

# LEK-HENG LIM

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Permanent Residence: United States; Citizenship: Singapore

## EMPLOYMENT

### University of Chicago

Associate Professor, Computational and Applied Mathematics Initiative, Department of Statistics  
(since Jul 2017; with tenure)

Assistant Professor, Computational and Applied Mathematics Initiative, Department of Statistics  
(Jul 2010–Jun 2017; tenure track)

### University of California, Berkeley

Charles B. Morrey Assistant Professor, Department of Mathematics  
(Jul 2007–Jun 2010; mentors: Ming Gu and Bernd Sturmfels)

## EDUCATION

### Stanford University

Ph.D. in Computational and Mathematical Engineering  
(Sep 2001–Jun 2007; principal advisors: Gene Golub and Gunnar Carlsson)

### Cambridge University

Cornell University's 2000/01 Clare Hall Fellow  
(Sep 2000–Aug 2001; matriculated Ph.D. student; transferred to Stanford in 2001)

### Cornell University

M.S. in Mathematics  
(Aug 1998–Aug 2000; Ph.D. candidate; won fellowship to Cambridge in 2000)

### National University of Singapore

B.Sc. (Honors) in Mathematics  
(Aug 1993–May 1996; direct honors program)

## SELECTED HONORS

### Society for Industrial and Applied Mathematics

James H. Wilkinson Prize in Numerical Analysis and Scientific Computing, 2017  
([http://www.siam.org/prizes/sponsored/wilkinson\\_nasc.php](http://www.siam.org/prizes/sponsored/wilkinson_nasc.php))

### Foundations of Computational Mathematics

Stephen Smale Prize, 2017  
([http://focm-society.org/smale\\_prize.php](http://focm-society.org/smale_prize.php))

### Defense Advanced Research Projects Agency

Director's Fellowship, 2017–2018  
(<http://www.darpa.mil/news-events/2017-09-07>)

Young Faculty Award, 2015–2017

(<http://www.darpa.mil/work-with-us/for-universities/young-faculty-award>)

### Air Force Office of Scientific Research

Young Investigator Award, 2013–2016  
(<http://community.afosr.org/wg/afosr/w/researchareas/12792/young-investigator-program-yip/>)

### National Science Foundation

Faculty Early Career Development Award, 2011–2016  
(<http://www.nsf.gov/career>)

**Massachusetts Institute of Technology**

Distinguished Seminar Series in Computational Science and Engineering, Win 2019

<http://computationalengineering.mit.edu/events>**Duke University–North Carolina State University–University of North Carolina**

Triangle Lectures in Combinatorics, Fall 2018

<http://wp.math.ncsu.edu/tlc/>**Foundations of Computational Mathematics**

Smale Prize Lecture, 2017

<http://www.ub.edu/focm2017/smaleprize.html>**Society for Industrial and Applied Mathematics**

James H. Wilkinson Prize Lecture, 2017

<http://www.siam.org/meetings/an17/prizes.php>**Pacific Institute for the Mathematical Sciences**

PIMS–CSC Distinguished Lecture, 2016

<http://www.pims.math.ca/scientific-event/161202-pscdsslhl>**Rice University**

Peaceman Lecture on Numerical Mathematics, 2014

<http://www.caam.rice.edu/peaceman-lectures-numerical-mathematics>**International Linear Algebra Society**

LAA Plenary Lecture, 2010

<http://www.ilasic.org/misc/laaleclecturers.html>

## PUBLISHED/ACCEPTED PAPERS

- [1] S. Friedland, L.-H. Lim, and J. Zhang, “An elementary and unified proof of Grothendieck’s inequality,” *Enseign. Math.*, to appear.
- [2] L. Zhang, G. Naitzat, and L.-H. Lim, “Tropical geometry of deep neural networks,” *Proc. Int. Conf. Mach. Learn. (ICML)*, **35** (2018), pp. 5824–5832.
- [3] S. Friedland and L.-H. Lim, “Nuclear norm of higher-order tensors,” *Math. Comp.*, **87** (2018), no. 311, pp. 1255–1281.
- [4] K. Ye and L.-H. Lim, “Fast structured matrix computations: tensor rank and Cohn–Umans method,” *Found. Comput. Math.*, **18** (2018), no. 1, pp. 45–95.
- [5] K. Ye and L.-H. Lim, “Cohomology of cyro-electron microscopy,” *SIAM J. Appl. Algebra Geometry*, **1** (2017), no. 1, pp. 507–535.
- [6] M. Ankele, L.-H. Lim, S. Groeschel, and T. Schultz, “Versatile, robust, and efficient tractography with constrained higher-order tensor fODFs,” *Int. J. Comput. Assist. Radiol. Surg.*, **12** (2017), no. 8, pp. 1257–1270.
- [7] A. Benson, D. Gleich, and L.-H. Lim, “The spacey random walk: a stochastic process for higher-order data,” *SIAM Rev.*, **59** (2017), no. 2, pp. 321–345.
- [8] L.-H. Lim, “Self-concordance is NP-hard,” *J. Global Optim.*, **68** (2017), no. 2, pp. 357–366.
- [9] L.-H. Lim and J. Weare, “Fast randomized iteration: diffusion Monte Carlo through the lens of numerical linear algebra,” *SIAM Rev.*, **59** (2017), no. 3, pp. 547–587.
- [10] S. Friedland and L.-H. Lim, “The computational complexity of duality,” *SIAM J. Optim.*, **26** (2016), no. 4, pp. 2378–2393.
- [11] K. Ye and L.-H. Lim, “Algorithms for structured matrix-vector product of optimal bilinear complexity,” *Proc. IEEE Inform. Theory Workshop (ITW)*, **16** (2016), pp. 310–314.
- [12] M. Ankele, L.-H. Lim, S. Groeschel, and T. Schultz, “Fast and accurate multi-tissue deconvolution using SHORE and H-PSD tensors,” pp. 502–510, S. Ourselin et al. (Eds.), *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, **III**, Springer International, Cham, 2016.
- [13] Y. Qi, P. Comon, and L.-H. Lim, “Semialgebraic geometry of nonnegative tensor rank,” *SIAM J. Matrix Anal. Appl.*, **37** (2016), no. 4, pp. 1556–1580.
- [14] K. Ye and L.-H. Lim, “Schubert varieties and distances between subspaces of different dimensions,” *SIAM J. Matrix Anal. Appl.*, **37** (2016), no. 3, pp. 1176–1197.

