Simon Foucart

Curriculum Vitae

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Current and Past Positions

2019- Professor of Mathematics, Texas A&M University, College Station
2015-19 Associate Professor of Mathematics, Texas A&M University, College Station
2013-15 Assistant Professor of Mathematics, University of Georgia, Athens
2010-13 Assistant Professor of Mathematics, Drexel University, Philadelphia
2009-10 Postdoctoral Researcher, Université Pierre et Marie Curie, Paris, France
(Laboratoire Jacques-Louis Lions; Mentor: Albert Cohen)
2006-09 Assistant Professor of Mathematics (NTT), Vanderbilt University, Nashville
(Center for Constructive Approximation; Mentor: Larry Schumaker)

Visiting Positions

2019 Visiting Researcher (Jan-May), Wisconsin Institute for Discovery, UW–Madison
2018 Visiting Researcher (Jun), LAAS-CNRS, Toulouse, France
2017 Visiting Researcher (Dec), Hong Kong University of Science and Technology, Hong Kong
2015 Visiting Researcher (May-Jun), University of South Florida, Tampa
2009 Visiting Researcher (Jul-Aug), University of Bonn, Germany

Academic Training

2001-05	PhD in Mathematics Advisor: Alexei Shadrin	University of Cambridge, U.K., Numerical Analysis Group
2000-01	Part III of Math Tripos With distinction	University of Cambridge, U.K.
1998-01	Masters of Engineering	Ecole Centrale Paris, France
1998-99	Licence de Mathématiques	Université Pierre et Marie Curie, Paris, France

Research Interests

Compressive Sensing; Approximation Theory (especially Spline Functions and Minimal Projections); Data Science; Computational Mathematics; Bioinformatics

External Funding

2019-22 NSF; senior personnel (executive committee), PI: B. Mallick (TAMU Statistics); $1,416,522
TRIPODS: Texas A&M Research Institute for Foundations of Interdisciplinary Data Science
2018-21 NSF; coPI, PI: D. Koslicki (Oregon State Math), coPI: I. Ivanov (TAMU Vet Med); $292,041
QuBBD: Fast, efficient mathematical approach to the analysis of the human microbiome through biodiversity optimization
2016-19 NSF; sole PI; $99,535
CDS&E-MSS: Recovery of high-dimensional structured functions
2011-15 NSF; PI, coPIs: G. Rosen (Drexel Engineering), L. P. Tabb (Drexel Biostatistics); $666,322
ATD: Improving analysis of microbial mixtures through sparse reconstruction and statistical inference

Internal Funding

2019-20 Texas A&M; coPI, PI: S. Shahrampour (Engineering), CoPI: B. Hanin (Math) $32,876
T3 Triads: Trade-offs between approximation and generalization in learning systems

Honors and Awards

2019 Recipient of a *Presidential Impact Fellowship*, Texas A&M University
2012 Recipient of the *Antelo Devereux Award for Young Faculty*, Drexel University
2010 *Journal of Complexity* Best Paper Award
2000-04 Various scholarships received at the University of Cambridge
(Dept of Applied Math and Theoretical Physics; Trinity Hall; Cambridge European Trust)
2001 Scholar of Trinity Hall, added to the College Register

Publications

Books

1. *A Mathematical Introduction to Compressive Sensing.*
Birkhäuser, Applied and Numerical Harmonic Analysis. With H. Rauhut.

Surveys

1. *Flavors of Compressive Sensing.*
Approximation Theory XV: San Antonio 2016, Springer Proceedings in Mathematics & Statistics, vol 201, 61–104.

Refereed Journal Papers

37. *Jointly low-rank and bisparse recovery: questions and partial answers.*
Analysis and Applications, special issue on Mathematics of Data Science. Accepted. With R. Gribonval, L. Jacques, H. Rauhut.
36. *Computation of Chebyshev polynomials for union of intervals.*
Computational Methods and Function Theory. To appear. With J. B. Lasserre.
35. *Optimal algorithms for computing average temperatures.*
Mathematics of Climate and Weather Forecasting, 5, 34–44, 2019. With M. Hielsberg, G. Mullendore, G. Petrova, P. Wojtaszczyk.
34. *Iterative hard thresholding for low-rank recovery from rank-one projections.*
Linear Algebra and its Applications, 572, 117–134, 2019. With S. Subramanian.
33. *Recovering low-rank matrices from binary measurements.*
Inverse Problems and Imaging, 13/4, 703–720, 2019. With R. Lynch.
32. *Determining projection constants of univariate polynomial spaces.*
Journal of Approximation Theory, 235, 74–91, 2018. With J. B. Lasserre.
31. *Computing a quantity of interest from observational data.*
Constructive Approximation, 49/3, 461–508, 2019. With R. DeVore, G. Petrova, P. Wojtaszczyk.
30. *Sparse recovery from inaccurate saturated measurements.*
Acta Applicandae Mathematicae, 158/1, 49–66, 2018. With J. Li.
29. *On the norms and minimal properties of de la Vallée Poussin's type operators.*
Monatshefte für Mathematik, 185/4, 601–619, 2018. With B. Deregowska, B. Lewandowska, L. Skrzypek.
28. *Concave Mirsky inequality and low-rank recovery.*
SIAM Journal on Matrix Analysis and Applications, 39/1, 99–103, 2018.
27. *An IHT algorithm for sparse recovery from subexponential measurements.*
IEEE Signal Processing Letters, 24/9, 1280–1283, 2017. With G. Lecué.

