

Ben Adcock | Curriculum Vitae

Department of Mathematics, Simon Fraser University, Burnaby, BC V5A 1S6, Canada

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Nationalities

Canadian and British (dual citizen)

Current Employment

Department of Mathematics, Simon Fraser University
Assistant Professor

Burnaby, BC, Canada
August 2014 to current

Previous Employment

Department of Mathematics, Purdue University
Assistant Professor

West Lafayette, IN, USA
August 2012 to July 2014

Department of Mathematics, Simon Fraser University
NSERC & PIMS Postdoctoral Fellow
Advisor: Professor Nilima Nigam

Burnaby, BC, Canada
September 2010 to August 2012

DAMTP, University of Cambridge
EPSRC PhD Plus Research Fellow

Cambridge, Cambs, UK
February 2010 to August 2010

Education

DAMTP, University of Cambridge
PhD in Applied Mathematics

Cambridge, Cambs, UK
October 2006 to July 2010

Supervisor: Professor Arieh Iserles

Thesis title: *Modified Fourier expansions: theory, construction and applications.*

Trinity Hall, University of Cambridge
Masters of Mathematics (MMath)

Cambridge, Cambs, UK
October 2005 to June 2006

Awarded a pass with high Distinction.

Trinity Hall, University of Cambridge
BA (Hons) in Mathematics

Cambridge, Cambs, UK
October 2002 to June 2005

First class in Parts IA, IB and II of the Mathematical Tripos.

Research interests

Numerical analysis, applied and computational harmonic analysis, approximation theory, data science, compressed sensing, sampling theory, mathematical signal processing, spectral methods for PDEs

Grants, Awards and Prizes

Grants.....

NSERC Discovery Grant
Structured compressed sensing algorithms: design, analysis and applications

Total: \$170,000
April 2015 to March 2020

Alfred P. Sloan Research Fellowship <i>New techniques in multivariate approximation and interpolation</i>	Total: \$62,000 <i>September 2015 to September 2017</i>
SFU President's Research Startup Grant <i>Structured sparsity: theory, implementation and applications</i>	Total: \$50,000 <i>August 2014 to July 2017</i>
NSF DMS Computational Mathematics Program <i>Robust reconstruction techniques for nonuniformly sampled data</i>	Total: \$289,998 USD <i>August 2013 to July 2016</i>
Purdue Research Foundation Summer Faculty Grant <i>Fast, accurate and robust reconstruction techniques for nonuniformly sampled data</i>	Total: \$8,000 USD <i>May to June 2013</i>

Awards.....

Alfred P. Sloan Research Fellowship	<i>September 2015 to September 2017</i>
Purdue Research Foundation Summer Travel Award	<i>May to June 2013</i>
NSERC Postdoctoral Fellowship Two years full support.	<i>September 2010 to August 2012</i>
Pacific Institute for the Mathematical Sciences Postdoctoral Fellowship Honorary position, including travel support.	<i>September 2010 to August 2012</i>
EPSRC PhD Plus Research Fellowship One of only two six-month fellowships awarded.	<i>February to August 2010</i>
EPSRC Postgraduate Scholarship Three years full support.	<i>October 2006 to August 2009</i>

Prizes.....

CAIMS/PIMS Early Career Award Awarded at the 2017 CAIMS Annual Meeting at Dalhousie University.	<i>July 2017</i>
The AMMCS Kolmogorov-Wiener Prize for Young Researchers Awarded at the AMMCS-CAIMS Congress at Wilfred Laurier University.	<i>June 2015</i>
Leslie Fox Prize in Numerical Analysis Awarded a second prize at the Leslie Fox Prize Meeting at the University of Manchester.	<i>June 2011</i>
DAMTP Awarded a Smith–Knight essay prize.	<i>2008</i>
Trinity Hall Awarded the Parks Prize in Mathematics.	<i>2006</i>
Awarded the Wylie Prize in Mathematics.	<i>2005</i>
Elected as a Bateman Scholar.	<i>2006</i>
Elected as an Academic Scholar. Re-elected in 2004 and 2005.	<i>2003</i>

Collaborators

Richard K. Archibald (Oak Ridge National Laboratory), Alex Bastounis (University of Cambridge), Mark Bostock (University of Cambridge), Robert Calderbank (Duke University), Irene Calvo-Almázan (University of Cambridge), Anne Gelb (Arizona State University), Martin Graves (University of Cambridge), Anders C. Hansen (University of Cambridge), Evelyn Herrholz (Neubrandenburg University of Applied Sciences), Daan Huybrechs (KU Leuven), Arieh Iserles (University of Cambridge), John D. Jakeman (Sandia National Laboratories), Alex Jones (University of Cambridge), Gitta Kutyniok (TU Berlin), Jackie Ma (TU Berlin), Jesús Martín–Vaquero (University of Salamanca), Akil Narayan (University of Utah), Daniel Nietlispach (University of Cambridge), Syvert Nørsett (NTNU Trondheim), Rodrigo Platte (Arizona State University), Clarice Poon (University of Cambridge), Mark

Richardson (University of Oxford), Bogdan Roman (University of Cambridge), José Luis Romero (University of Vienna), Alexei Shadrin (University of Cambridge), Guohui Song (Clarkson University), Tom Talavage (Purdue University), Gerd Teschke (Neubrandenburg University of Applied Sciences), Ed Walsh (Brown University), Clayton G. Webster (Oak Ridge National Laboratory).

