume 57, No. 3, pp. 152–155 (2023). `https://doi.org/10.1145/3637529.3637538`

5. "Computing zeta functions of large polynomial systems over finite fields," (by Qi Cheng, J. Maurice Rojas, and Daqing Wan), Journal of Complexity, Vol. 73, December 2022.

6. "Root Repulsion and Faster Solving for Very Sparse Polynomials Over p-adic Fields," (by J. Maurice Rojas and Yuyu Zhu), Journal of Number Theory, Vol. 241, Dec. 2022, pp. 655–699.

[6] I, J. Maurice Rojas, certify that this is my publications list and that it is up to date as of February 6, 2025.

7. "Correction to: Tropical varieties for exponential sums," (by Alperen A. Ergür, Grigoris Paouris, and J. Maurice Rojas) Mathematische Annalen **380**, pp. 2073–2077 (2021).

8. "A Complexity Chasm for Solving Univariate Sparse Polynomial Equations Over p-adic Fields," (by J. Maurice Rojas and Yuyu Zhu), Proceedings of ISSAC 2021, pp. 337–344, ACM Press, 2021.

9. "Smoothed analysis for the condition number of structured real polynomial systems," (by Alperen A. Ergür, Grigoris Paouris, and J. Maurice Rojas), Mathematics of Computation, **90** (Sep. 2021), pp. 2161–2184.

10. "Tropical Varieties for Exponential Sums and their Distance to Amoebae," (by Alperen Ergür, Grigoris Paouris, and J. Maurice Rojas), Mathematische Annalen (2020) 377:863–882. DOI 10.1007/s00208-019-01808-5.

11. "Randomized Polynomial-Time Root Counting in Prime Power Rings," (by Leann Kopp, Natalie Randall, J. Maurice Rojas, and Yuyu Zhu), Mathematics of Computation, Vol. 89, No. 321, January 2020, pp. 373–385. DOI: https://doi.org/10.1090/mcom/3431

12. "A Faster Solution to Smale's 17th Problem I: Real Binomial Systems," (by Grigoris Paouris, Kaitlyn Phillipson, and J. Maurice Rojas), in Proceedings of ISSAC '19 (International Symposium on Symbolic and Algebraic Computation), July 2019, pp. 323–330. DOI: https://doi.org/10.1145/3326229.3326267.

13. "Counting Roots of Polynomials Over Prime Power Rings," (by Qi Cheng, Shuhong Gao, J. Maurice Rojas, and Daqing Wan), proceedings of ANTS XIII (Thirteenth Algorithmic Number Theory Symposium University of Wisconsin, Madison July 16–20, 2018), Mathematical Science Publishers, Open Book series, Vol. 2, 2019.

14. "Probabilistic Condition Number Estimates for Real Polynomial Systems I: A Broader Family of Distributions," (by Alperen Ergür, Grigoris Paouris, and J. Maurice Rojas), Foundations of Computational Mathematics, Feb. 2019, Vol. 19, No. 1, pp. 131–157.

15. "Metric Estimates for Archimedean Amoebae and Tropical Hypersurfaces," (by Martin Avendano, Roman Kogan, Mounir Nisse, and J. Maurice Rojas), Journal of Complexity, Vol. 46, June 2018, pp. 45–65; DOI 10.1016/j.jco.2017.11.008.

16. "Sparse Univariate Polynomials with Many Roots Over a Finite Field," (by Qi Cheng, Shuhong Gao, J. Maurice Rojas, and Daqing Wan), accepted for presentation at MEGA 2015; Finite Fields and their Applications, Vol. 46, July 2017, pp. 235–246.

17. "Sub-Linear Root Detection, and New Hardness Results, for Sparse Polynomials Over Finite Fields," (by Jingguo Bi, Qi Cheng, and J. Maurice Rojas), SIAM Journal on Computing, Vol. 45, No. 4 (2016), pp. 1433–1447.

18. "About Herman Auerbach's Problem on Factors of Real Polynomials with Connected Zero Set Complement," (by J. Maurice Rojas), commentary on Problem #148 from the Scottish Book: The Scottish Book ($2^{\underline{\text{nd}}}$ ed., edited by R. Daniel Mauldin), pp. 239–242 Springer-Verlag, 2015.

19. "Polynomial-time Amoeba Neighborhood Membership and Faster Localized Solving," (by Eleanor Anthony, Sheridan Grant, Peter Gritzmann, and J. Maurice Rojas), Chapter 15 of: Topological and Statistical Methods for Complex Data – Tackling Large-Scale, High-Dimensional, and Multivariate Data Sets, (Bennett, Janine; Vivodtzev, Fabien; Pascucci, Valerio (Eds.)), pp. 255–278, series on Mathematics and Visualization, Springer-Verlag, 2015.

20. "Sub-Linear Root Detection, and New Hardness Results, for Sparse Polynomials Over Finite Fields," (by Jingguo Bi, Qi Cheng, and J. Maurice Rojas), in Proceedings of ISSAC (International Symposium on Symbolic and Algebraic Computation, June 26-29, Boston, MA), pp. 61–68, ACM Press, 2013. (Winner of the 2013 ISSAC Distinguished Paper Award.)

21. "Fewnomial Systems with Many Roots, and an Adelic Tau Conjecture," (by Kaitlyn Phillipson and J. Maurice Rojas), in CRM Conference Proceedings for Tropical and Non-Archimedean Geometry (Bellairs Research Institute, May 6–13, 2011), Contemporary Mathematics, vol. 605, pp. 45–71, AMS Press, 2013.

22. "Faster p-adic Feasibility for Certain Multivariate Sparse Polynomials,", (by Martin Avendaño, Ashraf Ibrahim, J. Maurice Rojas, and Korben Rusek), Journal of Symbolic Computation, special issue in honor of 60th birthday of Joachim von zur Gathen, vol. 47, no. 4, pp. 454–479 (April 2012).

23. "Randomization, Sums of Squares, Near-Circuits, and Faster Real Root Counting," (by Osbert Bastani, Chris Hillar, Dimitar Popov, and J. Maurice Rojas), in Randomization, Relaxation, and Complexity in Polynomial Equation Solving, Contemporary Mathematics, vol. 556, pp. 145–166, AMS Press, 2011.

