Philip T. Gressman
Short Curriculum Vitae
(last updated January 14, 2020)

Contact Information

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Citizenship: US

Research Interests: harmonic analysis and PDEs, geometric combinatorics, geometric analysis

Employment History

July 2014 - present	Professor	University of Pennsylvania
July 2011 - June 2014	Associate Professor	University of Pennsylvania
July 2008 - June 2011	Assistant Professor	University of Pennsylvania
July 2005 - June 2008	J. W. Gibbs Assistant Professor Postdoctoral advisor: Peter W. Jones	Yale University

Educational History

Ph.D.	Princeton University Thesis title: "$L^p - L^q$ estimates for Radon-like operators" Thesis advisor: Elias M. Stein	August 2001 - May 2005
A.B.	Washington University in St. Louis *Summa cum laude* with majors in mathematics and physics	August 1997 - June 2001

Manuscripts and Publications

1. "Multilinear oscillatory integral operators and geometric stability," with E. Urheim, to appear in *J. Geom. Analysis* special issue in honor of the 90th birthday of Guido Weiss. Available at arXiv:1912:08737.

2. "Reversing a philosophy: from counting to square functions and decoupling," with S. Guo, L. B. Pierce, J. Roos, and P.-L. Yung, *submitted.* Available at arXiv:1906.05877.

3. "Geometric averaging operators and nonconcentration inequalities," *submitted.* available at arXiv:1906.04599. Pending revision for *Analysis and PDE.*

4. "On the Oberlin affine curvature condition," *Duke Math J.*, **168** (2019), no. 11,2075–2126.

5. "Generalized curvature for certain Radon-like operators of intermediate dimension," *Indiana U. Math. J.*, **68** (2019), no. 1, 201–246.

6. "Higher decay inequalities for multilinear oscillatory integrals," with M. Gilula and L. Xiao, *Math. Res. Lett.* **25** (2018), no. 3, 819–842.

7. "Averages over submanifolds of intermediate dimension and the Oberlin condition," *Oberwolfach Reports*, **14** (2017), no. 3, 2119–2021.

8. "Maximal decay inequalities for trilinear oscillatory integrals of convolution type," with L. Xiao, *J. Func. Anal.* **271** (2016), no. 12, 3695–3726.

9. "On a trilinear singular integral form with determinantal kernel," with D. He, V. Kovač, B. Street, C. Thiele, and P.-L. Yung, *Proc. AMS.,* **144** (2016), no. 8, 3465–3477.

10. "Damping oscillatory integrals by the Hessian determinant via Schrödinger," *Math. Res. Lett.*, **23** (2016), no. 2, 405–430.

11. "An operator van der Corput estimate arising from oscillatory Riemann-Hilbert problems," with Y. Do, *J. Func. Anal.* **267** (2014), no. 12, 4775–4805.

12. "Coordinate-independent approaches to uniform oscillatory integral estimates," *Oberwolfach Reports*, **11** (2014), no. 3, 1879–1882.

13. "L^p-nondegenerate Radon-like operators with vanishing rotational curvature," *Proc. Amer. Math. Soc.* **143** (2015), no. 4, 1595–1604.

14. "On the uniqueness of solutions to the periodic 3D Gross-Pitaevskii hierarchy," with V. Sohinger and G. Staffilani, *J. Func. Anal* **266** (2014), no. 7, 4705–4764.

15. "Scalar oscillatory integrals in smooth spaces of homogeneous type," *Rev. Mat. Iberoam.* **31** (2015), no. 1, 215–244.

16. "A non-local inequality and global existence," with R. M. Strain and J. Krieger, *Adv. Math.* **230** (2012) 642–648.

17. "Fractional Poincaré and logarithmic Sobolev inequalities for measure spaces," *J. Func. Anal.* **265** (2013), no. 6, 867–889.

18. "Uniform sublevel Radon-like inequalities," *J. Geom. Anal.* **23** (2013), no. 2, 611–652.

19. "Sharp anisotropic estimates for the Boltzmann collision operator and its entropy production," with R. M. Strain, *Adv. Math.* **227** (2011), no. 6, 2349–2384.

20. "Global classical solutions of the Boltzmann equation without angular cut-off," with R. M. Strain, *J. Amer. Math. Soc.* **24** (2011), 709–769.

21. "Global classical solutions of the Boltzmann equation with long-range interactions," with R. M. Strain, *PNAS*, **107** (2010), no. 13, 5744–5749.

