Wenbo Sun

Department of Mathematics, Virginia Tech
225 Stanger Street
Blacksburg, VA, 24061

Tel: 847-660-8526
Email: swenbo@vt.edu

Employment

- **Virginia Tech, Blacksburg, VA** Aug. 2019 - present

  Assistant Professor in mathematics

- **The Ohio State University, Columbus, OH** Aug. 2016 - May 2019

  Zassenhaus Assistant Professor in mathematics

Education

- **Northwestern University, Evanston, IL** Sep. 2011 - June 2016

  Ph.D. in mathematics; Advisor: Bryna Kra

  – Thesis title: Topological and finite structure theorems and applications.

- **Peking University, Beijing, China** Sep. 2007 - June 2011

  B.A. in mathematics; Advisor: Wenxiang Sun

  – Undergraduate Research: Boundedness of Riesz means on H^p space associated with Hermite expansions (Joint with Y. Deng and H. Liu, unpublished).

  B.A. in philosophy; minor.

Research Interests

- Ergodic theory and dynamical system
- Combinatorics
- Number theory

Publications

- *Seminorm estimates and joint ergodicity for pairwise independent Hardy sequences* (Joint with S. Donoso, A. Koutsogiannis, B. Kuca, and K. Tsinas) submitted. arXiv:2410.15130.
- *Joint transitivity for linear iterates.* (Joint with S. Donoso, and A. Koutsogiannis) Forum of Mathematics, Sigma, to appear. arXiv: 2404.07876.
- *Spherical higher order Fourier analysis over finite fields IV: an application to the geometric Ramsey conjecture.* submitted. arXiv: 2312.06649.
- *Spherical higher order Fourier analysis over finite fields III: a spherical Gowers inverse theorem.* submitted. arXiv: 2312.06636.
- *Spherical higher order Fourier analysis over finite fields II: additive combinatorics for shifted ideals.* submitted. arXiv: 2312.06650.
- *Spherical higher order Fourier analysis over finite fields I: equidistribution for nilsequences.* submitted. arXiv: 2312.06651.

- *Total joint ergodicity for totally ergodic systems.* (Joint with A. Koutsogiannis) submitted. arXiv: 2302.12278.
- *Averages of completely multiplicative functions over the Gaussian integers – a dynamical approach.* (Joint with S. Donoso, A. Le and J. Moreira) Transactions of the American Mathematical Society. **377** (2024), no. 10: 7081–7115.
- *Joint ergodicity for functions of polynomial growth.* (Joint with S. Donoso, and A. Koutsogiannis) Israel Journal of Mathematics, to appear. arXiv: 2301.06911.
- *Decomposition of multicorrelation sequences and joint ergodicity.* (Joint with S. Donoso, A. Ferre and A. Koutsogiannis) Ergodic Theory and Dynamical Systems. **44** (2024), no. 2, 432–480.
- *Additive averages of multiplicative correlation sequences and applications.* (Joint with S. Donoso, A. Le and J. Moreira) Journal d'Analyse Mathematique, **149** (2023), no. 2, 719–761.
- *Sarnak's Conjecture for nilsequences on arbitrary number fields and applications.* Advances in Mathematics, **415** (2023), p.108883.
- *Seminorms for multiple averages along polynomials and applications to joint ergodicity.* (Joint with S. Donoso and A. Koutsogiannis) Journal d'Analyse Mathematique, **146** (2022), 1–64.
- *Weak ergodic averages over dilated measures.* Ergodic Theory and Dynamical Systems. **41** (2021), no. 2, 606–621.
- *Optimal lower bounds for multiple recurrence.* (Joint with S. Donoso, A. Le and J. Moreira) Ergodic Theory and Dynamical Systems. **41** (2021), no. 2, 379–407.
- *Under- and over-independence in measure preserving systems.* (Joint with T. Adams and V. Bergelson) Israel Journal of Mathematics. **235** (2020), 349–384.
- *Pointwise multiple averages for sublinear functions.* (Joint work with S. Donoso and A. Koutsogiannis) Ergodic Theory and Dynamical System, **40** (2020), no. 6, 1594–1618.
- *Equidistribution of dilated curves on nilmanifolds.* (Joint with B. Kra and N. Shah) Journal of the London Mathematical Society, **98** (2018), no. 3, 708–732.
- *Quantitative multiple recurrence for two and three transformations.* (Joint with S. Donoso) Israel Journal of Mathematics, **226** (2018), 71–85.
- *Pointwise convergence of some multiple ergodic averages.* (Joint with S. Donoso) Advances in Mathematics, **330** (2018), 946–996.
- *A structure theorem for multiplicative functions over the Gaussian integers and applications.* Journal d'Analyse Mathematique, **134** (2018), no. 1, 55–105.
- *Pointwise multiple averages for systems two commuting transformations.* (Joint with S. Donoso) Ergodic Theory and Dynamical Systems, **38** (2018), no. 6, 2132–2157.
- *A pointwise cubic average for two commuting transformations.* (Joint with S. Donoso) Israel Journal of Mathematics, **216** (2016), no. 2, 657–678.
- *Dynamical cubes and a criteria for systems having product extensions.* (Joint with S. Donoso) Journal of Modern Dynamics, **9** (2015), no. 1, 365–405.
- *Multiple recurrence and convergence for certain averages along shifted primes.* Ergodic Theory and Dynamical Systems, **35** (2015), no. 5, 1592–1609.

