Rayan Saab

Department of Mathematics, UC San Diego, 9500 Gilman Drive # 0112, La Jolla, CA 92093-0112

rsaab@ucsd.edu

www.math.ucsd.edu/∼rsaab

(June 2022)

ACADEMIC POSITIONS	**Associate Professor**	July 2017 - present
	Department of Mathematics, and	
	Halıcıoğlu Data Science Institute	
	University of California, San Diego (UCSD)	
	Assistant Professor	July 2013 - June 2017
	Department of Mathematics	
	University of California, San Diego (UCSD)	
	Visiting Assistant Professor	February 2011 - June 2013
	Department of Mathematics	
	Duke University	
	Faculty mentor: Ingrid Daubechies	
	Postdoctoral Fellow	June 2010 - January 2011
	Department of Mathematics	
	The University of British Columbia (UBC)	
	Faculty mentor: Özgur Yılmaz	

RESEARCH SUMMARY

Broadly speaking, my research is in applied and computational harmonic analysis, and is increasingly motivated by data science theory and applications. I focus on mathematical problems related to the acquisition, digitization and processing of data. To solve them, I develop and use tools in random matrix theory, frame theory, applied harmonic analysis, and optimization, among others.

EDUCATION	**PhD, Electrical Engineering**	November 2010
	Affiliation: **Institute of Applied Mathematics (IAM)**	
	University of British Columbia (UBC)	
	Advisor: Özgür Yılmaz (Mathematics)	
	Advisor: Rabab Ward (Electrical Engineering)	
	Master of Applied Science, Electrical Engineering	August 2005
	University of British Columbia	
	Advisor: Rafeef Abugharbieh (Electrical Engineering)	
	Advisor: Martin McKeown (Neuroscience)	
	Bachelor of Engineering, Computer & Communications Engineering	July 2003
	American University of Beirut (AUB), Beirut, Lebanon, July 2003	

AWARDS, HONORS, AND FELLOWSHIPS	**Professor**	
	Simons Fellowship	July 2022 – August 2023
	NSF Grant – DMS 2012546	Aug 2020 – July 2023
	Simons Collaboration Grant (declined due to receiving other awards allowing travel) 2020	
	Inst. for Mathematics and its Apps. (IMA),	Aug. 2017.
	Focused Research Initiative on Phase Retrieval Algorithms: Computational Efficiency, Deterministic Guarantees, and Auto-Calibration	
	August-Wilhelm Scheer Visiting Prof., Teschnische Universität München	June 2017
	NSF Grant – DMS 1517204	Aug 2015 – July 2019
	Hellman Fellowship	July 2015 - June 2016
	Simons Collaboration Grant (declined due to receiving other awards allowing travel) 2015	
	Mercator Fellowship – German Science Foundation	July 2014 - August 2017

Postdoctoral Fellow

Banting Postdoctoral Fellowship	October 2011 - October 2013
NSERC Postdoctoral Fellowship – declined	March 2011

Graduate Student

Faculty of Applied Science Graduate Award	September 2009
Pacific Century Graduate Fellowship	September 2007 - August 2009
UBC University Graduate Fellowship	September 2007 - August 2009
PhD Tuition Fee Award	September 2005 - August 2009
International Graduate Tuition Scholarship	September 2003 - August 2005

Undergraduate Student

AUB Merit Scholarship Award	October 1999 - June 2003

ACADEMIC SUPERVISION

Graduate Students

Jinjie Zhang, PhD Student, Expected Graduation in 2023 (Mathematics, UCSD)
Brian Preskitt, PhD 2019 (Mathematics, UCSD)
Jingwen Liang, PhD 2020 (Mathematics, UCSD)
Aaron Nelson, PhD 2020 (Mathematics, UCSD)
Eric Lybrand, PhD 2021 (Mathematics, UCSD)

Postdoctoral

Anna Ma, Chancellor's Postdoctoral Fellow (Mathematics, UCSD, Summer 2018 – Spring 2019) – accepted a position as Assistant Prof. at UC Irvine (2022).
Thang Huynh, SEW Instructor (Mathematics, UCSD, Summer 2016 – Spring 2018)

Recent PhD committees Haixiao Wang (Math), Harish Kannan (Math), Jing Liu, PhD (ECE), Ali Koochakzadeh (ECE), Maher Alshoukairi (ECE), Heng Qiao (ECE), Christian Kummerle, PhD 2020 (TUM, Munich, 2020). Jiaqi Guo, PhD 2018 (Mathematics), Hanbo Li, PhD 2018 (Mathematics), Xiao Pu, PhD 2017 (Mathematics).

