Curriculum Vitae
Matthew D. Blair

Personal Information

Address:	Department of Mathematics and Statistics MSC01 1115 1 University of New Mexico Albuquerque, NM 87131-0001
Email:	blair@math.unm.edu
Website:	`http://www.math.unm.edu/~blair/`

Research Harmonic Analysis
Partial Differential Equations: Wave, Helmholtz, and Schrödinger Equations
Microlocal Analysis

Education

June 2005	Ph.D., Mathematics, University of Washington.
May 2000	B.S., Mathematics, Michigan State University.

Dissertation

Title:	"Strichartz estimates for wave equations with coefficients of Sobolev regularity"
Advisor:	Hart Smith

Employment

07/2018–Present	Professor, Dept. of Mathematics, University of New Mexico
07/2012–06/2018	Associate Professor, Dept. of Mathematics, University of New Mexico
07/2007–07/2012	Assistant Professor, Dept. of Mathematics, University of New Mexico
07/2007–06/2008	Visiting Assistant Professor, Dept. of Mathematics, University of Rochester
01/2006–06/2007	FRG Postdoctoral Fellow, Dept. of Mathematics, Johns Hopkins University
08/2005–12/2005	Postdoctoral Fellow, Mathematical Sciences Research Institute, Workshop on Nonlinear Dispersive Equations
2000-2005	Teaching Assistant, Dept. of Mathematics, University of Washington

Publications in Refereed Journals

1. *Quasimode, Eigenfunction and Spectral Projection Bounds for Schrödinger Operators on Manifolds with Critically Singular Potentials* (with Y. Sire and C. Sogge), to appear, Journal of Geometric Analysis.

2. *Logarithmic improvements in L^p bounds for eigenfunctions at the critical exponent in the presence of nonpositive curvature* (with C. Sogge), Inventiones Mathematicae, 217 (2019), 703-748.

3. *On logarithmic improvements of critical geodesic restriction bounds in the presence of non-positive curvature*, Israel Journal of Mathematics, 224 (2018), no. 1, 407-436.

4. *Concerning Toponogov's theorem and logarithmic improvement of estimates of eigenfunctions* (with C. Sogge), Journal of Differential Geometry, 109 (2018), no. 2, 189-221.

5. *L^p-bounds on spectral clusters associated to polygonal domains* (with G. A. Ford and J. L. Marzuola), Revista Matemática Iberoamericana, 32 (2018), no. 3, 1071-1091.

6. *Refined and microlocal Kakeya-Nikodym bounds of eigenfunctions in higher dimensions* (with C. Sogge), Communications in Mathematical Physics, 356 (2017), no. 2, 501-533.

7. *Strichartz and localized energy estimates for the wave equation in strictly concave domains*, American Journal of Mathematics, 139 (2017), no. 3, 817-861.

8. *Refined and microlocal Kakeya-Nikodym bounds for eigenfunctions in two dimensions* (with C. Sogge), Analysis & PDE, 8 (2015), no. 3, 747-764.

9. *On Kakeya-Nikodym averages, L^p-norms and lower bounds for nodal sets of eigenfunctions in higher dimensions* (with C. Sogge), Journal of the European Mathematical Society, 17 (2015), no. 10, 2513-2543.

10. *On refined local smoothing estimates for the Schrödinger equation in domains*, Communications in Partial Differential Equations, 39 (2014), no. 5, 781-805.

11. *L^q bounds on restrictions of spectral clusters to submanifolds for low regularity metrics.* Analysis & PDE, 6 (2013), 1263-1288.

12. *Strichartz estimates for the wave equation on flat cones* (with G. A. Ford and J. L. Marzuola), International Mathematics Research Notices, 2013 (2013), 562-591.

13. *Strichartz estimates and the nonlinear Schrödinger equation on manifolds with boundary*, (with H. Smith and C. Sogge), Mathematische Annalen, 354 (2012), 1397-1430.

14. *Strichartz estimates for the Schrödinger equation on polygonal domains* (with G. A. Ford, S. Herr, and J. Marzuola), Journal of Geometric Analysis, 22 (2012), 339-351.

