Shaoming Guo

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Current Positions

Jan. 2019 — Assistant Professor, University of Wisconsin-Madison

Previous Positions

Jan. 2020 - Jul. 2020 Member at the IAS, Princeton

Aug. 2018 - Dec. 2018 Visiting professor, the Chinese University of Hong Kong, Hong Kong, China

Jan. 2017 - May 2017 Postdoc, MSRI, Berkeley, CA. Mentor: Alexander Volberg

Aug. 2015 - May 2018 Zorn Postdoctoral Fellow, Indiana University Bloomington. Mentor: Ciprian Demeter

Education Background

Oct. 2012 - Jul. 2015 Ph.D., Institute of Mathematics, University of Bonn
Research interest: Harmonic Analysis; Advisor: Christoph Thiele

Oct. 2010 - Aug. 2012 M.S., Institute of Mathematics, University of Bonn
Major: Analysis and Partial Differential Equations; Advisor: Herbert Koch

Jan. 2010 - May 2010 BICMR, Peking University

Sep. 2006 - Jun. 2010 B.S., School of Science, Beijing University of Posts and Telecommunications
Major: Mathematics and Applied Mathematics

Selected Publications

1. Hilbert transform along measurable vector fields constant on Lipschitz curves: L^2 boundedness
Anal. PDE 8 (2015), no. 5, 1263-1288.
2. Sharp bounds for the cubic Parsell-Vinogradov system in two dimensions
with J. Bourgain and C. Demeter. *Adv. Math. 320 (2017), 827–875.*

3. Maximal operators and Hilbert transforms along variable non-flat homogeneous curves
with J. Hickman, V. Lie and J. Roos. *Proc. Lond. Math. Soc. (3) 115 (2017), no. 1, 177–219.*

4. On integer solutions of Parsell-Vinogradov systems
with R. Zhang. *Invent. Math. 218 (2019), no. 1, 1–81.*

5. A short proof of ℓ^2 decoupling for the moment curve
with Zane Kun Li, Po-Lam Yung and Pavel Zorin-Kranich, to appear in *Amer. J. Math.*

Funded Research Activities

Jul. 2021 - Jun. 2026 NSF CAREER 2044828 "Decoupling Theory, Oscillatory Integral Theory, and Their Applications in Analytic Number Theory and Combinatorics"

Jul. 2018 - Jun. 2021 NSF 1800274, "Decoupling Theory, Time-Frequency Analysis and Related Oscillatory Integrals"

Sep. - Dec. 2018 Research grant 4053295 at the Chinese University of Hong Kong

Feb. 2019 SQuaREs (Structured Quartet Research Ensembles), AIM, San Jose, US
with David Beltran, Jonathan Hickman and Andreas Seeger

Mar. 2018 SQuaREs (Structured Quartet Research Ensembles), AIM, San Jose, US
with Philip Gressman, Lillian Pierce, Joris Roos and Po-Lam Yung

Teaching

Fall 2021	Graduate real analysis M721
Spring 2021	Vector calculus M234
Fall 2020	Undergraduate number theory M467; graduate Fourier analysis M827
Fall 2019	Undergraduate probability M431; graduate real analysis M721
Spring 2019	Undergraduate analysis M522; graduate topic course in Fourier analysis M828

Mini-courses

Dec. 2018	Eight hour mini-course on decoupling theory and its connections to analytic number theory, Westlake University, Hangzhou
Jun. 2017	Eight hour mini-course on decoupling theory and applications, Zhongshan University, Guangzhou
Sep. 2014	Six hour mini-course on Carleson's theorem and singular Radon transforms, HongKong

Organising Activities

July 2021	Summer school "Harmonic analysis related to Laplacian resolvent estimates", Hangzhou with Bochen Liu and Yakun Xi
May. 2021	Workshop "Arithmetic (and) Harmonic Analysis" at the institute of Mittag-Leffler, Sweden. with Julia Brandes
Mar. 2021	Online workshop "Fourier restriction online 2021" with Malabika Pramanik, Ruixiang Zhang and Pavel Zorin-Kranich
Apr. 2020	Special session on harmonic analysis, AMS sectional meeting, Purdue University (Cancelled) with Brian Street
May. 2018	Assisted to organise an MRC workshop "New Developments on Oscillatory Integrals" with Phil Gressman, Larry Guth, Lillian Pierce and Yumeng Ou
Oct. 2017	Summer school "Decoupling and polynomial methods in analysis", Kopp, Germany with Christoph Thiele and Diogo Oliveira e Silva