24. "New Multiplier Sequences via Discriminant Amoebae," (by M. Passare, J. M. Rojas, and B. Shapiro), Moscow Mathematical Journal (special issue in memory of Vladimir Igorevich Arnold), vol. 11, no. 3, July–September 2011, pp. 547–560.

25. "Optimizing n-variate $(n+k)$-nomials for small k," (by P. Pébay, J. M. Rojas, and D. C. Thompson), Theoretical Computer Science, SNC 2009 special issue, Vol. 412, No. 16 (1 April 2011), pp. 1457–1469.

26. "Randomized NP-Completeness for p-adic Rational Roots of Sparse Polynomials in One Variable," (by M. Avendaño, A. Ibrahim, J. M. Rojas, and K. Rusek), proceedings of ISSAC 2010 (July 25–28, 2010, München), pp. 331–338, ACM Press, 2010.

27. "Optimization and $\mathbf{NP}_{\mathbb{R}}$-Completeness of Certain Fewnomials," (by P. Pébay, J. M. Rojas, and D. C. Thompson), proceedings of SNC 2009 (August 3–5, 2009, Kyoto, Japan), pp. 133–142, ACM Press, 2009.

28. "Faster Real Feasibility via Circuit Discriminants," (by F. Bihan, J. M. Rojas, and C. E. Stella), proceedings of ISSAC 2009 (July 28-31, Seoul, Korea), pp. 39–46, ACM Press, 2009.

29. "On the Sharpness of Fewnomial Bounds and the Number of Components of Fewnomial Hypersurfaces," (by F. Bihan. J. M. Rojas, and F. Sottile), Algorithms in Algebraic Geometry (Alicia Dickenstein, Frank-Olaf Schreyer, and Andrew J. Sommese, eds.), IMA Volumes in Mathematics and its Applications, Vol.l 146, pp. 15–20, Springer-Verlag, 2007.

30. "Efficiently Detecting Embedded Subtori and Algebraic Torsion Points," invited paper, proceedings of MAGIC 2005 (Midwest Algebra, Geometry, and their Interactions Conference, Oct. 7–11, 2005, Notre Dame University, Indiana), edited by A. Corso, J. Migliore, and C. Polini, pp. 213–233, Contemporary Mathematics, vol. 448, AMS Press, 2007.

31. "Extremal Real Algebraic Geometry and $\mathcal{A}$-Discriminants," (by A. Dickenstein, J. M. Rojas, K. Rusek, and J. Shih), Moscow Mathematical Journal, vol. 7, no. 3, July–Sept. 2007, pp. 425-452.

32. "On Interpolating Between Quantum and Classical Complexity Classes," Proceedings of Mathematics of Quantum Computation and Quantum Technology (November 13-16, 2005, Texas A&M University), pp. 67–88, Taylor & Francis, 2007.

33. "A New Method of Motion Coordination of a Group of Mobile Robots," (by J. M. Rojas, S. Sethuraman, M. Lal, and S. Jayasuriya), Proceedings of IMECE 2006 (ASME International Mechanical Engineering Congress and Exposition, Nov. 5–10, 2006, Chicago, Illinois), to appear.

34. "On Solving Univariate Sparse Polynomial in Logarithmic Time," (by J. M. Rojas and Y. Ye), Journal of Complexity, Volume 21, Issue 1 (Foundations of Computational Mathematics Conference 2002 special issue), February 2005, pp. 87–110.

35. "Rapid conversion from torsion space to Cartesian space for *in silico* protein synthesis," (by J. Parsons, B. Holmes, C. E. Strauss, J. M. Rojas, and J. Tsai), Journal of Computational Chemistry, vol. 26 (July 2005), Issue 10, pp. 1063–1068.

36. "The Exact Rational Univariate Representation for Detecting Degeneracies," (by J. Keyser, K. Ouchi, and J. M. Rojas), Geometric and Algorithmic Aspects of Computer-Aided Design and Manufacturing (AMS/DIMACS Series in Discrete Mathematics and Theoretical Computer Science), edited by Ravi Janardan, Michiel Smid, and Debasis Dutta, pp. 299-328, AMS Press (2005).

37. "High Probability Estimates for the Numerical Conditioning of Sparse Polynomial Systems," (by G. Malajovich and J. M. Rojas), Theoretical Computer Science, special issue on algebraic and numerical algorithms, Vol. 315, no. 2–3, pp. 525–555 (May 6, 2004).

38. "Attitude and Position Estimation from Vector Observations," (by D. Mortari, J. M. Rojas, and J. L. Junkins), Proceedings of the AAS/AIAA Space Flight Mechanics Meeting (February 9–13, 2004, Maui, Hawaii), paper AAS 04-140.

39. "Arithmetic Multivariate Descartes' Rule," American Journal of Mathematics, vol. 126, no. 1, February 2004, pp. 1–30.

40. "Why Polyhedra Matter in Non-Linear Equation Solving," paper corresponding to an invited talk delivered at a conference on Algebraic Geometry and Geometric Modelling (Vilnius, Lithuania, July 29-August 2, 2002), Contemporary Mathematics, vol. 334, pp. 293–320, AMS Press, 2003.