26. *One-bit compressive sensing of dictionary-sparse signals.*
Information and Inference, 7/1, 83–104, 2018. With R. Baraniuk, D. Needell, Y. Plan, M. Wootters.

25. *Exponential decay of reconstruction error from binary measurements of sparse signals.*
IEEE Transactions on Information Theory, 63/6, 3368–3385, 2017. With R. Baraniuk, D. Needell, Y. Plan, and M. Wootters.

24. *On maximal relative projection constants.*
Journal of Mathematical Analysis and Applications, 447/1, 309–328, 2017. With L. Skrzypek.

23. *Sparse recovery from saturated measurements.*
Information and Inference, 6/2, 196–212, 2017. With T. Needham.

22. Basc*: constrained approximation by semidefinite programming.*
IMA Journal of Numerical Analysis, 37/2, 1066–1085, 2017. With V. Powers.

21. *Hard thresholding pursuit algorithms: number of iterations.*
Applied and Computational Harmonic Analysis, 41/2, 412–435, 2016. With J.-L. Bouchot, P. Hitczenko.

20. *Computation of minimal projections and extensions.*
Numerical Functional Analysis and Optimization. 37/2, 159–185, 2016.

19. *Dictionary-sparse recovery via thresholding-based algorithms.*
Journal of Fourier Analysis and Applications. 22/1, 6–19, 2016.

18. *Sparse disjointed recovery from noninflating measurements.*
Applied and Computational Harmonic Analysis, 39/3, 558–567, 2015. With M. Minner, T. Needham.

17. *WSGQuikr: fast whole-genome shotgun metagenomic classification.*
PLoS ONE, 9/3, e91784, 2014. With D. Koslicki, G. Rosen.

16. *Sparse recovery by means of nonnegative least squares.*
IEEE Signal Processing Letters, 21/4, 498–502, 2014. With D. Koslicki.

15. *Quikr: a method for rapid reconstruction of bacterial communities via compressive sensing.*
Bioinformatics, 29/17, 2096–2102, 2013. With D. Koslicki, G. Rosen.

14. *Generating dimension formulas for multivariate splines.*
Albanian Journal of Mathematics, 7/1, 24–35, 2013. With T. Sorokina.

13. *Stability and robustness of ℓ_1-minimizations with Weibull matrices and redundant dictionaries.*
Linear Algebra and its Applications, 441, 4–21, 2014.

12. *Hard thresholding pursuit: an algorithm for Compressive Sensing.*
SIAM Journal on Numerical Analysis, 49/6, 2543–2563, 2011.

11. *The Gelfand widths of ℓ_p-balls for $0 < p \leq 1$.*
Journal of Complexity, 26/6, 629–640, 2010. With A. Pajor, H. Rauhut, T. Ullrich.

10. *Real versus complex null space properties for sparse vector recovery.*
Comptes Rendus de l'Académie des Sciences, 348, 863–865, 2010. With R. Gribonval.

9. *A note on guaranteed sparse recovery via ℓ_1-minimization.*
Applied and Computational Harmonic Analysis, 29/1, 97–103, 2010.

8. *Sparse recovery with pre-Gaussian random matrices.*
Studia Mathematica, 200, 91–102, 2010. With M.-J. Lai.

7. *Allometry constants of finite-dimensional spaces: theory and computations.*
Numerische Mathematik, 112/4, 535–564, 2009.

6. *Sparsest solutions of underdetermined linear systems via ℓ_q-minimization for $0 < q \leq 1$.*
Applied and Computational Harmonic Analysis, 26/3, 395–407, 2009. With M.-J. Lai.

5. *Open questions around the spline orthoprojector.*
East Journal on Approximations, 14/2, 241–253, 2008.

4. *On the exact constant in Jackson–Stechkin inequality for the uniform metric.*
Constructive Approximation, 29/2, 157–179, 2009. With Yu. Kryakin, A. Shadrin.

3. *On the value of the max-norm of the orthogonal projector onto splines with multiple knots.*
Journal of Approximation Theory, 140/2, 154–177, 2006.

2. *Interlacing property for B-splines.*
Journal of Approximation Theory, 135/1, 1–21, 2005.

1. *On the best conditioned bases of quadratic polynomials.*
Journal of Approximation Theory, 130/1, 46–56, 2004.

Working Papers

4. *Weighted matrix completion from non-random, non-uniform sampling patterns.*
Submitted to IEEE Trans. Information Theory. With D. Needell, R. Pathak, Y. Plan, M. Wootters.

3. *Nonlinear approximation and (deep) ReLU networks.*
Submitted to Constructive Approximation. With I. Daubechies, R. DeVore, B. Hanin, G. Petrova.

2. *Sampling schemes and recovery algorithms for functions of few coordinate variables.*
Submitted to Journal of Complexity.

1. *Approximability models and optimal system identification.*
Submitted to Mathematics of Control, Signals, and Systems. With M. Ettehad.

Refereed Proceedings Papers

8. *One-bit sensing of low-rank and bisparse matrices.*
Proceedings of SampTA 2019, Bordeaux. With L. Jacques.

7. *De-biasing low-rank projection for matrix completion.*
Proceedings of SPIE Optics and Photonics, San Diego 2017. With D. Needell, Y. Plan, M. Wootters.