22. "On multilinear determinant functionals," *Proc. AMS*, **139** (2011), 2473–2484.

23. "Uniform geometric estimates for sublevel sets," *J. d'Analyse Math.*, **115** (2011), 251–272.

24. "L^p-improving properties of averages on polynomial curves and related integral estimates," *Math. Res. Lett.*, **16** (2009), no. 6, 971–989.

25. "Rank and regularity for averages over submanifolds," *J. Func. Anal.*, **257** (2009), no. 5, 1396–1428.

26. "Radon-like operators and rank conditions," *Oberwolfach Reports*, **32** (2008), no. 3, 1813–1817.

27. "Uniform estimates for cubic oscillatory integrals," *Indiana U. Math. J.*, **57** (2008), 3419–3442.

28. "Sharp $L^p - L^q$ estimates for generalized k-plane transforms," *Adv. Math.*, **214** (2007), no. 1, 344–365.

29. "L^p-improving properties of X-ray like transforms," *Math. Res. Lett.*, **13** (2006), no. 5-6, 787–803.

30. "Regularity of the Fourier transform on spaces of homogeneous distributions," with E. M. Stein, *J. d'Analyse Math.*, **100** (2006), 211–222.

31. "Convolution and fractional integration along homogeneous curves in $\mathbf{R}^n$," *Math. Res. Lett.* **11** (2004), no. 5-6, 869–881.

32. "Affine, quasi-affine, and co-affine wavelets," with D. Labate, G. Weiss, and E. Wilson, *Beyond Wavelets*, G. Welland, ed. (2003).

33. "Wavelets on the integers," *Collect. Math.* **52** (2001), no. 3, 257–288.

34. "Towards a realistic neutron star binary inspiral: Initial data and multiple orbit evolution in full general relativity," with M. Miller and W.-M. Suen, *Phys. Rev. D* **69** (2004), 064026.

35. "Head-on/near head-on collisions of neutron stars with a realistic equation of state," with E. Evans, A. Gopakumar, S. Iyer, M. Miller, W.-M. Suen, and H.-M. Zhang, *Phys. Rev. D* **67** (2003), 104001.

36. "Nonlinear r-modes in neutron stars: Instability of an unstable mode," with L.-M. Lin, W.-M. Suen, N. Stergioulas, and J. L. Friedman, *Phys. Rev. D* **66** (2002), 041303.

Grants, Fellowships, and Outside Funding

NSF Grant DMS-1764143, 2018–21
NSF Grant DMS-1700938 (conference funding), 2017–18
NSF Grant DMS-1361697, 2014–18
Alfred P. Sloan Research Fellowship, 2011–2013 (extended 2013–2015)
NSF Grant DMS-1101393, 2011–14
NSF Grant DMS-0850791, 2008–11
NSF Grant DMS-0653755, 2006–08

Other Prizes and Awards

UPenn Departmental Teaching Award: Fall 2008, Fall 2011, Spring 2012, Fall 2013, Spring 2014, Spring 2016, Spring 2018, Spring 2019
National Science Foundation Postdoctoral Fellowship, 2005 (declined)
National Science Foundation Graduate Research Fellowship, 2001
Barry M. Goldwater Fellowship, 2000
Astronaut Foundation Scholarship, 2000

Upcoming Talks or Other

BIRS Workshop: Restriction, Kakeya, and Carleson-Type Problems, May 2020
El Escorial Meeting: "11th International Conference on Harmonic Analysis and PDEs," Madrid, June 2020
Hausdorff Institute Dual Trimester "Harmonic Analysis and Analytic Number Theory," May–August 2021 (co-organizer)