- [15] K. Ye and L.-H. Lim, "Every matrix is a product of Toeplitz matrices," *Found. Comput. Math.*, **16** (2016), no. 3, pp. 577–598.
- [16] Y. Qi, P. Comon, and L.-H. Lim, "Uniqueness of nonnegative tensor approximations," *IEEE Trans. Inform. Theory*, **62** (2016), no. 4, pp. 2170–2183.
- [17] D. Gleich, L.-H. Lim, and Y. Yu, "Multilinear PageRank" *SIAM J. Matrix Anal. Appl.*, **36** (2015), no. 4, pp. 1507–1541.
- [18] L.-H. Lim, "Hodge Laplacians on graphs," S. Mukherjee (Ed.), *Geometry and Topology in Statistical Inference, Proc. Sympos. Appl. Math.*, **73**, AMS, Providence, RI, 2015.
- [19] A. Rajkumar, S. Ghoshal, L.-H. Lim, and S. Agarwal, "Ranking from stochastic pairwise preferences: recovering Condorcet winners and tournament solution sets at the top," *Proc. Int. Conf. Mach. Learn. (ICML)*, **37** (2015), pp. 665–673.
- [20] L.-H. Lim and P. Comon, "Blind multilinear identification," *IEEE Trans. Inform. Theory*, **60** (2014), no. 2, pp. 1260–1280.
- [21] T. Schultz, A. Fuster, A. Ghosh, L. Florack, R. Deriche, and L.-H. Lim, "Higher-order tensors in diffusion imaging," pp. 129–161, C.-F. Westin et al. (Eds.), *Visualization and Processing of Tensors and Higher Order Descriptors for Multi-Valued Data*, Springer-Verlag, Berlin Heidelberg, 2014.
- [22] C. J. Hillar and L.-H. Lim, "Most tensor problems are NP-hard," *J. ACM*, **60** (2013), no. 6, Art. 45, 39 pp.
- [23] L.-H. Lim, "Tensors and hypermatrices," Art. 15, 30 pp., in L. Hogben (Ed.), *Handbook of Linear Algebra*, 2nd Ed., CRC Press, Boca Raton, FL, 2013.
- [24] M. Gu, L.-H. Lim, and C. Wu, "PARNES: A rapidly convergent algorithm for accurate recovery of sparse and approximately sparse signals," *Numer. Algorithms*, **64** (2013), no. 2, pp. 321–347.
- [25] D. Gleich and L.-H. Lim, "Rank aggregation via nuclear norm minimization," *Proc. ACM SIGKDD Conf. Knowledge Discovery and Data Mining (KDD)*, **17** (2011), pp. 60–68.
- [26] X. Jiang, L.-H. Lim, Y. Yao, and Y. Ye, "Statistical ranking with combinatorial Hodge theory," *Math. Program.*, **127** (2011), no. 1, pp. 203–244.
- [27] B. Savas and L.-H. Lim, "Quasi-Newton methods on Grassmannians and multilinear approximations of tensors and symmetric tensors," *SIAM J. Sci. Comput.*, **32** (2010), no. 6, pp. 3352–3393.
- [28] L.-H. Lim and P. Comon, "Multisensor signal processing: tensor decomposition meets compressed sensing," *C. R. Acad. Sci. Paris, Series IIB – Mechanics*, **338** (2010), no. 6, pp. 311–320.
- [29] L.-H. Lim and P. Comon, "Nonnegative approximations of nonnegative tensors," *J. Chemometrics*, **23** (2009), no. 7–8, pp. 432–441.
- [30] M. Mørup, L. Hansen, S. Arnfred, L.-H. Lim, and K. Madsen, "Shift-invariant multilinear decomposition of neuroimaging data," *NeuroImage*, **42** (2008), no. 4, pp. 1439–1450.
- [31] P. Comon, G. Golub, L.-H. Lim, and B. Mourrain, "Symmetric tensor and symmetric tensor rank," *SIAM J. Matrix Anal. Appl.*, **30** (2008), no. 3, pp. 1254–1279.
- [32] V. De Silva and L.-H. Lim, "Tensor rank and the ill-posedness of the best low-rank approximation problem," *SIAM J. Matrix Anal. Appl.*, **30** (2008), no. 3, pp. 1084–1127.
- [33] P. Comon, G. Golub, L.-H. Lim, and B. Mourrain, "Genericity and rank deficiency of high order symmetric tensors," *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Process. (ICASSP)*, **31** (2006), no. 3, pp. 125–128.
- [34] L.-H. Lim, "Singular values and eigenvalues of tensors: a variational approach," *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Process. (CAMSAP)*, **1** (2005), pp. 129–132.
- [35] L.-H. Lim, J. Packer, and K. Taylor, "Direct integral decomposition of the wavelet representation," *Proc. Amer. Math. Soc.*, **129** (2001), no. 10, pp. 3057–3067.
- [36] L.-H. Lim, "Security of the Cao–Li public key cryptosystem," *Electron. Lett.*, **34** (1998), no. 2, pp. 170–172.

