

# EMILY J. KING

ASSOCIATE PROFESSOR – MATHEMATICS DEPARTMENT, COLORADO STATE UNIVERSITY

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**Research Interests:** Data Analysis, (Algebra, Combinatorics, Geometry in) Frame Theory, Pure & Applied Harmonic Analysis, Sparse & Redundant Representations, Signal & Image Processing

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10.4 Professional Societies ..... 45

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## 1 Education

### 1.1 Degrees

**University of Maryland** College Park, MD, USA  
*Ph.D. in Mathematics* 9/2005–8/2009  
“Wavelet and Frame Theory: Frame Bound Gaps, Generalized Shearlets, Grassmannian Fusion Frames,  
and  $p$ -adic Wavelets”  
Advisors: Dr. John J. Benedetto and Dr. Wojciech Czaja  
Oral Preliminary Exam: “Density of Gabor Systems,” 2007  
Written Exams: Analysis, Algebra, Topology, 2006  
Language Exam: Russian, 2006

**Texas A&M University** College Station, TX, USA  
*M.S. in Mathematics* 9/2004–8/2005  
Advisor: Dr. David Larson

**Texas A&M University** College Station, TX, USA  
*B.S. in Applied Mathematics* 9/2000–12/2003

### 1.2 Non-Degree Study

**Foundation for the Advanced Education in the Sciences Graduate School** Bethesda, MD, USA  
*Computational Biology & Bioinformatics* 2/2010–12/2010

**University of Maryland** College Park, MD, USA  
*Advanced Special Student - Bioengineering* 9/2009–12/2009

**Budapest Semesters in Mathematics** Budapest, Hungary  
*Discrete Math & Number Theory* 2/2004–6/2004

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## 2 Positions

### 2.1 Current

**Colorado State University***Associate Professor**Assistant Professor*

Fort Collins, CO, USA

7/2022–

8/2019–6/2022

### 2.2 Previous

**University of Bremen***Juniorprofessor Computational Data Analysis**Associate, Zentrum für Technomathematik (Center for Industrial Mathematics)**Wissenschaftliche Mitarbeiterin (Postdoctoral Researcher),**Zentrum für Technomathematik (Center for Industrial Mathematics)*

Bremen, Germany

4/2014–7/2019

11/2013–3/2014

**Technical University of Berlin***Humboldt Postdoctoral Fellow, FG Angewandte Funktionalanalysis*

Berlin, Germany

3/2012–6/2013

**Berlin Mathematical School***Postdoctoral Faculty Member*

Berlin, Germany

8/2012–6/2013

**University of Bonn***Humboldt Postdoctoral Fellow, Institute for Numerical Simulation*

Bonn, Germany

10/2011–2/2012

**Universität Osnabrück***Humboldt Postdoctoral Fellow, Applied Analysis Group*

Osnabrück, Germany

7/2011–9/2011

**University of Maryland***Postdoctoral Research Associate, Norbert Wiener Center*

College Park, MD, USA

9/2009–6/2011

**National Institutes of Health***Postdoctoral IRTA Fellow, Laboratory of Integrative and Medical Biophysics*

Bethesda, MD, USA

9/2009–2/2011

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## 3 Papers and Other Publications

### 3.1 Submitted Preprints

1. Huma Jamil, Yajing Liu, Christina Cole, Nathaniel Blanchard, Emily J. King, Michael Kirby, Christopher Peterson, "Dual Graphs of Polyhedral Decompositions for the Detection of Adversarial Attacks" (2022)
2. Lander Ver Hoef, Henry Adams, Emily J. King, Imme Ebert-Uphoff, "A Primer on Topological Data Analysis to Support Image Analysis Tasks in Environmental Science" (2022) <https://arxiv.org/abs/2207.10552>
3. Emily J. King, Dustin G. Mixon, Shayne Waldron, "Testing isomorphism between tuples of subspaces" (2021) <https://arxiv.org/abs/2105.03448>
4. Chris Cox, Emily J. King, Dustin G. Mixon, and Hans Parshall, "Uniquely optimal codes of low complexity are symmetric" (2020) <https://arxiv.org/pdf/2008.12871.pdf>.
5. Emily J. King, "New Constructions and Characterizations of Flat and Almost Flat Grassmannian Fusion Frames," (2019) <https://arxiv.org/abs/1612.05784>.

### 3.2 Journal Papers

1. Joseph W. Iverson, Emily J. King, Dustin G. Mixon "A note on tight projective 2-designs" (2021) <https://arxiv.org/pdf/2101.11756.pdf>, to appear *Journal of Combinatorial Designs*.
2. Sören Schulze, Johannes Leuschner, Emily J. King, "Training a Deep Neural Network via Policy Gradients for Blind Source Separation in Polyphonic Music Recordings," *Signals*, **2:4** (2021): 637–661
3. Matthew Fickus, Joseph W. Iverson, John Jasper, Emily J. King, "Grassmannian codes from paired difference sets," *Designs, Codes and Cryptography*, **89:11** (2021): 2553–2576.
4. Emily J. King, "Constructing Subspace Packings from Other Packings," *Linear Algebra and its Applications*, **625** (September 2021): 68–80.
5. Sören Schulze and Emily J. King, "Sparse Pursuit and Dictionary Learning for Blind Source Separation in Polyphonic Music Recordings," *EURASIP Journal on Audio, Speech, and Music Processing*, **2021:6** (2021).
6. Scott Mahan, Emily J. King, and Alex Cloninger, "Nonclosedness of the Set of Neural Networks in Sobolev Space" *Neural Networks*, **137** (May 2021): 85–96.
7. Sören Dittmer, Emily J. King, and Peter Maass, "Singular Values for ReLU Layers," *IEEE Transactions on Neural Networks and Learning Systems*, **31:9** (September 2020): 3594–3605.

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8. Bernhard Bodmann and Emily J. King, "Optimal arrangements of classical and quantum states with limited purity," *Journal of the London Mathematical Society*, **101**:1 (February 2020): 393–431.
9. Emily J. King and Xiaoxian Tang, "New Upper Bounds for Equiangular Lines by Pillar Decomposition," *SIAM Journal on Discrete Mathematics*, **33**:4 (2019): 2479–2508.
10. Rafael Reisenhofer and Emily J. King, "Edge, Ridge, and Blob Detection with Symmetric Molecules" *SIAM Journal on Imaging Sciences*, **12**:4 (2019): 1585–1626.
11. Matthew Fickus, John Jasper, Emily J. King, and Dustin G. Mixon, "Equiangular tight frames that contain regular simplices," *Linear Algebra and Applications*, **555** (2018): 98–138.
12. Emily J. King and Maria A. Skopina, "On biorthogonal  $p$ -adic wavelet bases," *Notes of Scientific Seminars of the St. Petersburg Department of the Steklov Mathematical Institute, Russian Academy of Sciences*, **455** (2017):67-83. (in Russian) English version *Journal of Mathematical Sciences*, **234**:2 (October 2018): 158–169, Springer.
13. Rafael Reisenhofer, Johannes Kiefer, Emily J. King, "Shearlet-based detection of flame fronts," *Experiments in Fluids*, **57** (2016): 41–55.
14. Wojciech Czaja and Emily J. King, "Anisotropic shearlet transforms for  $L^2(\mathbb{R}^k)$ ," *Mathematische Nachrichten*, **287**:8–9 (June 2014): 903–916.
15. Emily J. King, Gitta Kutyniok, and Xiaosheng Zhuang, "Analysis of Inpainting via Clustered Sparsity and Microlocal Analysis," *Journal of Mathematical Imaging and Vision*, **48**:2 (2014): 205–234.
16. Emily J. King, "Smooth Parseval frames for  $L^2(\mathbb{R})$  and generalizations to  $L^2(\mathbb{R}^d)$ ," *Int. J. Wavelets Multi*, **11**:6 (November 2013).
17. Wojciech Czaja and Emily J. King, "Isotropic shearlet analogs for  $L^2(\mathbb{R}^k)$  and localization operators," *Numerical Functional Analysis and Optimization*, **33** (2012): 872–905.
18. Emily J. King and Maria A. Skopina, "Quincunx multiresolution analysis for  $L^2(\mathbb{Q}_2^2)$ ,"  *$p$ -Adic Numbers, Ultrametric Analysis, and Applications*, **2**:3 (September 2010): 222–231.
19. John J. Benedetto and Emily J. King, "Smooth functions associated with wavelet sets on  $\mathbb{R}^d$ ,  $d \geq 1$ , and frame bound gaps," *Acta Appl. Math.*, **107**:1-3 (July 2009): 121–142.

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## 3.3 Refereed Conference Proceedings and Reports

1. Nathan Mankovich, Emily King, Chris Peterson, Michael Kirby, “The Flag Median and FlagIRLS” (2022), to appear CVPR [https://openaccess.thecvf.com/content/CVPR2022/papers/Mankovich\\_The\\_Flag\\_Median\\_and\\_FlagIRLS\\_CVPR\\_2022\\_paper.pdf](https://openaccess.thecvf.com/content/CVPR2022/papers/Mankovich_The_Flag_Median_and_FlagIRLS_CVPR_2022_paper.pdf)
2. Emily J. King, “2- and 3-Covariant Equiangular Tight Frames” (2019) *2019 13th International conference on Sampling Theory and Applications (SampTA)*, IEEE: 1–4 (2019).
3. Martin Ehler, Julia Dobrosotskaya, Emily J. King, and Robert F. Bonner, “Quantification of Retinal Chromophores Through Autofluorescence Imaging to Identify Precursors of Age-Related Macular Degeneration,” *Excursions in Harmonic Analysis: The February Fourier Talks at the Norbert Wiener Center*, Eds.: T. Andrews, R. Balan, J. J. Benedetto, W. Czaja, K. A. Okoudjou, Birkhäuser Basel (2013): 355–372.
4. Julia Dobrosotskaya, Martin Ehler, Emily J. King, Robert Bonner, and Wojciech Czaja, “Sparse Representations and Variational Methods in Retinal Image Processing,” *IFMBE Proceedings Series: Intern. Fed. for Medical & Biological Engineering, 26th Southern Biomedical Engineering Conference (SBEC 2010)*, Springer (2010): 344–347.
5. Martin Ehler, Zigurts Majumdar, Emily J. King, Julia Dobrosotskaya, Emily Chew, Wai Wong, Denise Cunningham, Wojciech Czaja, and Robert F. Bonner, “High-Resolution Autofluorescence Imaging for Mapping Molecular Processes Within the Human Retina,” *IFMBE Proceedings Series: Intern. Fed. for Medical & Biological Engineering, 26th Southern Biomedical Engineering Conference (SBEC 2010)*, Springer (2010): 361–364.

