Stefan Steinerberger

Contact Information

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Employment

2021 – : 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
- 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

- Randomly Pivoted Partial Cholesky: Random How?, arXiv:2404.11487
- On a problem involving unit fractions, arXiv:2403.17041
- A Note on Approximate Hadamard Matrices, arXiv:2402.13202
- (with Rekha Thomas) Conformally rigid graphs, arXiv:2402.11758
- 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, arXiv:2309.14313
- (with Ovall, Quan, Reid), On localization of eigenfunctions of the magnetic Laplacian, arXiv:2308.15994
- (with Bilyk, Mastrianni) Single radius spherical cap discrepancy via gegenbadly approximable numbers, arXiv:2308.00694
- (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, arXiv:2306.06204
- (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, arXiv:2212.07590
- (with Andrea Ottolini) Guessing cards with complete feedback, *Adv. Appl. Math.*, accepted.
- Quadratic Crofton and sets that see themselves as little as possible, arXiv:2211.03259, *Monatshefte Math.*, accepted.
- (with J. Hoskins and H. Quan), Magnetic Schrodinger operators and landscape functions, arXiv:2210.02646
- 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, arXiv:2206.05346
- 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

- 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'
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)