6. *Complexity of multivariate problems based on binary information.*
Proceedings of SampTA 2017, Tallinn.

5. *Stability and robustness of weak orthogonal matching pursuits.*
In: Recent Advances in Harmonic Analysis and Applications, Springer Proceedings in Mathematics & Statistics, vol 25, 395–405.

4. *Recovering jointly sparse vectors via hard thresholding pursuit.*
Proceedings of SampTA 2011, Singapore.

3. *Recovery of functions of many variables via compressive sensing.*
Proceedings of SampTA 2011, Singapore. With A. Cohen, R. DeVore, H. Rauhut.

2. *Sparse recovery algorithms: sufficient conditions in terms of restricted isometry constants.*
In: Approximation Theory XIII: San Antonio 2010, Springer Proceedings in Mathematics, vol 13, 65–77.

1. *Some comments on the comparison between condition numbers and projection constants.*
In: Approximation Theory XII: San Antonio 2007, Nashboro Press, 143–156.

Not for Publication

3. *Three topics in multivariate spline theory.*

2. *Symbolic spline computations.*
With P. Clarke.

1. *On the Hermite spline conjecture and its connection to k-monotone densities.*
With F. Balabdaoui, J. Wellner.

Theses

PhD Dissertation	*Small-normed projections onto polynomial and spline spaces.*
Part III Essay	*On definitions of discrete topological chaos and their relations on intervals.*

Oral Presentations

Popular Talks

1. *Compressive Sensing: Making the most of few measurements.* Drexel University, Dean's seminar, 20 Apr 2011.

Plenary Addresses

• *Standard, One-Bit, and Saturated Compressive Sensing*, 4th international Traveling Workshop on Interactions between low-complexity data models and Sensing Techniques (iTWIST), Marseille, France, 21-23 Nov 2018.

• *Assimilating Data to Optimally Compute Quantities of Interest*, 7th International Conference on Computational Harmonic Analysis, Nashville, 14-18 May 2018.

• *Flavors of Compressive Sensing*, 15th International Conference on Approximation Theory, San Antonio, 22-26 May 2016.

Colloquia

• *Optimal Recovery under Approximability Models, with Applications*, Michigan State University, 3 Dec 2018.

• *Standard, One-Bit, and Saturated Compressive Sensing*, University of Houston, 12 Sep 2018.

• *Excursion into the Mathematics of Compressive Sensing*, Texas A&M University, 30 Jan 2015.

• *Sparse Recovery: an Overview Leading to ℓ_1-Minimizations from Weibull Measurements*, University of Georgia, 10 Dec 2012.

• *Compressive Sensing and Banach Space Geometry*, Drexel University, 26 May 2011.

• *Compressive Sensing and the Hard Thresholding Pursuit algorithm*, Towson University, 22 Apr 2011.

• *Recovery Algorithms in Compressive Sensing*, University of South Florida, 10 Dec 2010.

• *Compressive Sensing: the Optimization Approach*, Drexel University, 23 Apr 2009.

• *From Approximation Theory to Compressive Sampling via Banach Space Geometry—a Computational Tour*, University of Georgia, 5 Feb 2008, University of South Florida, 15 Feb 2008.

Short Courses

• *Flavors of Compressive Sensing*, Doctoral School of the 4th international Traveling Workshop on Interactions between low-complexity data models and Sensing Techniques (iTWIST), Marseille, France, 19-20 Nov 2018

• *The Fundamentals of Compressive Sensing*, as part of the HKUST–ICERM Visiting Fellow Program, Hong Kong University of Science and Technology, 6-22 Dec 2017.

• *Essentials of Compressive Sensing*, Winter School at the Trimester Program on 'Mathematics of Signal Processing', Hausdorff Research Institute, Bonn, Germany, 11-15 Jan 2016.

• *A Mathematical Overview of Compressive Sensing*, University of South Florida, 18-22 May 2015.

• *A Tutorial on Compressive Sensing*, CIMPA school on 'New Trends in Applied Harmonic Analysis: Sparse Representations, Compressed Sensing, and Multifractal Analysis', Mar del Plata, Argentina, 5-16 Aug 2013.

• *Les Mathématiques du Compressive Sensing — une Introduction*, Labotatoire Paul Painlevé, Université des Sciences et Technologies de Lille, France, 20-22 Mar 2013.

Invited Workshop and Conference Presentations

• *TBA*, Special session 'Applications of Computational and Compressive Imaging', SIAM Conference on Imaging Science / SIAM Annual Meeting, Toronto, Canada, 6-10 Jul 2020.

• *TBA*, Workshop on 'Computational Harmonic Analysis and Compressive Sensing', Foundations of Computational Mathematics conference, Vancouver, Canada, 15-24 Jun 2020.

• *TBA*, Workshop on 'Mathematics of Data Science', Hausdorff Research Institute, Bonn, Germany, 27 Apr-1 May 2020.

• *Nonlinear approximation and (deep) ReLU networks*, Special session 'Mathematical Analysis in Data Science', Joint Mathematics Meetings, Denver, 15-18 Jan 2020.

• *Functions of few coordinate variables: sampling schemes and recovery algorithms*, Minisymposium 'Recent Advances in High-Dimensional Approximation', 2nd Annual Meeting of SIAM Texas-Louisiana, 1-3 Nov 2019.

• *Sparse recovery techniques in metagenomics*, Workshop 'Nonlinear Approximation', University of South Carolina, Columbia, 25-27 Oct 2019.

