Lars Becker

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Research Interests

I am broadly interested in harmonic analysis, and have done work in the following three directions. Firstly, in time-frequency analysis, more specifically about generalizations of Carleson's theorem on convergence of Fourier series. Secondly, in harmonic analysis on high dimensional spaces, such as the hypercube $\{-1,1\}^n$. Thirdly, I worked towards obtaining sharp constants in Fourier restriction inequalities, such as the Tomas-Stein inequality.

Education

2022 - current	PhD student in harmonic analysis, Universität Bonn *Advisor: Christoph Thiele*
2021 - 2022	Master of Mathematics, Universität Bonn *Final grade: 1.0*
2018 - 2021	Bachelor of Mathematics, Universität Bonn *Final grade: 1.0*

Teaching Experience

2019 - 2024	Universität Bonn *Tutor for the Lectures Analysis I – III, Introduction to PDE, Introduction to Functional Analysis* Conducting problem solving sessions and correcting homework

Papers and Preprints

1. *On trilinear singular Brascamp-Lieb integrals* (with Polona Durcik and Fred Yu-Hsiang Lin). arXiv:2411.00141
2. *Carleson Operators on Doubling Metric Measure Spaces* (with Floris van Doorn, Asgar Jamneshan, Rajula Srivastava and Christoph Thiele). arXiv:2405.06423
3. *Discrete Brunn-Minkowski Inequality for subsets of the cube* (with Paata Ivanisvili, Dmitry Krachun and José Madrid). arXiv:2404.04486
4. *A degree one Carleson operator along the paraboloid.* arXiv:2312.01134
5. *Dimension-free discretizations of the uniform norm by small product sets* (with Ohad Klein, Joseph Slote, Alexander Volberg and Haonan Zhang). accepted for publication in Inventiones mathematicae
6. *Sharp Fourier extension for functions with localized support on the circle.* arXiv:2304.02345 accepted for publication in Revista Matemática Iberoamericana
7. *Maximal polynomial modulations of singular Radon transforms.* Journal of Functional Analysis, 2024, Vol. 286, no. 6, paper no. 110299

Awards

2021 Bachelor Prize of the BMG, for being among the best graduates of the bachelor's degree program in mathematics for the graduating class of 2020/21 in Bonn
2018 First prize at the German national Math Olympiad
2017 First prize at the German national Math Olympiad

Talks

2024

09/18 *On the Fourier weight of $\mathbb{F}_2$ polynomials.* Hausdorff institute for mathematics, Bonn
08/14 *Carleson operators on doubling metric measure spaces.* IWOTA, Kent
06/07 *A degree one Carleson operator along the paraboloid.* Analysis and PDE seminar, Bonn
05/19 *The two dimensional bilinear Hilbert transform* (after C. Demeter and C. Thiele). Spring school 'Multilinear singular and oscillatory integrals with applications', UW Madison
04/29 *A degree one Carleson operator along the paraboloid.* Probability and analysis webinar
02/20 *A degree one Carleson operator along the paraboloid.* Analysis and PDE seminar, Stanford
01/25 *A degree one Carleson operator along the paraboloid.* Harmonic analysis seminar, Irvine
01/23 *A degree one Carleson operator along the paraboloid.* Analysis and PDE seminar, UCLA

2023

10/03 *Maximal modulations of singular Radon transforms.* Online analysis research seminar
09/28 *On the polynomial Szemerédi theorem in finite fields* (after S. Peluse). Summer school 'Analysis of multiple ergodic averages', Kopp
06/07 *Sharp Fourier extension for functions with localized support on the circle.* Workshop 'Incidence Problems in Harmonic Analysis, Geometric Measure Theory, and Ergodic Theory', Oberwolfach
04/28 *Sharp Fourier extension for functions with localized support on the circle.* Analysis and PDE seminar, Bonn

2022

10/04 *Nodal sets of Laplace eigenfunctions: proof of Nadirashvili's conjecture and of the lower bound in Yau's conjecture* (after A. Logunov). Summer school 'Nodal domains and landscape functions', Kopp

Research Visits

2024

02/01-29 Stanford University
01/01-31 UC Irvine

Conferences and Summer Schools

2024	Conference 'International workshop on operator theory and applications', Kent
2024	Summer school 'Maximal Operators and Applications', Bonn
2024	Summer school 'Uniformity and Stability of Oscillatory Integrals', Bonn
2024	Spring school 'Multilinear singular and oscillatory integrals with applications', Madison, Wisconsin
2024	Conference 'Madison Lectures in Harmonic Analysis', Madison, Wisconsin
2023	Summer school 'Analysis of multiple ergodic averages', Kopp
2023	Workshop 'Incidence Problems in Harmonic Analysis, Geometric Measure Theory, and Ergodic Theory', Oberwolfach
2023	Conference 'Harmonic Analysis and Partial Differential Equations', Bonn
2022	Summer school 'Nodal domains and landscape functions', Kopp