Publications

Reviewed Journal Publications.....

1. *Compressed sensing with local structure: uniform recovery guarantees for the sparsity in levels class* (with C. Li), Appl. Comput. Harmon. Anal. (to appear), 2017.
2. *Computing reconstructions from nonuniform Fourier samples: Universality of stability barriers and stable sampling rates* (with M. Gataric & J. L. Romero), Appl. Comput. Harmon. Anal. (to appear), 2017.
3. *Compressed sensing and parallel acquisition* (with I. Y. Chun), IEEE Trans. Inform. Theory (to appear), 2017.
4. *Infinite-dimensional compressed sensing and function interpolation*, Found. Comput. Math. (to appear), 2017.
5. *Density theorems for nonuniform sampling of bandlimited functions using derivatives or bunched measurements* (with M. Gataric & A. C. Hansen), J. Fourier Anal. Appl. (to appear), 2017.
6. *Infinite-dimensional ℓ^1 minimization and function approximation from pointwise data*, Constr. Approx. 45(3):343–390, 2017.
7. *Weighted frames of exponentials and stable recovery of multidimensional functions from nonuniform Fourier samples* (with M. Gataric & A. C. Hansen), Appl. Comput. Harmon. Anal. 42(3):508–535, 2017.
8. *Breaking the coherence barrier: a new theory for compressed sensing* (with A. C. Hansen, C. Poon & B. Roman), Forum Math. Sigma 5, 2017.
9. *Resolution-optimal exponential and double-exponential transform methods for functions with endpoint singularities* (with J. Martín–Vaquero and M. Richardson), SIAM J. Sci. Comput. 39(1):A164–A187, 2017.
10. *Generalized sampling and infinite-dimensional compressed sensing* (with A. C. Hansen), Found. Comput. Math. 16(5):1263–1323, 2016.
11. *A note on compressed sensing of structured sparse wavelet coefficients from subsampled Fourier measurements* (with A. C. Hansen & B. Roman), IEEE Signal Process. Lett. 23(5):732–736, 2016.
12. *A mapped polynomial method for high-accuracy approximations on arbitrary grids* (with R. Platte), SIAM J. Numer. Anal. 54(4): 2256–2281, 2016.
13. *On asymptotic incoherence and its implications for compressed sensing of inverse problems* (with A. Jones & A. C. Hansen), IEEE Trans. Inform. Theory 62(2):1020–1037, 2016.
14. *Efficient compressed sensing SENSE pMRI reconstruction with joint sparsity promotion* (with I. Y. Chun & T. M. Talavage), IEEE Trans. Med. Imag. 31(1): 354–368, 2016.
15. *Linear stable sampling rate: optimality of 2D wavelet reconstructions from Fourier measurements* (with A. C. Hansen, G. Kutyniok & J. Ma), SIAM J. Math. Anal. 47(2):1196–1233, 2015.
16. *Generalized sampling and the stable and accurate reconstruction of piecewise analytic functions from their Fourier coefficients* (with A. C. Hansen), Math. Comp. 84:237–270, 2015.
17. *On stable reconstructions from nonuniform Fourier measurements* (with M. Gataric & A. C. Hansen), SIAM J. Imaging Sci. 7(3):1690–1723, 2014.
18. *New exponential variable transform methods for functions with endpoint singularities* (with M. Richardson), SIAM J. Numer. Anal. 52(4) 1887–1912, 2014.
19. *On the numerical stability of Fourier extensions* (with D. Huybrechs and J. Martín–Vaquero), Found. Comput. Math. 14(4):635–687, 2014.
20. *Parameter selection and numerical approximation properties of Fourier extensions from fixed data* (with J. Ruan), J. Comput. Phys. 273:453–471, 2014.
21. *On optimal wavelet reconstructions from Fourier samples: linearity and universality of the stable sampling rate* (with A. C. Hansen & C. Poon), Appl. Comput. Harmon. Anal. 36(3):387–415, 2014.
22. *Generalized sampling: stable reconstructions, inverse problems and compressed sensing over the continuum* (with A. C. Hansen, B. Roman & G. Teschke), Adv. Imag. Elect. Phys. 182:187–279, 2014.
23. *A stability barrier for reconstructions from Fourier samples* (with A. C. Hansen & A. Shadrin), SIAM J. Numer. Anal. 52(1):125–139, 2014.

24. *On the resolution power of Fourier extensions for oscillatory functions* (with D. Huybrechs), *J. Comput. Appl. Math.* 260:312–336, 2014.
25. *Beyond consistent reconstructions: optimality and sharp bounds for generalized sampling, and application to the uniform resampling problem* (with A. C. Hansen & C. Poon), *SIAM J. Math. Anal.* 45(5):3132–3167, 2013.
26. *Generalized sampling: extension to frames and ill-posed problems* (with A. C. Hansen, E. Herrholz & G. Teschke), *Inverse Problems* 29:015008, 2013.
27. *Stable reconstructions in Hilbert spaces and the resolution of the Gibbs phenomenon* (with A. C. Hansen), *Appl. Comput. Harmon. Anal.* 32(3):357–388, 2012.
28. *A generalized sampling theorem for stable reconstructions in arbitrary bases* (with A. C. Hansen), *J. Fourier Anal. Appl.* 18(4):685–716, 2012.
29. *From high oscillation to rapid approximation II: Expansions in Birkhoff series* (with A. Iserles & S. P. Nørsett), *IMA J. Numer. Anal.* 32(1):105–140, 2012.
30. *On the convergence of expansions in polyharmonic eigenfunctions*, *J. Approx. Theory* 163(11):1638–1674, 2011.
31. *Gibbs phenomenon and its removal for a class of orthogonal expansions*, *BIT* 51(1):7–41, 2011.
32. *Convergence acceleration of modified Fourier series in one or more dimensions*, *Math. Comp.* 80(273):225–261, 2011.
33. *Multivariate modified Fourier series and application to boundary value problems*, *Numer. Math.* 115(4):511–552, 2010.
34. *Univariate modified Fourier methods for second order boundary value problems*, *BIT* 49(2):249–280, 2009.