• *One-bit sensing of low-rank and bisparse matrices*, Special session 'Mathematical Theory of Quantization', 13th International Conference on Sampling Theory and Applications, Bordeaux, France, 8-12 Jul 2019.

• *Nonlinear approximation and (deep) ReLU networks*, 3rd International Conference on Mathematics of Data Science, Hong Kong, 19-23 Jun 2019.

• *Functions of few coordinate variables: sampling schemes and recovery algorithms*, Workshop 'Approximation, Sampling, and Compression in High Dimensional Problems', Isaac Newton Institute, Cambridge, U.K., 17-21 Jun 2019.

• *Approximability models and optimal system identification*, Minisymposium 'Theory and Algorithms for Improved Performance of Machine Learning in Scientific Applications', SIAM Conference on Computational Science and Engineering, Spokane, 25 Feb-1 Mar 2019.

• *Assimilating data to optimally compute quantities of interest*, Minisymposium 'Sparsity-Based Methods for High-Dimensional Approximation in Uncertainty Quantification', International Conference on Spectral and High Order Methods, London, U.K., 9-13 Jul 2018.

• *Semidefinite programming in approximation theory: two examples*, Workshop 'Numerical Analysis and Approximation Theory meet Data Science', Banff, Canada, 22-27 Apr 2018.

• *Assimilating data to optimally compute quantities of interest*, Texas A&M workshop 'Big Data – Data Driven Discovery', College Station, 20 Apr 2018.

• *The usefulness of a modified restricted isometry property*, 'February Fourier Talks', University of Maryland, 15-16 Feb 2018.

• *Computing a quantity of interest from observational data*, Special session 'Compressed Sensing and Machine Learning', Data Institute Conference, San Francisco, 15-17 Oct 2017.

• *Concave Mirsky inequality and low-rank recovery*, Minisymposium 'Compressed Sensing and Matrix Completion', 21st Meeting of the International Linear Algebra Society, Ames, 24-28 Jul 2017.

• *On maximal relative projection constants*, Summer Informal Regional Functional Analysis Seminar, College Station, 21-23 Jul 2017.

• *Computing a quantity of interest from observational data* and *The usefulness of a modified restricted isometry property*, Workshops on 'Approximation Theory' and on 'Computational Harmonic Analysis and Compressive Sensing', Foundations of Computational Mathematics conference, Barcelona, Spain, 10-19 Jul 2017.

• *Complexity of multivariate problems based on binary information*, Special session 'Mathematical Theory of Quantization', 12th International Conference on Sampling Theory and Applications, Tallinn, Estonia, 3-7 Jul 2017.

• *Computing a quantity of interest from observational data*, Workshop 'Data-Driven Model Reduction', College Station, 27 Apr 2017.

• *Computing a quantity of interest from observational data*, Workshop 'Multiscale and High-Dimensional Problems', Oberwolfach, Germany, 26 Mar-1 Apr 2017.

• *Computing a quantity of interest from observational data*, 1st International Conference on Mathematics of Data Science, Hong Kong, 20-24 Mar 2017.

• *Sparse recovery via nonconvex optimization, with application in metagenomics*, Special session 'Nonconvex and Non-Lipschitz Optimization', 5th International Conference on Continuous Optimization, Tokyo, Japan, 6-11 August 2016.

• *One-bit compressive sensing of dictionary-sparse signals*, Minisymposium 'Compressive Sensing: Approximation and Optimization', 15th International Conference on Approximation Theory, San Antonio, 22-26 May 2016.

• *Sparse recovery from saturated measurements*, Workshop on 'Challenges in High-Dimensional Analysis and Computation', San Servolo, Italy, 1-5 May 2016.

• *How* MATLAB *impacts my research*, Workshop 'Scientific Computing with MATLAB at Texas A&M', College Station, 25 Apr 2016.

• *Sparse recovery from saturated measurements*, Special session 'Trends in the Mathematics of Signal Processing and Imaging', Joint Mathematical Meetings, Seattle, 6-9 Jan 2016.

• *Exponentially decaying error rate in one-bit compressive sensing*, 'Information-based Complexity' conference, Mathematical Research and Conference Center, Bedlewo, Poland, 26 Apr-2 May 2015.

• *Dimensions of spline spaces, Dehn–Sommerville equations, and Schumakers conjecture*, Workshop on 'Multivariate Splines and Algebraic Geometry', Oberwolfach, Germany, 19-25 Apr 2015.

• *Semidefinite programming for constrained approximation*, Special session 'Approximation Theory in Signal Processing and Computer Science', AMS Central Meeting, East Lansing, 13-15 Mar 2015.

• *Recovery of signals with sparse frame expansions*, Special session 'Frames and their Applications', Joint Mathematical Meetings, San Antonio, 10-13 Jan 2015.

• *Using semidefinite programming in Approximation Theory*, Workshop 'Approximation Theory', Foundations of Computational Mathematics conference, Montevideo, 11-20 Dec 2014.

• *Exponentially decaying error rate in one-bit compressive sensing*, Workshop 'Approximation, Integration, and Optimization', ICERM, Providence, 29 Sep-3 Oct 2014.

• *Exponentially decaying error rate in one-bit compressive sensing*, Minisymposium 'Mathematics of Information and Low Dimensional Models', SIAM Annual Meeting, Chicago, 7-11 Jul 2014.