## 3.4 Abstract-Refereed Conference Proceedings and Reports

1. Sören Schulze and Emily J. King, “A Frequency-Uniform and Pitch-Invariant Time-Frequency Representation.” *Proceedings in Applied Mathematics and Mechanics – 90th GAMM Annual Meeting*, **19:1** (November 2019).
2. John Jasper, Emily J. King, and Dustin Mixon, “Game of Sloanes: Best Known Packings in Complex Projective Space,” *Wavelets and Sparsity XVIII, SPIE Proceedings*, **11138** (2019).
3. Emily J. King and James M. Murphy, “A theoretical guarantee for data completion via geometric separation,” *Proceedings in Applied Mathematics and Mechanics*, **17.1** (2018).
4. Emily J. King, “Algebraic and geometric spread in finite frames,” *Wavelets and Sparsity XVI, SPIE Proceedings*, **9597** (2015).

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5. Emily J. King, Rafael Reisenhofer, Johannes Kiefer, Wang-Q Lim, Zhen Li, and Georg Heygster, "Shearlet-Based Edge Detection: Flame Fronts and Tidal Flats," *Applications of Digital Image Processing XXXVIII, SPIE Proceedings*, **9599** (2015).
6. Emily J. King, Gitta Kutyniok, and Wang-Q Lim, "Image inpainting: theoretical analysis and comparison of algorithms," *Wavelets and Sparsity XV, SPIE Proceedings*, **8858** (2013).
7. Emily J. King, "Frame theory for locally compact abelian groups," *Wavelets and Sparsity XV, SPIE Proceedings*, **8858** (2013).
8. Emily J. King, Gitta Kutyniok, and Xiaosheng Zhuang, "Analysis of data separation and recovery problems using clustered sparsity," *Wavelets and Sparsity XIV, SPIE Proceedings*, **8138** (2011).
9. Martin Ehler, Julia Dobrosotskaya, Emily J. King, Wojciech Czaja, and Robert F. Bonner, "Modeling Photo-bleaching Kinetics to Map Local Variations in Rod Rhodopsin Density," *Medical Imaging 2011: Computer-Aided Diagnosis, SPIE Proceedings*, **7963**.
10. Julia Dobrosotskaya, Martin Ehler, Emily J. King, Robert F. Bonner, and Wojciech Czaja, "Modeling of the rhodopsin bleaching with variational analysis of retinal images," *Medical Imaging 2011: Image Processing, SPIE Proceedings*, **7962**.

## 3.5 Unrefereed Conference Proceedings and Reports

1. Emily J. King (joint work with Alex Fink, Cynthia Vinzant, and Shayne Waldron), "Decomposing (equiangular) tight frames into (equiangular) tight frames for their spans," *Oberwolfach Reports – Applied Harmonic Analysis and Sparse Approximation*, **46** (2018): 29 – 32.
2. Emily J. King (joint work with Gitta Kutyniok and Xiaosheng Zhuang), "Analysis of Inpainting via Clustered Sparsity and Microlocal Analysis," *Oberwolfach Reports – Applied Harmonic Analysis and Sparse Approximation*, **29** (2012): 44 – 48.
3. Emily J. King (joint work with Wojtek Czaja), "Shearlets and representation theory (and the Wick calculus)," *Oberwolfach Reports – Operator Algebras and Representation Theory: Frames, Wavelets and Fractals*, **8.1** (2011): 961 – 963.

## 3.6 Other Publications and Papers

1. Sören Schulze and Emily J. King, "Formulating Beurling LASSO for Source Separation via Proximal Gradient Iteration," (2022)

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2. Emily J. King, “A Matricial Algorithm for Polynomial Refinement,” <http://arxiv.org/abs/1110.6061> (2011)
3. Olga I. Glazunova, *Rush to Russian*, 2nd ed., English-language editor: Emily J. King, Izdatel’ckijdom “Mirs” (Publishing House Mirs), St. Petersburg (2010): 304 pages. ISBN 978-5-91395-048-2
4. Emily J. King, “A Journal of the Budapest Semesters in Mathematics,” *MAA: Math Horizons*, **14** (September 2006).
5. Emily J. King, “Grassmannian fusion frames,” <https://arxiv.org/abs/1004.1086> (2013)
6. Emily J. King, Review of *Codes and Ciphers: Julius Caesar, the Enigma, and the Internet* by Robert Churchhouse, *MAA: Math Horizons*, **11** (April 2004).

## 4 Fellowships, Awards, and Grants

### 4.1 Grants

Co-PI: Good Fibrations: Neural Networks, Manifold Detectives, and Polytope Strings in Deep Space; DARPA, 2022–2023

PI: Cartoon Series to Highlight Challenges Faced by Underrepresented Groups in STEM; \$4,800.00; CNS Climate Grant for Diversity, Equity and Inclusion; College of Natural Sciences; Colorado State University; Spring 2021

Co-PI: 2021 AWM Research Symposium, \$25,000.00, National Security Agency

Co-Spokesperson / Project Leader: Helmholtz School for Marine Data Science (MarDATA), € 6,000,000.00 (total program), Helmholtz Association, 2019 – [left 2019]

Project Leader: Graduiertenkolleg “Research Training Group  $\pi^3$ : Parameter Identification – Analysis, Algorithms, Application,” € 208,837.50 (my portion, less overhead costs), Deutsche Forschungsgemeinschaft, 2016 – [left 2019]

Coauthor/PI: Explorationsprojekt “Hilbert Space Frames and Algebraic Geometry” with Eva-Maria Feichtner, € 245,535, Zentrale Forschungsförderung der University of Bremen, 2014 – 2016

Author: AMS-Simons Travel Grant, \$4000, July 1, 2013 – June 30, 2015

Author: Jacob K. Goldhaber Travel Grant, \$600, Graduate School, University of Maryland, June 2009

Author: Kaplan Travel Funds, \$600, University of Maryland, Alumni Association, Summer 2009

Coauthor: MAA-Tensor Grant, \$1500 for Women in Mathematics at the University of Maryland, Spring 2009

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## 4.2 Fellowships & Scholarships

Humboldt Postdoctoral Research Fellowship, July 2011 – June 2013

IRTA Postdoctoral Fellow, National Institutes of Health, September 2009 – February 2011

Norbert Wiener Center Summer Research Assistantship, University of Maryland, Summer 2009

Ann G. Wylie Dissertation Fellow, University of Maryland, August 2008 – December 2008

GAANN Fellow, University of Maryland, August 2005 – August 2008

Lechner Scholar, Texas A&M University, August 2000 – December 2004

National Merit Scholar, Texas A&M University, August 2000 – December 2003

Academic Achievement Scholar, Texas A&M Mathematics, August 2002 – December 2003

NSF-VIGRE Fellow, Texas A&M University, Summer 2002, Summer 2003

Mechanical Engineering Scholar, Texas A&M University, August 2000 – May 2001

Directors Excellence Scholar, Texas A&M University, August 2000 – May 2001

## 4.3 Prizes & Awards

Seymour Goldberg Writing Competition Winner, University of Maryland, March 2007

Rank 403.5/3615, Putnam Exam, Fall 2003

4th place winner, US National Collegiate Mathematics Championship, MathFest, Boulder, Colorado, USA, August 2003

Pi Mu Epsilon/AMS Outstanding Student Talk, MathFest, Boulder, Colorado, USA, August 2003

## 5 Conferences, Workshops, & Seminars

### 5.1 Invited Conference and Workshop Presentations

Title TBA, Session on Mathematics of Information, 2022 Pacific Rim Mathematical Association Congress, Vancouver, Canada, December 4–6, 2022

[Postponed to Fall 2022 due to COVID-19] Title TBA (plenary), Workshop on Applied Algebra in Data Science, Max Planck Institute, Leipzig, Germany, September 17–19, 2020

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- [Postponed in 2020 and 2021. Possibly canceled or postponed in 2022] “Combinatorics and Group Symmetry in [Hilbert Space] Frames,” ALCOMA 20 (international conference on algebraic combinatorics and applications), Kloster Banz, Germany, March 26–April 1, 2022
- “PCA is not dead: Vectorized persistent homology and flag medians,” IPAM Workshop on Mathematical Advances for Multi-Dimensional Microscopy, Institute for Pure and Applied Mathematics, Los Angeles, CA, USA, October 24–28, 2022
- “Switching Equivalence on the Grassmannian,” Special Session on Algebraic Combinatorics and its Application to Harmonic Analysis, AMS Western Sectional Meeting, University of Utah, Salt Lake City, UT, USA, October 22–23, 2022 [Postponed from 2020]
- “PCA is not dead: Vectorized persistent homology and flag medians,” 8th International Conference on Computational Harmonic Analysis (ICCHA), Munich, Germany, September 12–16, 2022 [Postponed from 2020]
- “Switching Equivalence on the Grassmannian,” Workshop on Graph Theory, Algebraic Combinatorics and Mathematical Physics, Thematic Semester on Symmetries: Algebras and Physics, Centre de recherches mathématiques (CRM), Montreal, Canada, August 1–12, 2022
- “Some Mathematical Approaches to Explainable AI,” Conference on the Mathematics of Complex Data, Stockholm, Sweden, June 13–16, 2022 [Postponed from 2020]
- “Subspace Configurations and Some Applications,” Focus Week on Computational Harmonic Analysis and Linear Algebra, Focus Program on Data Science, Approximation Theory, and Harmonic Analysis, Fields Institute, Toronto, Canada, May 9–June 10, 2022 [Postponed from 2021] [YouTube link](#)
- “Testing isomorphism between tuples of subspaces,” Special Session on Harmonic Analysis, Frames and Sampling, AMS Meeting #1172, Fall Western Sectional, October 23–24, 2021 [Held over Zoom]
- “Mathematical analysis of neural networks,” Online International Conference on Computational Harmonic Analysis (Online-ICCHA), Munich, Germany, September 13–17, 2021 [Held over Zoom]
- “Some topics in harmonic analysis over locally compact abelian groups,” Special Session on Harmonic Analysis, Fractal Geometry, and Applications, Mathematical Congress of the Americas 2021, Buenos Aires, Argentina, July 19–23, 2021 [Held over Zoom]
- “The Combinatorics of Equiangular Tight Frame Substructures,” Special Session on Frame Theory, DFT 2020: The District Fourier Talks, American University, Washington, DC, USA, October 24, 2020 [Held over Zoom]

