Weilin Li

Last updated: September 22, 2025

Contact Information

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Research Interests

Applied analysis, computational mathematics, signal processing, machine learning

Employment

City University of New York
Doctoral Faculty, Graduate Center 2025–
Assistant Professor, City College of New York 2022–

New York University
Visiting Assistant Professor 2021–22
Courant Instructor 2018–21

Education

University of Maryland, College Park 2018
Ph.D. Mathematics
Thesis: Topics in Harmonic Analysis, Sparse Representations, and Data Analysis
Advisors: John J. Benedetto and Wojciech Czaja

Cornell University 2013
B.A. Mathematics, Summa Cum Laude
Thesis: Boundary Value Problems on a Half-Sierpinski Gasket
Advisor: Robert S. Strichartz

Preprints

3. Albert Fannjiang, Weilin Li, and Wenjing Liao. Optimality of Gradient-MUSIC for spectral estimation. [arXiv]
2. Weilin Li, Karl Otness, Kui Ren, and Donsub Rim. An explicit spectral decomposition of the ADRT. [arXiv]
1. C. Sinan Güntürk and Weilin Li. Approximation of functions with one-bit neural networks. [arXiv]

Publications

27. Oleg Asipchuk, Laura De Carli, Weilin Li. Concerning the stability of exponential systems and Fourier matrices. *Journal of Fourier Analysis and Applications*, to appear. [arXiv]
26. Weilin Li. Nonharmonic multivariate Fourier transforms and matrices: condition numbers and hyperplane geometry. *Applied and Computational Harmonic Analysis*, 2025. [journal]
25. Sjoerd Dirksen, Weilin Li, and Johannes Maly. Subspace and DOA estimation under coarse quantization. *IEEE Transactions on Information Theory*, 2025. [journal]

24. Weilin Li. New perspectives on Fourier matrices. *15th International Conference on Sampling Theory and Applications (SampmTA)*, 2025. [proceeding]
23. Sjoerd Dirksen, Weilin Li, and Johannes Maly. Subspace estimation under coarse quantization. *15th International Conference on Sampling Theory and Applications (SampmTA)*, 2025. [proceeding]
22. Weilin Li. Multiscale estimates for the condition number of non-harmonic Fourier matrices. *Mathematics of Computation*, vol. 94, no. 356, pp. 2895–2929, 2025. [journal]
21. C. Sinan Güntürk and Weilin Li. Uniform approximation by polynomials with integer coefficients via the Bernstein lattice. *Combinatorial and Additive Number Theory, New York Number Theory Seminar*, vol. 6, pp. 221–231, 2025. [proceeding]
20. C. Sinan Güntürk and Weilin Li. Near-optimality of $\Sigma\Delta$ quantization for L^2 approximation with polynomials in Bernstein form. *14th International Conference on Sampling Theory and Applications (SampmTA)*, 2023. [proceeding]
19. C. Sinan Güntürk and Weilin Li. Approximation with one-bit polynomials in Bernstein form. *Constructive Approximation (special issue for Ron DeVore's 80th birthday)*, vol. 57, no. 2, pp. 601–630, 2023. [journal]
18. Weilin Li, Kui Ren, and Donsub Rim. A range characterization of the single-quadrant ADRT. *Mathematics of Computation*, vol. 92, no. 339, pp. 283–306, 2023. [journal]
17. C. Sinan Güntürk and Weilin Li. Quantization for spectral super-resolution. *Constructive Approximation*, vol. 56, no. 3, pp. 619–648, 2022. [journal]
16. Weilin Li, Zengying Zhu, Weiguo Gao, and Wenjing Liao. Stability and super-resolution of MUSIC and ESPRIT for multi-snapshot spectral estimation. *IEEE Transactions on Signal Processing*, vol. 70, pp. 4555–4570, 2022. [journal]
15. Ilya Kavalerov, Weilin Li, Wojciech Czaja, and Rama Chellappa. 3-D Fourier scattering transform and classification of hyperspectral images. *IEEE Transactions on Geoscience and Remote Sensing*, vol. 59, no. 12, pp. 10312–10327, 2021. [journal]
14. Wojciech Czaja, Weilin Li, Yiran Li, and Mike Pekala. Maximal function pooling with applications. *Excursions in Harmonic Analysis, Volume 6 (special volume for John Benedetto's 80th birthday)*, pp. 413–429, 2021. [book chapter].
13. Wojciech Czaja, Ilya Kavalerov, and Weilin Li. Exploring the high dimensional geometry of HSI features. *11th Workshop on Hyperspectral Imaging and Signal Processing: Evolution in Remote Sensing (WHISPERS)*, pp. 1–5, 2021. [proceedings]
12. Weilin Li and Wenjing Liao. Stable super-resolution limit and smallest singular value of restricted Fourier matrices. *Applied and Computational Harmonic Analysis*, vol. 51, no. 1, pp. 118–156, 2021. [journal]
11. Weilin Li. Generalization error of minimum weighted norm and kernel interpolation. *SIAM Journal on Mathematics of Data Science*, vol. 3, no. 1, pp. 414–438, 2021. [journal]
10. Weilin Li, Wenjing Liao, and Albert Fannjiang. Super-resolution limit of the ESPRIT algorithm. *IEEE Transactions on Information Theory*, vol. 66, no. 7, pp. 4593–4608, 2020. [journal]
9. Wojciech Czaja and Weilin Li. Rotationally invariant time-frequency scattering transforms. *Journal of Fourier Analysis and Applications*, vol. 26, no. 1, pp. 1–23, 2020. [journal]
8. John J. Benedetto and Weilin Li. Super-resolution by means of Beurling minimal extrapolation. *Applied and Computational Harmonic Analysis*, vol. 48, no. 1, pp. 218–241, 2020. [journal]
7. Weilin Li and Wenjing Liao. Conditioning of restricted Fourier matrices and super-resolution of MUSIC. *13th International Conference on Sampling Theory and Applications (SampTA)*, 2019. [proceedings]