• *Exponentially decaying reconstruction error in one-bit compressive sensing*, 5th International Conference on Computational Harmonic Analysis, Nashville, 19-23 May 2014.

• *New iterative algorithms in sparse approximation*, Special session 'Approximation Theory in Signal Processing', AMS Central Sectional Meeting, Lubbock, 11-13 Apr 2014.

• *A snapshot of iterative algorithms for sparse recovery*, Georgia Scientific Computing Symposium, Kennesaw State University, 22 Feb 2014.

• *Computing dimension formulas for multivariate spline spaces.* Minisymposium 'Multivariate Splines', 14th International Conference on Approximation Theory, San Antonio, 7-10 Apr 2013.

• *Stability and robustness of weak orthogonal matching pursuits.* Special session 'Models and Applications in Compressive Imaging', SIAM conference on Imaging Science, Philadelphia, 20-22 May 2012.

• *Stability and robustness of ℓ_1-minimizations with Weibull matrices and redundant dictionaries.* Workshop on 'Probabilistic Techniques and Algorithms', University of Texas, 6-8 Apr 2012.

• *Hard Thresholding Pursuit: an algorithm for Compressive Sensing* and *The dimension of trivariate spline spaces on Alfeld splits.* Special sessions 'Compressed Sensing' and 'Multivariate Splines', International Symposium in Approximation Theory, Nashville, 17-21 May 2011.

• *Recovering jointly sparse vectors via Hard Thresholding Pursuit.* Special session 'Sparse Approximation', 9th International Conference on Sampling Theory and Applications, Singapore, 2-6 May 2011.

• *Hard Thresholding Pursuit for sparse reconstruction.* Special session 'Sparse Data Representations and Applications', AMS Southeastern Meeting, Statesboro, 12-13 Mar 2011.

• *Compressive Sensing insight into the geometry of quasi-Banach spaces.* Workshop on 'Sparse and Low Rank Approximation', Banff, Canada, 6-11 Mar 2011.

• *Hard Thresholding Pursuit: an algorithm for Compressive Sensing.* Workshop on 'Wavelet and Multiscale Methods', Oberwolfach, Germany, 1-6 Aug 2010.

• *The Gelfand widths of ℓ_p-balls for $0 < p \leq 1$.* Minisymposium 'Sparse approximation', 7th International Conference on Curves and Surfaces, Avignon, France, 24-30 Jun 2010.

• *Best sufficient conditions for sparse recovery.* Minisymposium 'Compressive Sensing', 13th International Conference on Approximation Theory, San Antonio, 7-10 Mar 2010.

• *Reconstructions parcimonieuses: réelle contre complexe.* Journée 'Approximation et Modélisation Géométrique' du groupe SMAI–AFA, Paris, France, 13 Nov 2009.

• *Minimisation ℓ_1 et Compressive Sensing.* 9th Mathias Seminar, Cannes, France, 15-16 Oct 2009.

• *Sparse recovery via ℓ_q-minimization for $0 < q \leq 1$.* Special session 'Sparse approximation and high-dimensional geometry', 8th International Conference on Sampling Theory and Applications, Marseille, France, 18-22 May 2009.

• *Best conditioned bases in connection with minimal projections.* Minisymposium 'Minimal projections', 12th International Conference on Approximation Theory, San Antonio, 4-8 Mar 2007.

Contributed Conference Presentations

• *Iterative hard thresholding for low-rank recovery from rank-one projections*, Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop, Toulouse, France 1-4 Jul 2019.

• *Determining projection constants of univariate polynomial spaces*, 16th International Conference on Approximation Theory, Nashville, 19-22 May 2019.

• *Quikr & WGSQuikr: Rapid bacterial community reconstruction via compressive sensing.* Workshop 'Recent Computational Advances in Metagenomics', 13th European Conference on Computational Biology, Strasbourg, France, 6-10 Sep 2014.

• *On the value of the max-norm of the orthogonal spline projection.* Constructive Theory of Functions, Varna, Bulgaria, 1-7 Jun 2005.

• *On the least condition number of a basis of quadratic polynomials.* Advances in Constructive Approximation, Nashville, 14-17 May 2003.

Seminars

• *Optimal recovery under approximability models, with applications.* Data Science seminar, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, 17 Sep 2019.

• *Sparse recovery techniques in metagenomics.* Computation and Informatics in Biology and Medicine (CIBM) seminar, University of Wisconsin, Madison, 29 Jan 2019.

• *Optimal recovery under approximability models, with applications.* Systems, Information, Learning, and Optimization (SILO) seminar, Wisconsin Institute for Discovery, Madison, 23 Jan 2019.

• *Standard, one-bit, and saturated Compressive Sensing.* Department of Industrial and Systems Engineering, Texas A&M University, 14 Sep 2018.

• *Semidefinite programming in approximation theory: two examples.* RWTH Aachen University, 17 Jul 2018.

• *Semidefinite programming in approximation theory: two examples.* Multidisciplinary Optimization Seminar in Toulouse, France, 28 May 2018.

• *Assimilating data to optimally compute quantities of interest.* Alan Turing Institute, London, U.K., 23 Mar 2018.