41. "On the Determination of the Degree of an Equation Obtained by Elimination," (translation of, and commentary on, an 1841 paper of Ferdinand Minding, by David Cox and J. Maurice Rojas), Contemporary Mathematics, vol. 334, pp. 351–361, AMS Press, 2003.
42. "Counting Real Connected Components of Trinomials Curve Intersections and m-nomial Hypersurfaces," (by T.-Y. Li, J. M. Rojas, and X. Wang), Discrete and Computational Geometry, Discrete and Computational Geometry, **30** (2003), no. 3, pp. 379–414.
43. "Additive Complexity and the Roots of Polynomials Over Number Fields and p-adic Fields," Proceedings of ANTS-V (5th Annual Algorithmic Number Theory Symposium, University of Sydney, July 7-12, 2002), Lecture Notes in Computer Science #2369, Springer-Verlag (2002), pp. 506–515.
44. "Polynomial Systems and the Momentum Map," (by G. Malajovich and J. M. Rojas), Proceedings of FoCM 2000, special meeting in honor of Steve Smale's 70th birthday (July 2000, City University of Hong Kong, Hong Kong), pp. 251–266, World Scientific, 2002.
45. "Extending Triangulations and Semistable Reduction," (by D. Abramovich and J. M. Rojas), Proceedings of FoCM 2000, special meeting in honor of Steve Smale's 70th birthday (July 2000, City University of Hong Kong, Hong Kong), pp. 1–13, World Scientific, 2002.
46. "Finiteness for Arithmetic Fewnomial Systems," invited paper, Contemporary Mathematics, vol. 286, AMS-IMS-SIAM Joint Summer Research Conference Proceedings of "Symbolic Computation: Solving Equations in Algebra, Geometry, and Engineering (June 11-15, 2000, Mount Holyoke College)," edited by E. Green, S. Hosten, R. Laubenbacher and V. Powers, pp. 107–114, AMS Press, 2001.
47. "Computational Arithmetic Geometry I: Diophantine Sentences Nearly Within the Polynomial Hierarchy," invited paper, Journal of Computer and System Sciences, vol. 62, no. 2, march 2001, pp. 216–235.
48. "Algebraic Geometry Over Four Rings and the Frontier to Tractability," invited paper, Contemporary Mathematics, vol. 270, Proceedings of a Conference on Hilbert's Tenth Problem and Related Subjects (University of Gent, November 1999, edited by Jan Denef, Leonard Lipschitz, Thanases Pheidas, and Jan Van Geel), pgs. 270–321, AMS Press (2000).
49. "Some Speed-Ups and Speed Limits for Real Algebraic Geometry," Journal of Complexity, FoCM 1999 special issue, vol. 16, no. 3 (sept. 2000), pp. 552–571. [Winner of the Journal of Complexity 2000 Best Paper Award.]
50. "Uncomputably Large Integral Points on Algebraic Plane Curves?," *Theoretical Computer Science,* special issue in honor of Manuel Blum's 60$\underline{\text{th}}$birthday, vol. 235, no. 1, March, 2000, pp. 145–162.
51. "Solving Degenerate Sparse Polynomial Systems Faster," *Journal of Symbolic Computation*, vol. 28 (special issue on elimination theory), no. 1/2, July and August 1999, pp. 155–186.
52. "On the Complexity of Diophantine Geometry in Low Dimensions," *Proceedings of the 31*$\underline{\text{th}}$ *ACM Symposium on Theory of Computing (STOC '99, May 1–4, 1999, Atlanta, Georgia)*, pp. 527–536, ACM Press, 1999.
53. "Toric Intersection Theory for Affine Root Counting," *Journal of Pure and Applied Algebra*, vol. 136, no. 1, March, 1999, pp. 67–100.
54. "Intrinsic Near Quadratic Complexity Bounds for Real Multivariate Root Counting," *Proceedings of the Sixth Annual European Symposium on Algorithms*, pp. 127–138, Lecture Notes in Computer Science 1461, Springer-Verlag, 1998.
55. "Toric Laminations, Sparse Generalized Characteristic Polynomials, and a Refinement of Hilbert's Tenth Problem," Foundations of Computational Mathematics, selected papers of a conference, held at IMPA in Rio de Janeiro, January 1997, Felipe Cucker and Mike Shub (eds.), pp. 369–381, Springer-Verlag (1997).
56. "Affine Elimination Theory," *Proceedings of a Conference in Honor of David A. Buchsbaum*, October 18–20, 1997, Northeastern University, Boston, Massachusetts.
57. "A New Approach to Counting Nash Equilibria," *Proceedings of the IEEE/IAFE Conference on Computational Intelligence for Financial Engineering, Manhattan, New York, March 23–25, 1997*, pp. 130–136.
58. "On the Average Number of Real Roots of Certain Random Sparse Polynomial System," *Lectures in Applied Mathematics*, Vol. 32 (1996), pp. 689–699, American Mathematical Society.
59. "Counting Affine Roots Via Pointed Newton Polytopes," (by J. M. Rojas and X. Wang), Journal of Complexity, vol. 12 (June 1996), pp. 116–133.
60. "A Convex Geometric Approach to Counting the Roots of a Polynomial System," Theoretical Computer Science, vol. 133 (1), pp. 105–140, October, 1994.

61. "A New Upper Bound on the Number of Roots of a Multilinear System," technical report, SCAMP 1992, Center for Communications Research, Princeton, New Jersey.
62. "An Optimal Condition for Determining the Exact Number of Roots of a Polynomial System," (by J. Canny and J. M. Rojas), *Proceedings of ISSAC '91* (Bonn, Germany), pp. 96–102, ACM Press, 1991.

INVITED BOOK REVIEWS

63. Review of *Kolmogorov complexity and algorithmic randomness* (by Alexander Shen, Vladimir A. Uspensky, and Nikolay K. Vereshchagin), Bulletin of the American Mathematical Society, Vol. 57, no. 2, April 2020, pp. 339–346.
64. Review of József Beck's: Inevitable Randomness in Discrete Mathematics, Bulletin of the American Mathematical Society, Vol. 50, no. 3, July 2013, pp. 481–487.
65. Review of Basu, Pollack, and Roy's: Algorithms in Real Algebraic Geometry, Foundations of Computational Mathematics, Vol. 8, No. 6 (2008), pp. 765–771.

PAPERS SUBMITTED FOR PUBLICATION/IN PROGRESS

66. "Viro's Patchworking and the signed reduced A-discriminant," (by Weixun Deng, J. Maurice Rojas, and Mate Telek), submitted to a conference (2024).
67. "Feasibility of Circuit Polynomials without Black Swans," (by Weixun Deng, Alperen Ergur, Grigoris Paouris, and J. Maurice Rojas), submitted to a conference (2024).
68. "Trinomials and Deterministic Complexity Limits for Real Solving," (by Erick Boniface, Weixun Deng, and J. Maurice Rojas), in revision, 2024.
69. "Sub-Linear Point Counting for Variable Separated Curves over Prime Power Rings," (by Caleb Robelle, J. Maurice Rojas, and Yuyu Zhu), in progress.
70. "$\mathcal{A}$-Discriminants for Complex Exponents and Counting Real Isotopy Types," (by J. Maurice Rojas and Korben Rusek), in revision.
71. "Counting Tropically Degenerate Valuations and p-adic Approaches to the Hardness of the Permanent," (by Pascal Koiran, Natacha Portier, and J. Maurice Rojas), in revision.