Submitted for Publication.....

35. *Robustness to unknown error in sparse regularization* (with S. Brugiapaglia), submitted to *IEEE Trans. Inform. Theory*, 2017.
36. *Compressed sensing with sparse corruptions: Fault-tolerant sparse collocation approximations* (with A. Bao, J. D. Jakeman & A. Narayan), submitted to *SIAM/ASA J. Uncertain. Quantif.*, 2017.
37. *Frames and numerical approximation* (with D. Huybrechs), submitted to *SIAM Rev.*, 2016.
38. *Optimal sampling rates for approximating analytic functions from pointwise samples* (with R. Platte and A. Shadrin), submitted to *IMA J. Numer. Anal.*, 2017.
39. *Parameter assessment from time-dependent MR signals using sequential imaging* (with R. Archibald, A. Gelb, R. B. Platte, G. Song and E. G. Walsh), submitted to *IEEE Trans. Med. Imag.*, 2016.
40. *Uniform recovery from subgaussian multi-sensor measurements* (with I. Y. Chun), submitted to *Appl. Comput. Harmon. Anal.*, 2016.
41. *Exploiting asymptotic structure to enhance resolution in undersampled physical imaging* (with B. Roman, R. Calderbank, M. Graves, D. Nietlispach, M. Bostok, I. Calvo-Almázan & A. C. Hansen), submitted to *Proc. Natl. Acad. Sci. USA*, 2016.

Preprints.....

42. *On fundamentals of models and sampling in compressed sensing* (with B. Roman, A. Bastounis & A. C. Hansen), 2015.
43. *Analyzing the structure of multidimensional compressed sensing problems through coherence* (with A. C. Hansen & A. Jones), 2014.

Book Chapters.....

44. *Compressed sensing approaches for polynomial approximation of high-dimensional functions* (with S. Brugiapaglia & C. G. Webster), *Compressed Sensing and Its Applications*, Birkhäuser, 2017 (to appear).
45. *The quest for optimal sampling: computationally efficient, structure-exploiting measurements for compressed sensing* (with A. C. Hansen & B. Roman), *Compressed Sensing and Its Applications*, Birkhäuser, 2015.

Reviewed Proceedings.....

46. *Recovery guarantees for compressed sensing with unknown errors* (with S. Brugiapaglia & R. K. Archibald). Proceedings of the 12th International Conference on Sampling Theory and Applications, Tallinn, Estonia July 2017 (to appear).
47. *Optimal sparse recovery for multi-sensor measurements* (with I. Y. Chun). Proceedings of the 2016 IEEE Information Theory Workshop, Cambridge, UK, September 2016.
48. *Sparsity and parallel acquisition: optimal uniform and nonuniform recovery guarantees* (with I. Y. Chun and C. Li). Proceedings of the 2016 IEEE International Conference on Multimedia and Expo, Seattle, USA, July 2016.
49. *Compressed sensing with local structure: theory, applications and benefits* (with A. C. Hansen & B. Roman). Proceedings of the 11th International Conference on Sampling Theory and Applications, Washington DC, USA May 2015.
50. *Stable nonuniform sampling with weighted Fourier frames and recovery in arbitrary spaces* (with M. Gataric & A. C. Hansen). Proceedings of the 11th International Conference on Sampling Theory and Applications, Washington, USA May 2015.
51. *Recovering piecewise smooth functions from nonuniform Fourier measurements* (with M. Gataric & A. C. Hansen). Proceedings of the 10th International Conference on Spectral and High Order Methods, Salt Lake City, USA, June 2014.
52. *Efficient compressed sensing SENSE parallel MRI reconstruction with joint sparsity promotion and mutual incoherence enhancement* (with I. Y. Chun & T. M. Talavage). Proceedings of the 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago, USA, August 2014.
53. *Non-convex compressed sensing CT reconstruction based on rensor discrete Fourier slice theorem* (with I. Y. Chun & T. M. Talavage). Proceedings of the 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago, USA, August 2014.
54. *Overcoming the coherence barrier in compressed sensing* (with A. C. Hansen, C. Poon & B. Roman). Proceedings of the 10th International Conference on Sampling Theory and Applications, Bremen, Germany July 2013.
55. *Optimal wavelet reconstructions from Fourier samples via generalized sampling* (with A. C. Hansen & C. Poon). Proceedings of the 10th International Conference on Sampling Theory and Applications, Bremen, Germany July 2013.
56. *Accuracy of the Fourier extension method for oscillatory phenomena* (with D. Huybrechs). Proceedings of the 10th International Conference on Mathematical and Numerical Aspects of Waves, Vancouver, Canada, July 2011.
57. *Reduced consistency sampling in Hilbert spaces* (with A. C. Hansen). Proceedings of the 9th International Conference on Sampling Theory and Applications, Singapore, May 2011.
58. *Multivariate modified Fourier expansions* (with D. Huybrechs). Proceedings of the 8th International Conference on Spectral and High Order Methods, Trondheim, Norway, June 2009.