• *The usefulness of a modified restricted isometry property.* University of Oxford, U.K., 22 Mar 2018.
• *Optimal estimation and computation from data.* University of Maryland, 7 Nov 2017.
• *Computing a quantity of interest from observational data.* CUNY-Courant symbolic-numeric computing seminar, 19 Oct 2017.
• *The usefulness of a modified restricted isometry property.* Department of Electrical and Computer Engineering, Iowa State University, 25 Jul 2017.
• *Sparse recovery from binary or saturated measurements.* Department of Statistics and Biostatistics, Rutgers University, 28 Sep 2016.
• *Some extra structures in sparse recovery.* Department of Electrical and Computer Engineering, Texas A&M University, 23 Sep 2015.
• *Two extra structures in sparse recovery: nonnegativity and disjointedness.* Drexel University, 16 Oct 2014.
• *Classical and one-bit compressive sensing.* Kennesaw State University, 13 Nov 2013.
• *Iterative algorithms in compressive sensing.* INRIA Rennes, France, 28 Mar 2013, University of Cambridge, U.K., 19 Mar 2013.
• *ℓ_1-minimizations with Weibull matrices.* Wilks Seminar, Princeton Statistics Laboratory, 7 Dec 2012.
• *Schumaker's conjecture: do Bernstein operators induce P-matrices?* Drexel University, 9 Mar 2012.
• *Orthogonal matching pursuits in Compressive Sensing.* University of Bonn, Germany, 24 Nov 2011.
• *On the dimension of multivariate spline spaces.* Drexel University, 11 Nov 2011.
• *Compressive Sensing and the Hard Thresholding Pursuit algorithm.* University of Utah, 26 Sep 2011.
• *Recovering sparse vectors via Hard Thresholding Pursuit.* Johns Hopkins University, 17 Mar 2011.
• *Geometry of ℓ_1^n via Compressive Sensing.* VIGRE Seminar, University of Georgia, 15 Feb 2011.
• *Compressive Sensing and the Hard Thresholding Pursuit algorithm.* University of Maryland, 1 Dec 2010.
• *Some open problems in Approximation Theory.* Drexel University, 29 Oct 2010.
• *Sparse recoveries via Basis Pursuit and Hard Thresholding Pursuit.* Drexel University, 8 Oct 2010.
• *Variations around the RIP.* University of Bonn, Germany, 3 Jun 2010.
• *Basis pursuit with pre-Gaussian random matrices.* Université de Franche–Comté, Besançon, France, 26 Apr 2010.
• *Gelfand widths, pre-Gaussian random matrices, joint sparsity.* Vanderbilt University, 15 Mar 2010.
• *Randomness in Compressive Sensing.* Séminaire Parisien de Statistique, Paris, France, 11 Jan 2010.
• *Un condensé de Compressive Sensing.* Journée 40 ans du Laboratoire Jacques-Louis Lions, Paris, France, 18 Dec 2009.
• *Three topics in Compressive Sensing.* University of Cambridge, U.K., 29 Oct 2009.
• *Compressive sensing via ℓ_q-minimization for $0 < q \leq 1$.* University of Edinburgh, U.K., 22 Oct 2009.
• *Reconstruction parcimonieuse par minimisation ℓ_q avec $0 < q \leq 1$.* INRIA Rennes, France, 23 Jun 2009.
• *Sparse recovery via ℓ_q-minimization for $0 < q \leq 1$.* Université Pierre et Marie Curie, Paris, France, 26 May 2009.
• *Compressed Sensing via nonconvex minimization.* Hausdorff Center, Bonn, Germany, 19 Dec 2008.
• *Condition numbers of finite-dimensional frames.* University of Georgia, 11 Oct 2007.
• *Condition numbers of finite-dimensional frames.* Vanderbilt University, 9 Oct 2007
• *The orthogonal projector onto splines—ongoing development.* Vanderbilt University, 19 Sep 2006.
• *Best conditioned bases and minimal projections.* University of Cambridge, U.K., 10 Jun 2004.
• *Some inheritance properties for Chebyshev-type spaces.* University of Cambridge, U.K., 20 Feb 2003.