PROFESSIONAL ACTIVITIES

Organizer

Cofounder and organizer, One-world MINDS (Mathematics of INformation, Data, and Signals) Seminar, Online inter-institutional seminar (April 2020 – present)

Invited session organizer, Sampling Theory and Applications (SampTA), July 2019 (with S. Dirksen)

Session organizer, Information Theory and Applications Workshop, San Diego CA, February 2019.

Session organizer, Information Theory and Applications Workshop, San Diego CA, February 2018.

IMA Special Workshop "Phaseless Imaging in Theory and Practice: Realistic Models, Fast Algorithms, and Recovery Guarantees", August 14 - 18, 2017 (with M. Iwen, A. Viswanathan)

Invited session organizer, Sampling Theory and Applications (SampTA), July 2017 (with S. Dirksen)

Session organizer, Information Theory and Applications Workshop, February 2017

"Special Session on Mathematics of Signal Processing and Information", Joint Math Meetings, January 2017 (with M. Iwen)

Session organizer, Information Theory and Applications Workshop, February 2016

Session organizer, Information Theory and Applications Workshop, February 2015

"Special Session on Approximation Theory in Signal Processing and Computer Science", Spring Central Sectional Meeting, March 2015 (with M. Iwen, A. Viswanathan)

"Special Session on Approximation Theory in Signal Processing", AMS Special Session, Spring Central Sectional Meeting, April 2014 (with R. Ward)

Session organizer, Information Theory and Applications Workshop, February 2014.

"Compressed Sensing and its Applications" ,Young Researchers' Minisymposium, 84th Annual Meeting of the International Association of Applied Mathematics and Mechanics, March 2013. (with F. Krahmer)

Session chair, "Source Separation and Localization, and Array Signal Processing" International Symposium on Signal Processing and Information Theory (ISSPIT06)

Editor

Associate Editor: Applied and Computational Harmonic Analysis
Guest editor: Special topical issue on data science, approximation, and harmonic analysis (for the journal Sampling Theory, Signal Processing, and Data Analysis)

Reviewer

Annals of Statistics,
Applied and Computational Harmonic Analysis,
Communications on Pure and Applied Mathematics,
Constructive Approximation,
Discrete and Computational Geometry,
Geophysics,
IEEE Journal of Selected Topics in Signal Processing,
IEEE Transactions on Audio, Speech and Language Processing,
IEEE Transactions on Computational Imaging,
IEEE Transactions on Information Theory,
IEEE Transactions on Signal Processing,
Information and Inference,
Journal of Approximation Theory,
Journal of Fourier Analysis and its Applications,
Linear Algebra and its Applications,
Mathematical Programming Computation,
SIAM Journal on Computing,
SIAM Journal on Matrix Analysis and Applications,
Signal Processing,
IEEE Signal Processing Letters,
Special Issue of Sampling Theory in Signal Analysis and Image Processing,

Reviewer for the Springer book: Compressed Sensing and its Applications,
Reviewer for the Birkhauser/Springer book: Sampling Theory, a Renaissance

PUBLICATIONS The order of authorship for most manuscripts below is alphabetical (by last name), following the convention in mathematics. Otherwise, more recently, the order of authorship follows the convention of the area in which the work is published, and may therefore list students before faculty members.

Preprints

1. M. Mousavi, E. Lybrand, S. Feng, S. Tang, R. Saab, V. de Sa, "Spectrally Adaptive Common Spatial Patterns," arXiv preprint arXiv:2202.04542

2. J. Zhang, Y. Zhou, R. Saab, "Post-training Quantization for Neural Networks with Provable Guarantees," arXiv preprint arXiv:2201.11113

3. J. Zhang, H. Kannan, A. Cloninger, R. Saab, "Sigma-Delta and Distributed Noise-Shaping Quantization Methods for Random Fourier Features," arXiv preprint arXiv:2106.02614

4. D. Needell, A.A. Nelson, R. Saab, P. Salanevich, "Random Vector Functional Link Networks for Function Approximation on Manifolds." arXiv preprint arXiv:2007.15776.