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- [Canceled due to COVID-19] Title TBA, SUnMaRC Undergraduate Maths Research Conference, Colorado State University, Fort Collins, CO, USA, April 3–5, 2020
- “Small World Graphs: What Facebook, Roundworm Brains, and My Career Have in Common,” CSU Sonia Kovalevsky Day, Colorado State University, Fort Collins, CO, USA, March 12, 2020
- “ReLU-Singular Values and Gaussian Mean Width in Neural Networks,” AMS-AWM Special Session on Mathematical and Computational Research in Data Science, Joint Mathematics Meetings, Denver, CO, USA, January 15–18, 2020
- “Algebraic and Geometric Spread of Linear Measurements in Applications,” Keynote Address, Wavelets & Sparsity XVIII, SPIE Optics & Photonics 2019, San Diego, CA, USA, August 11–15, 2019
- “2- and 3-Covariant Equiangular Tight Frames,” SampTA 2019, Bordeaux, France, July 8–12, 2019
- “Edge, ridge, and blob detection with symmetric molecules,” AWM Research Symposium, Rice University, Houston, TX, USA, April 6–7, 2019
- “Negative Cliques in Sets of Equiangular Lines,” 7th International Conference on Computational Harmonic Analysis, Vanderbilt University, Nashville, TN, USA, May 14–18, 2018
- “Fourier Analysis on Groups and Grassmannian Packings,” Spring Mini Courses in Analysis and Geometry, Louisiana State University, Baton Rouge, Louisiana, USA, February 8–11, 2018
- “Difference Sets and Grassmannian Packings,” International Workshop on Wavelets, Frames and Applications III, Kirori Mal College, University of Delhi, Delhi, India, December 14–20, 2017
- “Combinatorial Frame Design,” AFG Summer Party, TU Berlin, Berlin, Germany, August 25–26, 2016
- “Optimal Frames,” Section on Mathematical Signal and Image Processing, Joint Annual Meeting of GAMM and DMV, Braunschweig, Germany, March 7–11, 2016
- “Algebraic and Geometric Spread in Finite Frames,” Applied and Computational Harmonic Analysis Section, DMV-Jahrestagung, Hamburg, Germany, September 21–25, 2015
- “Algebraic and geometric spread in finite frames,” Wavelets & Sparsity XVI, SPIE Optics & Photonics 2015, San Diego, CA, USA, August 9–13, 2015
- “Shearlet-Based Edge Detection: Flame Fronts and Tidal Fronts,” GAMM 86th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Section on Mathematical Signal and Image Processing, Lecce, Italy, March 23–27, 2015

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- “Sparsity-Based Approaches to Image Processing: Bridging Theory and Application,” GAMM 85th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Section on Mathematical Signal and Image Processing, Erlangen, Germany, March 10–14, 2014
- “Frame Theory for Locally Compact Abelian Groups,” Wavelets & Sparsity XV, SPIE Optics & Photonics 2013, San Diego, CA, USA, August 25–29, 2013
- “Image Inpainting: Theoretical Analysis and Comparison of Algorithms,” Wavelets & Sparsity XV, SPIE Optics & Photonics 2013, San Diego, CA, USA, August 25–29, 2013
- “Harmonic Analysis for Locally Compact Abelian Groups,” International Workshop on  $p$ -Adic Methods for Modeling of Complex Systems, Zentrum für interdisziplinäre Forschung (Center for Interdisciplinary Research), Bielefeld, Germany, April 15–19, 2013
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Young Researcher Mini-Symposium on Compressed Sensing and Applications, GAMM 84th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Novi Sad, Serbia, March 18–22, 2013
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Sparse Representation of Functions: Analytic and Computational Aspects, MATHEON, TU Berlin, Berlin, Germany, December 10–14, 2012
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Advances in Mathematical Image Processing, Göttingen, Germany, September 4–6, 2012
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Workshop on Applied Harmonic Analysis and Sparse Approximation, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, June 11–15, 2012
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” International Conference on Multivariate Approximation, Hagen, Germany, September 24–27, 2011
- “Shearlets and Representation Theory (and the Wick calculus),” Workshop on Operator Algebra and Representation Theory: Frames, Wavelets and Fractals, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, March 27–April 2, 2011
- “Generalized Shearlets and Representation Theory,” February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 17–18, 2011
- “Quincunx MRA for  $L^2(\mathbb{Q}_2^2)$  and self-similar tilings,” AMS Special Session on Wavelets, Tilings, and Iterated Function Systems, Joint Mathematics Meetings, New Orleans, LA, USA, January 6–9, 2011

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“High-Resolution Autofluorescence Imaging for Mapping Macular Processes Within the Human Retina” (poster), NICHD Sixth Annual Meeting of Postdoctoral, Clinical, & Visiting Fellows, Warrenton, VA, USA, May 3–4, 2010

“Representation theory of generalized shearlets,” Illinois/Missouri Applied Harmonic Analysis Seminar, Northern Illinois University, DeKalb, IL, USA, April 24, 2010

“Grassmannian fusion frames,” Workshop on Optimal Frames and Operator Algebras, San Francisco State University, San Francisco, CA, USA, January 17–19, 2010

“Grassmannian fusion frames,” Mini-conference in Harmonic Analysis on the Occasion of John Benedetto’s 70th Birthday, University of Maryland, College Park, MD, USA, August 21, 2009

“Grassmannian fusion frames,” Graduation Conference, University of Maryland, College Park, MD, USA, May 1, 2009

“The Geometry of Wavelets: Fractals and Group Representations,” Graduation Conference, University of Maryland, College Park, MD, USA, April 13, 2007

## 5.2 Contributed and Self-Invited Conference and Workshop Presentations

“Introduction to the Algebra, Geometry, and Combinatorics of Line Configurations,” Minisymposium on Algebra, Geometry, and Combinatorics of Line Configurations, SIAM Conference on Applied Algebraic Geometry, Texas A&M University, College Station, TX, USA, August 16–20, 2021 [Held over Zoom]

“Small World Graphs: What Facebook and Roundworm Brains Have in Common,” IK Interdisciplinary College, Günne at Lake Möhne, Germany, March 12–19, 2021 [Held over Zoom/gather.town/YouTube]

“Introduction to Group Actions in Harmonic Analysis,” Special Session on Group Actions in Harmonic Analysis, Joint Mathematics Meetings, Denver, Colorado, USA, January 15–18, 2020

“Grassmannian Frames and the Game of Sloanes,” Jubilee of Fourier Analysis and Applications: A Conference Celebrating John Benedetto’s 80th Birthday, University of Maryland, College Park, MD, USA, September 19–21, 2019

“Game of Sloanes: Best Known Packings in Complex Projective Space,” Wavelets & Sparsity XVIII, SPIE Optics + Photonics, San Diego, CA, USA, August 11–15, 2019

“Optimal subspace and spectrahedron arrangements in frame theory and quantum information theory,” Minisymposium on Algebra, Geometry, and Combinatorics of Subspace Packings, SIAM Conference on Applied Algebra Geometry, Bern, Switzerland, July 9–13, 2019

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- “Introduction to Low Complexity Models in Data Analysis and Machine Learning,” Special Session on Low Complexity Models in Data Analysis and Machine Learning, Joint Mathematics Meetings, Baltimore, MD, USA, January 16–19, 2019
- “Difference Sets and Grassmannian Packings,” AMS Contributed Paper Session on Combinatorics and Graph Theory, III, Joint Mathematics Meetings, Baltimore, MD, USA, January 16–19, 2018
- “Introduction to Algebraic, Geometric, and Combinatorial Methods in Frame Theory,” Mini-Workshop on Algebraic, Geometric, and Combinatorial Methods in Frame Theory, Oberwolfach, Germany, October 1–5, 2019
- “Negative cliques in sets of equiangular lines,” Tight Frames and Approximation, Taipa, New Zealand, February 20–23, 2018
- “Difference Sets and Grassmannian Packings,” SIAM Conference on Applied Algebraic Geometry, Atlanta, GA, USA, July 31–August 4, 2017
- “Difference Sets and Grassmannian Packings,” European Women in Mathematics – German Chapter Conference 2017, University of Bielefeld, Bielefeld, Germany, June 9–10, 2017
- “Shearlet-Based Morphological Component Analysis: Theory and Applications,” Applied Inverse Problems 2017, Hangzhou, China, May 29–June 6, 2017
- “Shearlet-Based Morphological Component Analysis: Theory and Applications,” GAMM 88th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Section on Mathematical Signal and Image Processing, Weimar, Germany, March 6–10, 2017
- “Shearlets and Morphological Component Analysis,” Mathematics of Signal Processing Hausdorff Trimester Program, Bonn, Germany, February 24, 2016
- “Algebraic and Geometric Spread in Finite Frames” (poster), 2nd International Matheon Conference on Compressed Sensing and its Applications, TU Berlin, Berlin, Germany, December 7–11, 2015
- “Shearlet-Based Edge Detection: Flame Fronts and Tidal Flats,” Applications of Digital Image Processing XXXVIII, SPIE Optics & Photonics 2015, San Diego, CA, USA, August 9–13, 2015
- “Sparse Representations and Compressed Sensing,” Compressed Sensing Workshop, Bremen, Germany, March 17, 2015
- “Multiscale Geometric Analysis” (copresented with Martin Storath), GAMM 85th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Young Researchers’ Minisymposium on Multiscale Geometric Image Analysis, Erlangen, Germany, March 10–14, 2014

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“Quincunx wavelets for  $L^2(\mathbb{Q}_2^2)$  and self-similar tilings,” Operator Algebras, Frames, and Undergraduate Research: A Conference in Honor of the 70th Birthday of David R. Larson, Texas A&M University, College Station, TX, USA, July 20–22, 2012

“Generalized shearlets and the extended metaplectic group,” Baton Rouge Workshop in Analysis and Geometry, Louisiana State University, Baton Rouge, LA, USA, January 4–5, 2011

“Age-related molecular degeneration & retinal image processing and RNA pseudoknots” (poster), Program in Physical Biology Retreat, National Institutes of Health, Bethesda, MD, USA, November 17, 2010

“Generalized shearlets and the extended metaplectic group,” Joint Mathematics Meetings, San Francisco, CA, USA, January 13–16, 2010

“Smooth functions associated with wavelet sets on  $\mathbb{R}^d$ ,  $d \geq 1$ , and frame bound gaps,” The International Conference: Wavelets and Applications, Euler International Mathematical Institute St. Petersburg, Russia, June 15–19, 2009

“Smooth functions associated with wavelet sets on  $\mathbb{R}^d$  and frame bound gaps,” D.C. Math Graduate Student Meeting, George Washington University, Washington DC, USA, April 25–26, 2009

“Smooth functions associated with wavelet sets on  $\mathbb{R}^d$  and frame bound gaps” (poster), February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 19–20, 2009

“Smooth functions associated with wavelet sets on  $\mathbb{R}^d$ ,  $d \geq 1$ , and frame bound gaps,” AMS Special Session on Harmonic Analysis, Joint Mathematics Meetings, Washington DC, USA, January 3–8, 2009

“Frame Theory” (an expository talk), Progress in Mathematics for Communication Systems Summer Academy at the International Center for Transdisciplinary Studies School of Engineering and Science, Jacobs University, Bremen, Germany, July 2–13, 2007

“The Geometry of Wavelets: Shearlets, Fractals and Group Representations,” Spotlight on Graduate Research, University of Maryland, College Park, MD, USA, November 8, 2006

“Some Constructions of Finite Tight Frames,” Spotlight on Graduate Research, University of Maryland, College Park, MD, USA, Fall 2005

“Tight Frames and Sampling Theory” (poster with Nathaniel Strawn), Undergraduate Student Poster Session, Joint Mathematics Meetings, Phoenix, AZ, USA, January 7–10, 2004

“A Matricial Algorithm for Polynomial Refinement,” MathFest, Boulder, CO, USA, July 31–August 2, 2003

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“Refinability of Multivariate Polynomials” (copresented with Justin Turner and Philip Watkins), TAMU REU/VIGRE Student Miniconference, Texas A&M University, College Station, TX, USA, July 22, 2003

