

# Michael T. Lacey

Full Professor  
School of Mathematics  
Georgia Institute of Technology

## Education and Positions

1998—20XX Full Professor, Georgia Institute of Technology

1996—1998 Associate Professor, Georgia Institute of Technology

1989—1996 Assistant Professor, Indiana University

1988—89 Assistant Professor, University of North Carolina

1987—88 Assistant Professor, Louisiana State University

1987 Ph.D. University of Illinois Urbana–Champaign,  
Thesis Adviser W. Philipp

1981 B.S. University of Texas at Austin

## Honors

2008: Fulbright Fellowship in Buenos Aires, Argentina

2004: Guggenheim Fellow

1998: 45 Minute address at International Congress of Mathematicians, Berlin Germany

1997: Awarded Prix Salem, jointly with Christoph Thiele. Prize is funded jointly by Princeton University and the Institute for Advanced Study.

1990: NSF Postdoctoral Fellow

## Principal Scientific Accomplishments

Theory of Bilinear Hilbert Transform, and new methods of phase plane analysis, jointly with C. Thiele. We in addition developed a new proof of the pointwise convergence of Fourier series, the famous theorem due to Carleson.

Kato Square Root Problem, in dimensions 3 and higher, jointly with P. Auscher, S. Hofmann, A. McIntosh, and P. Tchamitchian.

Characterized Bounded little Hankel Operators in two and more complex variables, jointly with S. Ferguson and Erin Terwilleger.

## Short Term and Visiting Positions

1995: Matrié de Conference, Universite Francois Rabelais, Tours

1997: Institute for Advanced Study

2002: Matrié de Conference, Universite d'Paris-Sud, Orsay

2004: Research Professor, Schrödinger Institute, Vienna Austria

2005: Visitor, University of British Columbia

2006: Centro di Georgi, Pisa Italy

2006: Pichorides Professor, University of Crete, Greece

## Publications

- [1] Michael T Lacey and Dmitry Bilyk, *On the Small Ball Inequality in Three Dimensions*, Duke, submitted, available at [arXiv:math.CA/060981d](https://arxiv.org/abs/math.CA/060981d).
- [2] Michael T Lacey, *Small Ball and Discrepancy Inequalities*, available at [arXiv:math.CA/060981d](https://arxiv.org/abs/math.CA/060981d).
- [3] ———, *On the Discrepancy Function in Arbitrary Dimension, Close to  $L^1$* , Analysis Mathematica, submitted, available at [arXiv:math.NT/060981d](https://arxiv.org/abs/math.NT/060981d).
- [4] Ciprian Demeter, Michael Lacey, Terence Tao, and Christoph Thiele, *Breaking the duality in the return times theorem*, submitted to Duke, available at [arXiv:math.DS/060145d](https://arxiv.org/abs/math.DS/060145d).
- [5] Michael Lacey, *Lectures on Nehari's Theorem on the Polydisk*, To appear to Ash-Jones Conference Proceedings, available at [arXiv:math.CA/060127d](https://arxiv.org/abs/math.CA/060127d).
- [6] Michael T Lacey and Erin Terwilleger, *Wiener-Wintner for Hilbert Transform*, Arkiv Math, submitted, available at [arXiv:math.CA/060119d](https://arxiv.org/abs/math.CA/060119d).
- [7] Michael Lacey and Xiaochun Li, *On a Lipschitz Variant of the Kakeya Maximal Function*, available at [arXiv:math.CA/0601213](https://arxiv.org/abs/math.CA/0601213).
- [8] Michael T. Lacey, Jill C. Pipher, Stefanie Petermichl, and Brett D. Wick, *Multiparameter Riesz Commutators*, in preparation.
- [9] Michael T Lacey and William McClain, *On an Argument of Shkredov on Two-Dimensional Corners*, O J Anal Combin, Vol 2, available at [www.ojac.org/vol2/Lacey\\_McClain\\_2007.pdf](http://www.ojac.org/vol2/Lacey_McClain_2007.pdf).
- [10] Michael T Lacey, *Commutators with Riesz Potentials in One and Several Parameters*, Hokkaido Math. J. (To appear), available at [arXiv:math.CA/0502336](https://arxiv.org/abs/math.CA/0502336).
- [11] Michael T Lacey and Jason Metcalfe, *Paraproducts in One and Several Parameters*, Forum Math. to appear, available at [arXiv:math.CA/0502334](https://arxiv.org/abs/math.CA/0502334).
- [12] Carlos Cabrelli, Michael T. Lacey, Ursula Molter, and Jill C. Pipher, *Variations on the theme of Journé's lemma*, Houston J. Math. **32** (2006), no. 3, 833–861 (electronic). MR 2247912