OTHER PUBLICATIONS

72. "Open Questions on Extensions of Hilbert's Tenth Problem," expository paper for Workshop on Extensions of Hilbert's Tenth Problem, American Institute of Mathematics (March 21–25, 2005), Palo Alto, California.
73. "Open Questions on Amoeba Theory and Tropical Geometry," expository paper for Workshop on Amoebas and Tropical Geometry, American Institute of Mathematics (October 23–26, 2003), Palo Alto, California.
74. "Encryption, $1 + 1 = 0$, and Secure Information," Advance, 2003 Edition, Office of the Vice President for Research, Texas A&M University.
75. Geometry and Topology: Seven Lectures by Raoul Bott, (notes edited by J. Maurice Rojas), Lecture Notes in Mathematics, Liu Bie Ju Centre for the Mathematical Sciences, City University of Hong Kong, 2000.
76. "Commutative Algebra Without Commutativity (Solution to Problem 10437)," *American Mathematical Monthly*, vol. 104, no. 7, Aug.-Sept. 1997.
77. Problem 10437, *American Mathematical Monthly*, Volume 102, #2, February 1995, page 170.

THESES

- "Cohomology, Combinatorics, and Complexity Arising from Solving Polynomial Systems," *Applied Mathematics Ph.D. Thesis, University of California, Berkeley*, University Microfilms International, 1995.
- "An Optimal Condition for Determining the Exact Number of Roots of a Polynomial System," *Computer Science M.S. Thesis, University of California, Berkeley*, 1991.

SOME INVITED LECTURES

1. "Computing Isotopy Type for Hypersurfaces (for Circuit Supports) Without Purple Swans," ISSAC 2024 (International Symposium on Symbolic and Algebraic Computation, Raleigh, North Carolina, July 18, 2024).
2. "Descartes' Rule and Fewnomials over the p-adics," ergodic theory and dynamics seminar, Graduate Center, City University of New York, April 12, 2024.
3. "Simple Pictures for Hard Equations," colloquium, City University of New York, April 9, 2024.
4. "Counting Real Solutions Faster," Conference in Honor of Mike Shub's 80th Birthday, February 3, 2024.
5. "New Hypergeometric Series and Faster Real Solving," University of Copenhagen, July 27, 2023.
6. "Diophantine Obstructions and Probabilistic Speed-Ups for Discriminants," SIAM Algebraic Geometry Conference, Eindhoven, July 14, 2023.
7. "On the Average-Case Complexity of Real Feasibility for Circuit Hypersurfaces," special session on real complexity, Foundations of Computational Mathematics, Paris, June 12, 2023.
8. "Exponential Speed-ups in Real Algebraic Geometry," National Science Foundation, Washington, D.C., March 28, 2023.
9. "The Shape of Equations," Colloquium, University of Texas, San Antonio, February 8, 2023.
10. "Circuits, p-adic Root Counting, and Complexity," Algebra Seminar, Georgia Institute of Technology, December 5, 2022.
11. "Contando Raices Reales de Poconomios," Colloquium, University of Puerto Rico, Mayaguez Campus [via Zoom], November 10, 2022.
12. "Wall-Hopping and Counting Fewnomial Hypersurfaces," Special Real Algebraic Geometry Seminar, Purdue University, September 9, 2022.
13. "Diophantine Approximation and Real Computation," Departmental Colloquium, Purdue University, September 8, 2022.
14. "Better Real Topology Estimates by Hopping Walls," MSRI-UP, Berkeley [via Zoom due to last-minute COVID emergency], July 8, 2022.
15. "Better Real Topology Estimates by Hopping Walls," MEGA 2022 (Effective Methods in Algebraic Geometry, Krakow, Poland), June 21, 2022.
16. "An Overview of p-adic Algorithmic Fewnomial Theory," online talk at CIMPA/CIMAT research school on p-adic numbers, ultrametric analysis, and applications, CIMAT, Guanajuato, Mexico, May 23–31, 2022.
17. "Dividing, conquering, and detecting compositeness," activity for middle-schoolers, Texas A&M University Math Circle, May 14, 2022.
18. "Fine-Grained Complexity of Real Solving," special session on optimization, complexity, and real algebraic geometry (virtual), Purdue University, Mar. 26–27, 2022.
19. "Counting Pieces of Real Near-Circuit Hypersurfaces Faster," Workshop on Real Polynomials: Counting and Stability (Online), Casa Matematica Oaxaca, Banff International Research Station, Oct. 17–22, 2021.
20. "A Complexity Chasm for Sparse Univariate Polynomials over p-adic Fields," ISSAC 2021 (International Symposium on Symbolic and Algebraic Computation, St. Petersburg, Russia, July 18–23, 2021).
21. "Sub-Linear Point Counting for Arbitrary Curves Over Prime Power Rings," Mathematical Congress of the Americas (Buenos Aires, Argentina, July 12–23, 2021).
22. "Counting Real Roots in Polynomial-Time for Systems Supported on Circuits," invited lecture, REU at Dearborn, Michigan, June 30, 2021.
23. "Counting Real Roots in Polynomial-Time for Systems Supported on Circuits," MEGA (Effective Method in Algebraic Geometry, Tromso, Norway, June 7–11, 2021).
24. "An Introduction to Bitcoin and the Importance of Pseudo-Randomness," Texas A&M University, Bitcoin Conference, April 17, 2021.
25. "Can You Hear Pseudorandomness?," Workshop on Mathematics and Music, TU Dresden, Germany, April 16, 2021.

