Stefan Steinerberger

CONTACT
INFORMATION

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University of Washington, Seattle

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EMPLOYMENT

2024 – :   Professor, University of Washington, Seattle
2021 – 2024: Associate Professor, University of Washington, Seattle
2020 – 2021: Assistant Professor, University of Washington, Seattle
2017 – 2020: Assistant Professor, Yale University
2014 – 2017: Gibbs Instructor, Yale University
2013 – 2014: Postdoc, Universität Bonn

EDUCATION

2010 - 2013: Ph.D., Universität Bonn, Germany
2009 - 2010: M.Sc., Johannes Kepler Universität Linz, Austria
2006 - 2009: B.Sc., Johannes Kepler Universität Linz, Austria

AWARDS
AND GRANTS

- 2022 SIAM SIGEST
- 2019 Poorvu Family Award [Excellence in Teaching]
- 2018 Alfred P. Sloan Fellow
- 2018 NSF Grant DMS-1763179 (2123224 after transfer)
- 2015 AMS Travel Grant
- 2015 Grant, Institute of New Economic Thinking
- 2015 Young Scientist Award, Governor of Upper Austria
- Kapp Prize, European Association for Evolutionary Political Economy 2013
- Felix Hausdorff Doctoral Scholarship (Bonn Graduate School), 2010–2013

PUBLICATIONS

- Many antipodes implies many neighbors, arXiv:2503.19792
- (with François Clément), On the largest singular vector of the Redheffer matrix, arXiv:2502.09489
- (with François Clément), Small gaps in the Ulam sequence, *Comptes Rendus Mathematique*, accepted.
- (with Dmitriy Bilyk), Regularizing random points by deleting a few, arXiv:2501.13813
- A Stability Version of the Jones Opaque Set Inequality, arXiv:2501.01004
- (with François Clément) Failure of Orthogonality of Rounded Fourier Bases, arXiv:2412.17466
- Kaczmarz Kac Walk, *Quarterly of Applied Mathematics*, accepted.
- (with Tony Zeng), A curious dynamical system in the plane, arXiv:2409.08961
- Universal lower bounds for Dirichlet eigenvalues, arXiv:2405.16354
- (with Jeck Lim) On differences of two harmonic numbers, *Mathematika*, accepted.
- (with Afonso Bandeira and Dustin Mixon), A lower bound for the Balan-Jiang matrix problem, *Applied and Computational Harmonic Analysis*
- Randomly Pivoted Partial Cholesky: Random How?, arXiv:2404.11487
- On a problem involving unit fractions, arXiv:2403.17041

- A Note on Approximate Hadamard Matrices, *Designs, Codes and Cryptography*, accepted.
- (with Rekha Thomas) Conformally rigid graphs, *Journal of Graph Theory*, accepted.
- Bad Science Matrices, arXiv:2402.03205
- Sums of square roots that are close to an integer, arXiv:2401.10152, *Journal of Number Theory*, accepted.
- Nonlinear recursions on the reals and a problem of Graham, arXiv:2401.04058
- (with Raghavendra Venkatraman), Dirichlet eigenfunctions with nonzero mean value, arXiv:2312.14122
- (with Mariana Smit Vega Garcia), An Almgren monotonicity formula for discrete harmonic functions, arXiv:2311.11887
- Random Growth via Gradient Flow Aggregation, *Journal of Applied Probability*, accepted.
- (with Ovall, Quan, Reid), On localization of eigenfunctions of the magnetic Laplacian, *Reports on Mathematical Physics*, accepted.
- (with Bilyk, Mastrianni) Single radius spherical cap discrepancy via gegenbadly approximable numbers, *Advances in Mathematics*, accepted.
- (with Bilyk, Chang, Heinävaara, Matzke) A random line intersects $\mathbb{S}^2$ in two probabilistically independent locations, arXiv:2307.04314
- (with Andrea Ottolini) Greedy Matching in Optimal Transport with concave cost, arXiv:2307.03140
- (with Catherine Babecki and Rekha Thomas), Spectrahedral Geometry of Graph Sparsifiers, *SIAM J. Discrete Math*, accepted.
- (with Markus Faulhuber) Maximal polarization for periodic configurations on the real line, *IMRN*, accepted.
- (with Andrea Ottolini) Concentration of Hitting Times in Erdos-Renyi graphs, *Journal of Graph Theory*, accepted.
- (with Karel Devriendt and Andrea Ottolini) Graph curvature via resistance distance, *Discrete Applied Mathematics*, accepted.
- Local sign changes of polynomials, *Journal d'Analyse Mathematique*, accepted.
- (with Shubham Gupta) Rearrangement Inequalities on the Lattice Graph, *Bull. London Math. Soc.*, accepted.
- (with Andrea Ottolini) Guessing cards with complete feedback, *Adv. Appl. Math.*, accepted.
- Quadratic Crofton and sets that see themselves as little as possible, *Monatshefte Math.*, accepted.
- (with J. Hoskins and H. Quan), Magnetic Schrodinger operators and landscape functions, *Comm. PDE.*
- An inequality characterizing convex domains, arXiv:2209.14153
- Discrete Rearrangements and the Polya-Szegő Inequality on Graphs, *Studia Mathematica*, accepted.
- (with K. Burdzy and J. Hoskins) From pinned billiard balls to partial differential equations, arXiv:2209.01503
- Some Remarks on the Erdős Distinct Subset Sums Problem, *Int. J. Number Theory*, accepted.