- [13] *Hankel Operators in Several Complex Variables and Product BMO*, Houston J M, to appear, available at [arXiv:math.CA/0310348](https://arxiv.org/abs/math/0310348).
- [14] Michael T. Lacey and Xiaochun Li, *Maximal theorems for the directional Hilbert transform on the plane*, Trans. Amer. Math. Soc. **358** (2006), no. 9, 4099–4117 (electronic). MR 2219012
- [15] Michael T Lacey, *Issues related to Rubio de Francia’s Littlewood–Paley Inequality: A Survey*, NY J Math Monographs **2** (2007), available at [nyjm.albany.edu:8000/m/2007/2v.pdf](https://nyjm.albany.edu/8000/m/2007/2v.pdf).
- [16] Michael T. Lacey, Erin Terwilleger, and Brett D. Wick, *Remarks on product VMO*, Proc. Amer. Math. Soc. **134** (2006), no. 2, 465–474 (electronic).MR2176015
- [17] G. A. Karagulyan and M. T. Leĭsi, *An estimate for maximal operators associated with generalized lacunary sets*, Izv. Nats. Akad. Nauk Armenii Mat. **39** (2004), no. 1, 73–82 (Russian).MR2168200
- [18] Michael T. Lacey, *Carleson’s theorem: proof, complements, variations*, Publ. Mat. **48** (2004), no. 2, 251–307.MR2091007
- [19] Jose Barrionuevo and Michael T. Lacey, *A weak-type orthogonality principle*, Proc. Amer. Math. Soc. **131** (2003), no. 6, 1763–1769 (electronic).MR1955263 (2004f:42025)
- [20] Sarah H. Ferguson and Michael T. Lacey, *A characterization of product BMO by commutators*, Acta Math. **189** (2002), no. 2, 143–160.MR1961195 (2004e:42026)
- [21] Michael T. Lacey, *Carleson’s theorem with quadratic phase functions*, Studia Math. **153** (2002), no. 3, 249–267.MR1949031 (2003i:42022)
- [22] Pascal Auscher, Steve Hofmann, Michael T. Lacey, Alan McIntosh, and Ph. Tchamitchian, *The solution of the Kato square root problem for second order elliptic operators on  $R^n$* , Ann. of Math. (2) **156** (2002), no. 2, 633–654.MR1933726 (2004c:47096c)
- [23] Steve Hofmann, Michael T. Lacey, and Alan McIntosh, *The solution of the Kato problem for divergence form elliptic operators with Gaussian heat kernel bounds*, Ann. of Math. (2) **156** (2002), no. 2, 623–631.MR1933725 (2004c:47096b)
- [24] Pascal Auscher, Steve Hofmann, Michael T. Lacey, John Lewis, Alan McIntosh, and Philippe Tchamitchian, *The solution of Kato’s conjectures*, C. R. Acad. Sci. Paris Sér. I Math. **332** (2001), no. 7, 601–606 (English, with English and French summaries).MR1841892 (2002i:35043)
- [25] Michael T. Lacey and Christoph Thiele, *A proof of boundedness of the Carleson operator*, Math. Res. Lett. **7** (2000), no. 4, 361–370.MR1783613 (2001m:42009)
- [26] ———,  *$L^p$  estimates on the bilinear Hilbert transform for  $2 < p < \infty$* , Ann. of Math. (2) **146** (1997), no. 3, 693–724.MR1491450 (99b:42014)
- [27] ———, *On Calderón’s conjecture for the bilinear Hilbert transform*, Proc. Natl. Acad. Sci. USA **95** (1998), no. 9, 4828–4830 (electronic). MR **1619285** (99e:42013)
- [28] Michael Lacey and Christoph Thiele, *On Calderón’s conjecture*, Ann. of Math. (2) **149** (1999), no. 2, 475–496. MR **1689336** (2000d:42003)
- [29] Michael T. Lacey and Christoph Thiele,  *$L^p$  estimates for the bilinear Hilbert transform*, Proc. Nat. Acad. Sci. U.S.A. **94** (1997), no. 1, 33–35. MR **1425870** (98e:44001)