26. "Counting Real Roots of Sparse Polynomial Systems Faster," US Naval Academy (via Zoom, due to COVID-19 pandemic), Annapolis, Feb. 10, 2021.
27. "Structure vs. Randomness in Mathematics and Music," invited talk, Symposium on Music and Mathematics, TU Dresden (via Zoom, due to COVID-19 pandemic), Germany, Nov. 27, 2020.
28. "Complexity Chasms Over Local Fields," plenary talk, Algebraic Geometry Northeast Seminar, Stony Brook University (via Zoom, due to COVID-19 pandemic), Oct. 23, 2020.
29. "How Quickly Can You Approximate Roots?," number theory seminar, UC Irvine, Jan. 7, 2020.
30. "Fewnomial Hypersurfaces have Polynomially Many Connected Components," invited talk, joint CUNY Graduate Center-Courant Seminar in Symbolic-Numeric Computing, Nov. 7, 2019.
31. "Calculus, Real Fewnomials, and P vs. NP," invited colloquium talk, Claremont College, Oct. 30, 2019.
32. "Faster Point Counting for Curves Over Prime Power Rings," invited algebra and number theory seminar talk, Claremont College, Oct. 29, 2019.
33. "Pseudorandom Generators and Computing Igusa Zeta Functions in Polynomial Time," invited talk, Felipefest (conference in honor of 60th birth of Felipe Cucker), TU Berlin, Germany, Aug. 23, 2019.
34. "Probabilistic and Diophantine Aspects of Real Sparse Polynomials," invited seminar talk, TU Braunschweig, Germany, Aug. 16, 2019.
35. "Faster Solution of Smale's 17th Problem for Binomial Systems," accepted paper, International Symposium on Symbolic and Algebraic Computation (Beijing, China), July 18, 2019.
36. "Explicit Univariate Polynomials with Optimal Condition Number (after Beltran, et. al.)," Algebraic Geometry Seminar, Texas A&M University, April 22, 2019.
37. "Pseudo-Random Generators: Old and New," CS 681 Graduate Student Seminar, Texas A&M University, April 3, 2019.
38. "Fewnomial Hypersurfaces have Polynomially Many Connected Components," Auburn University, Alabama, March 18, 2019.
39. "Faster Solution of Smale's 17th Problem for Binomial Systems," AMS Special Session on Applications of Algebraic Geometry, Auburn University, Alabama, March 15, 2019.
40. "Faster Point Counting Over Prime Power Rings and Pseudo-Random Generators," Number Theory Seminar, Texas A&M University, Feb. 13, 2019.
41. "Faster Algorithms Over Prime Power Rings and Pseudo-Random Generators," Computer Science seminar, University of Oklahoma, Norman, Feb. 8, 2019.
42. "Lattice Points and Generating Functions," math circle activity for homeschooled 6th-8th graders, Katy, Texas, Jan. 22, 2019.
43. "Protecting Your Data," math circle activity with 6th-8th graders, Texas A&M University, Dec. 1 & 8, 2018.
44. "Faster Root Counting Over $\mathbb{Z}/(p^k)$," rump session talk at Algorithmic Number Theory Symposium (ANTS) XIII, University of Wisconsin, Madison, July 19, 2018
45. "Polyhedral Measures for Random Polynomial Systems," talk at UT Probability Day, May 4, 2018
46. "A Few Words on Algorithms and Fewnomials," Department of Fundamental Sciences Colloquium, Texas A&M University, Galveston, Feb. 2, 2018.
47. "*abc* and Faster Computation of Isotopy Type," Number Theory Seminar, UC Irvine, Jan. 11, 2018.
48. "Geometry, Sorting, and Optimizing," Applied Mathematics Undergraduate Seminar, Texas A&M University, Nov. 1, 2017.
49. "Guessing, Sorting, and Optimizing," Math Circle activity (for 9th graders), Texas A&M University, Oct. 28, 2017.
50. "Sharper Topological Bounds for Near-Circuit Exponential Sums," AMS Sectional Meeting, Texas Tech University, Denton, Sep. 9, 2017.
51. "A-Discriminants for Complex Exponents and Counting Real Isotopy Types," MEGA 2017 (Effective Methods in Algebraic Geometry), University of Nice, France, June 12, 2017
52. "Sharper Bounds for Near-Circuit Polynomials," invited lecture at meeting in honor of Boris Shapiro's 60th birthday, Stockholm University, May 30, 2017
53. "$\mathcal{A}$-discriminants for Exponential Sums and New Topological Bounds," Valley Geometry Seminar, University of Massachusetts, Amherst, March 3, 2017.
54. "Polygons and Approximating Roots," invited colloquium, Amherst College, March 2, 2017.
55. "Counting Lattice Points in Polygons," Math Circle activity (for 9th graders), Texas A&M University, Feb. 25, 2017.