Organising Activities at UW Madison

Fall 2020	Graduate student seminar in analysis, UW Madison with Betsy Stovall
Fall 2019	Graduate student seminar in analysis, UW Madison with Betsy Stovall

Graduate research advising

2018 - present	Changkeun Oh (4th year graduate student, UW Madison)

Undergraduate research advising

May - Dec. 2020	Shiqi Dong (UW Madison), now PhD student at John Hopkins Yvette Ren (UW Madison), now PhD student at UC Berkeley
May.2021 -	Yufei Zhan (UW Madison)

Service

Referee for journals and reviewer for MathSciNet
Graduate admission committee, UW Madison, Spring 2020, Spring 2021
Visiting International Student Committee, 2019-2020

Languages

Chinese: Native speaker **English**: Fluent **German**: B2 (very good command)

Publications

ArXiv Preprints

10. On the strict majorant property in arbitrary dimensions
    with Philip Gressman, Lillian Pierce, Joris Roos and Po-Lam Yung, arXiv:2106.12538, submitted
9. The Bochner-Riesz problem: an old approach revisited
    with Changkeun Oh, Hong Wang, Shukun Wu and Ruixiang Zhang, arXiv:2104.11188, submitted
8. Improved discrete restriction for the parabola
    with Zane Li and Po-Lam Yung, arXiv:2103.09795, submitted
7. A stationary set method for estimating oscillatory integrals
    with Saugata Basu, Ruixiang Zhang and Pavel Zorin-Kranich, arXiv 2103.08844, submitted
6. Sobolev improving for averages over curves in R^4
    with David Beltran, Jonathan Hickman and Andreas Seeger, arXiv:2102.08806, submitted
5. Sharp L^p bounds for the helical maximal function
    with David Beltran, Jonathan Hickman and Andreas Seeger, arXiv:2102.08272, submitted
4. Decoupling inequalities for quadratic forms
    with Changkeun Oh, Ruixiang Zhang and Pavel Zorin-Kranich, arXiv:2011.09451, submitted.
3. A variable coefficient multi-frequency lemma
    with Pavel Zorin-Kranich, arXiv:2010.00812, submitted
2. A restriction estimate for polynomial surfaces with negative Gaussian curvatures
    with Changkeun Oh, arXiv:2005.12431, submitted
1. Decoupling for two quadratic forms in three variables: a complete characterization
    with Changkeun Oh, Joris Roos, Po-Lam Yung and Pavel Zorin-Kranich, arXiv:1912.03995, submitted.

Accepted papers

29. Fourier restriction estimates for surfaces of co-dimension two in R^5
    with Changkeun Oh, arXiv:2009.07244, to appear in *J. d'Analyse Math.*

28. A short proof of ℓ^2 decoupling for the moment curve
    with Zane Kun Li, Po-Lam Yung and Pavel Zorin-Kranich, to appear in *Amer. J. Math.*

27. Local Well-Posedness for the Derivative Nonlinear Schrödinger Equations with L^2 Subcritical Data
    with X. Ren and B. Wang, *Discrete Contin. Dyn. Syst. 41 (2021), no. 9, 4207–4253.*

26. The circular maximal operator on Heisenberg radial functions
    with David Beltran, Jonathan Hickman and Andreas Seeger, to appear in *Annali SNS.*

25. A bilinear proof of decoupling for the cubic moment curve
    with Zane Kun Li and Po-Lam Yung, *Trans. Amer. Math. Soc. 374 (2021), no. 8, 5405–5432.*

24. Polynomial Roth theorems on sets of fractional dimensions
    with Robert Fraser and Malabika Pramanik, to appear in *IMRN.*

23. Reversing a philosophy: from counting to square functions and decoupling
    with Philip Gressman, Lillian Pierce, Joris Roos and Po-Lam Yung, *J. Geom. Anal. 31 (2021), no. 7, 7075–7095.*

22. Decoupling for certain quadratic surfaces of low co-dimensions
    with Pavel Zorin-Kranich, *J. Lond. Math. Soc. (2) 102 (2020), no. 1, 319–344.*

21. Decoupling for moment manifolds associated to Arkhipov-Chubarikov-Karatsuba systems
    with P. Zorin-Kranich. *Adv. Math. 360 (2020), 106889, 56 pp.*

20. Maximal functions associated with families of homogeneous curves: L^p bounds for $p \leq 2$
with Joris Roos, Andreas Seeger and Po-Lam Yung, *Proc. Edinb. Math. Soc. (2) 63 (2020), no. 2, 398–412.*