Book Chapters

5. D. Molitor, D. Needell, A. Nelson, R. Saab, and P. Salanevich, "Classification scheme for binary data with extensions", in *Compressed Sensing and its Applications*, Birkhauser, 2019.

6. E. Chou, S. Gunturk, F. Krahmer, R. Saab, Ö. Yılmaz, "Noise-shaping Quantization Methods for Frame-based and Compressive Sampling Systems", in *Sampling Theory: A Renaissance* (edited by G. Pfander), Birkhauser, 2015 (28 pages).

7. P. Boufounos, L. Jacques, F. Krahmer, R. Saab, "Quantization and compressed sensing", in *Compressed Sensing and its Applications* (edited by H. Boche, R. Calderbank, G. Kutyniuk, J. Vybiral), Springer, 2015 (45 pages).

8. A. Powell, R. Saab, Ö. Yılmaz, "Quantization and finite frames", in *Finite Frames: Theory and Applications* (edited by P. Casazza and G. Kutyniok), Birkhauser, 2013 (35 pages).

Journal Papers

9. T. Faust, M. Iwen, R. Saab, R. Wang, "On the ℓ^∞-norms of the Singular Vectors of Arbitrary Powers of a Difference Matrix with Applications to Sigma-Delta Quantization", Linear Algebra and its Applications, 626, 79–151, 2021

10. E. Lybrand, R. Saab, "A greedy algorithm for quantizing neural networks", *Journal of Machine Learning Research*, vol. 22, no. 156, pp 1–38, 2021

11. E. Lybrand, A. Ma, R. Saab, "On the number of faces and radii of cells induced by Gaussian spherical tessellations", *Appl Comput Harmon Anal*, 2021

12. B. Preskitt, R. Saab, "Admissible measurements and robust algorithms for ptychography", *Journal of Fourier Analysis and Applications*, vol. 27(2), 1-39, 2021.

13. N. Sissouno, F. Boßmann, F. Filbir, M. Iwen, M. Kahnt, R. Saab, C. Schroer, W. zu Castell, "A direct solver for the phase retrieval problem in ptychographic imaging", *Mathematics and Computers in Simulation*, vol. 176, 292-300, 2020.

14. T. Huynh, R. Saab, "Fast binary embeddings, and quantized compressed sensing with structured matrices", *Comm. on Pure and Applied Mathematics*, vol. 73, no. 1, pp. 110-149, 2020

15. M. Iwen, B. Preskitt, R. Saab, A. Viswanathan, "Phase Retrieval from Local Measurements: Improved Robustness via Eigenvector-Based Angular Synchronization", *Applied and Computational Harmonic Analysis*, vol. 48, no. 1, pp. 415-444, 2020.

16. J. Feng, F. Krahmer, R. Saab, "Quantized Compressed Sensing for Partial Random Circulant Matrices", *Applied and Computational Harmonic Analysis*, vol. 47, no. 3, pp. 1014-1032, 2019.

17. D. Needell, R. Saab, T. Woolf, "Simple Classification using Binary Data", *Journal of Machine Learning Research*, vol. 19, no. 1, pp. 2487-2516, 2019.

18. E. Lybrand, R. Saab, "Quantization for Low-Rank Matrix Recovery", Information and Inference: A Journal of the IMA 8 (1), 161-180, 2019.

19. R. Saab, R. Wang, Ö. Yılmaz, "From compressed sensing to compressed bit-streams: practical encoders, tractable decoders", *IEEE Transactions on Information Theory*, 2017.

20. D. Needell R. Saab, T. Woolf, "Weighted ℓ_1-Minimization for Sparse Recovery under Arbitrary Prior Information" with D. Needell and T. Woolf, *Information and Inference*, 2017 iaw023. doi: 10.1093/imaiai/iaw023

21. R. Saab, R. Wang, Ö. Yılmaz, "Quantization of compressive samples with stable and robust recovery", *Applied and Computational Harmonic Analysis*, in press, available online 26 April 2016.