- [30] Michael T. Lacey, *The bilinear maximal functions map into  $L^p$  for  $2/3 < p \leq 1$* , Ann. of Math. (2) **151** (2000), no. 1, 35–57. MR1745019 (2001b:42015)
- [31] Roger L. Jones, Michael T. Lacey, and Máté Wierdl, *Integer sequences with big gaps and the pointwise ergodic theorem*, Ergodic Theory Dynam. Systems **19** (1999), no. 5, 1295–1308. MR1721622 (2001a:28017)
- [32] Michael T. Lacey, *On the bilinear Hilbert transform*, Proceedings of the International Congress of Mathematicians, Vol. II (Berlin, 1998), 1998, pp. 647–656 (electronic). MR1648113 (99h:42015)
- [33] ———, *The bilinear Hilbert transform is pointwise finite*, Rev. Mat. Iberoamericana **13** (1997), no. 2, 411–469. MR1617637 (99j:42009)
- [34] ———, *The return time theorem fails on infinite measure-preserving systems*, Ann. Inst. H. Poincaré Probab. Statist. **33** (1997), no. 4, 491–495 (English, with English and French summaries). MR1465799 (99d:28040)
- [35] ———, *On an inequality due to Bourgain*, Illinois J. Math. **41** (1997), no. 2, 231–236. MR1441675 (98k:42005)
- [36] ———, *Sharp estimates of the Sobolev norm of  $u$  times the gradient of  $v$* , J. Math. Anal. Appl. **205** (1997), no. 2, 554–559. MR1428368 (97i:46063)
- [37] ———, *On bilinear Littlewood-Paley square functions*, Publ. Mat. **40** (1996), no. 2, 387–396. MR1425626 (98c:42017)
- [38] ———, *Bourgain’s entropy criteria*, Convergence in ergodic theory and probability (Columbus, OH, 1993), 1996, pp. 249–261. MR1412609 (99c:28051)
- [39] C. Houdré and Michael T. Lacey, *Spectral criteria, SLLN’s and a.s. convergence of series of stationary variables*, Ann. Probab. **24** (1996), no. 2, 838–856. MR1404530 (97k:60086)
- [40] Michael T. Lacey, *Transferring the Carleson-Hunt theorem in the setting of Orlicz spaces*, Interaction between functional analysis, harmonic analysis, and probability (Columbia, MO, 1994), 1996, pp. 307–314. MR1358168 (96k:42012)
- [41] ———, *Ergodic averages on circles*, J. Anal. Math. **67** (1995), 199–206. MR1383493 (97f:28045)
- [42] Michael T. Lacey, Karl Petersen, Máté Wierdl, and Dan Rudolph, *Random ergodic theorems with universally representative sequences*, Ann. Inst. H. Poincaré Probab. Statist. **30** (1994), no. 3, 353–395 (English, with English and French summaries). MR1288356 (95h:28023)
- [43] Michael T. Lacey, *Weak convergence in dynamical systems to self-similar processes with time average representation*, Chaos expansions, multiple Wiener-Itô integrals and their applications (Guanajuato, 1992), 1994, pp. 163–178. MR1278043 (95g:60045)
- [44] ———, *On central limit theorems, modulus of continuity and Diophantine type for irrational rotations*, J. Anal. Math. **61** (1993), 47–59. MR1253438 (95a:60054)
- [45] ———, *Weak convergence to self-affine processes in dynamical systems*, New directions in time series analysis, Part II, 1993, pp. 255–262. MR1235610
- [46] ———, *On almost sure noncentral limit theorems*, J. Theoret. Probab. **4** (1991), no. 4, 767–781. MR1132137 (93j:60037)
- [47] ———, *On weak convergence in dynamical systems to self-similar processes with spectral representation*, Trans. Amer. Math. Soc. **328** (1991), no. 2, 767–778. MR1066446 (92c:60048)