Technical Reports.....

59. *Nonuniform sampling and reconstruction of multivariate functions using derivatives* (with M. Gataric & A. C. Hansen). Purdue Geomathematical Imaging Group Annual Project Review, April 2014.

Essays.....

60. *Modified Fourier expansions: theory, construction and applications*, PhD thesis, 2010.
61. *Birkhoff–Galerkin methods for linear boundary value problems*, Smith-Knight prize essay, 2008.
62. *Symplectic methods for Hamiltonian equations*, Part III Essay, 2006.

Conferences, Workshops and Seminars

Invited Seminars.....

1. *Frames and numerical approximation*
Applied & Computational Mathematics Seminar, Dartmouth College, USA, January 2017.
2. *Sparse polynomial approximation of high-dimensional functions*
SCAIM seminar, University of British Columbia, Canada, January 2017.
3. *Sparse polynomial approximation of high-dimensional functions*
Data Seminar, Johns Hopkins University, Baltimore, USA, December 2016.
4. *Compressed sensing with local structure: theory, applications and benefits*
Information Theory Seminar, University of British Columbia, Canada, October 2015.
5. *ℓ^1 minimization and function interpolation*
Chinese Academy of Sciences, Beijing, China, August 2015.
6. *Compressed sensing and imaging: the effect and benefits of local structure*
Chinese Academy of Sciences, Beijing, China, August 2015.
7. *An introduction to compressed sensing*
Chinese Academy of Sciences, Beijing, China, August 2015.
8. *Infinite-dimensional ℓ^1 minimization and function interpolation*
Oak Ridge National Laboratory Seminar, Oak Ridge, USA, May 2015.
9. *Compressed sensing: theory, applications and extensions*
PIMS/Shell Lunchbox Lecture, Calgary, Canada, February 2015.
10. *Function approximation via infinite-dimensional weighted ℓ^1 minimization*
Applied Mathematics Seminar, University of Utah, USA, December 2014.
11. *Getting more from less: An introduction to compressed sensing and its applications*
Biophysics Seminar, Simon Fraser University, Canada, October 2014.
12. *Infinite-dimensional compressed sensing*
Computational and Applied Mathematics Seminar, Arizona State University, USA, March 2014.
13. *Getting even more from less: A new framework for compressed sensing*
Data Seminar, Duke University, USA, February 2014
14. *Beyond incoherence and beyond sparsity: A new framework for compressed sensing*
CSCAMM Seminar, University of Maryland, USA, December 2013.
15. *Compressed sensing over the continuum*
Mathematics Colloquium, University of Maine, USA, November 2013.
16. *Breaking the coherence barrier in compressed sensing*
Compressive Sensing, Extensions, and Applications Seminar, Drexel University, USA, May 2013.
17. *Compressed sensing without incoherence*
CCAM Lunch Seminar, Department of Mathematics, Purdue University, USA, April 2013.
18. *Fast, stable and accurate approximations with Fourier extensions*
Mathematics Colloquium, University of New Hampshire, USA, February 2013.
19. *Breaking the coherence barrier: asymptotic incoherence and asymptotic sparsity in compressed sensing*
Applied Math & PDEs Seminar, Department of Mathematics, UC Davis, USA, December 2012.
20. *Breaking the coherence barrier: asymptotic incoherence and asymptotic sparsity in compressed sensing*
Stanford Applied Math Seminar, Department of Mathematics, Stanford University, USA, December 2012.
21. *Breaking the coherence barrier: asymptotic incoherence and asymptotic sparsity in compressed sensing*
Computational Analysis Seminar, Department of Mathematics, Vanderbilt University, USA, November 2012.
22. *Breaking the coherence barrier: asymptotic incoherence and asymptotic sparsity in compressed sensing*
CS&E Seminar, Department of Computer Science, Purdue University, USA, November 2012.
23. *A general framework for stable reconstructions from nonuniform samples*
CCAM Lunch Seminar, Department of Mathematics, Purdue University, USA, October 2012.
24. *Breaking the coherence barrier: semi-random sampling in compressed sensing*
GMIG Seminar, Department of Mathematics, Purdue University, USA, October 2012.
25. *Generalized sampling and infinite-dimensional compressed sensing*
Fields Institute, University of Toronto, Canada, May 2012.
26. *Generalized sampling and infinite-dimensional compressed sensing*