22. K. Knudsen, R. Saab, R. Ward, "One-bit compressive sensing with norm estimation", *IEEE Transactions on Information Theory*, vol. 62, no. 5, 2016

23. H. Mansour, R. Saab, "Recovery Analysis for Weighted ℓ_1-Minimization Using a Null Space Property", *Applied and Computational Harmonic Analysis*, in press, available online 19 October 2015.

24. I. Daubechies, R. Saab, "Near optimal encoding of bandlimited functions ", *IEEE Signal Processing Letters,* vol. 22, no. 11, 2015.

25. N. Strawn, A. Armagan, R. Saab, L. Carin, D. Dunson, "Finite sample posterior concentration in high-dimensional regression", *Information and Inference,* vol. 3, no. 2, pp 103–133, 2014.

26. F. Krahmer, R. Saab, Ö. Yılmaz, "Sigma-Delta quantization of sub-Gaussian frame expansions and its application to compressed sensing", *Information and Inference,* vol. 3, no.1, pp 40–58, 2014

27. M. Iwen, R. Saab, "Near optimal encoding of finite frame expansions", *Journal of Fourier Analysis and Applications,* vol. 19, no. 6, pp. 1255–1273, 2013.

28. S. Gunturk, M. Lammers, A. Powell, R. Saab, Ö. Yılmaz, "Sobolev duals for random frames and Sigma-Delta quantization of compressed sensing measurements", *Foundations of Computational Mathematics*, vol. 13, no. 1, pp 1 – 36, 2013.

29. F. Krahmer, R. Saab, R. Ward. "Root-exponential accuracy for quantization of finite frame expansions, " *IEEE Transactions on Information Theory*, vol. 58, no. 2, pp. 1069 – 1079, 2012.

30. M. Friedlander, H. Mansour, R. Saab. Ö. Yılmaz, "Recovery of compressively sampled signals using partial support information," *IEEE Transactions on Information Theory*, vol. 58, no. 2, pp. 1122 – 1134, 2012

31. R. Saab, Ö. Yılmaz, "Sparse recovery by nonconvex optimization - instance optimality." *Applied and Computational Harmonic Analysis*, vol. 29, no.1, pp. 30-48, 2010.

32. E. van den Berg, M.P. Friedlander, G. Hennenfent, F. J. Herrmann, R. Saab, Ö. Yılmaz, "Sparco: A testing framework for sparse reconstruction." *ACM Transactions on Mathematical Software*, vol. 25, no.4, 2009.

33. D. Wang, R. Saab, Ö. Yılmaz, F. J. Herrmann, "Bayesian wavefield separation by transform-domain sparsity promotion." *Geophysics*, Vol. 73, no 5, pp. 1-6, 2008.

34. R. Saab, Ö. Yılmaz, M.J. McKeown, R. Abugharbieh, "Underdetermined anechoic blind source separation via ℓ^q-Basis-Pursuit, with $q < 1$." *IEEE Transactions on Signal Processing*, vol. 55, no. 8, pp. 4004-4017, 2007.

35. V. Krishnamurthy, M. Hoyles, R. Saab, and S.H. Chung, "Permeation in Gramicidin ion channels by directly estimating the potential of mean force using Brownian dynamics simulations." *Journal of Computational and Theoretical Nanoscience*, Vol. 3, pp. 702-711, 2006.

36. M.J. McKeown, S. J. Palmer, W-L Au, R. G. McCaig, R. Saab, and R. Abu-Gharbieh, "Cortical muscle coupling in Parkinson's disease (PD) bradykinesia." *Journal of Neural Transmission*, Suppl 70, pp. 31-40, 2006.

Conference Proceedings

37. J. Zhang, R. Saab, "Faster Binary Embeddings for Preserving Euclidean Distances," *ICLR 2021*, arXiv:2010.00712.

38. M. Iwen, E. Lybrand, A. Nelson, R. Saab, "New Algorithms and Improved Guarantees for One-Bit Compressed Sensing on Manifolds," Sampling Theory and Applications (SampTA2019), July 2019, Bordeaux, France.