- [48] ———, *Large deviations for the maximum local time of stable Lévy processes*, Ann. Probab. **18** (1990), no. 4, 1669–1675.MR1071817 (91h:60085)
- [49] ———, *Limit laws for local times of the Brownian sheet*, Probab. Theory Related Fields **86** (1990), no. 1, 63–85.MR1061949 (91j:60131)
- [50] Michael T. Lacey and Walter Philipp, *A note on the almost sure central limit theorem*, Statist. Probab. Lett. **9** (1990), no. 3, 201–205.MR1045184 (91e:60100)
- [51] Michael T. Lacey, *A remark on the multiparameter law of the iterated logarithm*, Stochastic Process. Appl. **32** (1989), no. 2, 355–367.MR1014459 (91a:60105)
- [52] ———, *Laws of the iterated logarithm for partial sum processes indexed by functions*, J. Theoret. Probab. **2** (1989), no. 3, 377–398.MR996996 (91a:60088)
- [53] ———, *Laws of the iterated logarithm for the empirical characteristic function*, Ann. Probab. **17** (1989), no. 1, 292–300.MR972786 (90c:60005)

## Grants

- 2005–10 NSF \$540,000 High Impact Award
- 2005-08 NSF FRG \$350,000, with U. Georgia Athens, and U. Missouri Columbia
- 2001—05 NSF \$208,000 High Impact Award
- 2001–06 NSF \$2,100,000 VIGRE award, for the School of Mathematics
- 1999–01 NSF \$98,000 Creative Extension
- 1996—99 NSF \$147,000 High Impact Award
- 1995—96 NSF \$40,000
- 1990—93 NSF \$66,000 Postdoctoral Fellow
- 1989—90 NSF \$60,000

## Talks (Last Five Years)

- 2007 Plenary, Discrepancy, Varenna Italy
- 2007 Seminar, Brown University
- 2007 Seminar, UCLA
- 2007 AMS Special Session, Davidson NC
- 2007 Colloquium, UT-Austin
- 2007 Colloquium, TAMU
- 2007 Colloquium, U Maryland

- 2006 Seminar Scuola Normale, Pisa Italy, February
- 2006 Arithmetic Combinatorics, CRM Montreal, March
- 2006 Plenary, CIRM Marseille France, June
- 2006 Seminar, Universite d' Bordeaux, June
- 2006 Plenary, Zaros, Crete, June
- 2006 6 Seminars, University of Crete, July
- 2006 Plenary, Analysis in Barcelona, September
- 2006 Two Seminars, Georgia Tech
- 2006 Colloquium, TAMU
- 2006 AMS Special Session, Salt Lake City
- 2006 CMS Winter Meeting, Toronto
  