- SCAIM seminar, University of British Columbia, Canada, November 2011.
27. *Generalized sampling: a new framework for image and signal reconstruction*
Mathematics Colloquium, Arizona State University, USA, October 2011.
 28. *The computation of stable and accurate Fourier extensions of smooth functions*
Computational and Applied Mathematics Seminar, Arizona State University, USA, October 2011.
 29. *Stable reconstructions in Hilbert spaces and the resolution of the Gibbs phenomenon*
Leslie Fox Prize Meeting, MIMS, University of Manchester, UK, June 2011.
 30. *Generalised sampling in Hilbert spaces*
EPFL BIG Seminar, EPFL, Switzerland, June 2011.
 31. *A general framework for numerically stable reconstructions in Hilbert spaces*
Numerical Analysis Seminar, University of Cambridge, UK, March 2011.
 32. *A general framework for numerically stable reconstructions in Hilbert spaces*
Numerical Analysis Seminar, University of Bath, UK, March 2011.
 33. *Generalized sampling in Hilbert spaces, with application to spectral methods for nonsmooth problems*
SCAIM seminar, University of British Columbia, Canada, November 2010.
 34. *A stable framework for sampling in Hilbert spaces, with applications to Fourier and polynomial-based spectral methods*
CSC seminar, Simon Fraser University, Canada, October 2010.
 35. *Modified Fourier series: from d-variate cubes to expansions in simplices*
Department of Computer Science Seminar, K. U. Leuven, Belgium, May 2010.
 36. *Modified Fourier expansions: theory, accelerating convergence and generalisations*
Numerical Analysis Seminar, University of Bath, UK, April 2010.
 37. *Spectral-Galerkin methods based on eigenseries expansions*
Applied and Computational Analysis Graduate Seminar, University of Cambridge, UK, 2008.

Conference and Workshop Presentations

1. *From global to local: structure-exploiting sampling in compressive imaging*
The 2017 Annual Meeting of the Canadian Applied and Industrial Mathematics Society (CAIMS), Dalhousie University, Canada, June 2017 (invited speaker).
2. *Robustness to unknown error in sparse regularization*
Foundations of Computational Mathematics (FoCM), Barcelona, Spain, July 2017 (invited minisymposium speaker).
3. *Polynomial approximation of smooth, multivariate functions on irregular domains*
Foundations of Computational Mathematics (FoCM), Barcelona, Spain, July 2017 (invited minisymposium speaker).
4. *Sparse polynomial approximation of high-dimensional functions*
47th John H. Barrett Memorial Lectures, University of Tennessee, Knoxville, USA, May 2017 (invited talk).
5. *Approximating smooth, high-dimensional functions in irregular domains*
The 4th annual Cascade RAIN, Simon Fraser University, Canada, April 2017 (contributed talk).
6. *Polynomial approximation of smooth, multivariate functions on irregular domains*
Oberwolfach Workshop on Multiscale and High-Dimensional Problems, Oberwolfach, Germany, March 2017 (invited talk).
7. *Approximating smooth, multivariate functions in irregular domains*
The SIAM Conference on Computational Science & Engineering (SIAM CS&E), Atlanta, February 2017 (invited minisymposium speaker).
8. *Optimal sparse recovery for multi-sensor measurements*
The 2016 IEEE Information Theory Workshop, University of Cambridge, UK, September 2016 (contributed talk).
9. *Compressed sensing and parallel acquisition*
The 2016 IEEE International Conference on Multimedia and Expo, Seattle, July 2016 (contributed talk).
10. *Is there life beyond bases? Principles of numerical approximation with infinite frames*
The 2016 Annual Meeting of the Canadian Applied and Industrial Mathematics Society (CAIMS), University of Alberta, Edmonton, Canada, June 2016 (invited minisymposium speaker).
11. *Compressed sensing and application to uncertainty quantification*

- The SIAM Conference on Uncertainty Quantification (SIAM UQ), EPFL, Lausanne, Switzerland, April 2016 (invited minitutorial).
12. *Optimizing compressed sensing for high-dimensional function interpolation*
The SIAM Conference on Uncertainty Quantification (SIAM UQ), EPFL, Lausanne, Switzerland, April 2016 (invited minisymposium speaker).
 13. *Compressed sensing and parallel acquisition*
Workshop on Low Complexity Models in Signal Processing, Hausdorff Trimester Program on Mathematics of Signal Processing, Bonn, Germany, February 2016 (invited speaker).
 14. *Compressed sensing and function interpolation*
The 2nd Matheon Conference on Compressed Sensing and Its Applications, Berlin, Germany, December 2015 (invited speaker).
 15. *Infinite-dimensional ℓ^1 minimization and function interpolation*
The 8th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August 2015 (invited minisymposium speaker).
 16. *Compressed sensing with local structure: theory, applications and benefits*
The 8th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August 2015 (invited minisymposium speaker).
 17. *Compressed sensing: to infinity and back again*
The 8th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August 2015 (invited minisymposium speaker).
 18. *Infinite-dimensional ℓ^1 minimization and function interpolation*
Signal Processing with Adaptive Sparse Structured Representations (Spars), University of Cambridge, UK, July 2015 (contributed talk).
 19. *Compressed sensing with local structure: theory, applications and benefits*
11th International Conference on Sampling Theory and its Applications (SampTA), American University, Washington, May 2015 (minisymposium co-organizer and speaker).
 20. *Stable nonuniform sampling and recovery of multivariate functions*
11th International Conference on Sampling Theory and its Applications (SampTA), American University, Washington, May 2015 (contributed talk).
 21. *Infinite-dimensional ℓ^1 minimization and function approximation from pointwise data*
British Mathematics Colloquium, Cambridge, UK, March 2015 (invited minisymposium speaker).
 22. *Infinite-dimensional ℓ^1 minimization and function interpolation*
The SIAM Conference on Computational Science & Engineering (SIAM CS&E), Salt Lake City, March 2015 (minisymposium co-organizer and speaker).
 23. *Function approximation via infinite-dimensional weighted ℓ^1 minimization*
The American Mathematical Society Central Spring Sectional Meeting, Michigan State University, East Lansing, March 2015 (minisymposium speaker).
 24. *Infinite-dimensional ℓ^1 minimization and function approximation*
ICERM (Institute for Computational and Experimental Research in Mathematics) Research Cluster, ICERM, Providence, November 2014 (co-organizer and speaker).
 25. *Getting more from less: compressed sensing and its applications*
Symposium on Mathematics and Computation, Simon Fraser University, Burnaby, Canada, August 2014 (invited speaker).
 26. *Infinite-dimensional compressed sensing*
The Royal Society International Scientific Seminar, Chicheley Hall, England, June 2014 (co-organizer and speaker).
 27. *Weighted ℓ^1 minimization for scattered data approximation*
The International Conference on Spectral and High Order Methods (ICOSAHOM), Salt Lake City, June 2014 (co-organizer and speaker).
 28. *Getting even more from less: structure-exploiting sampling strategies for compressive imaging*
The 5th International Conference on computational Harmonic Analysis (ICCHAV), Vanderbilt University, Nashville, May 2014 (invited speaker).
 29. *Beyond incoherence and beyond sparsity: compressed sensing in the real world*
SIAM Conference on Imaging Sciences, Hong Kong Baptist University, Hong Kong, May 2014 (invited minisymposium speaker).