SUBMITTED PREPRINTS

- [37] L.-H. Lim, K. Wong, and K. Ye, "The Grassmannian of affine subspaces," <http://arxiv.org/abs/1807.10883>.
- [38] J. Rodriguez, L.-H. Lim, and Y. You, "Fiber product homotopy method for multiparameter eigenvalue problems," <http://arxiv.org/abs/1806.10578>.
- [39] L.-H. Lim, R. Sepulchre, and K. Ye, "Geometric distance between positive definite matrices of different dimensions," <http://arxiv.org/abs/1806.01428>.
- [40] P. Comon, L.-H. Lim, Y. Qi, and K. Ye, "Topology of tensor ranks," <http://arxiv.org/abs/1804.08060>.
- [41] K. Ye and L.-H. Lim, "Tensor network ranks," <http://arxiv.org/abs/1801.02662>.
- [42] Y. Qi, M. Michalek, and L.-H. Lim, "Complex best  $r$ -term approximations almost always exist in finite dimensions," <http://arxiv.org/abs/1711.11269>.

- [43] J. Zhang, S. Friedland, and L.-H. Lim, “Grothendieck constant is norm of Strassen matrix multiplication tensor,” <http://arxiv.org/abs/1711.04427>.
- [44] Y. You, J. Rodriguez, and L.-H. Lim, “Accurate solutions of polynomial eigenvalue problems,” <http://arxiv.org/abs/1711.01301>.
- [45] J. Foo, L.-H. Lim, and K. Wong, “Macroeconomics and FinTech: uncovering latent macroeconomic effects on peer-to-peer lending,” <http://arxiv.org/abs/1710.11283>.
- [46] L.-H. Lim, K. Wong, and K. Ye, “Numerical algorithms on the affine Grassmannian,” <http://arxiv.org/abs/1607.01833>.
- [47] B. St. Thomas, L. Lin, L.-H. Lim, and S. Mukherjee, “Learning subspaces of different dimensions,” <http://arxiv.org/abs/1404.6841>.

#### EXPOSITORY

- [48] L.-H. Lim, “Feature interviews: The field is as exciting as ever — interview of Shmuel Friedland,” *IMAGE: Bull. Internat. Linear Algebra Soc.*, **59** (2017), Fall, pp. 3–8.
- [49] M. Mahoney, L.-H. Lim, and G. Carlsson, “MMDS 2008: Algorithmic and statistical challenges in modern large-scale data analysis are the focus,” *Statist. Comput. Graph.*, **20** (2009), no. 1, pp. 12–18.
- [50] M. Mahoney, L.-H. Lim, and G. Carlsson, “Algorithmic, statistical challenges in data analysis focus of MMDS 2008,” *AMSTAT News*, **384** (2009), pp. 16–19.
- [51] M. Mahoney, L.-H. Lim, and G. Carlsson, “MMDS 2008: Algorithmic and statistical challenges in modern large-scale data analysis, Parts I & II,” *SIAM News*, **42** (2009), no. 1, pp. 8, & no. 2, pp. 8–9.
- [52] M. Mahoney, L.-H. Lim, and G. Carlsson, “Algorithmic and statistical challenges in modern large-scale data analysis are the focus of MMDS 2008,” *KDD Explorations*, **10** (2008), no. 2, pp. 57–60.
- [53] M. Mahoney, L.-H. Lim, and G. Carlsson, “Algorithms for modern massive data sets,” *IMS Bulletin*, **37** (2008), no. 10, pp. 10–11.
- [54] G. Golub, M. Mahoney, P. Drineas, and L.-H. Lim, “Bridging the gap between numerical linear algebra, theoretical computer science, and data applications,” *SIAM News*, **39** (2006), no. 8, pp. 1 & 16.