- (with Anna Gilbert and Yulan Zhang), May the force be with you, *58th Allerton Conference*
- An elementary proof of a lower bound for the inverse of the star discrepancy, *J. Complexity*, accepted.
- On Combinatorial Properties of Greedy Wasserstein Minimization, *J. Math. Anal. Appl.*, accepted.
- Approximate Solutions of Linear Systems at a Universal Rate, *SIAM. J. Matrix Anal.*, accepted.
- An Agmon estimate for Schrodinger operators on Graphs, *Lett. Math. Phys.*, accepted.
- (with Rekha Thomas) Random Walks, Equidistribution and Graphical Designs, *Advances in Applied Mathematics*, accepted.
- The first eigenvector of a distance matrix is nearly constant, *Discrete Mathematics* **346** (2023), 113291.
- (with Alaifari, Bartolucci, Wellershoff), On the connection between uniqueness from samples and stability in Gabor phase retrieval, *Sampling Theory, Signal Processing, and Data Analysis*, accepted.
- (with Bamdad Hosseini) Intrinsic Sparsity of Kantorovich Solutions, *Comptes Rendus Mathematique*, accepted.
- Sums of Distances on Graphs and Embeddings into Euclidean Space, *Mathematika*, accepted.
- Curvature on Graphs via Equilibrium Measures, *J. Graph Theory*, accepted.
- The Boundary of a Graph and its Isoperimetric Inequality, *Discrete Applied Mathematics*, accepted.
- (with Hau-tieng Wu), Fundamental component enhancement via adaptive nonlinear activation functions, *Appl. Comp. Harm. Anal.*, accepted.
- Quantum Entanglement and the Growth of Laplacian Eigenfunctions, *Comm. PDE*, accepted.
- (with Betermin, Faulhuber) A variational principle for Gaussian lattice sums, arXiv:2110.06008
- Effective Bounds for the Decay of Schrodinger Eigenfunctions and Agmon bubbles, *Israel J. Math*, accepted.
- (with Hau-tieng Wu), Eigenvector Phase Retrieval: Recovering eigenvectors from the absolute value of their entries, *Linear Algebra and its Applications*, accepted.
- (with George Linderman), Dimensionality Reduction via Dynamical Systems: the case of t-SNE, *SIAM Review*, **64**, p. 153-178 (2022).
- (with R. Coifman and N. Marshall), A common variable minimax theorem for graphs, *Foundations of Computational Mathematics*, accepted.
- Quantile-Based Random Kaczmarz for corrupted linear systems of equations, *Information and Inference*, accepted.
- An upper bound on the Hot Spots constant, *Revista Matematica Iberoamericana*, accepted.
- The product of two high-frequency Graph Laplacian eigenfunctions is smooth, *Discrete Mathematics*, accepted.
- (with Carlos Beltran, Laurent Betermin and Peter Grabner), How well-conditioned can the eigenvalue problem be?, *Mathematics of Computation*, **91**, p. 1237–1245 (2022).

- A Graph Decomposition motivated by the Geometry of Randomized Rounding, arXiv:2104.11198

- Concavity of solutions of the Poisson equation in sufficiently round planar domains, *Archive of Rational Mechanics and Analysis*, **244**, p. 209–224 (2021).

- (with Ofir Lindenbaum), Refined Least Squares for Support Recovery, *Signal Processing*, **195**, number: 108493 (2022).

- (with Yulan Zhang) t-SNE, Forceful Colorings and Mean Field Limits, *Res. Math. Sci.*, **9**, number: 42 (2022).

- Max-Cut via Kuramoto-type Oscillators, *SIAM Journal on Applied Dynamical Systems*, accepted

- A Pointwise Inequality for Derivatives of Solutions of the Heat Equation in Bounded Domains, arXiv:2102.02736

- (with Jianfeng Lu), Neural Collapse under Cross-Entropy Loss, *Applied and Computational Harmonic Analysis*, **59**, p. 224-251 (2022)

- (with Dana G. Korssjoen, Biyao Li, Raghavendra Tripathi, Ruimin Zhang), Finding Structure in Sequences of Real Numbers via Graph Theory: a Problem List, *Involve*, **15**, 251-270 (2022).