56. "$\mathcal{A}$-discriminants for Exponential Sums," Algebraic Geometry Conference, Hankuk University, Dec. 8, 2016.
57. "Fewnomials and Approximate Cosets #2: Finite Fields," Algebraic Geometry Seminar, Korean Institute for Advanced Studies, Seoul, Dec. 7, 2016.
58. "Fewnomials and Approximate Cosets #1: Local Fields," Algebraic Geometry Seminar, Korean Institute for Advanced Studies, Seoul, Dec. 6, 2016.
59. "Tropical Intersection Multiplicity and Complexity," workshop on Algorithmic Tropical Geometry, Schloss Dagstuhl, Germany, Nov. 25, 2016.
60. "Faster Approximation of Certain $\mathcal{A}$-Discriminant Contours," Special Session on Applied Algebraic Geometry, AMS Sectional Meeting, Raleigh, N.C. State University, Nov. 12, 2016.
61. "Gift Boxes, Mongoose in the Middle, and Secret Codes," Math Circle activity (for 9th graders), Texas A&M University, Sep. 24, 2016.
62. "A Broader Class of Measures for Faster Solving," Statistical Topology of Random Manifolds, Abdus Salam International Center for Theoretical Physics, Trieste, Italy, July 22, 2016.
63. "Faster! Faster! Solve it Faster!," Texas A&M University Optimization Day, April 4, 2016.
64. "What is Complexity Theory?," Junior Algebraic Geometry Seminar, Texas A&M University, March 8, 2016.
65. "Structure, Equidistribution, and Algorithms for Roots of Sparse Polynomials," Probability Seminar, Texas A&M University, Mar. 7, 2016.
66. "Hats, Codes, and Lattice Points," Math Circle activity for middle-school students, Texas A&M University, Feb. 13, 2016
67. "Polygons, Lattice Points, and Equations," Math Circle activity for high-school students, Texas A&M University, Feb. 6, 2016
68. "On a Real Analogue of Smale's 17th Problem," Mathematics Department, Technical University of Berlin, Germany, Nov. 26, 2015
69. "Circuits, and Trinomials, Over Arithmetic Fields," Mathematics Department, Technical University of Eindhoven, Netherlands, Nov. 11, 2015
70. "Structure versus Randomness for Exponential Sums," Mathematics Department, Technical University of München, Germany, Nov. 4, 2015
71. "Real Tropical Geometry for Exponential Sums," Mathematics Department, Free University of Berlin, Germany, Nov. 2, 2015
72. "Refined Equidistribution and Metric Estimates for Roots of Exponential Sums," Mathematics Department, Goethe University, Frankfurt, Germany, Sep. 23, 2015
73. "Is it music or is it noise?," Math Circle activity for middle-school students, Texas A&M University, May 13, 2015
74. "Teaching Algebraic Geometry to Undergrads," AMS Special Session on Successes and Challenges in Teaching Mathematics, Joint Mathematical Meeting, San Antonio, TX, USA, Jan. 13, 2015.
75. Solving Polynomial Equations, (1 week invited stay), Simons Institute for the Theory of Computing, UC Berkeley, Berkeley, California, USA, Oct. 13–16, 2014.
76. "On a Real Variant of Smale's 17th Problem," invited talk , Workshop on Computational Nonlinear Algebra, ICERM (Institute for Computational and Experimental Research in Mathematics), Brown University, Providence, Rhode Island, USA, June 5, 2014.
77. Arithmetic Approaches to P vs. NP, (1 week invited stay), first week of research in quartets project, AIM (American Institute of Mathematics), Palo Alto, California, USA, Aug. 18–22, 2014.
78. "From Hensel to Turing: Can Number Theory Yield New Separations," CS 691 Seminar, Computer Science and Engineering Department, Texas A&M University, Feb. 19, 2014.
79. "From Complexity to Geometry Over Local Fields," Invited Algebraic Geometry Seminar talk, University of Chicago, Nov. 6, 2013.
80. "Some Notes on Post-Quantum Cryptography," Applied Mathematics Undergraduate Seminar, Texas A&M University, Oct. 19, 2013.
81. "How far are Archimedean Tropical Varieties from Amoebae?," minisymposium on complexity of polynomial system solving, SIAM Conference on Applied Algebraic Geometry, Colorado State University, Fort Collins, Colorado, USA, Aug. 1–4, 2013.
82. "Faster Real-Solving for Random Sparse Polynomial Systems," minisymposium on complexity and the foundations of numerical computation, 2013 SIAM annual meeting (San Diego, CA), July 8–12, 2013.

83. "Structure and Randomness for Solutions of Large Multivariate Equations," invited presentation, Workshop on the analysis of large-scale, high-dimensional, and multivariate data using topology and statistics, Le Barp, France, June 12–14, 2013.
84. "Metric Estimates for Archimedean Amoebae and Tropical Hypersurfaces," accepted presentation, MEGA (Effective Methods in Algebraic Geometry, Frankfurt, Germany), June 3-7, 2013.
85. ""Bounds for Polyhedral Approximations of Complex Hypersurfaces," invited geometry seminar talk, Institute Camille Jordan, University of Lyon, May 23, 2013.
86. "Bounds for Polyhedral Approximations of Complex Hypersurfaces," invited geometry seminar talk, University of Savoir, Chambery, May 17, 2013.
87. "Descartes Rule over Finite Fields and New Complexity Bounds for Root Detection," invited computer science seminar talk, Ecole Normale Superior, Lyon, May 15, 2013.
88. "Arithmetic Approaches to **P** vs. **NP**," colloquium, Sam Houston State University, Huntsville, TX, Sep. 5, 2012.
89. "Arithmetic Approaches to **P** vs. **NP**," invited talk, Microsoft Research New England, Cambridge, MA, July 30, 2012.
90. "Arithmetic Approaches to **P** vs. **NP**," Turing Centennial Conference, Ecole Normal Superieure, Lyon, France, July 4, 2012.
91. "Solving a Real Analogue of Smale's 17th Problem," From Dynamics to Complexity (meeting in honor of Mike Shub), Fields Institute, May 7, 2012.
92. "Fast Toric Algorithms Over Local Fields," invited number theory seminar talk, UC Irvine, April 12, 2012.
93. "Petascale Polynomials and a Real Analogue of Smale's 17th Problem," invited talk in Optimization Session, DOE Applied Mathematics Program Meeting, Washington, D.C., Oct. 17, 2011
94. "Real Feasibility is in **NP** Most of the Time," Arithmetic Aspects of Numerical Solving Minisymposium, 2011 SIAM Conference on Applied Algebraic Geometry, North Carolina State University, Raleigh, North Carolina, Oct. 6–9, 2011.
95. "Fast Toric Algorithms Over Local Fields," Toric Geometry and Applications, Katholieke Universiteit Leuven, Leuven, Belgium, June 6–10, 2011
96. "Short Certificates for p-adic Feasibility," Tropical and Non-Archimedean Geometry, Bellairs Research Institute, Barbados, May 6–13, 2011.
97. "Extreme Extremal Results for Sparse Systems," Notre Dame University, Aug. 4, 2010
98. "Satellite Orbits and Solving Equations," NSF Mathematics at Critical Transitions guest lecture, Texas A&M University, July 14, 2010.
99. "Satellite Orbits and Solving Equations," SEEMath Program (expository lecture for 5th–8th graders), Texas A&M University, July 2, 2010.
100. "Simple Homotopies for Just Real Roots," plenary talk, workshop on Randomization, Complexity, and Relaxation, Banff International Research Station, Banff, Alberta, Canada, March 1, 2010.
101. "Optimization and $\mathbf{NP}_{\mathbb{R}}$-Completeness of Certain Fewnomials," Symbolic Numeric Computation, Kyoto, Japan, Aug. 4, 2009.
102. "Faster Real Feasibility via Circuit Discriminants," International Symposium on Symbolic and Algebraic Computation, Seoul, South Korea, Jul. 31, 2009.
103. "When Pretty Pictures Fail," SMaRT (Summer Mathematics Research Training) camp guest lecture (expository lecture for high school students), June 17, 2009.
104. "Coamoebae and Hypergeometric Functions after Lisa Nilsson," opponent presentation for thesis defense, Stockholm University, June 5, 2009
105. "Number Theory, Randomization, and Real Topology Computation," Colloquium, Mathematics Department, Technical University of Lisboa, Portugal, May 20, 2009
106. "Number Theory and the Hardness of Complex Geometry," Several Complex Variables Seminar, Stockholm University, April 28, 2009
107. "Real Topology Computation via Amoebae I," Several Complex Variables Seminar, Stockholm University, April 14, 2009
108. "Statistical Modelling and Real Solving," Sandia National Laboratories, Livermore, California, April 1, 2009
109. "ABCs of Real Solving," San Francisco State University, Mar. 4, 2009
110. "Hilbert's 10th Problem in Low Dimensions," University of Utah, Salt Lake City, Nov. 21, 2008
111. "ABCs of Real Algebraic Geometry," colloquium, University of Utah, Salt Lake City, Nov. 20, 2008