#### STUDENT AWARDS

##### **Stanford University**

Gerald J. Lieberman Fellowship, 2006/2007

(citation: ‘in recognition of outstanding scholarship, teaching, and university service’; ‘awarded on the basis of potential for academic leadership’)

##### **Cornell University**

Clare Hall Fellowship, 2000/2001

(tenable at Cambridge; selectivity: each department at Cornell nominates one candidate, two fellowships awarded)

Graduate School Scholarship, Sep 2000

(citation: ‘awarded in recognition of academic excellence’)

##### **Cambridge University**

Cambridge Commonwealth Trust Overseas Student Award, May 1997

(for graduate studies at Cambridge; declined award due to employment restrictions)

##### **National University of Singapore**

Direct Honors Program, 1994/1995/1996

(completed four-year program in three years; selectivity: 7 out of a cohort of 1614)

Dean’s List, 1993/1994/1995

(citation: ‘awarded for meritorious performance’; selectivity: top 5% of cohort; made Dean’s List throughout college)

#### EDITORIAL SERVICES

##### **Linear Algebra and its Applications**

Associate Editor, since 2012

Guest Editor (with M. Drton, W.-B. Wu), Special issue on *Statistics*, 2013–2014

Guest Editor (with S. Friedland, T. Kolda, E. Tyrtyshnikov), Special issue on *Tensors and Multilinear Algebra*, 2010–2011

## Linear and Multilinear Algebra

Associate Editor, since 2013

## Mathematical Programming B

Guest Editor (with S. Friedland, J.-B. Lasserre, J. Nie), Special issue on *Tensor and Polynomial Optimization*, 2018–

## Numerical Algorithms

Associate Editor, since 2018

## Numerical Linear Algebra and its Applications

Guest Editor (with M. K.-P. Ng, L. Qi), Special issue on *Spectral Theory of Tensors*, Mar 2011–Dec 2012

## GRANTS

### National Science Foundation

BIGDATA:F: Big Data, It's Not So Big — Exploiting Low-Dimensional Geometry for Learning and Inference

(IIS-1546413; amount awarded: \$1,000,000; with L. Lin and S. Mukherjee; 2015–2018; co-PI)

IMA Summer School Supplementary Funding

(DMS-1417916; amount awarded: \$40,000; with R. Kondor and J. Morton; 2014–2016; co-PI)

Collaborative Research: Numerical Algebra and Statistical Inference

(DMS-1209136; amount awarded: \$300,000; with S. Mukherjee; 2012–2015; PI)

CAREER: Numerical Multilinear Algebra and its Applications — From Matrices to Tensors

(DMS-1057064; amount awarded: \$550,000; 2011–2016; PI)

### Defense Advanced Research Projects Agency

Young Faculty Award Program: Statistical Inference on Grassmannians

(D15AP00109; amount awarded: \$750,000; 2015–2018; PI)

### Air Force Office of Scientific Research

Young Investigator Research Program: Multilinear Computing and Multilinear Algebraic Geometry

(FA9550-13-1-0133; amount awarded: \$400,000; 2013–2016; PI)

## OTHER PROFESSIONAL ACTIVITIES

### Grant Review Panels

Reviewer for *Mathematical Sciences Program*, National Security Agency, Apr 2016

Panel on *Numerical Linear Algebra and Related Areas*, National Science Foundation, Mar 2010

Panel on *Mathematics for Analysis of Petascale Data*, Department of Energy, Jun 2009

### External Ph.D. Oral Defense/Candidacy Jury

KATHOLIEKE UNIVERSITEIT LEUVEN: Laurent Sorber, Ph.D. in Engineering, Mar 2014

UNIVERSITY OF CALIFORNIA, BERKELEY: Ngoc-Mai Tran, Ph.D. in Statistics, Apr 2011

UNIVERSITY OF ILLINOIS, CHICAGO: Elizabeth Gross, Ph.D. in Mathematics, May 2013

### Program Committees

2020 ILAS Meeting; 2017 SIAM Conference on Applied Algebraic Geometry; 2015 Program on Combinatorial and Toric Homotopy, Institute for Mathematical Sciences, Singapore; 2015 International Conference on Artificial Intelligence and Statistics (AISTAT); 2014 SIAM Workshop on Combinatorial Scientific Computing

### Journal Refereeing

MATHEMATICS: *Advances in Mathematics*, *Communications in Mathematical Sciences*, *Discrete and Computational Geometry*, *Duke Mathematical Journal*, *Forum of Mathematics Pi*, *Foundations of Computational Mathematics*, *Journal of Applied and Computational Topology*, *Linear Algebra and its Applications*, *Linear and Multilinear Algebra*, *Mathematics of Computation*

NUMERICS: *Applied and Computational Harmonic Analysis*, *BIT Numerical Mathematics*, *Calcolo*, *IMA Journal of Numerical Analysis*, *Journal of Scientific Computing*, *Mathematical and Computer Modelling*, *Numerische Mathematik*, *SIAM Journal on Applied Algebra and Geometry*, *SIAM Journal on Discrete Mathematics*, *SIAM Journal on Matrix Analysis and Applications*, *SIAM Journal on Numerical Analysis*, *SIAM Journal on Scientific Computing*, *SIAM Journal on Uncertainty Quantification*, *SIAM Review*