- On the Logarithmic Energy of Points on $\mathbb{S}^2$, *Journal d'Analyse Mathematique*, accepted

- (with Jianfeng Lu and Cody Murphey), Fast localization of eigenfunctions via smoothed potentials, *Journal of Scientific Computing*, **90**, number: 38 (2022).

- On a Kantorovich-Rubinstein Inequality, *J. Math Anal. Appl.*, **501**, 125185 (2021).

- (with Greengard, Liu, Tsyvinski), Factor Clustering with t-SNE, SSRN:3696027

- Free Convolution Powers via Roots of Polynomials, *Experimental Mathematics*, accepted

- Surrounding the solution of a Linear System of Equations from all sides, *Quart. Appl. Math.*, **79**, p. 419-429 (2021).

- Using Expander Graphs to test whether samples are iid, arXiv:2008.01153

- On the Regularization Effect of Stochastic Gradient Descent applied to Least Squares, *Electronic Transactions in Numerical Linear Algebra*, **54**, p. 610-619 (2021).

- (with Noah Kravitz) The Smoothest Average: Dirichlet, Fejer and Chebychev, *Bull. London Math. Soc.*, **53**, p. 1801-1815 (2021).

- A Weighted Randomized Kaczmarz Method for Solving Linear Systems, *Mathematics of Computation*, **90**, p. 2815-2826 (2021).

- Randomized Kaczmarz converges along small singular vectors, *SIAM J. Matrix Anal. Appl.* **42**, p. 608-615 (2021).

- Polynomials with Roots on the Unit Circle: Regularity of Leja sequences, *Mathematika* **67**, p. 553-268 (2021).

- (with Jeremy Hoskins) A Semicircle Law for Derivatives of Random Polynomials, *IMRN* **13**,p. 9784-9809 (2022).

- Fourier Uncertainty Principles, Scale Space Theory and the Smoothest Average, *Math. Res. Lett.* **28**,p. 1851-1874 (2021).

- On the Stability of Fourier Phase Retrieval, *J. Fourier Anal. Appl.* **28**, no. 29 (2022)

- (with Aleh Tsyvinski) On Vickrey's Income Averaging, arXiv:2004.06289

- A Spectral Approach to the Shortest Path Problem, *Linear Algebra and its Applications*, **620**, p. 182-200 (2021).

- (with Adela DePavia), Spectral Clustering Revisited: Information Hidden in the Fiedler Vector, *Foundations of Data Science*, **3**, 225-249 (2021).

- (with Ofir Lindenbaum), Randomly Aggregated Least Squares for Support Recovery, *Signal Processing*, **180**, 107858 (2021).

- Regularized Potentials of Schrodinger Operators and a Local Landscape Function, *Comm. PDE*, **46**, p. 1262-1279 (2021).

- (with Ariel Jaffe, Ofir Lindenbaum, Jon Patsenker, Erez Peterfreund), The Spectral Underpinning of word2vec, *Frontiers in Applied Mathematics and Statistics*, accepted.

- (with Jeremy Hoskins), Towards Optimal Gradient Bounds for the Torsion Function in the Plane, *Journal of Geometric Analysis*, **31**, p. 7812–7841 (2021).

- (with Roy Lederman), Extreme Values of the Fiedler Vector on Trees, arXiv:1912.08327

- (with Jianfeng Lu), Synchronization of Kuramoto Oscillators in Dense Networks, *Nonlinearity*, **33**, 5905 (2020).

- (with Sean O'Rourke), A Nonlocal Transport Equation Modeling Complex Roots of Polynomials under Differentiation, *Proc. Amer. Math. Soc.* **149**, p. 1581-1592 (2021).

- (with Louis Brown), On the Wasserstein Distance between Classical Sequences and the Lebesgue Measure, *Trans. Amer. Math. Soc.* **373**, p. 8943-8962 (2020).

- (with Louis Brown), Positive-definite Functions, Exponential Sums and the Greedy Algorithm: a curious Phenomenon, *Journal of Complexity*, **61**, 101485 (2020).

- (with Jianfeng Lu), Optimal Trapping of Brownian Motion: A Nonlinear Analogue of the Torsion Function, *Potential Analysis*, **54**, p. 687-698 (2021).

- Hot Spots in Convex Domains are in the Tips (up to an Inradius), *Comm. PDE* **45**, p. 641-654 (2020).

- A Wasserstein Inequality and Minimal Green Energy on Compact Manifolds, *J. Functional Analysis*, **281** (2021).