Award Received

- NSF Grant (DMS-2247331), Principle Investigator: Structure theorems beyond Z-systems.
- 2016: best thesis award in Northwestern University.

Conferences organized/to organize

- New trends in symbolic dynamics and ergodic theory: dynamical obstructions arising from complexity theory, Institute for Advanced Study in Mathematics (IASM), Hangzhou, China, 2023 (co-organizing with N. Frantzikinakis, B. Kra, A. Maass, and X. Ye). The conference was canceled due to Covid-19.
- Mini workshop in dynamical systems, Virginia Tech, VA, Jan. 14–15, 2023 (co-organizing with Y. Yang).

Talks Given/to give

- **Dynamical seminar, Indiana University Indianapolis, Indianapolis, IN, Jan. 14, 2025:** Geometry Ramsey Conjecture over finite fields.
- **Rutgers Ergodic Theory and Analysis seminar, online, Nov. 13, 2024:** Geometry Ramsey Conjecture over finite fields.
- **Analysis seminar, University at Buffalo, Buffalo, NY, Sep. 18, 2024:** Geometry Ramsey Conjecture over finite fields.
- **NU Trends in Ergodic Theory conference, Northwestern University, Evanston, IL, Aug 5–9, 2024:** Geometry Ramsey Conjecture over finite fields.
- **NU Trends in Ergodic Theory summer school, Northwestern University, Evanston, IL, July 29–Aug 2, 2024:** Spherical higher order Fourier analysis.
- **Seminar on Dynamical Systems, Northeastern Normal University, Changchun, Jilin, China, July 22, 2024:** Geometry Ramsey Conjecture over finite fields.
- **Seminars on dynamical systems and their applications, Soochow University, Suzhou, Jiangsu, China, July 6–12, 2024:** Geometry Ramsey Conjecture over finite fields.
- **Seminars on recent developments in dynamical systems and related areas, Soochow University, Suzhou, Jiangsu, China, June 28–30, 2024:** The joint transitivity problem.
- **Mini conference on dynamical systems and related areas, Soochow University, Suzhou, Jiangsu, China, June 24–25, 2024:** Convergence of multiple ergodic averages for totally ergodic systems.
- **Analysis and math physics seminar, Virginia Tech, VA, 2024:** Geometry Ramsey Conjecture over finite fields.
- **Seminar on Dynamical Systems, Northeastern Normal University, Changchun, Jilin, China, July. 7, 2023:** Sarnak's Conjecture for nilsequences and applications to partition regularity problems.
- **Mini conference in dynamical systems, Soochow University, Suzhou, Jiangsu, China, Jun. 29–30, 2023:** Recent advances in jointly ergodic problems.