**OPTIMIZATION:** INFORMS Annual Meeting Tutorial, Journal of Global Optimization, Mathematical Programming, Mathematics of Operations Research, Optimization Methods and Software, SIAM Journal on Optimization

**ALGORITHMS:** Information and Computation, Journal of the ACM, Journal of Symbolic Computation, ACM–SIAM Symposium on Discrete Algorithms (SODA), Theory of Computing Systems, Theoretical Computer Science

**MACHINE LEARNING:** Annals of Statistics, Biometrika, Data Mining and Knowledge Discovery, Computational Statistics and Data Analysis, IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Pattern Analysis and Machine Intelligence, International Conference on Machine Learning (ICML), Journal of the American Statistical Association, Journal of Machine Learning Research, Neural Information Processing Systems (NIPS)

**SCIENCE AND ENGINEERING:** Electronics Letters, IEEE Transactions on Geoscience and Remote Sensing, IEEE Transactions on Information Theory, IEEE Transactions on Image Processing, IEEE Transactions on Signal Processing, Journal of Chemometrics, Journal of Computational Physics, Proceedings of the National Academy of Sciences

## TEACHING

### University of Chicago

Instructor, Department of Statistics

(Fall: Stat 30900 Mathematical Computation I – Matrix Computation; Winter: Stat 31015 Mathematical Computation IIA – Convex Optimization; Spring: Stat 28000 Optimization, Stat 31060 Further Mathematical Computation, Stat 31070 Modern Approximation Theory)

### University of California, Berkeley

Instructor, Department of Mathematics

(Fall 07/Spring 08: Math 110 Linear Algebra; Fall 07/Fall 08/Fall 09: Math 185 Complex Analysis; Spring 09/Spring 10: Math 104 Introductory Analysis; Spring 09: Math 114 Galois Theory; Fall 09: Math 191 Mathematical Tools for the Information Sciences)

### Stanford University

Course Assistant, Departments of Computer Science and Management Science & Engineering

(Spring 03: MS&E 315 Linearly Constrained Optimization; Fall 05: CS 237A Numerical Linear Algebra; Spring 06: CS 336 Advanced Methods in Matrix Computations)

### Cambridge University

Supervisor, Queen’s College and Trinity College

(Lent 01: Mathematical Tripos Part II B2 Representation Theory)

### Cornell University

Teaching Assistant/Recitation Instructor, Department of Mathematics

(Fall 98: Math 193 Calculus for Engineers; Spring 99: Math 423 Applied Functional Analysis; Fall 99: Math 332 Algebra and Number Theory; Spring 00: Math 422 Complex Analysis and Distribution Theory)

## TALKS

### Universities

CALIFORNIA INSTITUTE OF TECHNOLOGY: Applied and Computational Mathematics Colloquium

CORNELL UNIVERSITY: Computer Science Colloquium

DUKE UNIVERSITY: Applied Mathematics Seminar

GEORGIA INSTITUTE OF TECHNOLOGY: Applied and Computational Mathematics Seminar, Algebra Seminar

ILLINOIS INSTITUTE OF TECHNOLOGY: Applied Mathematics Colloquia

KYOTO UNIVERSITY: Computational Algebraic Statistics Workshop

MASSACHUSETTS INSTITUTE OF TECHNOLOGY: Applied Mathematics Colloquium; Computational Engineering Seminar

MCMASTER UNIVERSITY: Mathematics Colloquium

NATIONAL UNIVERSITY OF SINGAPORE: Applied and Computational Mathematics Seminar; Mathematics Colloquium

NEW YORK UNIVERSITY: Mathematics Colloquium

NORTH CAROLINA STATE UNIVERSITY: Symbolic Computation Seminar

PEKING UNIVERSITY: School of Mathematical Sciences Centennial Celebration (Young Mathematician Forum)

PENNSYLVANIA STATE UNIVERSITY: Applied Algebra Seminar; Statistics Colloquium

PURDUE UNIVERSITY: Computational and Applied Mathematics Seminar; Real and Computational Algebraic Geometry Seminar