Recent Invited Talks, Workshops, Minicourses

Swarthmore College Mathematics and Statistics Colloquium, October 2019
AMS Sectional Meeting, Madison, September 2019
University of Wisconsin, "Madison Lectures in Fourier Analysis," May 2019
JMM 2019 "AMS Special Session on Harmonic Analysis: Recent Developments on Oscillatory Integrals," January 2019
"Mid-Atlantic Analysis Meeting," Virginia Tech, November 2018
"International Conference on Harmonic Analysis and Its Applications," Beijing, June 2018
Temple U. Math Department Colloquium, February 2018
Purdue Math Department Colloquium, October 2017
CUNY Graduate Center Fourier Analysis Seminar, October 2017
UPenn Geometry-Topology Seminar, October 2017
UPenn Graduate Student Seminar, September 2017
ICMS Edinburgh "Harmonic Analysis and its Interactions," July 2017 (co-organizer)
Oberwolfach Workshop "Real Analysis, Harmonic Analysis and Applications," July 2017
Recent Developments in Harmonic Analysis, MSRI, May 2017
University of Delaware Analysis Seminar, April 2017
Texas Analysis and Mathematical Physics Symposium, Rice University, October 2016
MIT Analysis Seminar, December 2015
Indiana U. Bloomington Analysis Seminar, November 2015
George Boole Mathematical Sciences Conference 2015, Cork, Ireland, August 2015
Minicourse on Oscillatory Integrals and Geometric Interactions, Aalto U., Finland, June 2015
Princeton University Analysis Seminar, April 2015
Brown University Analysis Seminar, March 2015
ICM Satellite Conference in Harmonic Analysis, South Korea, August 2014
Oberwolfach Workshop "Real Analysis, Harmonic Analysis and Applications," July 2014
IPAM: "The Kakeya problem, Restriction Problem, and Sum-Product Theory," May 2014
UPenn Graduate Student Flyout Weekend, March 2014
University of Wisconsin: Harmonic Analysis RTG Meeting (2 lecture series), November 2013
Yale Analysis Seminar, April 2013
University of Birmingham (UK) Analysis Seminar, March 2013
Minicourse: Harmonic Analysis and the Boltzmann Equation, FIM @ ETH, March 2013
University of Wisconsin Analysis Seminar, February 2013
Perspectives in HA, GMT, and PDE, and appl. to SCV, Temple U., September 2012
9th Internat. Conf. on Harmonic Analysis and PDEs, El Escorial, June 2012 (short talk)
Temple University Colloquium, April 2012
Courant Institute Colloquium, March 2012
UPenn Graduate Student Pizza Seminar, November 2011
WHAPDE 2011, Mexico City, October 2011
Workshop on Oscillatory Integrals in Harmonic Analysis, ICM, Edinburgh, June 2011
University of Maryland Analysis/PDE Seminar, October 2010
ICM Satellite Conference in Harmonic Analysis, Bhubaneswar, August 2010
MIT PDE/Analysis Seminar, March 2010
University of Wisconsin Analysis Seminar, February 2010

Workshops Organized, Grant Panels, Other Activities

Center for Teaching and Learning Graduate Student Workshop speaker, "Inclusive Teaching," October 2019

Pre-Freshman Program: Mathematics Instructor (joint with Dennis DeTurck), July–August 2019

Penn Active Learning Symposium Panelist, May 2019

Center for Teaching and Learning Inclusive Teaching Seminar Participant, 2018–2019

AMS MRC "Harmonic Analysis: New developments on oscillatory integrals," with Larry Guth and Lillian Pierce, June 2018

AIM SQuaRE with Shaoming Guo, Joris Roos, Po Lam Yung, and Lillian Pierce, March 2018

Center for Teaching and Learning SAIL Seminar Participant, 2017–2018

"Harmonic analysis and its interactions: in honour of Tony Carbery," with Juan Antonio Barcelo, Jonathan Bennett, Marina Iliopoulou, and Jim Wright, July 2017

Research Member, MSRI Program on Harmonic Analysis, Spring 2017

Center for Teaching and Learning SAIL Seminar Participant, 2016–2017

Penn Summer Mathematics Academy Instructor, July 2016

Swarthmore College Honors Examiner, Real and Complex Analysis, Spring 2016

Simons Foundation Collaboration Grant Referee, Spring 2016

Center for Teaching and Learning Workshop "Designing Your Own Course" speaker, January 2016

Weigle Information Commons Engaging Students Through Technology Symposium speaker, October 2015

Graduate Mentoring Workshop, Tufts/MIT, April 2015

AIM Workshop: "Carleson theorems and multilinear operators," May 2015, co-organized with Lillian Pierce, Victor Lie, and Po-Lam Yung

NSF Panelist

UPenn Math Teaching Brown Bag Meeting (July 2013, June 2014, September 2016)

NSERC (Canada) Referee 2011

Outreach and Media

Penn SAS Omnia Article "Math and Social Belonging," October 2019
Covers recent efforts undertaken in Math 104 SAIL to enhance students' feelings of social belonging in the classroom. `https://omnia.sas.upenn.edu/story/math-and-social-belonging`
Also covered in Penn Today `https://penntoday.upenn.edu/news/math-stereotypes-and-social-belonging`