112. "ABCs of Real Algorithmic Geometry," colloquium, Center for Communications Research, Institute for Defense Analyses, Princeton, NJ, Oct. 24, 2008
113. "Unifying Algorithms for Real and p-adic Geometry," special seminar, University of Illinois, Urbana-Champaign, Aug. 15, 2008.
114. Algorithmic Fewnomial Theory, invited 1 week lecture series, IAS Park City Mathematics Institute Undergraduate Mathematics Summer School, July 6–13, 2008.
115. "Randomization and Discriminant Chambers," joint AMS/SMB meeting, Rio de Janeiro, June 4-8, 2008.
116. "Sharper, High Probability Bounds for Real Fewnomial Zero Sets," Enumeration and bounds in real algebraic geometry (April 21–26, 2008), Bernoulli Center, EPFL, Laussane.
117. "Most Hard Equations are Easy," invited mathematics colloquium, University of Houston, November 28, 2007.
118. "Most Hard Equations are Easy," introductory talk, MSRI Modern Mathematics Workshop, Kansas City, Missouri, October 11, 2007.
119. "Torsion Points and Algorithmic Fewnomial Theory," Number Theory Seminar, University of Texas at Austin, September 27, 2007.
120. "Efficient Polynomial System Solving: An Introduction," invited series of 10 talks, Sandia National Laboratories, Combustion Research Facility, Livermore, California, August 8-12, 2007.
121. "P=NP, Optimization, and Algebraic Geometry," IMA summer school in algebraic geometry, Texas A&M University, July 27, 2007.
122. "Descartes' Rule for Complete Fields and Arbitrary Codimension," Latin-American Colloquium on Algebra, Medellín, Colombia, July 23, 2007.*
123. "Arithmetic Progressions and Complex Algebraic Geometry," invited talk; Workshop on Number Theory and Computability, Edinburgh, Scotland, June 26, 2007.*
124. "The Complete Fewnomial Conjecture," algebraic geometry seminar, University of Chicago, May 9, 2007.
125. "Feasibility of Complex Equations and Primes in Arithmetic Progressions," computer science seminar, University of Wisconsin, May 7, 2007.
126. "Random Polynomials and Balanced Metrics," Algebraic Geometry Seminar, Institute for Mathematics and its Applications, Minnesotta, April 26, 2007.
127. "A Critical Radius for Low Complexity," Workshop on Complexity, Coding, and Communications, Institute for Mathematics and its Applications, Minnesotta, April 20, 2007.
128. "Large Chambers, Discriminants, and Fewnomials," invited series of 3 talks, Johns Hopkins University, March 21, 22, 27; 2007.
129. "An Introduction to $\mathcal{A}$-discriminants and Chambers," Johns Hopkins University, March 22, 2007.
130. "The Complete Fewnomial Conjecture," New York University, Courant Institute of Mathematical Sciences, March 20, 2007.
131. "On the Effectiveness of Number Theory in Algebraic Geometry," invited talk, Algorithms in Algebraic Geometry Workshop, Institute for Mathematics and its Applications, Minnesotta, September 20, 2006.
132. "On the Effectiveness of Number Theory in Algorithmic Geometry," Algebra Seminar, Colorado State University, Ft. Collins, Colorado, August 24, 2006.
133. "Extremal Real Algebraic Geometry," Applied Mathematics Seminar, Colorado State University, Ft. Collins, Colorado, August 22, 2006.
134. "Convexity and a Phase Transitions for Detecting Real Roots," MAA MathFest 2006, Invited Paper Session on Computational Convexity and its Applications, Knoxville, Tennessee, August 10, 2006.
135. "Interpolating Between Quantum and Classical Complexity," NEC Research Laboratories, Princeton, New Jersey, May 18, 2006.
136. "Understanding Polynomial Equations: Complexity and Reality," two invited plenary lectures, Midatlantic Algebra Conference, James Madison University, Virginia, April 29–30, 2006.
137. "A-Discriminants and Real Algebraic Geometry," Invited Undergraduate Seminar Lecture, Trinity University, San Antonio, Texas, February 9, 2006.
138. "A-Discriminants and Real Algebraic Geometry," Graduate Student Seminar, Texas A&M University, February 2, 2006.

* Shortly after I was invited, I needed to cancel due to conflicts with other invitations and my summer REU course.

139. "Basic Tropicalia (or, How to Use Polyhedra to Understand Polynomials)," Workshop on Random Analytic Functions and Surfaces, American Institute of Mathematics, January 16, 2006.

(Talks before 2006 can be documented upon request.)

MENTORING

Weixun Deng — Ph.D. 2025 (expected)

Joshu Goldstein — Ph.D. 2025 (expected)

Yuyu Zhu (now at Facebook) — Ph.D. 2020

Timo DeWolff (now at TU Braunschweig) — Postdoc (co-mentored with F. Sottile), Fall '14 – Spring '17

Alperen Ergür (now a tenure-track assistant professor at UT San Antonio) — Ph.D. 2016

Kaitlyn Phillipson (Teaching Faculty II, U Wisconsin, Madison) — Ph.D. 2016

Korben Rusek (now at Google) — Ph.D. 2013

Mounir Nisse (now a professor at Xiamen U, Malaysia) — Postdoc (co-mentored with F. Sottile), Fall '10 – May '13

Harlan Kadish — Postdoc (co-mentored with J.M. Landsberg), Fall '11 – June '12

Martin Avendaño (now tenured at U Zaragoza, Spain) — Postdoc, Fall '08 – Summer '11