PRINCETON UNIVERSITY: Program in Applied and Computational Mathematics Colloquium  
 RICE UNIVERSITY: Peaceman Lecture in Numerical Mathematics  
 STANFORD UNIVERSITY: Applied Mathematics Seminar; Linear Algebra and Optimization Seminar; Scientific Computing/Computational Math Seminar  
 TECHNICAL UNIVERSITY OF DENMARK: Informatics Graduate School Seminar  
 TEXAS A&M UNIVERSITY: Geometry Seminar; Statistics Colloquia  
 TSINGHUA UNIVERSITY: Mathematical Sciences Departmental Seminar  
 UNIVERSITY OF CALIFORNIA, BERKELEY: Convex Algebraic Geometry Seminar; Matrix Computations and Scientific Computing Seminar; Industrial Engineering and Operations Research Seminar  
 UNIVERSITY OF CALIFORNIA, DAVIS: Algebra and Discrete Mathematics Seminar; Joint Mathematics/Statistics Colloquium  
 UNIVERSITY OF CALIFORNIA, SAN DIEGO: Computational and Applied Mathematics Seminar; Mathematics Colloquium  
 UNIVERSITY OF CHICAGO: Statistics Seminar; Theory of Computing Seminar  
 UNIVERSITY OF ILLINOIS, CHICAGO: Mathematics Colloquium  
 UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN: Initiative for Mathematical Sciences and Engineering Symposium; Mathematics Colloquium  
 UNIVERSITY OF MICHIGAN, ANN ARBOR: Applied and Interdisciplinary Mathematics Seminar  
 UNIVERSITY OF MINNESOTA, MINNEAPOLIS: Mathematics Colloquium; Mathematical Physics Seminar  
 UNIVERSITY OF PENNSYLVANIA: Monthly Workshop on Topology: Identifying Order in Complex Systems  
 UNIVERSITY OF TEXAS, AUSTIN: Computer Science Colloquium; Computational Engineering and Sciences Seminar; Numerical Analysis Seminar  
 UNIVERSITY OF UTAH: Mathematics Colloquium  
 UNIVERSITY OF WISCONSIN, MADISON: Applied Algebra Days; Mathematics Colloquium; Statistics Seminar  
 VANDERBILT UNIVERSITY: Mathematics Colloquium

### Research Institutes

ABDUS SALAM INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS: Advanced School and Workshop on Matrix Geometries and Applications (*four lectures*)  
 AMERICAN INSTITUTE OF MATHEMATICS: Mathematics of Ranking Workshop  
 CENTRE INTERNATIONAL DE RENCONTRES MATHÉMATIQUES: Tensor Decompositions Workshop  
 INTERNATIONAL CENTRE FOR MATHEMATICS AND COMPUTER SCIENCE, TOULOUSE: Workshop on Optimization in Machine Learning, Vision and Image Processing  
 CHERN INSTITUTE OF MATHEMATICS: International Conference on Spectral Theory of Tensors; International Conference on Tensor, Matrix and their Applications (*Plenary*)  
 HAUSDORFF RESEARCH INSTITUTE FOR MATHEMATICS: Workshop on Low Complexity Models in Signal Processing; Workshop on Low-rank Optimization and Application; Workshop on Tensor Products for High-Dimensional Problems  
 INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS: Workshop on Optimization and Parsimonious Modeling; Workshop on Machine Learning Theory and Computation  
 INSTITUTE FOR MATHEMATICAL SCIENCES, SINGAPORE: Workshop on Large Scale Conic Optimization  
 INSTITUTE FOR PURE AND APPLIED MATHEMATICS: Convex Optimization and Algebraic Geometry Workshop  
 LEIBNIZ CENTER FOR INFORMATICS AT DAGSTUHL: Seminar on Communication Complexity, Linear Optimization, and Lower Bounds for Nonnegative Rank of Matrices; Seminar on Visualization and Processing of Tensors  
 MATHEMATICAL SCIENCES RESEARCH INSTITUTE: Algebraic Statistics Workshop  
 MATHEMATICAL RESEARCH INSTITUTE OF OBERWOLFACH: Workshop on Nonlinear Data: Theory and Algorithms; Workshop on Learning Theory and Approximation  
 SIMONS INSTITUTE FOR THE THEORY OF COMPUTING: Workshop on Spectral Algorithms  
 TOYOTA INSTITUTE OF TECHNOLOGY: TTIC Colloquium

### Professional Societies

AMERICAN MATHEMATICAL SOCIETY: 2014 Short Course on Geometry and Topology in Statistical Inference, 2009 Joint Mathematics Meeting; 2016 Fall Southeastern Sectional Meeting; 2013 Spring Central Sectional Meeting; 2000 Fall Western Sectional Meeting  
 AMERICAN STATISTICAL ASSOCIATION: 2012 Joint Statistical Meetings; 2012 Conference on Statistical Learning and Data Mining

CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES: 2016 NSF–CBMS Regional Research Conference on Topological Data Analysis  
 EUROPEAN RESEARCH CONSORTIUM FOR INFORMATICS AND MATHEMATICS: 6th ERCIM Workshop on Matrix Computations and Statistics  
 FOUNDATIONS OF COMPUTATIONAL MATHEMATICS: 2014 Workshop on Computational Algebraic Geometry; 2014 Workshop on Numerical Linear Algebra (*Semi-plenary*)  
 INTERNATIONAL CONGRESS ON INDUSTRIAL AND APPLIED MATHEMATICS: 8th and 6th ICIAM Meeting  
 INTERNATIONAL LINEAR ALGEBRA SOCIETY: 18th and 16th ILAS Conference  
 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: 2016 IEEE Information Theory Workshop; 2005 IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing  
 MATHEMATICAL PROGRAMMING SOCIETY: 2012, 2009 International Symposium of Mathematical Programming  
 NEURAL INFORMATION PROCESSING SYSTEMS FOUNDATION: 2016 NIPS Workshop on Learning with Tensors, 2010 NIPS Workshop on Tensors, Kernels, and Machine Learning; 2009 NIPS Workshop on Advances in Ranking; 2008 NIPS Symposium and Workshop on Algebraic and Combinatorial Methods in Machine Learning  
 SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS: 2013 SIAM Conference on Applied Algebraic Geometry; 2012 SIAM Conference on Applied Linear Algebra; 2017 and 2011 SIAM Conference on Optimization; 2014 and 2010 SIAM Conference on Imaging Science; 2012, 2010, 2008, and 2003 SIAM Annual Meeting