30. *Nonuniform sampling of multivariate functions using derivatives*
Purdue Geomathematical Imaging Group Annual Project Review Meeting, Chicago, April 2014 (invited speaker).
31. *Getting even more from less: A new framework for compressed sensing*
American Mathematical Society Central Spring Sectional Meeting, Lubbock, Texas, April 2014 (invited minisymposium speaker).
32. *Beyond incoherence and beyond sparsity: compressed sensing in the real world*
Signal Processing with Adaptive Sparse Structured Representations (Spars), EPFL, Switzerland, July 2013 (contributed talk).
33. *Breaking the coherence barrier in compressed sensing*
10th International Conference on Sampling Theory and its Applications (SampTA), Jacobs University, Germany, July 2013 (contributed talk).
34. *Breaking the coherence barrier: asymptotic incoherence, asymptotic sparsity and multilevel sampling in compressed sensing*
The 14th International Conference on Approximation Theory, San Antonio, April 2013 (invited minisymposium speaker).
35. *Stable reconstructions from nonuniform Fourier data*
The SIAM Conference on Computational Science & Engineering (SIAM CS&E), Boston, February 2013 (invited minisymposium speaker).
36. *Is there life beyond bases? Numerically stable function approximation with infinite frames*
Chebfun & Beyond Workshop, University of Oxford, UK, September 2012 (contributed talk).
37. *Generalized sampling and infinite-dimensional compressed sensing*
Pacific Northwest Numerical Analysis Seminar (PNWNAS), VIU, Canada, October 2011 (invited speaker).
38. *Accuracy of the Fourier extension method for oscillatory phenomena*
The 10th International Conference on Mathematical and Numerical Aspects of Waves (WAVES), Vancouver, Canada, July 2011 (contributed talk).
39. *Generalised sampling in Hilbert spaces*
9th International Conference on Sampling Theory and its Applications (SampTA), NTU, Singapore, May 2011 (contributed talk).
40. *A numerical framework for stable reconstructions in Hilbert spaces*
Oberwolfach Workshop on Geometric Numerical Integration, Oberwolfach, Germany, March 2011 (contributed talk).
41. *Stable sampling in Hilbert spaces*
Canadian Mathematical Society Winter Meeting, Vancouver, Canada December 2010 (invited minisymposium speaker).
42. *Accurate and stable recovery of functions from spectral data*
The LMS–EPSRC Durham Symposium on Numerical Analysis of Multiscale Problems, Durham, UK, July 2010 (contributed poster).
43. *Generalising modified Fourier series: expansions in (sub)polyharmonic eigenfunctions*
BIT50 Trends in Numerical Computing, Lund, Sweden, June 2010 (contributed talk).
44. *Fourier-like expansions for spectral-Galerkin discretizations of non-periodic boundary value problems*
The International Conference on Spectral and High Order Methods (ICOSAHOM), Trondheim, Norway, June 2009 (invited minisymposium speaker).
45. *Modified Fourier spectral-Galerkin methods for boundary value problems*
Foundations of Computational Mathematics (FoCM), Hong Kong, June 2008 (contributed poster).
46. *Spectral methods and modified Fourier series*
International Conference on Scientific Computation And Differential Equations (SCICADE), St. Malo, France, July 2007 (invited minisymposium speaker).
47. *Spectral methods and modified Fourier series*
Programme on Highly Oscillatory Problems: Computation, Theory and Application, Isaac Newton Institute for Mathematical Sciences, Cambridge, June 2007 (invited minisymposium speaker).

Declined Invitations.....

1. Workshop on Uncertainty Quantification, Institut Mittag-Leffler, 2016.

2. Conference on Applied Harmonic Analysis and Sparse Approximation, Oberwolfach, 2015.
3. Workshop on Eigenvalues/singular values and fast PDE algorithms: acceleration, conditioning, and stability, Banff International Research Station (BIRS), 2012.

Committee Experience

External Committees

Secretary of the SIAM Pacific Northwest Section (SIAMPNWS), January 2016 to December 2017.

Technical Program Committee member, the 2016 IEEE Information Theory Workshop (IEEE ITW), September 2016.

