

**Emanuel A.S. Carneiro**

Ph.D. in Mathematics

ICTP - The Abdus Salam International Centre for Theoretical Physics  
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**PERSONAL**

**Citizenship** Brazilian. Born in October 30, 1980.

**EDUCATION**

**Ph.D. in Mathematics.** 2005 - 2009.

The University of Texas at Austin.

Thesis: Extremality, symmetry and regularity issues in harmonic analysis.

Advisors: William Beckner and Jeffrey Vaaler.

**Master of Sciences in Mathematics.** 2002 - 2004.

Universidade Federal do Ceará - Brazil.

**Bachelor Degree in Mathematics** (Summa Cum Laude). 1999 - 2002.

Universidade Federal do Ceará - Brazil.

**APPOINTMENTS**

**ICTP - Trieste**, Research Scientist, 2018 - present.

**IMPA - Rio de Janeiro**, Assistant Professor (2011 - 2016); Associate Professor, 2016 - present (currently on leave).

**McKinsey and Company**, Associate Consultant, 2010 - 2011.

**Institute for Advanced Study, Princeton**, Member, 2009 - 2010.

**PUBLICATIONS**

38. *Sunrise strategy for the continuity of maximal operators* (with C. González-Riquelme and J. Madrid), preprint.
37. *Generalized sign Fourier uncertainty* (with O. E. Quesada-Herrera), preprint.
36. *Optimality for the two-parameter quadratic sieve* (with A. Chirre, H. Helfgott and J. Mejia-Cordero), preprint.
35. *Gaussians never extremize Strichartz inequalities for hyperbolic paraboloids* (with L. Oliveira and M. Sousa), preprint.
34. *Gradient bounds for radial maximal functions* (with C. González-Riquelme), Ann. Acad. Sci. Fenn. Math., to appear.
33. *Extremizers for adjoint Fourier restriction on hyperboloids: the higher dimensional case* (with D. Oliveira e Silva, M. Sousa and B. Stovall), Indiana Univ. Math. J., to appear.
32. *Regularity of maximal operators: recent progress and some open problems*, Applied and Numerical Harmonic Analysis, New Trends in Harmonic Analysis, vol. 2 (2019), Chapter 3, 69-92. Proceedings of the 2017 CIMPA School in Harmonic Analysis, Geometric Measure Theory and Applications.
31. *Fourier optimization and prime gaps* (with M. Milinovich and K. Soundararajan), Comment. Math. Helv. 94 (2019), no. 3, 533–568.
30. *Bandlimited approximations and estimates for the Riemann zeta-function* (with A. Chirre and M. Milinovich), Publ. Mat. 63 (2019), no. 2, 601–661.