Miscellaneous Conferences and Workshops

- SQuaRE project 'Approximation Theory and Semidefinite Programming', AIM, 23-27 Mar 2020. With M. Dressler, E. de Klerk, M. Joldes, J. B. Lasserre, Y. Xu.
- Programme on 'Approximation, Sampling and Compression in Data Science', Isaac Newton Institute, Cambridge, U.K., 3 Jan-28 Jun 2019. With a Simons Foundation Fellowship. Declined.
- Workshop on 'Applied Harmonic Analysis and Data Processing', Oberwolfach, Germany, 25-31 Mar 2018.
- SQuaRE project 'Developing the theory of 1-bit compressive sensing', AIM, 22-26 Aug 2016, 13-17 Jul 2015 (San Jose), 18-22 Nov 2013 (Palo Alto). With R. Baraniuk, D. Needell, Y. Plan, M. Wooters.
- Workshop on 'Optimization and Parsimonious Modeling', Institute for Mathematics and its Applications, Minneapolis, 25-29 Jan 2016.
- Trimester Program on 'Mathematics of Signal Processing', Hausdorff Research Institute, Bonn, Germany, 4 Jan-22 Apr 2016.
- Invited Research Fellow at the Semester Program on 'High-Dimensional Approximation', Institute for Computational and Experimental Research in Mathematics, Brown University, 8 Sept-5 Dec 2014.
- 2nd International Workshop on Compressed Sensing Applied to Radar, Bonn, Germany, 17-19 Sep 2013.
- Annual Meeting of the Canadian Applied and Industrial Mathematics Society, Quebec City, 16-20 Jun 2013.
- Workshop on 'Structure and Randomness in System Identification and Learning', Institute for Pure and Applied Mathematics, University of California at Los Angeles, 15-18 Jan 2013.
- DTRA/NSF/NGA Algorithm Workshop, San Diego, 26-29 Nov 2012.
- Workshop on 'Applied Harmonic Analysis and Sparse Approximation', Oberwolfach, Germany, 10-16 Jun 2012.
- Long Program on 'Mathematical and Computational Approaches in High-Throughput Genomics', Institute for Pure and Applied Mathematics, University of California at Los Angeles. Attending the workshop for the period 12 Sep-10 Oct 2011.
- Concentration week on 'Greedy Algorithms in Banach Spaces and Compressed Sensing', Texas A&M University, 18-22 Jul 2011.
- 'Foundations of Computational Mathematics' conference, Budapest, 4-14 Jul 2011.
- Trimester Program on 'Analysis and Numerics for High-Dimensional Problems', Hausdorff Research Institute, Bonn, Germany. Attending the workshops for the period 19 Jun-2 Jul 2011.
- 'February Fourier Talks' conference, University of Maryland, 17-18 Feb 2011.
- Workshop on 'High Dimensional Problems and Solutions', Paris, France, 21-22 Jun 2010.
- Workshop on 'Sparsity and Computation', Bonn, Germany, 7-11 Jun 2010.
- Workshop on 'Probability and Geometry in High Dimensions', Marne-la-Vallée, France, 17-21 May 2010.
- Fall School on 'Interactions between Compressed Sensing, Random Matrices, and High Dimensional Geometry', Marne-la-Vallée, France, 16-20 Nov 2009.
- Summer School on 'Theoretical Foundations and Numerical Methods for Sparse Recovery', Linz, Austria, 31 Aug-4 Sep 2009.
- Workshop on 'Nonlinear Approximation Techniques Using L_1', Texas A&M University, 16-18 May 2008.
- 10th SIAM Conference on Geometric Design and Computing, San Antonio, 4-8 Nov 2007.
- 6th International Conference on Curves and Surfaces, Avignon, France, 29 Jun-5 Jul 2006.

Teaching

• **Texas A&M University** (2015-). *Graduate courses:* Compressive Sensing, Topics in Mathematical Data Science, *Undergraduate courses:* (Honors) Linear Algebra, Advanced Calculus I.

• **University of Georgia** (2013-15). *Graduate courses:* Compressive Sensing, *Undergraduate courses:* Calculus I for Science and Engineering, Calculus II for Science and Engineering.

• **Drexel University** (2010-13). *Graduate courses:* Linear Algebra and Matrix Analysis, Approximation Theory, Compressed Sensing, Mathematics of Genome Analysis. *Undergraduate courses:* Problem Solving for Math Competitions, Probability and Statistics II, Numerical Analysis II, Linear Algebra, Calculus I.

• **Vanderbilt University** (2006-09). *Graduate courses:* Compressed Sensing. *Undergraduate courses:* Introduction to Numerical Mathematics, Methods of Ordinary Differential Equations, Calculus I & III.

• **University of Cambridge**, U.K. (2003-05). Gave supervisions in Differential Equations, Probability, Numbers and Sets, Dynamics, Numerical Analysis.

• **Ecole Nationale de Commerce**, Paris, France (1999-00). Oral examiner in Mathematics, preparing students for the entrance examinations to the economic Grandes Ecoles.

Advisees

Postdocs	Richard Lynch (Aug 2016-Jun 2019), now Instr. Assistant Prof. at Texas A&M
	Jean-Luc Bouchot (Nov 2012-Aug 2014), now Assistant Prof. at BIT, China
	David Koslicki (Jan-Sep 2012), now Associate Prof. at Penn State
PhD students	Chunyang Liao (Aug 2019-)
	Ryan Malthaner (Aug 2018-)
	Bolong Ma (Aug 2017-)
	Mahmood Ettehad (Aug 2016-)
	Srinivas Subramanian (Aug 2016-)
	Michael Minner (Sep 2012-Mar 2016), now at Sandia National Lab
Graduate RAs	Anchit Agarwal (Aug 2013-Jul 2014)
	Vladlena Powers (Jan 2014-Jul 2014), now PhD student at Columbia
	Tom Needham (Summer 2014), now Assistant Prof. at Florida State

Professional Services

Editorial Boards

• *Journal of Approximation Theory* (Aug 2017-)

Reviewing

• Refereed for *SIAM Journal on Mathematics of Data Science* (2019), *SIAM Journal on Applied Algebra and Geometry* (2019), *IEEE Transactions on Information Theory* (2019; 2018; 2013; twice in 2011; 2009; 2008), *Boletín de la Sociedad Matemática Mexicana* (2019), *Applied and Computational Harmonic Analysis* (2019, twice in 2010), *Journal of Fourier Analysis and Applications* (2019), *Annals of Applied Probability* (2019), *Constructive Approximation* (2018; 2015; 2012; twice in 2010), *Journal of Machine Learning Research* (2018), *Journal of Mathematical Analysis and Applications* (2017), *Advances in Computational Mathematics* (2017, 2013), *Journal of Approximation Theory* (2017; 2016; 2014; 2012; 2007), *Michigan Mathematical Journal* (2017), *Monatshefte für Mathematik* (2016), *Information and Inference* (2016), *Journal of Functional Analysis* (2016), *SIAM Journal on Optimization* (2015), *Inverse Problems* (2015), *SIAM Journal on Scientific Computing* (2015), *Journal of Theoretical Biology* (2015), *SIAM Journal on Imaging Sciences* (2014), *Journal of Algebra* (2014), *IEEE Signal Processing Letters* (2014; 2013; 2009), *Digital Signal Processing* (2014), *Foundations of Computational*