39. D. Needell, R. Saab, T. Woolf, "Simple Object Classification using Binary Data," Proceedings of the AAAI Fall Symposium, Arlington, VA, Nov. 2017.

40. M. Iwen, B. Preskitt, R. Saab, A. Viswanathan, "Phase retrieval from local measurements in two dimensions." *Prodceedings of SPIE 10394, Wavelets and Sparsity XVII, San Diego, CA, 2017*

41. J. Feng, F. Krahmer, R. Saab, "Quantized Compressed Sensing for Partial Random Circulant Matrices." *Sampling Theory and Applications (SampTA2017)*, July 2017, Tallinn, Estonia.

42. R. Saab, R. Wang, Ö. Yılmaz "Near-optimal compression for compressed sensing." *Data Compression Conference 2015 (DCC2015)*, Snowbird, UT, 2015.

43. H. Mansour, R. Saab, "Recovery analysis for weighted ℓ_1-Minimization using a null space property" *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brisbane, Australia, 2015.

44. M. Iwen, R. Saab, "Random encoding of quantized finite frame expansions." *Proceedings of SPIE 8858, Wavelets and Sparsity XV, San Diego, CA, 2013.*

45. F. Krahmer, R. Saab, R. Ward, "Root-exponential accuracy for coarse quantization of finite frame expansions." *Proceedings of 9th International Conference on Sampling Theory and its Applications (SAMPTA)*, 2011.

46. C.S. Gunturk, M. Lammers, A. Powell, R. Saab, Ö. Yılmaz, "Sigma-Delta quantization for compressed sensing." *Proceedings of Conference on Information Sciences and Systems (CISS)*, 2010.

47. C.S. Gunturk, M. Lammers, A. Powell, R. Saab, Ö. Yılmaz, "Sobolev duals of random frames." *Proceedings of Conference on Information Sciences and Systems (CISS)*, 2010.

48. H. Mansour, R. Saab, P. Nasiopoulos, R. Ward, "Color image desaturation using sparse reconstruction." *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Dallas, Texas, 2010.

49. R. Saab, Ö. Yılmaz, "A short note on nonconvex compressed sensing." *Sampling Theory and Applications (SAMPTA)*, Marseilles, France, 2009.

50. R. Saab, R. Chartrand, Ö. Yılmaz, "Stable sparse approximation via nonconvex optimization." *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Las Vegas, Nevada, 2008.

51. R. Saab, D. Wang, Ö. Yılmaz, F. J. Herrmann, "Curvelet-based primary-multiple separation from a Bayesian perspective." *Annual Meeting International Society Exploratory Geophysics*, San Antonio, Texas, 2007.

52. D. Wang, R. Saab, Ö. Yılmaz, F. J. Herrmann, "Recent results in curvelet-based primary-multiple separation: application to real data." *Annual Meeting International Society Exploratory Geophysics*, San Antonio, Texas, 2007.

53. R. Saab, Ö. Yılmaz, M.J. McKeown, R. Abugharbieh, "Blind separation of anechoic underdetermined speech mixtures using multiple sensors." *International Symposium on Signal Processing and Information Theory (ISSPIT06)*, Vancouver, Canada, 2006.

54. R. Saab, Ö. Yılmaz, M.J. McKeown, R. Abugharbieh, "Underdetermined sparse blind source separation with delays." *Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS05)*, Rennes, France, 2005.

55. R. Saab, M.J. McKeown, L.J. Myers, and R. Abu-Gharbieh, "A wavelet based approach for the detection of coupling in EEG signals." *IEEE EMBS International Conference on Neural Engineering*, Arlington-USA, 2005, pp. 616-620.

56. M.J. McKeown, R. Saab, and R. Abu-Gharbieh, "A combined independent component analysis (ICA)/ empirical mode decomposition (EMD) method to infer corticomuscular coupling." *IEEE EMBS International Conference on Neural Engineering*, Arlington-USA, 2005, pp. 679-682

57. H. Mansour, R. Saab and F. Zebian, "Phase resolution partial discharge diagnostics system." *AUB 2nd FEA Student Conference*, Beirut, Lebanon, May 30-31, 2002.