"Quaker Days" College Academic Welcome Panel, April 2019

Penn Almanac Talk About Teaching and Learning Article Contributor: "Social Belonging in Introductory Calculus," April 2019 `https://almanac.upenn.edu/volume-65-number-32`

Center for Teaching and Learning Inclusive Teaching Video Interviewee, Summer 2018
`https://www.ctl.upenn.edu/inclusive-teaching`

Sonya Kovalevskaya Day Presenter, Wissahickon High School (Ambler, PA), April 2018. Ran 3 sessions on the Kakeya Needle Problem for a total of approximately 30 girls in grades 5–8 from local schools.

Selected to represent the American Mathematical Society at the 19th Annual Coalition for National Science Funding (CNSF) Capitol Hill Exhibition, May 2013. Met with congressional representatives to discuss the importance of national science funding for pure and applied mathematics and a poster session for the members and their staff people. Following the exhibition, on June 12, 2013, Rep. Jerry McNerney (D-CA) gave a brief speech on the floor of the House of Representatives about the presented research.

New Scientist article "Proof at last for Boltzmann's 140-year-old gas equation," May 2010
Covers joint work with R. Strain on small-data global well-posedness of the non-cutoff Boltzmann equation.
https://www.newscientist.com/article/dn18931-proof-at-last-for-boltzmanns-140-year-old-gas-equation/

Recent Courses Taught

Spring 2020: Math 509: Advanced Analysis II
Fall 2019: Math 104 Calculus I (SAIL), Math 508: Advanced Analysis I
Spring 2019: Math 510 Advanced Complex Analysis, Math 748 Topics in Classical Analysis
Fall 2018: Math 104 Calculus I (SAIL)
Spring 2018: Math 609 Analysis
Fall 2017: MATH 104 Calculus I (SAIL), MATH 608 Analysis
Fall 2016: MATH 104 Calculus I (SAIL), MATH 644 Partial Differential Equations
Spring 2016: MATH 509: Advanced Analysis II

Department and University Service

Math Department Bridge to PhD Program: Fall 2016 to present
Math Department Calculus Diagnostic Exam Committee: 2012–2013
Math Department Colloquium Committee: 2008–2009, 2010–2011, 2012–2013 (chair)
Math Department Curriculum Revision Committee MATH 241: Spring 2012 (chair)
Math Department Graduate Admissions Committee: 2019–2020
Math Department Graduate Advising Committee: 2011–2012, 2013–2014, 2017–2018
Math Department Graduate Advisory Committee: 2015–2016
Math Department Major Advising Committee: 2009–2010, 2010–2011, 2013–2014, 2016–2017, 2017–2018, 2018–2019
Math Department Penn Undergraduate Math Club Advisor: 2016–2017
Math Department Personnel Committee: 2011–2012, 2014–2015, 2015–2016, 2017–2018, 2018–2019
Math Department Personnel Subcommittees (various): 2013–2014, 2014–2015, 2015–2016, 2018–2019
Math Department Preliminary Exam Committee: 2008–2009, 2013–2014 (chair)
Math Department Search Committee Chair, Fall 2019
Math Department TA Recruitment Committee: 2014–2015 (chair), 2015–2016 (chair)
Math Department Teaching Evaluation Committee: 2018–2019
Math Department Undergraduate Curriculum Committee: 2009–2010, 2012–2013
Penn First Plus Working Group on Academic Transitions: Fall 2019 to Spring 2020
SAS Curriculum Committee: Fall 2017 to Spring 2019
SAS NSF Outreach Committee: 2008–2009
SAS Teaching Awards Committee: 2016, 2017 (chair)
SAS Undergraduate Academic Advising: Fall 2009 to present

Other

Former referee for Adv. Math., J. Fourier Anal. and Appl., J. Func. Anal., J. London Math. Soc., Math. Res. Lett., Proc. Amer. Math. Soc., Revista Mat. Iberoamericana, J. Math. Anal. and Appl., Duke Math. J., Internat. Mat. Res. Not.
Former reviewer for Mathematical Reviews

Editorial Adviser for the London Mathematical Society: Proceedings, Journal, Bulletin, and Transactions of the LMS, May 2016 to May 2019

Associate Editor for Journal of Geometric Analysis, November 2019–present

Member of AMS Liaison Committee with AAAS (Liawaaas), 2016–2018