Mathematics (2013), *IEEE Transactions on Signal Processing* (twice in 2013; 2012), *Statistics and Probability Letters* (2013), *Mathematics of Computation* (2012), *Linear Algebra and its Applications* (2012), *SIAM Journal on Matrix Analysis and Applications* (2011), *International Journal of Mathematics and Mathematical Sciences* (2011), *Inverse Problems and Imaging* (2011), *Signal Processing* (2011), *EURASIP Journal on Advances in Signal Processing* (2011), and *IEEE Journal of Selected Topics in Signal Processing* (twice in 2009)

• Various conferences (member of the technical program committee of SampTA 2019; refereed for iTWIST 2018, COLT 2018, SampTA 2017, AT 2016, SPARS 2015, SampTA 2015, ISIT 2015, CSA 2013, AT 2013, GRETSI 2013, SPARS 2013, SampTA 2013, CAMSAP 2011, AT 2010)

• Refereed textbooks for Cambridge University Press (2018, 2016), a book proposal for SIAM (2017), and a research monograph for the Société Mathématique de France (2011)

• Refereed for the *National Science Foundation* (2019, 2017), the *Research Grants Council of Hong Kong* (2018, 2017, 2016, 2015), the *Fonds zur Förderung der wissenschaftlichen Forschung* (Austrian equivalent of NSF, 2013) and the *Agence Nationale de la Recherche* (French equivalent of NSF, 2010)

• Reviewer for *Mathematical Reviews* (wrote about 60 reviews since 2005)

Administrative Activities

• *Department committees*: *TAMU* – graduate (2019-), executive (2017-19), postdoc (2015-17); *UGA* – personnel (2014-15), Cantrell lectures (2014); *Drexel* – graduate program (qualifying exam subcommittee 2010-13); tenure-track faculty hiring (2012-13); candidacy exams (three occurrences in Sept 2012); web page (2011-12); visiting faculty hiring (2010-11).

• *College and University committees*: *Drexel* – Task force on the future of computing at Drexel (2013); NSF graduate research fellowship program review (2011-13); panelist at the meeting on higher education in the U.K. organized by Drexel Study Abroad (May 2012); U.K. scholarship review (Marshall and Gates–Cambridge scholarships, 2011-2012).

Organization

2019-	Co-organizer of the *Inverse Problems and Machine Learning Seminar* Texas A&M University
2019	Co-organizer of the week on *Randomness and Determinism in Compressive Data Acquisition* Workshop in Analysis and Probability, Texas A&M University, 22-26 July
2019	Co-organizer of the minisymposium *Neural Network Approximation* 16th International Conference on Approximation Theory, Nashville, 19-22 May
2018	Coordinator of the SQuaRE project *Approximation Theory and Semidefinite Programming* American Institute of Mathematics, San Jose, one week per year for three years
2017	Co-organizer of the minisymposium *Compressed Sensing and Matrix Completion* 21st Meeting of the International Linear Algebra Society, Iowa State University, 24-28 Jul
2016	Organizer of the minisymposium *Reconstruction Parcimonieuse (Compressive Sensing)* 43rd Congrès National d'Analyse Numérique (CANUM), Obernai, France, 9-13 May
2015-	Organizer of the reading seminar *Data Science and Compressive Sensing* Texas A&M University
2013-15	Coordinator of the *Applied Math Seminar* University of Georgia
2013	Organizer of the minisymposium *Compressive Sensing* 14th International Conference on Approximation Theory, San Antonio, 7-10 Apr
2011-13	Organizer of the seminar *Compressive Sensing, Extensions, and Applications* Drexel University

2010	Organizer of the minisymposium *Compressive Sensing* 13th International Conference on Approximation Theory, San Antonio, 7-10 Mar
2007-09	Coordinator of the *Computational Analysis Seminar* Vanderbilt University
2008	Co-organizer of the Shanks Workshop *Nonlinear Models in Sampling Theory* Vanderbilt University
2007	Co-organizer of the Shanks Workshop *An Advanced Tutorial in Compressed Sensing* Vanderbilt University
2007	Co-organizer of the 10th SIAM Conference on Geometric Design and Computing San Antonio, 4-8 Nov

Membership of Associations

- Member, American Mathematical Society
- Member, Society for Industrial and Applied Mathematics
- Member, Société Mathématique de France
- Member, Société de Mathématiques Appliquées et Industrielles
- Member, European Mathematical Society

Additional Information

Computer Skills

MATLAB, Mathematica, Maple, R, Html, JavaScript.

Languages

French (native), German (basic), and Spanish (basic).

Miscellaneous Interests

- Team Handball: competition at pre-national and national levels in France and England.
- Gymnastics: trained at Forbach Academy (France, 1986-1990); former member of the Cambridge University Team (selected for the Varsity matches against Oxford, 2001 to 2005, winner in 2004).
- Trampolining: former member of the Cambridge University Team (selected for the Varsity matches against Oxford, 2001 and 2002).