- 2005 Seminar University of British Columbia, February
- 2005 Technical University of Vienna, May
- 2005 E. Schrodinger Institute, Vienna, Seminar May
- 2005 Oberwolfach, July (Participation only)
- 2005 Plenary, Harmonic Analysis in Japan (Two Lectures) August
- 2005 Plenary, Harmonic Analysis and Approximation in Armenia  
September
- 2005 Number Theory Seminar, UIUC October
- 2005 "Applying to Grad School" UIUC October
- 2005 Colloquium, Vanderbilt University, November
- 2005 "Applying to Grad School" Vanderbilt University, November
- 2005 Invited Talk, Harmonic Analysis and Ergodic Theory, DePaul  
University, December
  
- 2004 Colloquium at Simon Fraser University, Vancouver
- 2004 Seminar at Simon Fraser University, Vancouver
- 2004 Colloquium at University of South Carolina
- 2004 Seminar at University of South Carolina
- 2004 Invited Address, Southern California PDE meeting, San Diego  
CA
- 2004 Seminar at Brown University
- 2004 Colloquium at Temple University
- 2004 Invited Talk at SEAM, Tuscaloosa, Alabama
- 2004 Special Trimester at Centro Di Giorgi, Pisa, Italy (May)
- 2004 SUMIFRAS, Texas A&M University
- 2004 Seminar, University of Georgia at Athens
- 2004 Two Seminars at Georgia Tech
- 2004 Auburn Miniconference
- 2004 IPAM (UCLA) Math Analysis and Multiscale Geometric Anal-  
ysis Workshop

- 2003 Keynote at Southeastern Analysis Meeting, Knoxville TN
- 2003 Six Seminars at E. Schrodinger Institute, Vienna Austria
- 2003 Colloquium, Technical University of Graz
- 2003 Seminar, “Mathematics in Armenia” Thaskador Armenia
- 2003 Seminar and Colloquium, University of British Columbia
- 2003 Seminar, UCLA
- 2003 Contributed Talk, CMS Annual Meeting, Vancouver
  
- 2002 Seminar at Macquarie University, Sydney Australia
- 2002 Seminar at Australian National University, Canberra
- 2002 Conference Spring Lectures, Univ Arkansas, Fayetteville
- 2002 Undergrad talk University of Arkansas, Fayetteville
- 2002 Conference PDE, Harmonic Analysis, University of Missouri
- 2002 Conference Fabes-Riviere Symposium, University of Minnesota
- 2002 Conference Harmonic Analysis, Oberwolfach
- 2002 Colloquium at Universite Francoise Rabelais, Tours France
- 2002 Colloquium at Universite d’Cergy, France
- 2002 Seminar at Universite d’Paris, Orsay France
- 2002 Seminar at Universite d’Orleans, France
  
- 2001 Seminar at University of Missouri, Columbia
- 2001 Seminar at University of South Carolina
- 2001 Contributed Talk Southeast Analysis Meeting, Athens GA
- 2001 Conference University of Memphis
- 2001 Colloquium at University of Missouri
- 2001 Conference Talk at Convexity 2001, Milan
- 2001 Conference Talk Young Analysts Meeting, Furman University, SC
- 2001 Conference Talk Approx Theory, Yerevan, Armenia
- 2001 Colloquium at U Tennessee, Knoxville
- 2001 Undergrad Talk U Tennessee, Knoxville
- 2001 Seminar at Princeton University
- 2001 Conference Talk Harmonic Analysis, Auburn University, AL

## Service

February 2005—20XX: Harmonic Analysis editor for the Proceedings of the American Mathematical Society. Five papers a month are submitted; target acceptance rate is 25%.

Served on the NSF Real, Complex and Harmonic Analysis Panel in 1998, 1999, 2001, 2003 and 2006. Over 3 days, approximately 70 proposals are ranked, setting priorities for funding.

Served on the 2005 NSF Graduate Fellowship Committee

Served on a 2005 NSF CAREER Fellowship Committee

2005: Appointed to Hiring Committee, GT

2003: Elected member of the Salary and Awards Committee, GT.

2002, 2003: Member of the Postdoc Selection Committee, GT.