Technical Program Committee member, the 11th International Conference on Sampling Theory and its Applications (SampTA), May 2015.

Scientific Committee member, the 10th International Conference on Mathematical and Numerical aspects of Waves (WAVES), Vancouver, Canada, July 2011.

Student Committees

Ben Goodman (PhD). Examining Committee Member.	July 2017
Kevin Chow (MSc). Examining Committee Member.	December 2016
Nathan King (PhD). Supervisory Committee Member.	September 2015 to current
Dillon Nasserden (MSc). Supervisory Committee Member.	September 2015 to April 2016
Nathan King (MSc). Examining Committee Chair.	April 2015
Nathan Sharp (MSc). Examining Committee Member.	November 2015
Shanshan Huang (PhD, Purdue). Examining Committee Member.	May 2013

Organizational Experience

Conferences and Workshops

1. Co-organizer of a 5-day workshop on “Numerical Analysis and Approximation Theory meets Data Science” at BIRS, April 2018.
2. Organizing Committee, 2017 SIAM Pacific Northwest Section Biennial Conference, October 2017.
3. Organizing Committee, 2017 bcdata Data Science Workshop, August 2017.
4. Co-organizer of the 2016 SFU Symposium on Mathematics and Computation, August 2016.
5. Co-organizer of the 2015 SFU Symposium on Mathematics and Computation, August 2015.
6. Co-organizer of an invited research cluster on “Computational challenges in sparse and redundant representations” at ICERM, November 2014.
7. Co-organizer of a Royal Society International Scientific Seminar on “Computations in infinite dimensions: challenges in a continuous world”, June 2014.

Minisymposia

1. Organizer of an invited session on “Recent Advances in Compressed Sensing and Sparse Regularization” at the 2016 IEEE Information Theory Workshop, September 2016.
2. Co-organizer of the 2nd Canadian Symposium on Scientific Computing and Numerical Analysis at the 2015 AMMCS–CAIMS Congress, June 2015.
3. Co-organizer of the invited session on “Compressed Sensing and Sparsity Based Regularizations” at the 11th International Conference on Sampling Theory and its Applications (SampTA), May 2015.
4. Co-organizer of the minisymposium “Novel Spectral Approximation: Theory, Algorithms and Applications” at the SIAM Conference on Computational Science & Engineering (SIAM CS&E), March 2015.

5. Co-organizer of the minisymposium “Advances in Compressed Sensing and Structured Sparse Representations” at the SIAM Conference on Computational Science & Engineering (SIAM CS&E), March 2015.
6. Organizer of the invited minisymposium “Sampling, high-order methods, and compressed sensing” at the International Conference on Spectral and High Order Methods (ICOSAHOM), June 2014.

Other.....

1. Co-organizer of an American Institute of Mathematics (AIM) SQuaRE on “Understanding the Mathematical Underpinnings in Medical Imaging”, October 2013, April 2014 and February 2016.

Refereeing Experience

Journals.....

1. Acta Applicandae Mathematicae
2. Applied and Computational Harmonic Analysis
3. Advances in Computational Mathematics
4. Applied Numerical Mathematics
5. BIT Numerical Mathematics
6. Calcolo
7. Communications in Mathematical Analysis
8. Continuous and Discrete Dynamical Systems B
9. Electronic Transactions on Numerical Analysis
10. Foundations of Computational Mathematics
11. IEEE Selected Topics on Signal Processing
12. IEEE Signal Processing Letters
13. IEEE Transactions on Image Processing
14. IEEE Transactions on Information Theory
15. IEEE Transactions on Signal Processing
16. IMA Journal of Numerical Analysis
17. Journal of Approximation Theory
18. Journal of Complexity
19. Journal of Computational and Applied Mathematics
20. Journal of Fourier Analysis and Applications
21. Journal of Scientific Computing
22. Linear Algebra and its Applications
23. LMS Journal of Computation and Mathematics
24. Mathematics of Computation
25. Numerische Mathematik
26. Proceedings of the Royal Society A
27. SIAM Journal on Applied Mathematics
28. SIAM Journal on Imaging Sciences
29. SIAM Journal on Numerical Analysis
30. SIAM Journal on Scientific Computing
31. Signal, Image and Video Processing
32. SMAI Journal of Computational Mathematics

Conference Proceedings.....

1. The 12th International Conference on Sampling Theory and its Applications (SampTA), 2017.
2. Signal Processing with Adaptive Sparse Structured Representations (Spars), 2017.
3. The IEEE International Symposium on Information Theory (ISIT), 2016.
4. The 11th International Conference on Sampling Theory and its Applications (SampTA), 2015.
5. Signal Processing with Adaptive Sparse Structured Representations (Spars), 2015.
6. The International Conference on Spectral and High Order Methods (ICOSAHOM), 2014.
7. The 10th International Conference on Sampling Theory and its Applications (SampTA), 2013

8. Signal Processing with Adaptive Sparse Structured Representations (Spars), 2013.
9. The 10th International Conference on Mathematical and Numerical Aspects of Waves, 2011.

Funding Agencies.....

AFOSR, FONDECYT (Chilean Science and Technology Foundation), NSF, WWTF (Vienna Science and Technology Fund)

Publishers.....

Cambridge University Press, Springer

Supervisory Experience

Postdoctoral Students.....