19. A maximal function for families of Hilbert transforms along homogeneous curves
with Joris Roos, Andreas Seeger and Po-Lam Yung, *Math. Ann. 377 (2020), no. 1-2, 69–114.*

18. On integer solutions of Parsell-Vinogradov systems
with R. Zhang. *Invent. Math. 218 (2019), no. 1, 1–81.*

17. Sharp variation-norm estimates for oscillatory integrals related to Carleson's theorem
with J. Roos and P. Yung, *Anal. PDE 13 (2020), no. 5, 1457–1500.*

16. Square functions for bi-Lipschitz maps and directional operators
with F. Di Plinio, C. Thiele and P. Zorin-Kranich. *J. Funct. Anal. 275 (2018), no. 8, 2015–2058.*

15. A polynomial Roth theorem on the real line
with P. Durcik and J. Roos. *Trans. Amer. Math. Soc. 371 (2019), no. 10, 6973–6993.*

14. On a binary system of Prendiville: The cubic case
Publ. Mat. 64 (2020), no. 1, 255--281.

13. Remarks on Wolff's inequality for hyper-surfaces
with C. Oh. *Math. Proc. Cambridge Philos. Soc. 168 (2020), no. 2, 249--259.*

12. A remark on oscillatory integrals associated with fewnomials
New York J. Math. 23 (2017), 1733–1738.

11. Maximal operators and Hilbert transforms along variable non-flat homogeneous curves
with J. Hickman, V. Lie and J. Roos. *Proc. Lond. Math. Soc. (3) 115 (2017), no. 1, 177–219.*

10. Sharp decouplings for three dimensional manifolds in R^5
with C. Demeter and F. Shi. *Rev. Mat. Iberoam. 35 (2019), no. 2, 423–460.*

9. Sharp bounds for the cubic Parsell-Vinogradov system in two dimensions
with J. Bourgain and C. Demeter. *Adv. Math. 320 (2017), 827–875.*

8. Polynomial Carleson operators along monomial curves in the plane
with L. Pierce, J. Roos and P. Yung. *J. Geom. Anal. 27 (2017), no. 4, 2977–3012.*

7. Hilbert transforms along Lipschitz direction fields: A lacunary model
with C. Thiele. *Mathematika* 63 (2017), no. 2, 351-363.

6. Single annulus estimates for the variation-norm Hilbert transforms along Lipschitz vector fields
Proc. Amer. Math. Soc. 145 (2017), no. 2, 601-615.

5. A geometric proof of Bourgain's L^2 estimate of the maximal operator along analytic vector fields
J. Geom. Anal. 27 (2017), no. 2, 968-985.

4. Hilbert transform along measurable vector fields constant on Lipschitz curves: L^p boundedness
Trans. Amer. Math. Soc. 369 (2017), no. 4, 2493-2519.

3. On the 1D cubic nonlinear Schrödinger equation in an almost critical space
J. Fourier Anal. Appl. 23 (2017), no. 1, 91-124.

2. Oscillatory integrals related to Carleson's theorem: fractional monomials
Commun. Pure Appl. Anal. 15 (2016), no. 3, 929-946.

1. Hilbert transform along measurable vector fields constant on Lipschitz curves: L^2 boundedness
Anal. PDE 8 (2015), no. 5, 1263-1288.

Selected invited Talks

Aug. 2021 Panorama of math, Bonn, Germany

July 2021 Trimester program in harmonic analysis and analytic number theory, Bonn, Germany

May 2021	PDE seminar, Chinese Academy of Science, Beijing, China
Nov. 2020	Analysis seminar, Cornell University
Oct. 2020	Analysis and PDE seminar, Rutgers University
Jul. 2020	Workshop “Real Analysis, Harmonic Analysis and Applications”, Oberwolfach, Germany (Cancelled)
Apr. 2020	Analysis seminar, Georgia Tech (Cancelled)
Apr. 2020	Workshop “Restriction, Kakeya, and Carleson-Type Problems”, Banff, Canada (Cancelled)
Mar. 2020	Workshop “Analytic and discrete aspects of finite points configurations”, CIRM, France (Cancelled)
Feb. 2020	Analysis seminar, Brown University
Jan. 2020	Workshop “Fourier analysis and applications”, Sanya, China
Dec. 2019	Special session on analytic number theory, Canadian math society winter meeting
May. 2019	Follow-up Workshop to TP "Harmonic Analysis and Partial Differential Equations”, Bonn, Germany
Mar. 2019	Analysis seminar, CalTech