“A Matricial Algorithm for Polynomial Refinement,” Nebraska Conference for Undergraduate Women in Mathematics, University of Nebraska, Lincoln, NE, USA, February 1–3, 2002

“A Matricial Algorithm for Polynomial Refinement” (poster), Sigma Xi Student Research Conference, Galveston, TX, USA, November 15–17, 2002

“A Matrix System for Polynomial Refinement,” REU Conference, Texas A&M University, College Station, TX, USA, July 2002

“Methodologies and Emergent Patterns in Forming Elliptical Tight Frame Sequences,” REU Conference, Texas A&M University, College Station, TX, USA, July 2002

## 5.3 Colloquium Talks

“An Interactive Tour of Some Data Analysis Techniques,” Geneseo Mathematics Colloquium, SUNY Geneseo, Geneseo, NY, USA, May 5, 2021 [Held over Zoom]

“Low Complexity Models in Data Analysis,” Department of Mathematics and Statistics Colloquium Series, Georgetown University, Washington, DC, USA, September 11, 2020 [Held over Zoom]

“The Algebra, Geometry, and Combinatorics of Frames,” Fisk Distinguished Speaker Series, University of Wyoming, Laramie, WY, USA, February 20, 2020

“Combinatorics and Group Symmetry in [Hilbert Space] Frames,” Colloquium of the Mathematics and Statistics Department, Vassar College, Poughkeepsie, NY, USA, October 8, 2019

“(Hilbert Space) Frames, Algebraic Combinatorics, and Geometry,” DMS Colloquium, Auburn University, Auburn, AL, USA, March 30, 2018

“Shearlet Theory and Applications,” Lothar Collatz Kolloquium für Angewandte Mathematik, University of Hamburg, Hamburg, Germany, February 1, 2018

“Optimal Representation Systems and Sparsity,” AWI Kolloquium, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, January 17, 2018

“(Hilbert Space) Frames, Algebraic Combinatorics, and Geometry,” Mathematisches und Mathematikdidaktisches Kolloquium, Carl von Ossietzky University of Oldenburg, Oldenburg, Germany, October 25, 2017

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“Frames and Geometry,” Institut für Mathematik Kolloquium, University of Osnabrück, Osnabrück, Germany, July 1, 2015

“Shearlets: From Algebra to Applications,” Mathematisches Kolloquium, University of Bremen, Bremen, Germany, November 11, 2014

“Frames Meet Algebraic Geometry,” Kolloquium über Angewandte Mathematik, University of Göttingen, Göttingen, Germany, July 22, 2014

## 5.4 International Seminar Talks

[originally an invited talk at the AMS Special Session on Recent Advances in Packing, Joint Mathematics Meetings, Seattle, Washington, January 5–8, 2022 which was postponed/moved online due to COVID-10]

“The Combinatorics of Equiangular Tight Frame Substructures,” [CodEx Seminar](#), international remote seminar, May 31, 2022 [YouTube link](#)

“A Potpourri of Mathematical Analyses of Neural Networks,” [One World Mathematics of Information, Data, and Signals \(1W-MINDS\) Seminar](#), international remote seminar, December 16, 2021 [Held over Zoom] [YouTube link](#)

“A Potpourri of Projective 2-Designs,” [CodEx Seminar](#), international remote seminar, February 2, 2021 [Held over Zoom] [YouTube link](#)

## 5.5 Institutional Seminar Talks

“A Potpourri of Projective 2-Designs,” Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Fort Collins, CO, USA, May 6, 2022

“An Ode to the Inner Product, the Powerhouse of Data Science,” Data Science Seminar, Colorado State University, Fort Collins, CO, USA, May 5, 2022. [Held over Zoom.]

“How to Interpret the Output of Standard Linear Algebra and Harmonic Analysis Tools: An Ode to the Inner Product,” NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES), Colorado State University, Fort Collins, CO, USA, April 12, 2022. [Held over Meet.]

“Applications of Group Symmetry,” University of Washington Seminar on Topology, Algebra, and Geometry in Data Science, Seattle, WA, USA, February 3, 2022. [Held over Zoom]

“Switching Equivalence on the Grassmannian,” Algebraic Graph Theory Seminar, University of Waterloo, Waterloo, Canada, November 22, 2021 [Held over Zoom] [YouTube link](#)

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“Do be a blockhead: Block designs and their application to telecommunications,” Algebratorics Lab, Colorado State University, Fort Collins, CO, USA, November 5, 2021

[Five minute talk] “The power of ‘simple’ models in data analysis,” DSRI Collaborative Research Acceleration Seminar: Private Sector Partnerships, Fort Collins, CO, USA, October 15, 2021

“Applications of Harmonic Analysis: Classical and Data-Driven Methods,” Machine Learning Core Meeting, Cooperative Institute for Research in the Atmosphere, Colorado State University, Fort Collins CO, USA, June 23, 2021 [Held over Zoom]

“Applications of Group Symmetry,” Applied Algebra and Analysis Online Seminar, TU Braunschweig / Uni Osnabrück, Germany, June 11, 2021 [Held online]

“Mathematical analysis of neural networks,” CUNY Harmonic Analysis and PDEs Seminar, City University of New York, the Graduate Center, NYC, NY, USA, May 14, 2021 [Held over Zoom]

[Three minute talk] “Low Complexity Models in Data Analysis,” First DSRI Research Collaboration Acceleration Seminar, Colorado State University, Fort Collins, CO, April 23, 2021 [Held over Zoom]

“What are neural networks? How do they work?” Data Science Seminar, Colorado State University, Fort Collins, CO, USA, April 22, 2021 [Held over Zoom]

“Low Complexity Models in Data Analysis,” Computational and Applied Math Seminar, Tufts University Department of Mathematics, Medford, MA, USA, February 8, 2021 [Held over Zoom]

“Low Complexity Models in Data Analysis,” Data Seminar, University of Missouri, Columbia, MO, USA, December 1, 2020 [Held over Zoom]

“Group Actions in Harmonic Analysis,” Seminario Harmonic Analysis and Fractal Geometry, CONICET-Universidad de Buenos Aires, Buenos Aires, Argentina, November 24, 2020 [Held over Zoom]

“Pure & Applied Harmonic Analysis: Choosing the right building blocks for the task at hand,” Who is? What is? Seminar, Colorado State University, Fort Collins, CO, USA, September 15, 2020 [Held over Zoom]

“Combinatorics and Group Symmetry in Frames,” Analysis Seminar, University of Rochester, Rochester, NY, USA, July 17, 2020 [Held over Zoom]

“John Conway and Optimal Grassmannian Packings,” Algebratorics Lab, Colorado State University, Fort Collins, CO, USA, April 21, 2020 [Held over Zoom]

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- “Strongly Regular Graphs (and Frames),” Algebratorics Lab, Colorado State University, Fort Collins, CO, USA, April 7, 2020 [Held over Zoom]
- “Lie Algebras and Quantum Information Theory,” Algebraic Lie Theory Seminar, University of Colorado, Boulder, CO, USA, December 10, 2019
- “ReLU-Singular Values and Gaussian Mean Width in Neural Networks,” Image Analysis Seminar, University of Houston, Houston, TX, USA, November 26, 2019
- “Low Complexity Models in Image Processing and Data Analysis,” guest lecture in DSCI 100, Colorado State University, Fort Collins, CO, USA, November 18, 2019
- “Shearlet Theory and Applications,” Applied Math Seminar, Colorado State University, Fort Collins, CO, USA, October 3, 2019
- “Low Complexity Models in Image Processing and Data Analysis,” Data Science Seminar, Colorado State University, Fort Collins, CO, USA, September 26, 2019
- “Combinatorics and Group Symmetry in [Hilbert Space] Frames,” Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Fort Collins, CO, USA, September 13, 2019
- “Sparsity-Based Inpainting and Data Separation,” Seminar in Inverse Problems, Colorado State University, Fort Collins, CO, USA, September 5, 2019
- “Glühwein\* and Block Designs. \*Glühwein not included,” FB3 Weihnachtsfeier, University of Bremen, Bremen, Germany, December 19, 2018
- “Combinatorics and Discrete Geometry in (Hilbert Space) Frames,” Kombinatorische Strukturen in der Geometrie Kollegseminar, University of Osnabrück, Osnabrück, Germany, November 12, 2018
- “Edge, Ridge, and Blob Detection with Symmetric Molecules,” Image Analysis Seminar, University of Houston, TX, USA, August 27, 2018
- “Frames and Bases over Locally Compact Abelian Groups,” Analysis Seminar, University of Houston, Houston, TX, USA, October 6, 2017
- “Difference Sets and Grassmannian Packings,” Seminario de Análisis Real, Armónico y Geometría Fractal, Universidad de Buenos Aires, Buenos Aires, Argentina, August 27, 2017
- “Difference Sets and Grassmannian Packings,” Harmonic Analysis Theory & Applications Seminar, Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, September 19, 2016.

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- “Optimal Representation Systems and Sparsity,” Department of Mathematics and Statistics Seminar, AFIT, Wright-Patterson, OH, USA, May 25, 2016
- “Optimal Representation Systems and Sparsity,” Fachgebiet Technische Thermodynamik Seminar, University of Bremen, Germany, December 5, 2015
- “Wavelets: Ergodic Sets and Fractal Tilings,” Dynamical Systems and Geometry Oberseminar, University of Bremen, Germany, November 27, 2014
- “Optimal Representation Systems and Sparsity,” Seminar on Physics and Chemistry of the Atmosphere, University of Bremen, Germany, July 11, 2014
- “Frames Meet Algebraic Geometry,” AFG Oberseminar, TU Berlin, Berlin, Germany, March 27, 2014
- “(Hilbert Space) Frames Meet Algebraic Geometry,” ALTA Oberseminar, University of Bremen, Bremen, Germany, February 5, 2014
- “Harmonic Analysis on Locally Compact Abelian Groups,” AFG Oberseminar, TU Berlin, Berlin, Germany, June 20, 2013
- “Harmonic Analysis on Locally Compact Abelian Groups: What is known and new frontiers,” Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, May 14, 2013
- “Protein-Protein Docking and the Fast Fourier Transform,” Department of Mathematics Undergraduate Colloquium, University of Houston, Houston, TX, USA, March 26, 2013
- “Shearlet-Based Inpainting,” Analysis Seminar, University of Houston, Houston, TX, USA, March 25, 2013
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Oberseminar Angewandte Funktionalanalysis, TU Berlin, Berlin, Germany, February 28, 2013
- “Isotropic shearlet analogs for  $L^2(\mathbb{R}^k)$  and localization operators,” Seminario de Análisis y Aplicaciones, Universidad Autónoma de Madrid, Madrid, Spain, January 18, 2013
- “Image Inpainting via Analysis-Side  $\ell^1$ -Minimization,” Institute of Biomathematics and Biometry Colloquium, Helmholtz Zentrum München, Munich, Germany, May 4, 2012
- “Generalized Shearlets, Representation Theory, and the Wick Calculus,” Applied Harmonic Analysis Group Seminar, University of Bonn, Germany, October 20, 2011
- “Grassmannian Fusion Frames,” Jacobs Computational Analysis Seminar, Jacobs University, Bremen, Germany, April 6, 2011