6. C. Sinan Güntürk and Weilin Li. High performance quantization for spectral super-resolution. *13th International Conference on Sampling Theory and Applications (SampTA)*, 2019. [proceedings]
5. Wojciech Czaja and Weilin Li. Analysis of time-frequency scattering transforms. *Applied and Computational Harmonic Analysis*, vol. 47, no. 1, pp. 149–171, 2019. [journal]
4. John Peterson, Weilin Li, Brian Cesar-Tondreau, John Bird, Kevin Kochersberger, Wojciech Czaja, and Morgan McLean. Experiments in unmanned aerial vehicle/unmanned ground vehicle radiation search. *Journal of Field Robotics*, vol. 36, no. 4, pp. 818–845, 2019. [journal]
3. Kevin Kochersberger, John Peterson, Prashant Kumar, John Bird, Morgan McLean, Wojciech Czaja, Weilin Li, and Nathaniel Monson. Unmanned aircraft applications in radiological surveys. *IEEE International Symposium on Technologies for Homeland Security*, pp. 1–5, 2018. [proceedings]
2. Wojciech Czaja, Ilya Kavalerov, and Weilin Li. Scattering transforms and classification of hyperspectral images. *SPIE, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery*, XXIV, 2018. [proceedings]
1. Weilin Li and Robert S. Strichartz. Boundary value problems on a half Sierpinski gasket. *Journal of Fractal Geometry*, vol. 1, no. 1, pp. 1–43, 2014. [journal]

Grants and Honors

- PSC-CUNY Traditional B Grant 2025–26
- PSC-CUNY Traditional B Grant 2024–25
- National Science Foundation, Division of Mathematics, Sole-PI Grant 2023–26
  Three year sole PI project "Multidimensional and compressive super-resolution: theory, computation, and fundamental limits," funded by the NSF computational math program with a budget of $176,476.
- PSC-CUNY Traditional B Grant 2023–24
- Charles Chui Young Researcher Best Paper Award 2021
  for the paper "Stable super-resolution limit and smallest singular value of restricted Fourier matrices" published in *Applied and Computational Harmonic Analysis* in 2021.
- AMS-Simons Travel Grant 2019–22
- Cohen Foundation Research Support, New York University 2018–19
- James C. Alexander Prize for Graduate Research, University of Maryland 2018
- Program Associate, Mathematical Sciences Research Institute 2017
- Ann G. Wylie Dissertation Fellowship, University of Maryland 2017
- Graduated Summa Cum Laude in Mathematics, Cornell University 2013