- **Nilpotent structures in topological dynamics, ergodic theory and combinatorics, Bedlewo Conference Center, Bedlewo, Poland, Jun. 4–10, 2023:** Modern tools in jointly ergodic problems.
- **Mini workshop in dynamical systems, Virginia Tech, VA, Jan. 14–15, 2023:** Sarnak's Conjecture for nilsequences on arbitrary number fields and applications.
- **School: Combinatorial and Geometric Approaches on Dynamics, Centro de Modelamiento Matemático (CMM), Universidad de Chile, Santiago, Chile, Nov. 28–Dec. 2, 2022:** Partition regularity problems for quadratic functions (mini-course).
- **AMS Sectional Meetings # 1181, University of Tennessee at Chattanooga, Chattanooga, TN, Oct. 15–16, 2022:** Equidistribution for nilsequences along spheres.
- **Graduate international academic innovation forum for dynamical systems and related areas, Virtual, Soochow University, Suzhou, Jiangsu, China, Aug. 26–30, 2022:** Equidistribution for nilsequences along spheres.
- **Dynamical system seminar at Michigan State University, East Lansing, MI, July 25, 2022:** Equidistribution for nilsequences along spheres.
- **Carolina Dynamics Symposium, Furman University, Greenville, SC, Apr. 22–24, 2022:** Recent advances in jointly ergodic problems.
- **Analysis participating seminar, UCLA, Virtual, Apr. 1, 2022:** Sarnak's Conjecture for nilsequences on arbitrary number fields and applications.
- **AMS Sectional Meetings # 1176, formerly at Tufts University, Virtual, RI, March 19–20, 2022:** Joint ergodicity conjecture for systems with commuting transformations.
- **Seminar on Dynamical Systems, the Ohio State University, Virtual, Oct. 28, 2021:** Jointly ergodicity problems for systems with commuting transformations.
- **Chapel Hill Ergodic Theory Workshop, online, July 5–6, 2021:** Recent advances in jointly ergodic problems.
- **Annual meeting of International Consortium of Chinese Mathematicians, Hefei, Anhui, China, Dec. 27–29, 2020:** Recurrence theorem for multiplicative systems and applications.
- **Seminar on Dynamical Systems, Soochow University, Suzhou, Jiangsu, China, July 31, 2020:** Exponential sum in $\mathbb{F}_p^d$ along spheres.
- **Online seminar on Dynamical Systems, Peking University, Beijing, China, Mar. 20, 2020:** Weak ergodic averages over dilated measures.
- **Seminar on Dynamical Systems, Peking University, Beijing, China, Dec 31, 2019:** Sarnak's conjecture and partition regularity problem.
- **Combinatorial and Additive Number Theory (CANT) 2019, City University of New York, New York, NY, May 21–24, 2019:** Sarnak's Conjecture for nilsequences on arbitrary number fields and applications.
- **Seminar on Dynamical Systems, Northwestern University, Evanston, IL, May 14, 2019:** Sarnak's Conjecture for nilsequences on arbitrary number fields and applications.
- **Joint Mathematics Meetings # 1145, Baltimore Convention Center, Hilton Baltimore, and Baltimore Marriott Inner Harbor Hotel, Baltimore, MD, Jan. 16–19, 2019:** Topological models characterizing multiple ergodic averages.