Rohun Kshirsagar — Graduate Research Assistant, Spring '11

Scott Zrebiec (now statistical projects manager, Lexis-Nexis) — Postdoc, Fall 2007 – June 2010

Ashraf Ibrahim (now postdoc at Texas A&M Aerospace Dept.) — Ph.D. 2009

Swami Sethuraman (now quantitative analyst at Royal Bank of Scotland) — Ph.D. 2009

Over 98 undergraduate NSF-sponsored REU students — Summers '04–'19 and '21–'23

David Offner (M.S. mathematics, 2020); Kris Watkins (M.S. mathematics, 2020); Emma Owusu Kwaakwah (M.S. mathematics, Aug. '16); Theodoros Kyriopolos (M.S. mathematics, Dec. '07); Michael Muzheve (M.S. mathematics, Dec. '05); Casey Stella (M.S. mathematics, May '05);

Zander Kelley (Computer Science, B.S.) — Summer 2014 – Summer 2016
Undergraduate Honor's Thesis student

Katherine Turner (Mathematics, B.S.) — Summer 2011 – Summer 2014
Undergraduate research assistant funded by my NSF Grant DMS-09515245

Jennifer Dieringer (Mathematics, B.S.) — June 2004 – Spring 2005
Undergraduate research assistant funded by my NSF Grant DMS-0211458

Brian Worthen (Mathematics, B.S.) — June 2004 – Fall 2005
Undergraduate research assistant funded by my NSF Grant DMS-0211458

Robert Bliss (Biochemistry, B.S.) — Oct. 2003 – Spring 2005
Undergraduate biochemistry research assistant, funded by my NSF Grant DMS-0211458, co-advised with Prof. Jerry Tsai (Biochemistry, Texas A&M)

Brad Holmes (Biochemistry, B.S.) — Oct. 2003 – Present
Undergraduate biochemistry research assistant, funded by my NSF Grant DMS-0211458, co-advised with Prof. Jerry Tsai (Biochemistry, Texas A&M)

Marianne Manglicmot (Computer Science, B.S.) — Dec. 2003 – Dec. 2004
Undergraduate computer science research assistant, funded by my NSF Grant DMS-0211458

Zhigang Zhang (Ph.D. Mathematics) — Fall 2002
Graduate research assistant, funded by my NSF Grant DMS-0138446

1 M. Phil. student (Shirley Cheung, co-advised with F. Cucker) and 4 B. Sci. Honors students (Nancy Chan, Jacqueline Chan, Angle Kim, and Christopher Wong) in computational mathematics at City University of Hong Kong, 1998–2000

EXTERNAL ACTIVITIES

- Invited Member, AMS Award for Mathematics Programs that Make a Difference Selection Committee (Feb. 1, 2024 – Jan. 31, 2027).
- Invited Member, AMS Fellows Selection Committee (Feb. 1, 2021 – Jan. 31, 2024).
- Editor, Houston Journal of Mathematics (Jan. 2008 – Present)
- Reviewer for European Research Council grant proposals (2 in 2015, 1 in 2020, 1 in 2021)
- Program Committee, ISSAC (International Symposium on Symbolic and Algebraic Computation), 2014
- NSF Panelist during '02–'09, '13, '19
- Reviewer for Canadian NSERC program, 2011
- Reviewer for Argentinian PICS Program, 2010
- Reviewer for AMS MathSciNet, Sept. '05 – Present
- Reviewer for NSF and DOE proposals, '03–'16
- Reviewer for NSF/CONICYT (joint US/Chile) Bicentennial Program in Science and Technology, '06
- Referee for:

· Journal of the American Mathematical Society
· Journal of the Association for Computing Machinery
· Discrete and Computational Geometry
· Journal of Mathematical Analysis and Applications
· Symposium on Theory of Computing (1999 Proceedings)
· Foundations of Computational Mathematics
· Information and Computation
· Econometrica
· Advances in Mathematics
· Journal of Symbolic Computation
· Mathematics of Computation
· American Journal of Mathematics
· Mathematical Programming
· Computational Complexity
· Journal of Complexity
· Computer Science Symposium in Russia '07
· Effective Methods in Algebraic Geometry (MEGA) '02, '05, '07, '09, '11, '13, '17
· SIAM Symposium on Discrete Algorithms 2014
· International Symposium on Symbolic and Algebraic Computation
· Contemporary Mathematics
· Journal of Algebraic Combinatorics

UNIVERSITY ACTIVITIES

- Member, Executive Committee, Mathematics Department, Fall 2022 – Present
- Chair, Sub-Committee P (Promotion), Department of Mathematics, Summer 2021 – Summer 2022
- Member, Graduate Committee, Mathematics Department, Fall 2018 – Spring 2020
- Member, Executive Committee, Mathematics Department, Fall 2016 – Summer 2018
- Member, Faculty Senate, Fall '10 - Summer '12
- Member, Faculty Senate Research Committee, Fall '10 – Summer '12
- Member, Departmental Graduate Admissions Committee, Fall '12 - Present
- Chair, Departmental Promotion Subcommittee, Fall '13 - Spring '14
- Member, Departmental Promotion Subcommittee, Fall '12 - Spring '13
- Member, Faculty Senate Legislative Affairs Committee, Fall '10 - Summer '12
- Member, Executive Committee, Mathematics Department, Sept. '04 - Aug. '06 & Sept. '09 - Aug. 11
- Member, Undergraduate Program Committee, Mathematics Department, Sept. 2005 – Aug. 2007

LANGUAGES

- English (native speaker)
- Portuguese
- Spanish
- French (reading knowledge)

REFERENCES

- Federico Ardila (Professor of Mathematics, San Francisco State University, California)
- Eric Bach (Professor of Computer Science, University of Wisconsion, Madison)
- Saugata Basu (Professor of Mathematics and Computer Science, Purdue University)
- Peter Bürgisser (Professor, Algebraic Complexity and Algorithmic Algebra, Technical University of Berlin, Germany)
- David A. Cox (Professor of Mathematics (retired), Amherst College)
- Pascal Koiran (Professor of Computer Science, ENS Lyon)
- Bruce Reznick (Professor (retired), University of Illinois, Urbana-Champaign)
- Andrew Sommese (Duncan Professor of Mathematics, Notre Dame University, Indiana)