- (with T. Beck, B. Brandolini, K. Burdzy, A. Henrot, J. Langford, S. Larson, R. Smits), Improved Bounds for Hermite-Hadamard Inequalities in Higher Dimensions, *The Journal of Geometric Analysis* **31**, p. 801-816 (2021).

- On Sublevel Set Estimates and the Laplacian, *Potential Analysis* **55**, p. 11-28 (2021).

- (with Amir Sagiv) Transport and Interface: an Uncertainty Principle for the Wasserstein distance, *SIAM J. Math. Anal.* **52**, p. 3039-3051 (2020).

- (with Jianfeng Lu), A Dimension-Free Hermite-Hadamard Inequality via Gradient Estimates for the Torsion Function, *Proc. Amer. Math. Soc.*, **148**, p. 673-679 (2020).

- (with Aleh Tsyvinski) Tax Mechanisms and Gradient Flows, arXiv:1904.13276

- (with R. Alaifari, X. Cheng, L. Pierce), On Matrix Rearrangement Inequalities, *Proc. Amer. Math. Soc.* **148**, p. 1835-1848 (2020).

- Roots of trigonometric polynomials and the Erdős-Turán theorem, *Mathematika* **66**, p. 245-254 (2020).

- (with Rick Barnard) Three Convolution Inequalities on the Real Line with Connections to Additive Combinatorics, *Journal of Number Theory* **207**, p. 42-55 (2020).

- (with Markus Faulhuber) An Extremal Property of the Hexagonal Lattice, *Journal of Statistical Physics* **177**, p. 285-298 (2019).

- (with Felipe Goncalves and Diogo Oliveira e Silva), A Universality Law For Sign Correlations of Eigenfunctions of Differential Operators, *Journal of Spectral Theory* **11**, p. 661–676 (2021).

- (with Dmitry Kobak, George Linderman, Yuval Kluger, Philipp Berens) Heavy-tailed kernels reveal a finer cluster structure in t-SNE visualisations, ECML PKDD 2019

- Dynamically Defined Sequences with Small Discrepancy, *Monatshefte fur Mathematik* **191**, p. 639-655 (2020).

- A Nonlocal Functional Promoting Low-Discrepancy Point Sets, *Journal of Complexity* **54**, 101410 (2019).

- The best way to reconcile your past is exponentially, *American Mathematical Monthly* **127**, p. 64–69 (2020).

- Poissonian Pair Correlation in Higher Dimensions, *Journal of Number Theory* **208**, p. 47-58 (2020).

- (with Jianfeng Lu and Chris Sogge) Approximating Pointwise Products of Laplacian Eigenfunctions, *Journal of Functional Analysis*, **373** (2019): 3271–3282.

- A Nonlocal Transport Equation Describing Roots of Polynomials Under Differentiation, *Proc. Amer. Math. Soc.* **147**, p. 4733-4744 (2019).

- Quantitative Homogenization and Convergence of Moving Averages, arXiv:1810.13190

- (with Raphy Coifman), A Remark on the Arcsine Distribution and the Hilbert transform, *Journal of Fourier Analysis and Applications* **25**, p. 2690-2696 (2019).

- (with Trevor Richards) Leaky Roots and Stable Gauss-Lucas Theorems, *Complex Variables and Elliptic Equations* **64**, p. 1898-1904 (2019).

- (with Peter W. Jones) Localization of Neumann eigenfunctions near irregular boundaries, *Nonlinearity* **32** (2019): 1898–1904.

- A metric Sturm-Liouville theory in two dimensions, *Calc. Var. Ell. Equations* **59**, article 12 (2020).

- The Hermite-Hadamard inequality in higher dimensions, *Journal of Geometric Analysis* **30**, p. 466–483 (2020).

- (with Hau-tieng Wu) On Zeroes of Random Polynomials and Applications to Unwinding, *IMRN*, **11** (2021): 10100–10117.

- (with Eric Chi) Recovering Trees with Convex Clustering, *SIAM J. Math Data Science*, **1** (2019): p. 383–407.

- A Stability Version of the Gauss-Lucas Theorem and Applications, *J. Aust. Math. Soc.* **109** (2020): p. 262 – 269

- A Compactness Principle for Maximizing Smooth Functions over Toroidal Geodesics, *Bull. Aust. Math. Soc.* **100** (2019): 148–154.

- (with Jakob Kapeller and Matthias Aistleitner) Citation Patterns in Economics and Beyond: Assessing the Peculiarities of Economics from Two Scientometric Perspectives, *Science in Context* **32** p. 361 - 380 (2019).

- (with Alex Cloninger) On the Dual Geometry of Laplacian Eigenfunctions, *Experimental Mathematics* **30**, p.283-293 (2021).

- Electrostatic Interpretation of Zeros of Orthogonal Polynomials, *Proc. Amer. Math. Soc.* **146** (2018): 5323–5331.