TALKS AND PRESENTA-TIONS

Invited Talks

1. Focus Program on Data Science, Approximation Theory, and Harmonic Analysis, Fields Institute, Toronto, May 2022
2. Mathematics Department Colloquium, Michigan State University, April 2022
3. Mathematics of Data Science Follow-up Workshop, Hausdorff Research Institute for Mathematics, Bonn, Germany, April 2022
4. Applied Math Seminar, UC Irvine, March 2022
5. Mathematical Data Science Seminar, Purdue University, November 2021
6. Plenary Talk, Online International Conference on Computational Harmonic Analysis (in Lieu of Munich, Germany), September 2021
7. RWTH Aachen, MIP Seminar, March 2021, held virtually.
8. Siam Conference on Mathematics of Data Science (MDS20), June 2020, Held virtually.
9. Learning Theory workshop, Foundations of Computational Mathematics (FoCM 2020) Conference, Vancouver, June 2020 (Cancelled due to COVID)
10. Computer Science Theory Seminar, UCSD, April 2020 (held virtually).
11. Mathematics of Data Science ?Follow-up Workshop?, Hausdorff Research Institute for Mathematics, Bonn, Germany, April 2020 (Cancelled due to COVID)
12. AMS Special Session on Mathematical Analysis in Data Science, Joint Math Meetings, Denver, January 2020
13. Concentration Week on Randomness and Determinism in Compressive Data Acquisition, College Station, TX, July 2019
14. Special Session on Compressed sensing and low rank matrix recovery, 13th International Conference on Sampling Theory and Applications (SampTA2019), Bordeaux, France, July 2019
15. Math Dept. Colloquium, Technical University Munchen, Munich, Germany, July 2019

16. Special Session on Sparsity, Randomness, and Optimization, AMS Spring Central and Western Joint Sectional Meeting, Honolulu, HI, Apr. 2019
17. Data Institute SF Annual Conference, Mar. 2019
18. BIRS workshop on Intersection of Information Theory and Signal Processing: New Signal Models, their Information Content and Acquisition Complexity, Oct./Nov. 2018
19. Special Session on Extensions-Interpolation-Shape Matching in Rd, Symmetry-Invariance, Algorithms and Related Topics, AMS Fall Central Sectional Meeting, Ann Arbor, MI, Oct. 2018
20. PIMS Summer School and Workshop on the Mathematical Foundations of Data Science, Aug 2018
21. Minisymposium on "Harmonic analysis in imaging and signal processing", SIAM Annual Meeting, July 2018.
22. Plenary, Seventh International Conference on Computational Harmonic Analysis (ICCHA7), May 2018.
23. Applied Mathematics Seminar, Michigan State University, September 2017.
24. Applied Interdisciplinary Mathematics Seminar, University of Michigan Ann Arbor, September 2017.
25. Mathematics Colloquium, University of Michigan, Dearborn, September 2017.
26. Wavelets and Sparsity XVII, SPIE Annual Optics & Photonics Meeting, San Diego, CA, August 2017.
27. 2017 Meeting of the International Linear Algebra Society, Aimes, IA, July 2017.
28. SFB colloquium, Technische Universität München, June 2017.
29. BIRS (Oaxaca) Worskhop on Applied Harmonic Analysis, Massive Data Sets, Machine Learning, and Signal Processing, October 2016.
30. Hausdorff Institute of Mathematics Trimester Seminar, January 2016.
31. Mathematics Department, Michigan State University, September 2015.
32. Mathematics Department, CSC Seminar, Simon Fraser University, September 2015.
33. International Symposium on Mathematical Programming, Pittsburg, PA, July 2015.
34. Seminar at Mitsubishi Electric Research Labs (MERL), Boston, MA, July 2015.
35. Special Session on Frames and Their Applications, Joint Mathematics Meetings, January 2015.
36. Colloquium, Mathematics Department, Claremont Mckenna College, November 2014.
37. Special Session on Sampling Theory, AMS Fall Eastern Sectional Meeting, October 2014.
38. BIRS Workshop on Sparse Representations, Numerical Linear Algebra, and Optimization, Banff, Canada, October 2014.
39. Mathematics Department, University of British Columbia, September 2014.
40. Mathematics Department, University of Alberta, September 2014.
41. 5th International Conference on Computational Harmonic Analysis, Nashville, TN, May 2014.
42. Seminar in Communication Theory and Systems, UCSD, San Diego, CA, May 2014.
43. San Diego Honors Math Contest Banquet, San Diego, CA, April 2014.
44. Statistical Issues in Compressive Sensing, Gottingen, Germany, November 2013.
45. Special Session on Frame Theory and Applications, Wavelets and Sparsity XV, SPIE Annual Optics & Photonics Meeting, San Diego, CA, August 2013.
46. Minisymposium on Compressive Sensing and Extensions, Approximation Theory Conference, San Antonio, TX, April 2013.
47. Mathematics Department, University of California San Diego, San Diego, CA, January 2013.
48. Electrical and Computer Engineering Seminar, University of Alberta, Edmonton, Canada, January 2013.
49. Mathematics Department Colloquium, Arizona State University, Tempe, AZ, February 2013.