2002, 2003: Organized the Research Experience for Undergraduates, a summer program for 10 students. Several of these have produced publications, or gone onto graduate school.

2001-2006: PI on the VIGRE award. A quote from the report on the site visit for the third year review of this program: "It is apparent that PI Michael Lacey plays an extensive and pivotal role in the mentoring of undergraduates, graduate students, and post-docs. Many highly favorable reports about the School's VIGRE activities from trainees were phrased in terms such as 'A professor suggested. . .' and in almost every case that professor was Dr. Lacey."

2001: Member of Faculty Advisory Committee, representing faculty interests in matters concerning governance of the School of Mathematics.

2001-2003: With Richard Duke, Interim Chair, wrote a successful NSF VIGRE Award, to train undergraduates, graduate students and postdoctorates in the School of Mathematics. Award amount is to be \$2,100,000 over a five year period.

2001: Director of Undergraduate Education, with oversight of the entire undergraduate program in mathematics at the Georgia Institute of Technology. Different initiatives here lead to a dramatic improvement in placement of the undergraduates into graduate programs.

2000: Member of Executive Committee, council to the Chair on performance evaluations and awards to faculty members.

1998: Chair of Undergraduate Committee. Oversaw the selection of new Calculus texts to implement an "early linear algebra" approach to Calculus.

1998—2000: Hiring Committee. This Committee of three served as principal council to the Chair on all hiring matters. Hired four and five faculty members, respectively, in the two years of service.

## **Mentoring**

From 2001, a frequent mentor to undergraduates about Graduate School. This has lead to a great increase in the number of quality of undergrads being accepted to Graduate School, and winning nationally significant fellowships.

Postdocs, 2000–present: Erin Terwilleger VIGRE Postdoc, moved to tenure track at U. Conn. Jason Metcalfe, VIGRE Postdoc, moved to NSF Postdoc at Berkeley. Julia Garibaldi (FRG) and Dmitry Bilyk are currently postdocs at GT.

William McClain, graduate student, PhD expected 2007; Armen Varshagyan, graduate student PhD expected 2009.

Derrick Hart, graduate student, MS 2006

## **Teaching**

Spring 2006, Math 8813, Graduate Special Topics, 6 students

Fall 2006, Math 1501, Calculus I, 240 students

Spring 2006, Math 4317, Analysis I, 40 students

Spring 2004, Math 4105, Introduction to Number Theory, 30 students

Fall 2003, Math 7440, Harmonic Analysis, 3 students

Fall 2003, Undergraduate Research, 1 Student

Summer 2003, Graduate Reading Course

Spring 2003, Math 4105, Introduction to Number Theory, 10 students

Spring 2002, Math 2401, Calculus III 30 students

Fall 2001, Math 4431, Intro. to Topology, 4 students

Fall 2001, Math 4080, Senior Project I, Cryptography, 4 students

Spring 2001 Math 3012 Applied Comb. 35 students

Fall 1999, Math 1502, Calculus II, 170 students

Fall 1999, Math 3215, Probability, 30 students  
Spring 1999, Math 2803, Calculus, 45 students  
Spring 1999, Math 4305, Linear Algebra, 45 students  
Winter 1999, Math 4215, Probability, 40 students  
Winter 1999, Math 4305, Linear Algebra, 45 students  
Fall 1998, Math 1507, Calculus I, 47 students  
Fall 1998, Math 1507, Calculus I, 48 students  
Spring 1998, Math 6322, Complex Analysis, 3 students  
Winter 1998 Math 4305 Linear Algebra 55 students  
Winter 1998, Math 6321, Complex Analysis, 15 students  
Spring 1997, Math 1509, Calculus III, 35 students  
Spring 1997, Math 6322, Complex Analysis II, 2 students  
Winter 1997, Math 6321 Complex Analysis I 13 students  
Fall 1996, Math 4317 Analysis I 16 students