15. *Strichartz estimates for the wave equation on manifolds with boundary* (with H. Smith and C. Sogge), Annales de l'Institut Henri Poincaré, Analyse Non Linéaire, 26 (2009), 1817-1829.

16. *Spectral cluster estimates for metrics of Sobolev regularity*, Transactions of the American Mathematical Society, 361 (2009), 1209-1240.

17. *On multilinear spectral cluster estimates for manifolds with boundary* (with H. Smith and C. Sogge), Mathematical Research Letters, 15 (2008), 419-426.

18. *On Strichartz estimates for Schrödinger operators in compact manifolds with boundary* (with H. Smith and C. Sogge), Proceedings of the American Mathematical Society, 136 (2008), 247-256.

19. *Strichartz estimates for wave equations with coefficients of Sobolev regularity*, Communications in Partial Differential Equations, 31 (2006), 649-688.

Grants and Awards

2016	NSF Award, Analysis Program, "Dispersion in Harmonic Analysis: Geometry and Boundary Conditions", DMS-1565436
2014	NSF conference grant, co-PI, "New Mexico Analysis Seminar 2014-2016", DMS-1400429
2013	NSF Award, Analysis program, "Fourier Analysis on Bounded and Exterior Domains", DMS-1301717
2012	Teaching Award, "Graduate Instructor of the Year", Dept. of Mathematics & Statistics, University of New Mexico
2010	NSF Award, Analysis program, "Fourier Analysis on Bounded and Exterior Domains", DMS-1001529
2008	NSF Award, Analysis program, "Fourier Analysis on Bounded Domains", DMS-0801211
2000, 2002, 2003	NSF VIGRE Fellow, University of Washington
2001	Allendoerfer Award for Academic Excellence, University of Washington
2000	Plant Award for Academic Excellence, Michigan State University

Research Supervision

Graduate Students

Chamsol Park, current Ph.D. student, graduation expected in Spring 2021.

Shuxin Wang, Ph.D. student, graduated in Spring 2013.
Dissertation title: *Well-Posedness and Ill-Posedness for the Nonlinear Beam Equation.*

Dusty Brooks, Master's student, graduated in Summer 2013.
Thesis title: *Lattice Points in Disks and Strongly Convex Domains.*

Honors Students

Stephen Pietromonaco, defended in fall 2013, graduated in spring 2014.
Thesis title: *L^p Asymptotics on the Zonal and Sectoral Harmonics.*

Other directed research

Matthew Arnold, directed readings and research, January 2011-December 2012.

Thesis Committees

David Weirich, Ph.D. University of New Mexico, 2018 (Advisor: Cristina Pereyra).

Kaylee Tejeda, Master's, University of New Mexico, 2014 (Advisor: Stephen Lau).

Peng Shao, Ph.D., Johns Hopkins University, 2013 (Advisor: Christopher Sogge).

Jean Moraes, Ph.D., University of New Mexico, 2011 (Advisor: Cristina Pereyra).

Daewon Chung, Ph.D., University of New Mexico, 2009 (Advisor: Cristina Pereyra).

Jin-Cheng Jiang, Ph.D., Johns Hopkins University, 2009 (Advisor: Christopher Sogge).

Teaching Experience

University of New Mexico: Undergraduate Courses

Vector Analysis (Math 311, 4 semesters)

Linear Algebra (Math 321)

Introduction to Mathematical Thinking and Discrete Structures (Math 327)

Advanced Calculus I (Math 401, 4 semesters)

Advanced Calculus II (Math 402, 4 semesters)

University of New Mexico: Graduate Courses

Introduction to Analysis I (Math 510, 4 semesters)

Introduction to Analysis II (Math 511, 5 semesters)

Functions of a Complex Variable I (Math 561, 1 semester)

Functions of a Complex Variable II (Math 562, 1 semester)

Measure Theory (Math 563, 3 semesters)

Harmonic Analysis (Math 565, 1 semester)

Selected topics in Analysis: Oscillatory Integrals in Analysis and PDE (Math 569)

Selected topics in Analysis: Partial Differential Equations II (Math 569)

Functional Analysis I (Math 581, 3 semesters)

Functional Analysis II (Math 582)