- An Endpoint Alexandrov Bakelman Pucci Estimate in the Plane, *Canad. Math. Bull.* **62** (2019): 643–651.

- Quantitative Projections in the Sturm Oscillation Theorem, *J. Math. Pure Appl.* **144**, p. 1-16 (2020).

- (with Jianfeng Lu and Matthias Sachs) Quadrature Points via Heat Kernel Repulsion, *Constructive Approximation* **51** p. 27 - 48 (2020).

- Wasserstein Distance, Fourier Series and Applications, *Monatshefte Math.* **194**, p.. 305 - 338 (2021).

- (with George Linderman) Numerical Integration on Graphs: where to sample and how to weigh, *Mathematics of Computation* **89**, p. 1933-1952 (2020).

- Generalized Designs on Graphs: Sampling, Spectra, Symmetries, *Journal of Graph Theory* **03** p. 253 - 267 (2020).

- Refined Heinz-Kato-Löwner inequalities, *Journal of Spectral Theory* **9**, p. 1-20 (2018).

- (with Dmitriy Bilyk and Feng Dai), General and Refined Montgomery Lemmata, *Math. Ann.* **373** (2019): 1283–1297.

- A Sharp Estimate for Probability Distributions, *Stat. Prob. Lett.*, **155** (2019), 108584.

- (with G. Linderman, M. Rachh, J. Hoskins, Y. Kluger), Efficient Algorithms for t-distributed Stochastic Neighborhood Embedding, *Nature Methods*, **16** (2019): 243–245.

- On the Spectral Resolution of Products of Laplacian Eigenfunctions, *Journal of Spectral Theory*, **9**, p. 1367–1384, 2019

- (with S. Johnson), Intuitions about mathematical beauty: A case study in the aesthetic experience of ideas, Cognition, **189** (2019): 242–259.

- (with S. Johnson), The Universal Aesthetics of Mathematics, *Math. Intelligencer* **41** (2019): 67–70.

- (with J. Lierl) A Local Faber-Krahn inequality and Applications to Schrödinger's Equation, *Comm. PDE*, **43** (2018): 66–81.

- Varadhan Asymptotics for the Heat Kernel on Finite Graphs, arXiv:1801.02183

- (with G. Linderman, G. Mishne, Y. Kluger), Randomized Near Neighbor Graphs, Giant Components, and Applications in Data Science, *Advances in Applied Probability* **57**, o. 458 -476 (2020).

- Poissonian Pair Correlation and Discrepancy, *Indag. Math.*, **29** (2018): 1167–1178.

- (with Jianfeng Lu), Detecting localized eigenstates of linear operators, *Res. Math. Sci.*, **5** (2018): no. 34.

- Spectral Limitations of Quadrature Rules and Generalized Spherical Designs, *IMRN* **16** (2021), 12265–12280.

- Oscillatory functions vanish on a large set, *Asian J. Math* **24** (2020), pp. 177-190.

- Exponential Sums and Riesz Energies, *Journal of Number Theory*, **182** (2018): 37–56.

- (with Nick Marshall) Triangles capturing many lattice points, *Mathematika*, **64** (2018): 551-582.

- (with George Linderman) Clustering with t-SNE, provably, *SIAM J. Math. Data Science*, **1** (2019): 313–332.

- (with Xiuyuan Cheng and Gal Mishne) The Geometry of Nodal Sets and Outlier Detection, *Journal of Number Theory*, **185** (2018): 48–64.

- Topological Bounds for Fourier coefficients and Applications to Torsion, *Journal of Functional Analysis*, **274** (2018): 1611–1630.

- (with Noah Kravitz) Ulam Sequences and Ulam Sets, *Integers*, **18** (2018): A80.

- (with Florian Pausinger and Manas Rachh) Optimal Jittered Sampling for two points in the unit square, *Stat.Prob. Lett.*, **132** (2018): 55-61.

- (with Uri Shaham) Stochastic Neighbor Embedding separates well-separated clusters, arXiv:1702.02670

- (with Bogdan Georgiev and Mayukh Mukherjee), A Spectral Gap Estimate and Applications, *Potential Analysis*, **49** (2018): 635–645.

- (with Xiuyuan Cheng and Manas Rachh), On the Diffusion Geometry of Graph Laplacians and Applications, *Applied and Computational Harmonic Analysis*, **46** (2019): 674–688.

- (with SMALL 2016), On algorithms to calculate integer complexity, *Integers*, **19** (2019): A12.

- Well-distributed great circles on $\mathbb{S}^2$, *Discrete & Computational Geometry*, **60** (2018): 40-56.

- Fast Escape in Incompressible Vector Fields, *Monatshefte Math.*, **186** (2018): 525–537.