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- “Protein-Protein Docking and the FFT,” NWC Seminar, Norbert Wiener Center, College Park, MD, USA, November 2, 2010
- “Biological Network Theory – How Actors are Like Neurons in *C. elegans*,” AMSC Student Seminar, University of Maryland, College Park, MD, USA, October 19, 2010
- “Biological Network Theory – How Actors are Like Neurons in *C. elegans*, I & II,” NICHD Postbac Course: Becoming an Effective Scientist, National Institutes of Health, Bethesda, MD, USA, October 4 & 18, 2010
- “Protein-Protein Docking,” Building 9 Computational Bio Journal Club, National Institutes of Health, Bethesda, MD, USA, July 29, 2010
- “Biological Pattern Formation,” Building 9 Computational Bio Journal Club, National Institutes of Health, Bethesda, MD, USA, January 7, 2010
- “Harmonic Analysis on Locally Compact Abelian Groups,” Student Analysis and PDE Seminar, University of Maryland, College Park, MD, USA, April 14, 2009
- “ $p$ -Adic Wavelets and Pseudodifferential Operators,” Student Analysis and PDE Seminar, University of Maryland, College Park, MD, USA, March 31, 2009
- “Hadamard Matrices: Theory and Applications,” Women in Mathematics Lunch, University of Maryland, College Park, MD, USA, March 25, 2009
- “The Extended Metaplectic Group,” Student Analysis and PDE Seminar, University of Maryland, College Park, MD, USA, February 10, 2009
- “Smooth functions associated with wavelet sets on  $\mathbb{R}^d$ ,  $d \geq 1$ , and frame bound gaps,” NWC Seminar, Norbert Wiener Center, College Park, MD, USA, December 9, 2008
- “Hadamard Matrices: Theory & Applications,” Graduate MiniCourse, University of Maryland, College Park, MD, USA, March 31, 2008
- “The Geometry of Wavelets: Fractal Tilings, Representations and Shearlets,” Graduate MiniCourse, University of Maryland, College Park, MD, USA, March 24, 2008
- “Intro to Harmonic Analysis: Finite Frame Theory,” NWC Seminar, Norbert Wiener Center, College Park, MD, USA, September 27, 2007
- “Density of Gabor Frames,” NWC Seminar, Norbert Wiener Center, College Park, MD, USA, February 8, 2007

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## 5.6 Short Courses and Special Lectures

Title TBA, 4 hour short course, Workshop in Harmonic Analysis, Sampling Theory, Machine Learning, and Data Science, IMAS (Institute of Mathematical Research, Luis A. Santaló), Buenos Aires, Argentina, November 21–25, 2022

[Invited; canceled due to COVID-19] “Low Complexity Modeling in Data Analysis and Image Processing,” 3 hour short course, IK Interdisciplinary College, Günne at Lake Möhne, Germany, March 13–20, 2020

“Low Complexity Modeling in Data Analysis and Image Processing,” 90-minute lecture, 3rd Annual Neuroengineering Retreat of the Elite MSc in Neuroengineering of the Technical University of Munich, Brixlegg, Austria, May 30–June 2, 2019

“Data Analysis and Image Processing: Low Complexity Modeling,” short course with 7.5 hours of lecture and 7.5 hours of problem sessions, Research Training Group,  $\pi^3$  Parameter Identification, University of Bremen, Bremen, Germany, January 23–27, 2017

“Mathematical Transforms and Sparsity: Harmonic Analysis and its Applications,” 4 hour short course team taught with Rafael Reisenhofer, IK Interdisciplinary College, Günne at Lake Möhne, Germany, March 3–5, 2016

## 5.7 Talks for the Open Public

Post-talk panelist, “The American Pandemic Preparedness Plan (AP3) and how innovations in data science can help to accomplish the ambitious goal of preventing future pandemics,” Dr. Matthew Hepburn, DSRI Distinguished Lecture Series, Colorado State University, Fort Collins, CO, USA, December 10, 2021

“Millennium-Probleme” (talk given in German), Open Campus, University of Bremen, Bremen, Germany, June 15, 2019

“Millennium-Probleme” (talk given in German), Open Campus, University of Bremen, Bremen, Germany, June 11, 2015

## 5.8 Other Conferences and Workshops Attended

AlToGeLiS: Revealing structures of data with algebra, topology, and geometry, Stockholm, Sweden, June 17, 2022

Workshop on Manifold and Graph-Based Learning, Focus Program on Data Science, Approximation Theory, and Harmonic Analysis, Fields Institute, Toronto, Canada, May 16–20, 2022

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Data4Justice Conference; Institute for the Quantitative Study of Inclusion, Diversity, and Equity; April 22, 2022 [Held online]

AlCoVE – an Algebraic Combinatorics Virtual Expedition, Zoom, June 15–16, 2020

38th Northern German Colloquium on Applied Analysis and Numerical Mathematics, Hamburg University of Technology, Hamburg, Germany, May 4–5, 2017

Summer Informal Regional Functional Analysis Seminar (SUMIRFAS), Texas A&M University, College Station, TX, USA, July 29–31, 2016

Concentration Week on Geometric Functional Analysis, Texas A&M University, College Station, TX, USA, July 25–29, 2016

Workshop on Harmonic Analysis, Graphs and Learning, Hausdorff Research Institute for Mathematics, Bonn, Germany, March 14–18, 2016

Workshop on Finite Weyl-Heisenberg Groups in mathematics, quantum physics, and engineering, Hausdorff Research Institute for Mathematics, Bonn, Germany, February 22–24, 2016

Workshop on Low Complexity Models in Signal Processing, Hausdorff Research Institute for Mathematics, Bonn, Germany, February 15–19, 2016

Winter School on Advances in Mathematics of Signal Processing, Hausdorff Research Institute for Mathematics, Bonn, Germany, January 11–15, 2016

February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 19–20, 2015

IUP – AWI Blockseminar : Human Impact on the Earth System, University of Bremen, Bremen, Germany, February 6, 2015

IUP – AWI Blockseminar : Ice – Ocean Interaction, Alfred Wegener Institut, Bremerhaven, Germany, July 29, 2014

IUP – AWI Blockseminar: Climate Change, University of Bremen, Bremen, Germany, February 3, 2014

Matheon Workshop on Compressed Sensing and its Applications, TU Berlin, Berlin, Germany, December 9–13, 2013

(Invited Workshop Participant), Frame Theory Intersects Geometry, American Institute of Mathematics, Palo Alto, CA, USA, July 29–August 2, 2013

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Computational Analysis in Systems Biology, National Institutes of Health, Bethesda, MD, USA, September 23, 2010

Mini-Symposium: Random Walks in Biology and Beyond In Honor of Dr. George H. Weiss, National Institutes of Health, Bethesda, MD, USA, May 26, 2010

From Banach Spaces to Frame Theory and Applications: In Honor of Professor Pete Casazza's 65th Birthday, University of Maryland, College Park, MD, USA, May 20–22, 2010

Southern Biomedical Engineering Conference, University of Maryland, College Park, MD, USA, April 30–May 2, 2010

International Conference on Social Computing, Behavioral Modeling, and Prediction Pre-Conference Tutorials, National Institutes of Health, Bethesda, MD, USA, March 29, 2010

February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 18–19, 2010

IPAM Workshop on Mathematical Problems, Models and Methods in Biomedical Imaging, Institute for Pure and Applied Mathematics, Los Angeles, CA, USA, February 8–12, 2010

Systems Biology Collaboration Workshop, University of Maryland, College Park, MD, USA, January 26, 2010

The Inter-Institute Workshop on Optical Diagnostic and Biophotonic Methods from Bench to Bedside, National Institutes of Health, Bethesda, MD, USA, October 1–2, 2009

Summer Time Frequency Talks: Workshop on Biomedical Image Analysis and Algorithms, National Institutes of Health, Bethesda, MD, USA, August 20, 2009

AMS Short Course on Quantum Computation and Quantum Information, Joint Mathematics Meetings, Washington DC, USA, January 3–8, 2009

Workshop on Random Matrix Theory and Wireless Communications, University of Colorado, Boulder, CO, USA, July 14–17, 2008

Summer Time Frequency Talks, Norbert Wiener Center, College Park, MD, USA, June 26, 2008

February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 21–22, 2008

Nebraska Conference for Undergraduate Women in Mathematics, University of Nebraska, Lincoln, NE, USA, February 8–10, 2008

Joint Mathematics Meetings, San Diego, CA, USA, January 6–9, 2008

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IPAM Short Course Sparse Representations and High Dimensional Geometry, Institute for Pure and Applied Mathematics, Los Angeles, CA, USA, May 30–June 1, 2007

February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 15–16, 2007

Joint Mathematics Meetings, New Orleans, LA, USA, January 5–8, 2007

February Fourier Talks, Norbert Wiener Center, College Park, MD, USA, February 16–17, 2006

Joint Mathematics Meetings, San Antonio, TX, USA, January 12–15, 2006

Combinatexas, Texas State University, San Marcos, TX, USA, February 25–26, 2005

Joint Mathematics Meetings, Atlanta, GA, USA, January 5 – 8, 2005

Joint Mathematics Meetings, Baltimore, MD, USA, January 15 – 18, 2003

Society of Women Engineers Regional Conference, Texas Tech University, Lubbock, TX, USA, October 13 – 14, 2000

## 6 Research Visits

### 6.1 Outgoing Research Visits

Prof. Shayne Waldron, University of Auckland, Auckland, New Zealand, November 10–16, 2019

Prof. Bernhard Bodmann, University of Houston, Houston, TX, USA, April 8–12, 2019

Prof. Bernhard Bodmann, University of Houston, Houston, TX, USA, August 13–31, 2018

Prof. Nate Strawn, Georgetown University, Washington DC, USA, July 21–August 3, 2018

Prof. Luke Oeding, Auburn University, Auburn, AL, USA, March 28–30, 2018

Prof. Bernhard Bodmann, University of Houston, Houston, TX, USA, September 27– October 13, 2017

Prof. Victoria Paternostro, Universidad de Buenos Aires, Buenos Aires, Argentina, August 14–September 1, 2017

Summer of Frame Theory 2, Air Force Institute of Technology, Dayton, OH, USA, July 25–28, 2017

Prof. Jakob Lemvig, Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, September 19–23, 2016

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Prof. Bernhard Bodmann / Prof. Demetrio Labate / Prof. Manos Papadakis, University of Houston, Houston, TX, USA, July 5–22, 2016

Norbert Wiener Center, University of Maryland / Prof. Nate Strawn, Georgetown University / Prof. Chris Manon, George Mason University, College Park, MD / Washington DC / Fairfax, VA, June 3–14, 2016

Summer of Frame Theory, Air Force Institute of Technology, Dayton, OH, USA, May 4–June 1, 2016

Mathematics of Signal Processing, Hausdorff Trimester Program, Bonn, Germany, January 4–March 24, 2016

FG Angewandte Funktionalanalysis, TU Berlin, Berlin, Germany, March 26–28, 2014

Prof. Jakob Lemvig, Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, May 13–20, 2013