Conference Presentations

19. 15th International Conference on Sampling Theory and Applications, Vienna, Austria 2025
18. Frame Theory Days, St. Louis University, MO 2024
17. NSF PI Meeting, University of Washington Seattle, WA 2024
16. SIAM Conference on Applied Linear Algebra, Paris, France 2024
15. AMS Spring Sectional Meeting, Tallahassee, FL 2024
14. 11th Applied Inverse Problems Conference, Göttingen, Germany 2023
13. 17th US National Congress on Computational Mechanics, Albuquerque, New Mexico 2023
12. TUM Science and Study Center Raitenhaslach, Germany 2023
11. Fall Fourier Talks, University of Maryland, College Park, MD 2022

10. Focus Program, Fields Institute, Toronto, Canada 2022
9. Joint Math Meetings, Seattle, WA, 2022
8. SIAM Conference on Imaging Science, Berlin, Germany 2022
7. 11th WHISPERS, Amsterdam, Netherlands (online) 2021
6. Randomness and Determinism in Compressive Data Acquisition, Texas A&M University 2019
5. AMS Fall Western Sectional Meeting, San Francisco State University, CA 2018
4. 7th International Conference on Computational Harmonic Analysis, Vanderbilt University 2018
3. AMS Sectional Meeting, University of Florida, Orlando, FL 2017
2. Joint Mathematics Meetings, Baltimore, MD 2014
1. Joint Mathematics Meetings, San Diego, CA 2013

Seminar Talks

29. CUNY Harmonic Analysis and PDE seminar, CUNY Graduate Center, New York 2025
28. Colloquium, New Jersey Institute of Technology, Newark 2025
27. Analysis and Data Science Seminar, State University of New York, Albany 2024
26. Data-Enabled Science Seminar, University of Houston 2024
25. Applied and Computational Math Seminar, Georgia Institute of Technology 2024
24. Colloquium, Florida International University 2023
23. Machine Learning Seminar, University of Massachusetts at Amherst 2023
22. Colloquium, The City College of New York 2022
21. Applied Math Colloquium, Columbia University 2022
20. Harmonic Analysis and PDE Seminar, Graduate Center of CUNY (online) 2022
19. Applied/PDE/Data Seminar, University of California, Santa Barbra (online) 2021
18. Faraway Fourier Talks (online) 2021
17. 1W-MINDS: One World Mathematics of INformation, Data, and Signals (online) 2021
16. Scientific Computing And Numerics, Cornell University (online) 2021
15. Computational and Applied Math Seminar, Tufts University 2021
14. Computational Analysis Seminar, Vanderbilt University (online) 2021
13. Colloquium, Washington University in St. Louis (online) 2021
12. Colloquium, North Carolina State University (online) 2020
11. Seminar in Mathematical Physics/PDE, University of California, San Diego 2019
10. Applied and Computational Math Seminar, University of California, Irvine 2019
9. Norbert Wiener Center Seminar, University of Maryland, College Park 2019
8. Analysis Seminar, Courant Institute of Mathematical Sciences 2019
7. Norbert Wiener Center Seminar, University of Maryland, College Park 2018
6. Applied Math and Analysis Seminar, Duke University 2018
5. Harmonic Analysis and Signal Processing Seminar, Courant Institute 2017
4. Applied and Computational Mathematics Seminar, Georgia Institute of Technology 2017
3. Norbert Wiener Center Seminar, University of Maryland, College Park 2017
2. Graduate Student Seminar, Mathematical Sciences Research Institute, Berkeley 2017
1. Research Interaction Team on Deep Learning, University of Maryland, College Park 2016

Teaching Experience (* indicates a graduate level class)

City College of New York:

- *Math 343/A34 Theory of Functions of a Real Variables (Fa23, Sp25)
- *Math 342/A42 Theory of Functions of a Complex Variable (Fa25)
- Math 377 Applied Statistics and Probability (Sp23, Sp24)
- Math 328 Methods of Numerical Analysis (Fa24)
- Math 324 Advanced Calculus II (Fa22)

New York University:

- *Math 2110 Linear Algebra I (Fa21)
- *Math 2111 Linear Algebra (Fa21)
- Math 325 Analysis (Sp22, Sp21, Sp20)
- Math 211 Math for Economics I (Fa19)
- Math 123 Calculus III (Sp19)
- Math 122 Calculus II (Fa20)
- Math 121 Calculus I (Fa18)