### Government

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH: Cybersecurity and Information Science Program Review  
 ARGONNE NATIONAL LABORATORY: Laboratory for Advanced Numerical Simulations Informal Seminar  
 LAWRENCE BERKELEY NATIONAL LABORATORY: Scientific Computing Seminar  
 NATIONAL SCIENCE FOUNDATION: Future Directions in Tensor-based Computation and Modeling

### Other conferences

2018 INTERNATIONAL CONFERENCE OF NUMERICAL ANALYSIS AND APPLIED MATHEMATICS (*Invited*)  
 2018 GEORGIA ALGEBRAIC GEOMETRY SYMPOSIUM (*Invited*)  
 2017 and 2013 INTERNATIONAL CONFERENCE ON ENGINEERING AND COMPUTATIONAL MATHEMATICS (*Invited*)  
 2017 INTERNATIONAL CONFERENCE ON MATHEMATICS OF DATA SCIENCE (*Invited*)  
 2016 INTERNATIONAL WORKSHOP ON MATHEMATICAL ASPECTS OF DATA SCIENCE (*Invited*)  
 2016 WORKSHOP ON TENSOR DECOMPOSITIONS AND APPLICATIONS (*Keynote*)  
 2015 WINTER SCHOOL ON SEARCH FOR LATENT VARIABLES: ICA, TENSORS, AND NMF (*Invited*)  
 2014 WORKSHOP ON STRUCTURED MATRICES AND TENSORS (*Invited*)  
 2014 WORKSHOP ON MATHEMATICAL ISSUES IN INFORMATION SCIENCES III (*Invited*)  
 2013 EUROPEAN NUMERICAL MATHEMATICS AND ADVANCED APPLICATIONS Conference  
 2012 CORTONA WORKSHOP ON Structured Numerical Linear and Multilinear Algebra Problems  
 2011 HOUSEHOLDER SYMPOSIUM XVIII (*Plenary*)  
 2011 INTERNATIONAL CONFERENCE ON COMPUTATIONAL HARMONIC ANALYSIS IV (*Invited*)  
 2007 SYMPOSIUM ON GENE GOLUB’S LEGACY: MATRIX COMPUTATIONS — FOUNDATION AND FUTURE

### Lecture series

UNIVERSITY OF LISBON, PORTUGAL Centro de Matemática e Aplicações Fundamentais: Lectures on “Tensors and Hypermatrices” (*four lectures*)  
 HONG KONG BAPTIST UNIVERSITY Institute for Computational Mathematics: Lectures on “Numerical Multilinear Algebra” (*six lectures*)  
 NATIONAL TAIWAN UNIVERSITY National Center for Theoretical Sciences: Short Course on “The Mathematics of Data” (*four lectures*)

## MEETINGS ORGANIZED

### 2015 SIAM Conference on Applied Linear Algebra

Minisymposium on *Multilinear Algebra, Markov Chains, and Hypergraphs*, Atlanta, GA, Oct 29, 2015 (with D. Gleich)

### 2015 Stevanovich Center Conferences

Conference on *Geometry and Data Analysis*, University of Chicago, IL, Jun 8–10, 2015 (with S. Weinberger)



**2014 Simons Institute Workshop**

Workshop on *Tensors in Computer Science and Geometry*, University of California, Berkeley, CA, Nov 10–14, 2014 (with H. Cohn, J. Morton, G. Ottaviani)

**2014 IMA Summer Graduate Program**

Summer School on *Modern Applications of Representation Theory*, University of Chicago, Chicago, IL, Jul 21–Aug 6, 2014 (with R. Kondor, J. Morton)

**2014 International Conference on Machine Learning**

Workshop on *Topological Methods for Machine Learning*, Beijing, China, Jun 25, 2014 (with Y. Yao, J. Zhu, X. Zhu)

**2014 ICERM Topical Workshop**

Workshop on *Computational Nonlinear Algebra*, Brown University, Providence, RI, Jun 2–6, 2014 (with G. Blekherman, P. Parrilo, A. Sommese, R. Thomas)

**2014 SIAM Conference on Optimization**

Minisymposium on *Tensor and Optimization Problems*, San Diego, CA, May 22, 2014 (with J. Nie)

**2013 IMA Annual Program**

Workshop on *Modern Applications of Homology and Cohomology*, University of Minnesota, Minneapolis, MN, Oct 28–Nov 1, 2013 (with A. Blumberg, Y. Yao)