Prof. Eugenio Hernández, Universidad Autónoma de Madrid, Madrid, Spain, January 15–18, 2013

Dr. Martin Ehler, Helmholtz Zentrum München, Munich, Germany, May 4–8, 2012

Prof. Maria Skopina, Euler Institute, St. Petersburg, Russia, June 1–30, 2009

## 6.2 Research Visitors

Prof. John Jasper, South Dakota State University, Brookings, SD, USA, February 26–March 5, 2020

Prof. Joey Iverson, Iowa State University, Ames, IA, USA, February 26–March 1, 2020

Sören Schulze, University of Bremen, Bremen, Germany, October 21–30, 2019

Prof. Cynthia Vinzant, North Carolina State University, NC, USA, June 30–July 3, 2019

Prof. Dustin Mixon, Ohio State University, OH, USA, June 10–12, 2018

Dr. Erik Bekkers, Technische Universiteit Eindhoven, Netherlands, January 10–12, 2018

Prof. Jakob Lemvig, Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, December 14–15, 2015

Prof. Jakob Lemvig, Danmarks Tekniske Universitet, Kongens Lyngby, Denmark, June 19–21, 2013

Dr. Jameson Cahill, University of Missouri, USA, June 3–7, 2013

Dr. Nathaniel Strawn, Duke University, USA, June 3–7, 2013

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## 6.3 Remote Research Gatherings

Summer of Frame Theory 2021, Zoom, May 24–28, 2021

- Prof. Jameson Cahill, University of North Carolina Wilmington, Wilmington, NC, USA
- Prof. Matt Fickus, Air Force Institute of Technology, Wright-Patterson AFB, OH, USA
- Prof. Joey Iverson, Iowa State University, Ames, IA, USA
- Prof. John Jasper, South Dakota State University, Brookings, SD, USA
- Prof. Zilin Jiang, Arizona State University, Tempe, AZ, USA
- Prof. Dustin Mixon, Ohio State University, OH, USA
- Prof. Kasso Okoudjou, Tufts University, MA, USA

Summer of Frame Theory 2020, Zoom, May 18–August 14, 2020

- Dr. Chris Cox, Iowa State University, Ames, IA, USA
- Prof. Matt Fickus, Air Force Institute of Technology, Wright-Patterson AFB, OH, USA
- Prof. Joey Iverson, Iowa State University, Ames, IA, USA
- Prof. John Jasper, South Dakota State University, Brookings, SD, USA
- Prof. Dustin Mixon, Ohio State University, OH, USA
- Prof. Hans Parshall, Western Washington University, Bellingham, WA, USA

## 7 Teaching & Pedagogy

### 7.1 Teaching & Grading

Instructor of Record, Linear Algebra for Data Science DSCI 369, Colorado State University, Fall 2022

Instructor of Record, Capstone Group Project in Data Science DSCI 478, Colorado State University, Spring 2022

Instructor of Record, Linear Algebra for Data Science DSCI 369, Colorado State University, Fall 2021

Instructor of Record, Capstone Group Project in Data Science DSCI 478, Colorado State University, Spring 2021

Instructor of Record, Fourier and Wavelet Analysis with Apps MATH/ECE 430, Colorado State University, Spring 2021

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Instructor of Record, Algebraic, Geometric and Combinatorial Methods in Frame Theory MATH 676, Colorado State University, Fall 2020

Instructor of Record, Linear Algebra I MATH 369, Colorado State University, Spring 2020

Instructor of Record, Projects in Applied Mathematics MATH 435, Colorado State University, Spring 2020

Instructor of Record, Linear Algebra I MATH 369, Colorado State University, Fall 2019

Instructor of Record, Algebraic, Geometric and Combinatorial Methods in Frame Theory [upper-level lecture with problem sessions], University of Bremen, Summer 2019

Instructor of Record, Harmonic Analysis: Theory and Applications [upper-level lecture with problem sessions], University of Bremen, Winter 2018–2019

Co-Instructor, Inverse Methods and Data Analysis [master's course in environmental physics and space science] (Matlab assignments), University of Bremen, Winter 2018–2019

Discussion Leader, Randomization in data analysis [reading course for doctoral students], University of Bremen, Winter 2017–2018

Discussion Leader, Sparse and redundant representation systems [reading course for doctoral students], University of Bremen, Winter 2017–2018

Co-Instructor, Inverse Methods and Data Analysis [master's course in environmental physics and space science] (Matlab assignments), University of Bremen, Winter 2017–2018

Instructor of Record, Analysis 2, [large lecture course with additional "Plenum" section], University of Bremen, Summer 2017

Co-Instructor, Inverse Methods and Data Analysis [master's course in environmental physics], University of Bremen, Winter 2016–2017

Co-Instructor, Introduction to Mathematical Parameter Identification [one week block course as part of a 6 week program], Winter 2016–2017

Instructor of Record, Analysis 1, [large lecture course with "Plenum" section], University of Bremen, Winter 2016–2017

Co-Instructor, Inverse Methods and Data Analysis [master's course in environmental physics] (Matlab assignments), University of Bremen, Winter 2015–2016

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Instructor of Record, Compressed Sensing, [graduate-level lecture with problem sessions], University of Bremen, Summer 2015

Co-Instructor, Inverse Methods and Data Analysis [master's course in environmental physics] (Matlab assignments), University of Bremen, Winter 2014–2015

Co-Instructor, Frames: Eine Einführung [combined proseminar and seminar], University of Bremen, Winter 2014–2015

Instructor of Record, Dictionaries and Transforms [upper-level harmonic analysis lecture with problem sessions], University of Bremen, Summer 2014

Grader, Precalculus MATH 115 and Elementary Calculus I MATH 220, University of Maryland, Summer 2009

Recitation Leader, Intro to Linear Algebra MATH 240 (Matlab assignments), University of Maryland, Spring 2009

Mentor and T.A., Graduate Student Boot Camp – Linear Algebra, University of Maryland, Summer 2008

Recitation Leader, Applied Statistics & Probability STAT 400, University of Maryland, Spring 2008

Recitation Leader, Elementary Calculus II MATH 221 [calculus for business and life science majors] (Web Assign assignments), University of Maryland, Fall 2007

Grader, Cryptography MATH 470 (online course, Matlab assignments), Texas A&M University, Summer 2005

Recitation Leader, Engineering Mathematics I MATH 151 [calculus for engineers] (Maple assignments), Texas A&M University, Spring 2005

Recitation Leader, Functions MATH 150 [precalculus] (iLrn quizzes and exams), Texas A&M University, Fall 2004

Grader, Foundations of Mathematics MATH 220 [logic, set theory, and discrete math for math majors], Texas A&M University, Fall 2003

Private Mathematics Tutor [high school algebra II, college algebra, calculus I/II, business math, business calculus, applied calculus, statistics and linear algebra], Spring 2003–Summer 2004

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## 7.2 Training

NSRF MicroCredential Training: Building Belonging, National School Reform Faculty, webinar, January 12–13, 2021. 6 hours.

Best Practices in Online and Hybrid Teaching: An Introduction, CSU The Institute for Learning and Teaching, webinar, January 11, 2021. 1.5 hours.

Supporting Students' Mental Health in a Virtual Environment, CSU College of Natural Science, webinar, Zoom, October 22, 2020. 1 hours.

How to move your math or science class online with Maria Andersen, Almy Education, webinar, Zoom, March 14, 2020. 1.5 hours.

Ideas for Motivating Students to Succeed in Difficult Classes, Master Teaching Initiative, luncheon and lecture, Colorado State University, Fort Collins, CO, USA, September 24, 2019. 1.5 hours.

Zertifikatsprogramm Hochschule Didaktische Qualifizierung (Certificate Program in University-Level Didactics), University of Bremen, Bremen, Germany, February 2017–April 2019. 200 hours.

Rhetorik – Professionell und motivierend vortragen, Universität of Bremen Personalentwicklung (University of Bremen Personnel Development), Bremen, Germany, March 23, 2017. 8 hours.

National Institute of Child Health and Human Development Teaching Workshop, National Institutes of Health, Bethesda, MD, USA, March 2010. 7.5 hours.

TA Teaching Seminar MATH 695 (required), University of Maryland, College Park, MD, USA, Fall 2007. ~ 10 hours.

Graduate Teaching Academy, Center for Teaching Excellence, Texas A&M, College Station, TX, USA, Fall 2004–Spring 2005

## 8 Advising & Mentoring

### 8.1 Postdocs

Advisor, Xiaoxian Tang, postdoc, December 2015 – November 2016

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## 8.2 Doctoral Students

Co-Advisor (with Henry Adams), Lander ver Hoef, Ph.D., “Topological data analysis and harmonic analysis in data science” (working title), Colorado State University, June 2020 – Now

Advisor, Harley Meade, Ph.D., “Realization of matroids as equiangular tight frames” (working title), Colorado State University, June 2020 – Now

Advisor, Sören Schulze, Dr.-Ing., “Blind Source Separation in Single-Channel Polyphonic Music Recordings,” University of Bremen, December 2016 – February 2022

Advisor, Rafael Reisenhofer, Dr. rer. nat., “Image Analysis via Applied Harmonic Analysis: Perceptual Image Quality Assessment, Visual Servoing, and Feature Detection”, University of Bremen, November 2014 – September 2018

Co-Advisor (with Armin Lechleiter), Frederieke Miesner, Dr. rer. nat., “Advanced Inverse Modeling of Sediment Thermal Diffusion Processes: Reconstructing Temporal Variant Boundary Conditions for the One-Dimensional Heat Equation”, University of Bremen, June 2017 – July 2018

## 8.3 Master’s Students

Advisor, Lennart Abels, M.S., “Randomized Image Decomposition and Reconstruction - RIDeR,” University of Bremen, February 2019 – February 2020

Advisor, Sören Dittmer, M.S., “Mathematical Analysis of Information Loss and Errors in Neural Networks,” University of Bremen, February – September 2017

Advisor, Sören Schulze, M.S., “Spectrogram-based Musical Instrument Separation via Pitch-invariant Dictionaries,” University of Bremen, January – October 2016

Advisor, Alina Stürck, M.S., “Shearlet-Based Image Inpainting,” University of Bremen, August 2014 – March 2015

## 8.4 Bachelor’s Students

Advisor, Julian Gebken, B.S., “Nutzung verallgemeinerter Singulärwerte zur Untersuchung künstlicher neuronaler Netze” (Use of generalized singular values for the investigation of artificial neural networks), University of Bremen, December 2018 – November 2019

Advisor, Laura Breitkopf, B.S., “Tangent and Curvature Estimation of 2D Point Clouds,” University of Bremen, January – September 2018

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## 8.5 Other Doctoral & Master's Committees

Committee Member (outside member), Abhijnan Nath, M.S. (computer science), Colorado State University, January 2022 – Now

Committee Member, Carter Lyons, Ph.D., Colorado State University, January 2022 – Now

Committee Member, Amaury Minino, M.S., Colorado State University, September 2021 – Now

Committee Member (outside member), Mohit Kumar Katragadda, M.S. (computer science), Colorado State University, September – October 2021 [Poster session defense]

Committee Member (outside member), Sudeep Pamulapati, M.S. (computer science), Colorado State University, December 2020 – Now

Committee Member, Michael Moy, M.S., Colorado State University, October 2020 – March 2021

Committee Member, Shannon Golden, Ph.D., Colorado State University, August 2020 – Summer 2021 [degree not completed]

Committee Member (outside member) Mridula Bontha, M.S. (computer science), Colorado State University, September 2019 – February 2021

Committee Member (outside member), Matt Gorbett, M.S. (computer science), "Utilizing network features to detect erroneous inputs," Colorado State University, October 2019 – December 2020

Committee Member (medlem av betygskommitten [member of the grading committee]), Irina Dumitru, Ph.D. (physics), "Studies in the Geometry of Quantum Measurements," Stockholm University, September 2020 [Defense held over Zoom.]