- (with Jakob Kapeller and Matthias Aistleitner) The Power of Scientometrics and the Development of Economics, *Journal of Economics Issues*, **52** (2018): 816–834.

- (with Jianfeng Lu), A Variation on the Donsker-Varadhan Inequality for the Principal Eigenvalue, *Proceedings of the Royal Society A*, **473** (2017).

- (with Jakob Kapeller) Stability, Fairness and Random Walks in the Bargaining Problem, *Physica A*, **488** (2017): 60–71.

- Localized Quantitative Criteria for Equidistribution, *Acta Arithmetica*, **180** (2017): 183–199.

- (with Manas Rachh), On the location of maxima of solutions of Schrödinger's equation, *Comm. Pure Appl. Math.* **71** (2018): 1109–1122.

- (with Raphy Coifman and Hau-tieng Wu), Carrier frequencies, holomorphy and unwinding, *SIAM J. Math. Anal.* **49** (2017): 4838–4864.

- (with Roy Lederman) Stability Estimates for Truncated Fourier and Laplace Transforms *Integral Equations and Operator Theory*, **87** (2017): 529–543.

- An amusing sequence of functions, *Mathematics Magazine*, **91** (2019): 262–266.

- (with Alex Cloninger) On Suprema of Autoconvolutions with an Application to Sidon sets, *Proc. Amer Math. Soc.*, **145** (2017): 3191–3200.

- (with Alex Cloninger), Spectral Echolocation via the Wave Embedding, *Applied and Computational Harmonic Analysis* **43** (2017): 577–590.

- (with Florian Pausinger) Heating a Room with Number Theory, to appear in *Mathematics Magazine*

- Localization of Quantum States and Landscape Functions, *Proceeding of the American Mathematical Society*, **145** (2017): 2895–2907.

- A Hidden Signal in the Ulam Sequence, *Experimental Mathematics*, **23** (2017): 460–467.

- (with Raphy Coifman), Nonlinear phase unwinding of functions, *Journal of Fourier Analysis and Applications*, **23** (2017): 778–809.

- (with Diogo Oliveira e Silva) Hermite polynomials, linear flows on the torus, and an uncertainty principle for roots, *Journal of Mathematical Analysis and Applications*, **451** (2017): 678–711.

- (with Markus Faulhuber) Optimal Gabor frame bounds for separable lattices and estimates for Jacobi theta functions, *Journal of Mathematical Analysis and Applications*, **445** (2017): 407–422.

- (with Yuke Li, Tianhao Wu and Nicholas Marshall) Extracting Geography from Trade Data, *Physica A*, **473** (2017): 205–212.

- (with Jakob Kapeller) Emergent phenomena in scientific publishing: a simulation exercise, *Research Policy*, **45** (2016): 1945–1952.

- (with Alberto Enciso and Daniel Peralta-Salas) Prescribing the nodal set of the first eigenfunction in each conformal class, *IMRN* **11** (2016): 3322–3349.

- Directional Poincaré inequalities along mixing flows, *Arkiv foer Matematik*, **54** (2016): 555–569.

- A Filtering Technique for Markov Chains with Applications to Spectral Embedding, *Applied and Computational Harmonic Analysis* **40** (2016), 575-587.

- (with Florian Pausinger) On the Discrepancy of Jittered Sampling, *Journal of Complexity* **33** (2016), 199-216.

- (with Rima Al-Aifari and Lillian Pierce) Lower bounds for the truncated Hilbert transform, *Revista Matematica Iberobamericana*, **32** (2016), 23-56.

- A Rigidity Phenomenon for the Hardy-Littlewood maximal function, *Studia Mathematica*, **229** (2015): 263–278.

- An Uncertainty Principle on Compact Manifolds, *The Journal of Fourier Analysis and Applications*, **21** (2015),575-599.

- (with Herbert Koch) Convolution Estimates for Singular Measures and some Global Nonlinear Brascamp-Lieb inequalities, *Proceedings of the Royal Society of Edinburgh*, **145** (2015), 1223-123..

- Sharp L^1-Poincare inequalities correspond to optimal hypersurface cuts,*Archiv der Mathematik* **105** (2015), 179-188.

- On the number of legal positions in chess without promotion, *International Journal of Game Theory* **44**, 761-767.

- (with Florian Pausinger) Local Extrema in Quantum Chaos, *Physics Letters A* **379** (2015), 535–541.

- Lower bounds on nodal sets of eigenfunctions via the heat flow, *Communications in Partial Differential Equations*, **39** (2014).

- New Bounds for the Traveling Salesman Constant, *Advances in Applied Probability*, **47** (2015).

- A Remark on Disk Packings and Numerical Integration of Harmonic Functions, *Journal of Complexity* **31** (2015), 486–493.