University of Rochester

Multivariable Calculus

Calculus II

Calculus III

Johns Hopkins University

Partial Differential Equations for Applications

Calculus III, Calculus of Several Variables

Calculus II for Biological and Social Sciences

University of Washington

Advanced Multivariable Calculus, Instructor (2 quarters)

Precalculus, Instructor

Teaching Assistant for Calculus with Analytic Geometry III, Calculus I for Life Sciences, and Algebra with Applications

Math Study Center, Tutor (2 quarters)

Curriculum Development

Established curriculum for a proposed year-long graduate course "Analysis III and IV", designed to consolidate our offerings in Measure Theory, Functional Analysis, and Harmonic Analysis. The new course was approved by the faculty in Spring 2019 and will pilot in Fall 2020.

Created content for "Partial Differential Equations II", a sequel to our current graduate offering in PDE

Created content for graduate topics course on Oscillatory Integrals in Analysis and PDE (ran as Math 565 and Math 569 at UNM, with substantial development on the curriculum and course materials each time).

Created content for Functional Analysis (Math 581/582, UNM)

Created content for Measure Theory (Math 563, UNM)

Departmental Service: University of New Mexico

Chair of the Lecturer Promotion Committee, Spring 2020.

Chair of the Colloquium Committee, Spring 2020.

Chair of Scheduling Committee, Spring 2019.

Chair of Undergraduate Committee, 2015-16 and 2016-17.

Undergraduate Committee, 2008-09, 2010-14.

Executive Committee, 2013-14 and 2017-18.

Tenure and Promotion Committee, 2013-14, 2015-16.

Writer and grader of qualifying exams.

Co-organizer of the Analysis seminar in several semesters.

Schedule advisor for undergraduate and graduate students.

Professional Service

Served on 3 NSF panels, reviewing standard grant proposals.

Co-organizer of the New Mexico Analysis Seminar (with Cristina Pereyra, Joseph Lakey, Nicholas Michalowski, Anna Skripka, Maxim Zinchenko) and co-PI on the application for funding through the National Science Foundation.

Co-organizer of a Special Session on "Harmonic Analysis and Dispersive Equations" (with Jason Metcalfe) at the AMS sectional meeting at UNM in April, 2014.

Co-organizer of a Special Session on "Harmonic Analysis and Partial Differential Equations" (with Hart Smith) at the AMS sectional meeting at UNM in April, 2010.

Reviewed for Mathematical Reviews

Refereed for numerous journals (not public)

Talks

2019

Differential Geometry & PDE Seminar, University of Washington, November 2019

Analysis & PDE Seminar, University of North Carolina-Chapel Hill, August 2019

Workshop on Bourgain-Demeter Decoupling Method, Chern Institute of Mathematics, Nankai University, Tianjin, China, June 2019

Analysis Seminar, University of Texas-Austin, January 2019

2018

Contributed talk, 2018 Texas Analysis and Mathematical Physics Symposium, Baylor University, October 2018.

2017

Special Session on Global Harmonic Analysis and its Applications, AMS sectional meeting, University of Central Florida, September 2017

2016

Caltech/UCLA Joint Analysis Seminar, California Institute of Technology, October 2016

Conference on "Evolution Equations on Singular Spaces", Centre International de Rencontres Mathématiques (CIRM), Luminy, France, April 2016

Special Session on "Global Harmonic Analysis", Joint Mathematics Meetings, Seattle WA, January 2016

2015

Applied Mathematics Seminar, Applied Mathematics Program, Yale University

Special Session on Evolution Problems at the Interface of Waves and Fluids, AMS sectional meeting, University of Nevada-Las Vegas

14th New Mexico Analysis Seminar, New Mexico State University

Special Session on Harmonic Analysis and Partial Differential Equations, AMS sectional meeting, Michigan State University

2014

Analysis and PDE seminar, Department of Mathematics, Johns Hopkins University

Special Session on Hamiltonian Partial Differential Equations, AMS sectional meeting, San Francisco State University

Analysis Seminar, Department of Mathematics, Northwestern University

Analysis Seminar, Department of Mathematics, University of North Carolina-Chapel Hill

Partial Differential Equations Seminar, Department of Mathematics, Brown University