Committee Member, Nathan Mankovich, Ph.D. student, Colorado State University, December 2019 – Now

Committee Member, Colin Jensen, Ph.D. student, Colorado State University, November 2019 – March 2022 (Ph.D. qual 2, April 2021) [degree not completed]

Committee Member, Ameni Trabelsi (outside member of the Ph.D. committee), Ph.D. (computer science), Colorado State University, October 2019 – December 2021 (Ph.D. prelim April 2021)

Committee Member, Tom Eddy, Ph.D., Colorado State University, September 2019 – August 2020 [degree not completed]

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Committee Member (Prüfungsausschuss [non-grading committee member]), Florian Bürgel, Dr. rer. nat., “Effective and Efficient Reconstruction Schemes for the Inverse Medium Problem in Scattering,” University of Bremen, August 2019 [I joined the defense over Skype.]

Committee Member (Prüfungsausschuss [non-grading committee member]), Daniel Lantzberg, Dr. rer. nat., “Quantum Frames and Uncertainty Principles Arising from Symplectomorphisms,” University of Bremen, February 2019

Committee Member (2. Gutachter [grader]), Tobias Schnier, Dr.-Ing. (electrical engineering), “Acquisition and Reconstruction of Compressed Signals with Applications in Wireless Neural Systems,” University of Bremen, November 2017 – February 2019

Committee Member (Prüfungsausschuss [non-grading committee member]), Thuong Huyen Nguyen, Dr. rer. nat., “Mathematical aspects of catalyst positioning in Lithium/air batteries,” University of Bremen, December 2018

Committee Member (2. Gutachter [grader]), Lukas Zumvorde, M.S., “Distributed Kalman Filtering for Large-Scale Dynamic Systems with Sparcely [sic] Coupled States,” University of Bremen, March 2018 – September 2018

Committee Member (Prüfungsausschuss [non-grading committee member]), Florian Lieb, Dr.-Ing., “The Affine Uncertainty Principle, Associated Frames and Applications in Signal Processing,” University of Bremen, July 2018

Committee Member (2. Gutachter [grader]), Marcel Rennoch, Dr. rer. nat., “Regularization Methods in Banach Spaces Applied to Inverse Medium Scattering Problem,” University of Bremen, March – June 2017

Committee Member (Prüfungsausschuss [non-grading committee member]), Anna Kemper, Dr.-Ing., “Modellbasierte optimale Mehrgrößenregelung und optimale Reglerparametrisierung für Luftsysteme von Pkw-Dieselmotoren,” University of Bremen, July 2015

Committee Member (2. Gutachter [grader]), Joshua Belding, M.S., “From One-Dimensional Signals to Hyperspectral Images: Robustness and Numerical Experiments in Compressed Sensing,” University of Bremen, August 2014 – January 2015

Committee Member (External referee), Lucia Mantovani, Ph.D., “Admissible Vectors and Discretization for 2-dimensional Signals,” Università degli Studi di Genova, Genoa, Italy, January 2013

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## 8.6 Other Advising Roles

- Undergraduate Research Advisor, Emma Stone, B.S. Student, “An Exploration of Spectral Graph Theory and Small World Graphs” [working title], Colorado State University, USA, Summer 2022–Now
- Honors Thesis Committee Member, Heidi Gilbert, B.S. Student, “An Exploration of Inequities in Undergraduate Mathematics Education,” Colorado State University, USA, Spring 2022
- Honors Thesis Committee Member, Adam Kiehl, B.S. Student, “Inference on Hippocampal Neural Structure Using Poisson Regression,” Colorado State University, USA, Spring 2022
- Undergraduate Research Advisor, Heidi Gilbert, B.S. Student, “Topological Data Analysis (and Cancer Cells),” Colorado State University, USA, Spring 2021
- Advisor, Henry Cafaro, Fort Collins High School student, various topics like frame theory, topological group theory, functional analysis, and more, Colorado State University, USA, January–May 2020
- Reading Course Advisor, Janek Gödeke, M.S. student, “Discussion of the axioms of a (Frame) Multiresolution Analysis,” University of Bremen, Germany, April–September 2019
- Advisor, Scott Mahan, visiting graduate student from University of California San Diego, “Approximation of Sobolev Functions in Neural Networks,” University of Bremen, June–July, 2019
- Reading Course Advisor, Barbara Stolerek, M.S. student, “Dictionary-Learning und K-SVD Algorithmus,” University of Bremen, Germany, April–December 2018
- Reading Course Advisor, Sören Dittmer, M.S. student, “Frame Theory and Feature Extraction” and “Representation Theory of Lie Groups,” University of Bremen, Germany, March 2016–February 2017
- Advisor, Tianlin Liu, undergraduate intern from Jacobs University, “Compressed Sensing and Structured Dictionary Learning,” University of Bremen, Germany, June–September 2015
- Advisor, David Rea, visiting graduate student from Clemson University, “Structured Dictionary Learning,” University of Bremen, Summer 2014
- Mentor, Sandra Kneiper, M.S. student, “Analysis of Generalized Ridge Functions in High Dimensions,” TU Berlin, Summer 2012

## 8.7 Mentoring

- Panelist, AWM Panel on Women in Mathematics, AWM Seminar, Colorado State University, Fort Collins, CO, USA, September 6, 2022

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Panelist, Women in Research, NSF TRIPODS REU 2021 – STEM For All, Rochester, NY, USA via Zoom, August 5, 2021

Panelist, “What is academia, and how do I work in it?” CSU Who is? What is? Seminar, Fort Collins, CO, USA via Zoom, February 26, 2021

[Canceled due to COVID-19] Panelist, “Career Pathways to Lived Curiosity in Industry and Academia,” IK Interdisciplinary College, Günne at Lake Möhne, Germany, March 13–20, 2020

[Canceled due to COVID-19] Speaker, “Curiosity, Risk, and Reward in the Academic Job Search,” IK Interdisciplinary College, Günne at Lake Möhne, Germany, March 13–20, 2020

Mentor, CSU AWM mentoring program, Fall 2019–Spring 2020

Faculty Participant, Nebraska Conference for Undergraduate Women in Mathematics, Lincoln, Nebraska, USA, January 31–February 2, 2020

[Volunteered; assigned student did not participate] Faculty Guide, Multicultural Undergraduate Research, Art and Leadership Symposium (MURALS 2020), Fall 2019 – Spring 2020

Speaker, Panel Discussion on Women in Academia, AWM Seminar, Colorado State University, Fort Collins, CO, USA, November 5, 2019

Seminar Speaker, Women in Math Seminar, University of Houston, TX, USA, August 29, 2018

Mentor, Postgraduate Programme Environmental Physics, University of Bremen, Germany, January 2018 – July 2019

Mentor, Tea-Time mit Professorinnen, navigare - Career Coaching for International Females in Science, University of Bremen, Bremen, Germany, April 26, 2018

Graduate Student Mentor, Nebraska Conference for Undergraduate Women in Mathematics, University of Nebraska, Lincoln, NE, USA, February 2008

Graduate Student Mentor, REU in Matrix Analysis and Wavelet Theory, Texas A&M University, College Station, TX, USA, Summer 2005

## 9 Other Service Activities

### 9.1 Conference and Special Session Planning

Co-Chair, SPIE Wavelets and Sparsity XIX (2022) and onwards

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- Co-Organizer, Minisymposium on Algebra, Geometry, and Combinatorics of Line Configurations, SIAM Conference on Applied Algebraic Geometry, online, August 16–20, 2021
- Co-Chair, Connected in Cyberspace, Interdisciplinary College IK 2021, Zoom/gather.town/YouTube, March 12–19, 2021
- Member Planungskommission (steering committee), Interdisciplinary College IK, 2019–now
- Co-Organizer, Special Session on Group Actions in Harmonic Analysis, Joint Mathematics Meetings, Denver, CO, USA, January 15–18, 2020
- Co-Organizer, Workshop for John Benedetto’s 80th Birthday, University of Maryland, College Park, MD, USA, September 19–21, 2019
- Co-Organizer, Special Sessions on Optimal Frames and Subspace Packings and Applications of Frames and Related Transforms, Wavelets & Sparsity XVIII, SPIE Optics & Photonics, San Diego, California, USA, August 11–15, 2019
- Co-Organizer, Minisymposium on Algebra, Geometry, and Combinatorics of Subspace Packings, SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland, July 9–13, 2019
- Co-Chair, Out of Your Senses – From Data to Insight, Interdisciplinary College IK 2019, Mönnesee-Günne, Germany, March 12–19, 2019
- Co-Organizer, Special Session on Low Complexity Models in Data Analysis and Machine Learning, Joint Mathematics Meetings, Baltimore, MD, USA, January 16–19, 2019
- Co-Organizer, Oberwolfach Mini-workshop 1840c: Algebraic, Geometric, and Combinatorial Methods in Frame Theory, Oberwolfach, Germany, September 20–October 6, 2018
- Organizing Committee Chair, Mathematical Signal Processing and Data Analysis, Annual Workshop of the GAMM Working Group in Mathematical Signal and Image Processing, University of Bremen, Germany, September 18–20, 2017.
- Co-Organizer, Minisymposium on Algebra and Geometry in Frame Theory, SIAM Conference on Applied Algebraic Geometry, Atlanta, Georgia, USA, July 31–August 4, 2017
- Co-Organizer, Minisymposium on Inverse Problems and Low Complexity Models, Applied Inverse Problems 2017, Hangzhou, China, May 29–June 2, 2017
- Co-Organizer, Workshop on Frames and Algebraic & Combinatorial Geometry, University of Bremen, July 27–31, 2015

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Co-Organizer, Minisymposium on Inverse Problems in Atmospheric Remote Sensing, Applied Inverse Problems 2015, Helsinki, Finland, May 25–29, 2015

Co-Organizer, Bremen Compressed Sensing Workshop, University of Bremen, March 17, 2015

Co-Organizer, Young Researcher Minisymposium on Multiscale Geometric Image Analysis, 85th Annual Meeting of the GAMM, Nuremberg-Erlangen, Germany, March 10–14, 2014

Organizing Committee Chair, Operator Algebras, Frames, & Undergraduate Research: A Birthday Conference in Honor of David Larson, Texas A&M University, College Station, TX, USA, July 20–22, 2012

Organizing Committee Chair, Frame Theory and Maps Between Operator Algebras, Texas A&M University, College Station, TX, USA, July 16–19, 2012

Organizer, Women Who Use Applied Statistics & Stochastic Processes: A celebration of women across the campus who use applied statistics and stochastic processes in their research, University of Maryland, College Park, MD, USA, April 15, 2009

Co-Organizer, Graduation Conference, Mathematics Department, University of Maryland, College Park, MD, USA, May 2, 2008

## 9.2 Seminars Organized

Organizer, Data Science Seminar, Colorado State University, Fort Collins, CO, USA, Fall 2022–Now

Co-Founder and Co-Organizer, CodEx Seminar, international remote seminar, May 2020–Now

Organizing Committee, What is ...? Seminar, Berlin Mathematical School, Berlin, Germany, October 2012–June 2013

Organizer, FG Angewandte Funktionalanalysis Oberseminar, TU Berlin, Berlin, Germany, March 2012–June 2013

Founder and Organizer, Institut für Numerische Simulation Journal Club, University of Bonn, Bonn, Germany, October 2011–February 2012

Organizer, Building 9 Computational Bio Journal Club, National Institutes of Health, Bethesda, MD, USA, 2010–2011

Organizer, Women in Mathematics Lunch Seminar, University of Maryland, College Park, MD, USA, 2008–2009

Co-Organizer, Norbert Wiener Center Seminar, University of Maryland, College Park, MD, USA, 2007–2008

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## 9.3 Committee Work for National Organizations

**Association for Women in Mathematics** 2009–2011

*AWM Student Chapters Committee*

Member of the national committee to improve the AWM student chapters program.