- Dispersion dynamics for the generalized Korteweg-de Vries equation, *Proceedings of the AMS*, **143** (2015), 486-493.

- A Geometric Uncertainty Principle with an Application to Pleijel's Estimate, *Annales Henri Poincaré*, **15** (2014), 2299-2319.

- (with Michaela A. C. Nieuwenhuis and James C. Robinson), Minimal Periods for Ordinary Differential Equations in Strictly Convex Banach Spaces and Explicit Bounds for some L^p-Spaces, *Journal of Differential Equations*, **256** (2014), 2846 - 2857.

- (with Jakob Kapeller) Modeling the evolution of preferences: an answer to Schubert and Cordes, *Journal of Insitutional Economics*, **10** (2014), 337-347.

- (with Jakob Kapeller and B. Schuetz) The Impossibility of Rational Consumer Choice–A Problem and its Solution.*Journal of Evolutionary Economics* **23** (2013): 29–60.

- (with Jakob Kapeller) How Formalism shapes Perception: An Experiment on Mathematics as a Language, *International Journal of Pluralism and Economics Education* **4** (2013): 138–156.

- Random restricted matching and lower bounds for combinatorial optimization. *Journal of Combinatorial Optimization* **24** (2012), no. 3, 280–298.

- (with Erhard Aichinger) A proof of a Theorem by Fried and MacRae and applications to the composition of polynomial functions, *Archiv der Mathematik* **97** (2011), 115–124.

- On the optimal interpoint distance sum inequality, Archiv der Mathematik 97 (2011) no.3, 289-298.

- Extremal uniform distribution and random chord lengths. *Acta Mathematica Hungarica* **130** (2011), 321–339.

- A note on implicitly defined sets in uniform distribution theory. *Uniform Distribution Theory* **6** (2011), no. 2, 85–94.

- The asymptotic behavior of the average L^1-discrepancies and a randomized discrepancy, *The Electronic Journal of Combinatorics*, **17** (2010), R106

- A New Lower Bound for the Geometric Traveling Salesman Problem in Terms of Discrepancy, *Operations Research Letters*, **38** (2010), 318–319.

- A Note on the number of different inner products generated by a finite set of vectors, *Discrete Mathematics* **310** (2010), 1112–1117.

- Uniform distribution preserving mappings and variational problems. *Uniform Distribution Theory* **4** (2009), 117–145.

- (with Fritz Pillichshammer) Average distance between consecutive points of uniformly distributed sequences, *Uniform Distribution Theory* **4** (2009), 51–67.

RECENT INVITED TALKS/EVENTS

- 2024: Colloquium, University of New Mexico (Feb 9), 2024 PNM-UNM Lecture before the New Mexico Math Olympiad, Albuquerque (Feb 10), Oberwolfach (Applied Harmonic Analysis, April), AMS Sectional Meeting (Convexity and PDEs, May), 2024 Serge Lang Undergraduate Lecture (UC Berkeley, Oct 9), Seminar UC Berkeley (Oct 10), Wilkes Lecture in Statistics (Princeton, Oct 21), Analysis Seminar (UNC Chapel Hill, Oct 23), Colloquium (UNC Chapel Hill, Oct 24), Colloquium (NC State, Oct 25), Unexpected Phenomena in Energy Minimization (Sofia, Bulgaria, Dec 8-13)

- 2023: Combinatorics Seminar, UW (Jan 11) Codes and Expansions (CodEx) Webinar (Jan 17), Analysis and Probability Seminar, Webinar Iowa State (Jan 25), Colloquium, University of Alberta (Feb 2-3), Seminar, UC Irvine (Feb 15), Colloquium, Wisconsin-Madison (Mar 3), Colloquium, Howard University (April 14), Colloquium, U Minnesota, Minneapolis (May 4), SIAM Conference on Optimization (Seattle) (May 31 - Jun 3), Colloquium, Oregon State (June 5), Modern Applied and Computational Analysis, ICERM (June 26 - 30), Geometric Spectral

Theory, Oberwolfach (Aug 20-26 2023), Algorithms and Complexity for Continuous Problems, Dagstuhl (Aug 27 - Sep 1, 2023), Mathematical Information Science, Lagrange Mathematics and Computing Research Center, Paris (Oct 9-13 2023), SIAM PNW Meeting (Oct 14-15), Pacific Northwest Probability Seminar (Nov 4)