- **Seminar on Dynamical Systems, University of Chicago, Chicago, IL, Nov. 19, 2018:** Weak ergodic averages over dilated curves.
- **Seminar on Dynamical Systems, the City University of New York, New York, NY, Nov. 16, 2018:** Weak ergodic averages over dilated curves.
- **Seminar on Dynamical Systems, University of Science and Technology of China, Hefei, Anhui, China, July 16, 2018:** Under- and over-independence in measure preserving systems.
- **International conference on dynamical systems, Southern University of Science and Technology, Shenzhen, China, Jun. 18–29, 2018:** Pointwise convergence of some averages for commuting transformations.
- **Combinatorial and Additive Number Theory (CANT) 2018, City University of New York, New York, NY, May 22–25, 2018:** Quantitative recurrence theorem and solution counting problem.
- **AMS Sectional Meetings # 1139, Northeastern University, Boston, MA, Apr. 21–22, 2018:** Quantitative recurrence theorem and solution counting problem.
- **Seminar on Dynamical Systems, Northwestern University, Evanston, IL, Nov. 7, 2017:** Pointwise multiple convergence for commuting transformations.
- **AMS Sectional Meetings # 1131, University of North Texas, Denton, TX, Sep. 9–10, 2017:** Equidistribution of dilated curves.
- **Mathematical Congress of Americas 2017, Session "Symbolic Dynamics", Montreal, Canada, July 24–28, 2017:** Quantitative multiple recurrence problem.
- **Seminar on Dynamical Systems, Chile University, Santiago, Chile, July 10, 2017:** Equidistribution of dilated curves.
- **Seminar on Dynamical Systems, Penn State University, University Park, Pennsylvania, Mar. 13, 2017:** Quantitative multiple recurrence problem.
- **AMS Sectional Meetings # 1113, University of Memphis, Memphis, TN, Oct. 17–18, 2015:** Structure theorem for multiplicative functions of Gaussian integers and its applications.
- **AMS Sectional Meetings # 1112, Loyola University Chicago, Chicago, IL, Oct. 2–4, 2015:** Face transformations on dynamical cubes and its applications.
- **BIRS Workshop: Combinatorics Meets Ergodic Theory, Banff, BC, Canada, July 19–23, 2015:** Dynamical cubes and a criteria for systems having product extensions.
- **Workshop and Dynamical Systems and Related Topics, University of Maryland, College Park, MD, Apr. 18-20, 2015:** Multiple pointwise averages and topological models.
- **AMS Sectional Meetings # 1107, Georgetown University, Washington, DC, Mar. 7–8, 2015:** Partition regularity over Gaussian integers.
- **Seminar on Dynamical Systems, University of Science and Technology of China, Hefei, Anhui, China, July 1, 2013:** Multiple averages along shifted primes.

Teaching Experience

Virginia Tech, Blacksburg, VA 2019 – present

Lecturer for:

- Introduction to linear Algebra (honored course): Spring 2022.

- Real analysis: Fall 2023, Fall 2022, Fall 2021.
- Real analysis II: Spring 2023.
- Functional analysis: Fall 2023.
- Functional analysis II: Spring 2024.
- Calculus of a Single Variable (2 sections): Fall 2020.
- Introduction to linear Algebra: Fall 2019 (2 sections), Spring 2023, Spring 2025 (2 sections).

The Ohio State University, Columbus, OH 2016 – 2019
Lecturer for:

- Linear Algebra (2 sections): Spring 2019.
- Mathematical Topics for Engineers: Fall 2018.
- Linear Algebra (2 sections): Spring 2018.
- Mathematical Topics for Engineers: Fall 2017.
- Engineering Mathematics B: Spring 2017.
- Calculus III (2 sections): Fall 2016.

Northwestern University, Evanston, IL 2011 – 2016
Teaching Assistant for:

- Complex Analysis: Spring 2015.
- Linear Algebra and Multivariable Calculus: Fall 2014.
- Applied Analysis (Ordinary Differential Equations): Fall 2014.
- Analysis: Winter 2014.
- Algebra: Winter 2014.
- Accelerated Mathematics for ISP (calculus): Fall 2013.
- Geometry/Topology: Fall 2013.
- Accelerated Linear Algebra and Multivariable Calvulus: Winter 2013.
- Analysis: Winter 2013.
- Accelerated Mathematics for ISP (calculus): Fall 2012.
- Analysis: Fall 2012.