**MAA *Math Horizons*** 2003–2005

*Student Advisory Committee*

Provided many ideas integrated into the *Math Horizons* magazine and wrote articles printed in the publication.

## 9.4 Committee Work at Home Institutions

**Colorado State University** 2022–

*President's Council for Gender Equity on the Faculty (CoGen)*

Serving as a member in the committee.

**Colorado State University** 2021

*Hiring Committee High Energy Physics / Particle Astrophysics*

Serving as the outside member in a hiring committee for the Physics Department.

**Colorado State University** 2020–

*Math Department DEI/ Committee*

Serving as the co-chair of the department's Diversity, Equity, Inclusion, and Justice committee.

**Colorado State University** 2020–

*Data Science Research Institute Steering Committee*

The Data Science Research Institute is an umbrella organization of data science research and groups at CSU.

**Colorado State University** 2020–2021

*Executive Committee Member*

Math department executive committee.

**University of Bremen** February–August 2019

*Berufungskommission W2-Professur Mathematische Modellierung*

Hiring committee (for ~ associate professor position) member.

**University of Bremen** March 2018–July 2019

*Netzwerk „Chancengleichheit in Forschungsverbänden“*

A network to bring together researchers involved with gender and diversity in funded research programs

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# EMILY J. KING

## University of Bremen

January 2018–July 2019

*Mitgliedlerin im Prüfungsausschuss für den 2-Fächer-Bachelor*

Actively participated as a substitute and then official member in the exam committee for the math education bachelor's degree.

## University of Bremen

December 2017–July 2019

*Beauftragte für Einstufungsprüfung Mathematik*

Official representative of the Mathematics Department in the committee to decide if certain students may study at the university without the typical qualifications.

## University of Bremen

May 2017–July 2019

*Wissenschaftskommunikationsgruppe / Webseite Task Force*

Member of the committees working to increase visibility of the Mathematics and Computer Science Department and specifically to overhaul the departmental website.

## University of Bremen

October 2016–July 2019

*Co-PI in charge of Gender and Diversity*

*PI in charge of Guests*

Coorganized training and support in gender and diversity and organized guest visits for the Research Training Group  $\pi^3$ : Parameter Identification – Analysis, Algorithms, Application

## University of Bremen

June 2016–February 2017

*Berufungskommission W3-Professur Technische Mathematik der Erdsystemwissenschaften*

Hiring committee (for  $\sim$  full professor position) member.

## University of Bremen

Winter 2015–2016

*ZUK II / AG Internationalisierung*

Met to discuss issues related to the future direction of and internationalization of the university.

## TU Berlin

March 2012–June 2013

*Gruppenaktivitäten Koordinator, FG Angewandte Funktionalanalysis*

Organized research group activities.

## National Institute of Child Health and Human Development

2010–2011

*NICHD Fellows Committee*

Founding member of the committee to improve the status of fellows in NICHD and also improve communication among fellows.

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# EMILY J. KING

## 9.5 Training to Improve Hiring Practices

Search Chair Training, Colorado State University, June 2, 2022. 4 hours.

Professionelle, gender- und diversitätsgerechte Personalauswahl in der Wissenschaft (Professional, gender- and diversity-appropriate personnel selection in science), University of Bremen, Bremen, Germany, March 6–7, 2019. 9 hours.

## 9.6 Elected Positions as a Student

President, Women in Mathematics (a student chapter of the Association for Women in Mathematics), University of Maryland, 2008–2009

Mathematics Graduate Student Representative, University of Maryland, 2007–2009

Chair, Association for Women in Mathematics, Texas A&M University, 2004–2005

Treasurer, Math Club, Texas A&M University, Fall 2003

President, Math Club, Texas A&M University, 2002–2003

## 9.7 Journal Editing

**Sampling Theory, Signal Processing and Data Analysis** 2022

*Guest Editor*

Guest Editor for the topical collection in data science, approximation, and harmonic analysis for the Springer journal *Sampling Theory, Signal Processing and Data Analysis*.

**Sampling Theory, Signal Processing and Data Analysis** 2020–

*Editor*

Member of the Editorial Board for the Springer journal *Sampling Theory, Signal Processing and Data Analysis*.

## 9.8 Journal & Conference Talk Refereeing

Advances in Computational Mathematics

Applicable Analysis

Applied and Computational Harmonic Analysis

Applied Numerical Mathematics

Complex Analysis and Operator Theory

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Excursions in Harmonic Analysis (Springer book series)

Houston Journal of Mathematics

IEEE Signal Processing Letters

IEEE Transactions on Signal Processing

IEEE Transactions on Information Theory

International Journal of Remote Sensing

Journal of Approximation Theory

International Journal of Wavelets Multiresolution and Information Processing

Journal of Fourier Analysis and Applications

Journal of Geometric Analysis

Journal of Imaging

Journal of Physics A

Journal of Scientific Computing

Linear and Multilinear Algebra

Numerical Functional Analysis and Optimization

Online Journal of Analytic Combinatorics

Real Analysis Exchange

Remote Sensing Letters

Science Asia

SIAM Journal on Applied Algebra and Geometry

Studia Mathematica

Mathematical Reviews (MathSciNet)

Zentralblatt

Proceedings of the Matheon Workshop on Compressed Sensing and its Applications 2013

Applicant selection committee, 2022 Program for Women and Mathematics, Institute for Advanced Study,  
Princeton, NJ, USA, May 21–27, 2022

Talk referee and metareviewer, SampTA 2019, 13th International Conference on Sampling Theory and Ap-  
plications, Bordeaux, France, July 8–9, 2019

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Talk referee, SampTA 2017, 12th International Conference on Sampling Theory and Applications, Tallinn, Estonia, July 3–7, 2017

Talk referee, SampTA 2015, 11th International Conference on Sampling Theory and Applications, Washington DC, USA, May 25–26, 2015

Program Committee (talk referee), Signal Processing with Adaptive Sparse Structured Representations, EPFL, Lausanne, Switzerland, July 8–11, 2013

Talk referee, SampTA 2013, 10th International Conference on Sampling Theory and Applications, Bremen, Germany, July 1–5, 2013

## 9.9 Grant Refereeing

Austrian Science Fund (FWF)

Department of Science and Technology, Government of India (DST) and the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)

International Centre for Mathematical Sciences (Scotland)

## 9.10 Miscellaneous Service at CSU

<b>RamWelcome</b> <i>Undergraduate Welcome</i> Participated in an undergrad welcome event.	August 19, 2022
<b>Celebrate Undergraduate Research and Creativity</b> <i>Faculty Poster Judge</i> Judge of undergraduate posters, both in-person and virtually.	April 21, 2022
<b>RamWelcome</b> <i>Undergraduate Welcome</i> Participated in an undergrad welcome event.	August 20, 2021
<b>Undergraduate Advising</b> <i>Primary Advising Contact</i> Advising some math upperclassmen.	Fall 2020–Now
<b>Choose CSU</b> <i>Undergraduate Recruitment</i> Assisted in an online undergrad recruitment event.	May 1, 2020

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## Celebrate Undergraduate Research and Creativity

April 21–30, 2020

*Faculty Poster Judge*

Judge of undergraduate posters. Competition held online due to COVID-19.

[Volunteered; canceled due to COVID-19]

## Multicultural Undergraduate Research, Art and Leadership Symposium (MURALS 2020) March 27, 2020

*Faculty Poster Judge*

Judge of undergraduate posters.

## CSU Math Day

November 2019

*Competition Moderator*

Moderated rounds of a team mathematics competition for high schoolers.

## 10 Skills

### 10.1 Programming & Markup Languages

Matlab

LaTeX

Python

HTML/CSS

Perl

### 10.2 Math Websites Designed

CodEx Seminar, <https://www.math.colostate.edu/~king/codex/index.html>, May 2020

Game of Sloanes, <https://www.math.colostate.edu/~king/GameofSloanes.html>, August 2019

Mathematical Signal Processing and Data Analysis, Annual Workshop of the GAMM Working Group in Mathematical Signal and Image Processing, <http://www.math.uni-bremen.de/cda/GAMM-MSIP2017/>, Fall 2017, Note: Updated by Yovany Cordero

Gesellschaft für Angewandte Mathematik und Mechanik Activity Group Mathematical Signal and Image Processing, <http://gamm-msip.math.lmu.de/>, May 2012, Note: Revamped since then, but the core design remains. The color scheme was imposed by the national organization.

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Concentration Week in Frame Theory and Maps Between Operator Algebras & Operator Algebras, Frames, and Undergraduate Research: A Conference in Honor of the 70th Birthday of David R. Larson, (no longer online), 2012

Programs for Women in Math, <http://wim.math.umd.edu/programs.php>, 2008, Note: I was only responsible for the content.

Norbert Wiener Center Seminar, <http://www.math.umd.edu/research/seminars/wavelets/>, 2007

## 10.3 Spoken Languages

English (mother tongue)

German (Common European Framework of Reference for Languages C1)

Russian (basic)

## 10.4 Professional Societies

Pi Mu Epsilon (U.S. honorary national mathematics society), lifetime member

Dobro Slovo (National Slavic Honor Society), lifetime member

AMS (American Mathematical Society), 2004–2011, 2019–Now

AWM (Association for Women in Mathematics), 2004–2005, 2008–2011, 2019–Now

SIAM, 2006 – 2011, 2021–Now

## 11 Erdős Number

My Erdős Number is 3:

Wojciech Czaja → Charles Chui → Paul Erdős

and Chris Cox → Steve Butler → Paul Erdős

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