Simone Brugiapaglia	September 2016 to August 2018
Project title: <i>Topics in Compressed Sensing and Sparse Regularization</i>	
Il Yong Chun (Purdue University)	August 2015 to May 2016
Project title: <i>Sparsity-regularized Parallel Magnetic Resonance Imaging</i>	

PhD Students.....

Yi Sui	September 2015 to August 2019
Thesis title: <i>Multivariate Function Interpolation with Compressed Sensing</i>	
Il Yong Chun (Purdue University)	August 2013 to July 2015
Thesis title: <i>Advances in Medical Imaging and Image Reconstruction</i>	
Co-supervised with Professor Tom Talavage	
Milana Gataric (University of Cambridge)	August 2013 to July 2015
Thesis title: <i>Nonuniform Generalized Sampling</i>	
Co-supervised with Dr Anders C. Hansen	

Master's Students.....

Reid Constable	January 2016 to August 2016
Project title: <i>Interpolation Techniques for Overcoming the Gibbs Phenomenon</i>	
Xinyi Wang	December 2015 to August 2016
Project title: <i>Phase Transitions in Weighted ℓ^1 Minimization</i>	
Co-supervised with Professor Weiran Sun	

Undergraduate Students.....

Saurav Shastri	May to August 2017
12-week MITACS Globalink Research Internship	
Project title: <i>Compressed Sensing in Parallel Image Acquisition Systems</i>	
Zhenqi Zhu	May to August 2017
16-week summer KEY Big Data USRA	
Project title: <i>Numerical Methods for Parameter Assessment from Time-Dependent Magnetic Resonance Signals</i>	
Matthew King–Roskamp	May to August 2017
16-week summer NSERC USRA	
Project title: <i>Optimal Sampling Strategies for Compressive Imaging</i>	
Casie Bao	May to July 2017
8-week research project	
Project title: <i>Weighted Sparse Recovery with Corrupted Measurements</i>	

Juan Manuel Cárdenas Two-month research project Project title: <i>Frames and Numerical Approximations from Indirect Data</i>	February to April 2017
Sebastián Scheuermann Two-month research project Project title: <i>Frames and Numerical Approximations from Indirect Data</i>	February to April 2017
Joshua McManus One-semester research project Project title: <i>Nonnegative Sparse Recovery and Compressive Imaging</i>	September to December 2016
Casie Bao 16-week summer VPR USRA Project title: <i>Uncertainty Quantification with Corrupted Measurements</i>	May to August 2016
Chen Li 12-week research project Project title: <i>Recovery Guarantees for Practical Compressive Imaging Systems</i>	March to May 2016
Chen Li 9-week research project Project title: <i>Nonuniform Sampling and Efficient Compressed Sensing MRI</i>	July to September 2015
Matthew King–Roskamp 16-week summer NSERC USRA Project title: <i>Approximating High-Dimensional Functions with Compressed Sensing</i> Awarded second place in the 2015 SFU Symposium on Mathematics and Computation	May to August 2015
Joseph Ruan (Purdue University) Two-semester research project Project title: <i>Parameter Selection and Numerical Approximation Properties of Fourier Extensions from Fixed Data</i>	January 2013 to December 2014

Teaching Experience

Department of Mathematics, Simon Fraser University

Assistant Professor

Burnaby, BC, Canada

August 2014 to current

- Summer 2017: MATH 310, *Introduction to Ordinary Differential Equations*
- Spring 2017: MATH 894, *Topics in Besov Spaces, Interpolation and Non-linear Approximation*
- Fall 2016: MATH 894, *Wavelets, Approximation Theory and Signal Processing*
- Fall 2016: MACM 316, *Numerical Analysis I*
- Summer 2016: MACM 316, *Numerical Analysis I*
- Fall 2015: MATH 709, *Numerical Linear Algebra and Optimization* (graduate course)
- Fall 2015: MACM 409, *Numerical Linear Algebra: Algorithms, Implementation and Applications*
- Fall 2015: MATH 895, *An Introduction to Compressed Sensing* (graduate reading course)
- Spring 2015: MACM 316, *Numerical Analysis I*
- Fall 2014: APMA 920, *Numerical Linear Algebra* (graduate course)

Department of Mathematics, Purdue University

Assistant Professor

West Lafayette, IN, USA

August 2012 to July 2014

- Spring 2014: MATH 26600, *Ordinary Differential Equations*
- Fall 2013: MATH 69200, *An Introduction to Compressed Sensing* (graduate topics course)
- Fall 2013: MATH 26600, *Ordinary Differential Equations*
- Spring 2013: MATH 26600, *Ordinary Differential Equations*
- Spring 2013: MATH 39000, *Practical Approximation Theory* (undergraduate research course)

Birkbeck College, University of London

Sessional Lecturer

London, UK

October 2007 to June 2009

Taught *Quantitative Techniques for Financial Engineering*, part of the Graduate Diploma in Financial Engineering. Subject: multivariable calculus and differential equations.

University of Cambridge
Undergraduate Supervisor

Cambridge, Cambs, UK
October 2006 to June 2010

- II(D) Linear Analysis – A first course in functional analysis.
- II(C) Topics in Analysis.
- IB Complex Analysis – A first course in the theory of functions of a complex variable.
- IB Linear Algebra – A second course in vector spaces and linear maps.
- IB Numerical Analysis – A first course.
- IIA Mathematics for Economists and Statisticians – A course in calculus and linear algebra.
- IA – various first year undergraduate courses, including analysis, group theory, differential equations and mathematical methods