- 2022: Geometry & Analysis Seminar, Columbia (Feb 11), Waves, Simons Center, Flatiron Institute (Feb 17-19), Combinatorics Seminar, Graz (Mar 2), UW Rainwater Seminar (Mar 8), Combinatorics and Probability, Ohio State (Mar 31), Joint Mathematical Meetings (online, April 6-9), Colloquium Portland State (April 22), Wilhelm Killing Colloquium Munster (April 28), UW Probability (May 2), Colloquium University of Chicago (May 12), PIMS Summer School on Optimal Transport (Seattle, June 19 - July 1), MCQMC 2022 (Linz, Austria, July 17-22), SIAM Math of Data Science (San Diego, Sep 28), Chern-Weil Symposium (U Chicago, Oct 7-9), St. Louis Academy of Sciences (Nov 18) Pacific Rim Mathematical Association Congress (Vancouver, Dec 8)

- 2021: Analysis Seminar Erlangen, UW (Probability), Kickoff Event Pacific Inderdisciplinary Hub on Optimal Transport, Uniform Distribution Theory (7UDT, Plenary Lecture), 38th Western States Meeting, Trends in Mathematical Modelling, Simulation and Optimisation: Theory and Applications (Erlangen), UC Berkeley, UW AMATH, Flatiron Institute, Koc University, 33th Brazilian Mathematical Colloquium, International Conference on Computational Harmonic Analysis (plenary talk, Sep 13-17), Oberwolfach (Applied Harmonic Analysis and Data Science), Geometric and functional inequalities and applications (webinar), Seminari A Distanza Di Analisi Armonica (webinar), UCI Harmonic Analysis (online), LSU Applied Analysis, Georgia Tech Analysis, Georgia Tech Asymptotic Geometric Analysis

- 2020: U Toronto, UW Seattle, U Minnesota, Localization of Waves Annual Meeting (Simons Foundation), Spectral Geometry in the Clouds (Webinar), Corona Seminar: Inequalities on Function Spaces of Smooth Functions (Webinar), UC Berkeley (Applied Math, Webinar), Northwestern (Analysis, Webinar), 2nd Mid-Atlantic Analysis Seminar (webinar), Rutgers (Number Theory, webinar), Point Distribution Webinar (2 talks), Joint UCLA/Caltech Analysis Seminar, Syracuse (Colloquium), IIT Delhi (Math Seminar), Fernuni Hagen

TEACHING

1. Supervision of Ph.D. Theses

   - Nicholas F. Marshall (2019, co-advised with Raphy Coifman): 'Harmonic Analysis in Discrete Geometries'
   - George C. Linderman (2019, co-advised with Raphy Coifman and Yuval Kluger): 'Efficient methods for imputation, dimensionality reduction, and visualization of biomedical datasets'
   - Louis Brown (2021), 'Well-Distributed Sequences: Number Theory, Optimal Transport, and Potential Theory'
   - Tony Zeng (expected 2026)

2. Supervision of M.Sc. Theses

   - Sina Koohbour: 'Spectral gaps on Graphs' (Bonn, 2014)
   - Kathrin Heim: 'Computer-aided investigations of solitons in Boson stars' (Bonn, 2014)

3. Selected Undergraduate Research and Honor Theses

   - Noah Kravitz: Additive Combinatorics, arXiv:1705.01883, *Integers*

- SMALL 2016: Integer Complexity, arXiv:1706.08424, *Integers*
- Noah Kravitz: Fourier Analysis, arXiv:1712.01206 *J. Fourier Anal.*
- Borys Kuca: Additive Combinatorics, arXiv:1804.09594, *Acta Arithm.*
- SUMRY 2017: Additive Combinatorics (Hinman, Kuca, Schlesinger, Sheydvasser, published in *J. Number Theory* and *Involve*)
- SUMRY 2018: Complex Analysis (M. Lukianchikov, V. Nazarchuk and C. Xue, *Complex Analysis and Operator Theory*)
- Noah Kravitz: Lonely Runner Conjecture, arXiv:1912.06034, *Comb. Theo.*
- Emma Pierce-Hoffman and Isaac Robinson: tree-SNE, arXiv:2002.05687
- Alex Cohen: Poisson Correlation arXiv:2003.05421, *J. Number Theo.*
- Adela DePavia: Spectral Clustering, arXiv:2003.09969 *Found. Data Sc.*
- Noah Kravitz: Convolution Inequalities arXiv:2004.06611
- WXML Fall 2020, arxiv:2012.04625, *Involve*
- Yulan Zhang: t-SNE and mean field limits, arXiv, *Res. Math Sc.*
- WXML Spring 2022 (arXiv:2209.04438), *Journal of Combinatorics*
- WXML Fall 2022 (arXiv:2212.02496), *Journal of Fourier Analysis and Applications*
- WXML Spring 2023 (arXiv:2307.04740)
- WXML Fall 2023 (arXiv:2312.08649)
- WXML Spring 2024 (arXiv:2408.00933)
- WXML: Fall 2024 (arXiv:2412.04284)