50. Mathematics Department Special Colloquium, Queens University, Kingston, Canada, February 2013.
51. Mathematics Department Seminar, University of Minnesota, Minneapolis, MN, February 2013.
52. MATHEON-Workshop on Sparse Representation of Functions: Analytic and Computational Aspects, Berlin, Germany, December 2012.
53. International Symposium on Mathematical Programming, Berlin, Germany, August 2012.
54. Joint Alberta/British Columbia seminar, Vancouver, BC, August 2012.
55. Computational Analysis Seminar, Vanderbilt University, April 2012.
56. Probabilistic Techniques and Algorithms, Austin, Texas, April 2012.
57. International Conference on Applied Harmonic Analysis and Multiscale Computing, July 2011.
58. Sampling Theory and Applications (SAMPTA), Singapore, May 2011.
59. BIRS Workshop on Sparse and Low Rank Approximation, Banff, Canada, March 2011.
60. Spring Southeastern Section Meeting of the American Mathematical Society, Statesboro, GA, March 2011
61. Compressed Sensing: Theory, Algorithms, and Applications, 2010 Canadian Mathematical Society (CMS) winter meeting, Vancouver, Canada, December 2010.
62. BIRS Workshop on Frames from first principles: Error Correction, Symmetry Goals, and Numerical Efficiency, Banff, Canada, March 2009.
63. Conference on Applied Inverse Problems, Vancouver, Canada, June 2007.

Conference Presentations and Other Talks

64. "Compressed sensing using Kronecker products." Seismic Imaging by Next-Generation Basis Functions Decomposition (SINBAD) Sponsor Meeting, Vancouver, Canada, December 2010.

65. "Sparse recovery via non-convex optimization." Seismic Imaging by Next-Generation Basis Functions Decomposition (SINBAD) Sponsor Meeting, Vancouver, Canada, November 2009.

66. "Stable sparse approximation via nonconvex optimization." IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Las Vegas, Nevada, April 2008.

67. "Stable sparse approximation via nonconvex optimization." Institute of Applied Mathematics Fourth Seminar Retreat, Vancouver, Canada, April 2008.

68. "Curvelet-based primary-multiple separation from a Bayesian perspective." Seismic Imaging by Next-Generation Basis Functions Decomposition (SINBAD) Sponsor Meeting, Vancouver, Canada, February 2008.

69. "Curvelet-based primary-multiple separation from a Bayesian perspective." Annual Meeting International Society Exploratory Geophysics, San Antonio, Texas, September 2007.

70. "Blind separation of anechoic under-determined speech mixtures using multiple sensors." The 6th IEEE International Symposium on Signal Processing and Information Technology, Vancouver, BC, Canada, August 2006.

71. "A wavelet based approach for the detection of coupling in EEG signals." IEEE EMBS International Conference on Neural Engineering, Arlington, Virginia, March 2005.

72. "A combined independent component analysis (ICA)/ empirical mode decomposition (EMD) method to infer corticomuscular coupling." IEEE EMBS International Conference on Neural Engineering, Arlington, Virginia, March 2005.