Special Session on Stochastics and PDEs, AMS sectional meeting, University of New Mexico

Partial Differential Equations Seminar, University of Washington

2013

Madison Harmonic Analysis Workshop, University of Wisconsin (2 talks)

Analysis and Partial Differential Equations Seminar, Department of Mathematics, University of Kentucky

Seminar, Workshop on Nonhomogeneous Boundary-Value Problems for Nonlinear Waves, American Institute of Mathematics, Palo Alto

Analysis Seminar, Department of Mathematics, Northwestern University

Analysis and Partial Differential Equations Seminar, Department of Mathematics, Johns Hopkins University

Analysis Seminar, Department of Mathematics, University of California-San Diego

2012

A Conference on Partial Differential Equations: Analytic and Geometric Aspects, in honor of Michael Taylor's 65th birthday, University of North Carolina

Special Session on Nonlinear Dispersive Equations, AMS sectional meeting, George Washington University

2011

Minisymposium on Recent Progress on Dispersive Partial Differential Equations, SIAM Conference on Analysis of Partial Differential Equations, San Diego

Departmental Colloquium, Department of Mathematics and Statistics, University of New Mexico

Special Session on Harmonic Analysis and Dispersive Partial Differential Equations, AMS sectional meeting, University of Utah

Special Session on Nonlinear Dispersive Equations, AMS sectional meeting, Wake Forest University

Minisymposium on Dispersive Equations in Mathematical Physics, International Congress on Industrial and Applied Mathematics, Vancouver, BC

Analysis, PDE, and Mathematical Physics seminar, Department of Mathematics, Michigan State University

Special Session on Harmonic Analysis and Partial Differential Equations, AMS sectional meeting, Georgia Southern University

2010

Analysis and PDE seminar, Department of Mathematics, Johns Hopkins University

Analysis seminar, Department of Mathematics, University of North Carolina-Chapel Hill

Conference on Nonlinear Waves and Dispersion, Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France

Beijing Conference in Harmonic Analysis and Partial Differential Equations, Institute of Applied Physics and Computational Mathematics

Analysis seminar, Department of Mathematics, Kansas State University

Scattering and Spectral Theory Seminar, Department of Mathematics, Purdue University

2009

In-service seminar for graduate students, Department of Mathematics and Statistics, University of New Mexico

The AMSI-ANU Spectral Theory and Harmonic Analysis Workshop, Australian National University, Canberra

Special Session on Nonlinear Dispersive Equations, AMS sectional meeting, San Francisco

12th New Mexico Analysis Seminar, University of New Mexico

Analysis seminar, Department of Mathematics, Johns Hopkins University

2008

Graduate Colloquium, Department of Mathematics and Statistics, University of New Mexico

PDE seminar, Department of Mathematics and Statistics, University of New Mexico

Special Session on Harmonic Analysis and related topics, AMS sectional meeting, Vancouver, BC

Analysis seminar, Department of Mathematics, Johns Hopkins University

Colloquium, Department of Mathematics, Georgia Southern University

Internal Faculty Colloquium, Department of Mathematics, University of Rochester

2007

Analysis seminar, Department of Mathematics, Cornell University

Analysis seminar (2 lectures), Department of Mathematics, University of Rochester

Special Session on Harmonic Analysis Applied to Partial Differential Equations, AMS sectional meeting, Albuquerque

MSRI Summer Microprogram on Nonlinear Partial Differential Equations

Colloquium, Department of Mathematics and Statistics, University of New Mexico

Colloquium, Department of Mathematics, Wright State University

Colloquium, Department of Mathematics, University of Virginia

Special Session on Microlocal Analysis and Singular Spaces, AMS national meeting, New Orleans

2006

FRG/JAMI workshop: Global Harmonic Analysis and its Applications

FRG workshop: Eigenfunctions of the Laplacian II,

2005

MSRI postdoc seminar, Nonlinear Dispersive Equations workshop

MSRI weekly seminar, Nonlinear Dispersive Equations workshop

FRG workshop: Eigenfunctions of the Laplacian I

Eighth New Mexico Analysis Seminar

Differential Geometry and PDE seminar, University of Washington