**2013 SIAM Conference on Applied Algebraic Geometry**

Minisymposium on *Algebraic Geometry of Tensor Decompositions*, Fort Collins, CO, Aug 1–3, 2013

**2013 International Conference on Continuous Optimization**

Session on *Algebraic Geometry and Semidefinite Programming*, Lisbon, Portugal, Jul 29–30, 2013 (with C. Reiner)

**2012 International Symposium of Mathematical Programming**

Minisymposium on *Algebraic Geometry and Conic Programming*, Berlin, Germany, Aug 24, 2012 (with C. Reiner, M. Schweighofer)

**2012 Mysore Park Workshop**

Workshop on *Machine Learning*, Mysore, India, Aug 1–5, 2012 (with P. Jain, I. Dhillon)

**2011 SIAM Conference on Applied Algebraic Geometry**

Minisymposium on *Algebraic Geometry of Tensor Decompositions*, Raleigh, NC, Oct 6–7, 2011

**7th International Congress on Industrial and Applied Mathematics**

Minisymposium on *Applied Hodge Theory*, Vancouver, BC, Canada, Jul 18–19, 2011 (with A. Hirani, Y. Yao)

**2011 SIAM Conference on Optimization**

Minisymposium on *Algebraic Geometry and Optimization*, Darmstadt, Germany, May 16–17, 2011 (with C. Reiner, M. Schweighofer)

Minisymposium on *Algorithms for Ranking*, Darmstadt, Germany, May 18, 2011 (with D. Hochbaum)

**2010 AIM Research Workshop**

Workshop on *The Mathematics of Ranking*, American Institute of Mathematics, Palo Alto, CA, Aug 16–20, 2010 (with S. Agarwal)

**16th Conference of the International Linear Algebra Society**

Session on *Tensor Computations in Linear and Multilinear Algebra*, Pisa, Italy, Jun 24–25, 2010 (with E. Tyrtyshnikov)

**2010 Workshop on Algorithms for Modern Massive Data Sets**

Stanford University, Stanford, CA, Jun 15–18, 2010 (with G. Carlsson, P. Drineas, M. Mahoney, A. Shkolnik)

**2009 SIAM Conference on Applied Linear Algebra**

Minisymposium on *Multilinear Methods in Numerical Linear Algebra*, Monterey, CA, Oct 29, 2009 (with E. Tyrtyshnikov)

Minisymposium on *Applied Multilinear Algebra*, Monterey, CA, Oct 28, 2009 (with J. Morton)

**2009 European Workshop on Challenges in Modern Massive Data Sets**

Technical University of Denmark, Lyngby, Denmark, Jul 1–4, 2009 (with G. Carlsson, L. Hansen, M. Mahoney, M. Mørup)

### **2008 AIM Research Workshop**

Workshop on *Geometry and Representation Theory of Tensors for Computer Science, Statistics and Other Areas*, American Institute of Mathematics, Palo Alto, CA, Jul 21–25, 2008 (with J. Landsberg, J. Morton, J. Weyman)

### **2008 SIAM Annual Meeting**

Minisymposium on *Numerical Multilinear Algebra*, San Diego, CA, Jul 11, 2008

Minisymposium on *Mathematical Methods in Data Mining*, San Diego, CA, Jul 7, 2008 (with I. Dhillon)

### **2008 MSRI Summer Graduate Workshop**

Graduate Workshop on *Geometry and Representation Theory of Tensors for Computer Science, Statistics and Other Areas*, Mathematical Sciences Research Institute, Berkeley, CA, Jul 7–20, 2008 (with J. Landsberg, J. Morton)

### **2008 Workshop on Algorithms for Modern Massive Data Sets**

Stanford University, Stanford, CA, Jun 25–28, 2008 (with G. Carlsson, P. Drineas, M. Mahoney)

### **6th International Congress on Industrial and Applied Mathematics**

Minisymposium on *Novel Matrix Methods for Internet Data Mining*, ETH, Zürich, Jul 19, 2007 (with A. Dasgupta, G. Golub, M. Mahoney)

Minisymposium on *Numerical Multilinear Algebra: a new beginning*, ETH, Zürich, Jul 17, 2007 (with P. Comon, L. De Lathauwer, G. Golub)

### **2006 Workshop on Algorithms for Modern Massive Data Sets**

Stanford University/Yahoo! Research, Stanford, CA, Jun 21–24, 2006 (with P. Drineas, G. Golub, M. Mahoney)

## VISITING APPOINTMENTS

### **University of California, Berkeley**

Long-Term Participant, Simons Institute for the Theory of Computing

(Aug–Dec 2014; semester program in *Algorithms and Complexity in Algebraic Geometry*)

### **University of Minnesota, Minneapolis**

Long-Term Visitor, Institute for Mathematics and its Applications

(Feb–Jun 2011; thematic year on *Mathematics of Information*)

### **University of Copenhagen**

Visiting Assistant Professor, Faculty of Life Sciences

(Jun–Aug 2009; host: R. Bro)

### **Technical University of Denmark**

Visiting Assistant Professor, Institute of Informatics and Mathematical Modeling

(Jun–Aug 2008; host: L. Hansen)