29. *Extremizers for Fourier restriction on hyperboloids* (with D. Oliveira e Silva and M. Sousa), *Ann. Inst. H. Poincaré Anal. Non Linéaire* 36 (2019), no. 2, 389–415.
28. *Sharp mixed norm spherical restriction* (with D. Oliveira e Silva and M. Sousa), *Adv. Math.* 341 (2019), 583–608.
27. *On the variation of maximal operators of convolution type, II* (with R. Finder and M. Sousa), *Rev. Mat. Iberoam.* 34 (2018), 739–766.
26. *Bounding  $S_n(t)$  on the Riemann hypothesis* (with A. Chirre), *Math. Proc. Cambridge Philos. Soc.* 164 (2018), 259–283.
25. *A sharp trilinear inequality related to Fourier restriction on the circle* (with D. Foschi, D. Oliveira e Silva and C. Thiele), *Rev. Mat. Iberoam.* 33 (2017), 1463–1486.
24. *Endpoint Sobolev and BV continuity for maximal operators* (with J. Madrid and L. Pierce), *J. Funct. Anal.* 273 (2017), 3262–3294.
23. *Extremal functions in de Branges and Euclidean spaces, II* (with F. Littmann), *Amer. J. Math.* 139, no. 2 (2017), 525–566.
22. *Hilbert spaces and the pair correlation of zeros of the Riemann zeta-function* (with V. Chandee, F. Littmann and M. Milinovich), *J. Reine Angew. Math.* 725 (2017), 143–182.
21. *Derivative bounds for fractional maximal functions* (with J. Madrid), *Trans. Amer. Math. Soc.* 369 (2017), 4063–4092.
20. *On the argument of L-functions* (with R. Finder), *Bull. Braz. Math. Soc.* 46, No. 4 (2015), 601–620.
19. *A note on the zeros of zeta and L-functions* (with V. Chandee and M. Milinovich), *Math. Z.* 281 (2015), 315–332.
18. *Some sharp restriction inequalities on the sphere* (with D. Oliveira e Silva), *Int. Math. Res. Not. IMRN* vol. 2015 (2015), 8233–8267.
17. *Extremal problems in de Branges spaces: the case of truncated and odd functions* (with F. Gonçalves), *Math. Z.* 280 (2015), 17–45.
16. *Extremal functions in de Branges and Euclidean spaces* (with F. Littmann), *Adv. Math.* 260 (2014), 281–349.
15. *Entire approximations for a class of truncated and odd functions* (with F. Littmann), *J. Fourier Anal. Appl.* 19 (2013), 967–996.
14. *Bandlimited approximations to the truncated Gaussian and applications* (with F. Littmann), *Const. Approx.* 38, No. 1 (2013), 19–57.
13. *Bounding  $S(t)$  and  $S_1(t)$  on the Riemann hypothesis* (with V. Chandee and M. Milinovich), *Math. Ann.* 356, No. 3 (2013), 939–968.
12. *On the variation of maximal operators of convolution type* (with B. F. Svaiter), *J. Funct. Anal.* 265 (2013), 837–865.
11. *Gaussian subordination for the Beurling-Selberg extremal problem* (with F. Littmann and J. D. Vaaler), *Trans. Amer. Math. Soc.* 365 (2013), 3493–3534.
10. *On the endpoint regularity of discrete maximal operators* (with K. Hughes), *Math. Res. Lett.* 19, No. 6 (2012), 1245–1262.
9. *On a discrete version of Tanaka’s theorem for maximal functions* (with J. Bober, K. Hughes and L. Pierce), *Proc. Amer. Math. Soc.* 140 (2012), 1669–1680.
8. *Bounding  $\zeta(s)$  in the critical strip* (with V. Chandee), *J. Number Theory* 131 (2011), 363–384.
7. *Convolution inequalities for the Boltzmann collision operator* (with R. J. Alonso and I. M. Gamba), *Comm. Math. Phys.* 298, No. 2 (2010), 293–322.
6. *Sharp estimates for the Boltzmann collision operator via radial symmetry and Fourier transform* (with R. Alonso), *Adv. Math.* 233, No. 2 (2010), 511–528.

5. *Some extremal functions in Fourier analysis, III* (with J. D. Vaaler), *Const. Approx.* 31, No. 2 (2010), 259–288.
4. *Some extremal functions in Fourier analysis, II* (with J. D. Vaaler), *Trans. Amer. Math. Soc.* 362 (2010), 5803–5843.
3. *A sharp inequality for the Strichartz norm*, *Int. Math. Res. Not. IMRN* 16 (2009), 3127–3145.
2. *Sharp approximations to the Bernoulli periodic functions by trigonometric polynomials*, *J. Approx. Theory* 154 (2008), 90–104.
1. *On the regularity of maximal operators* (with D. Moreira), *Proc. Amer. Math. Soc.* 136 (2008), 4395–4404.

#### **AWARDS AND HONORS**

- 2020 CAPES Thesis Prize (Advisor).
- 2020 Carlos Gutierrez Thesis Prize (Advisor), USP - São Carlos.
- 2017 CAPES Thesis Prize (Advisor).
- 2017 Carlos Gutierrez Thesis Prize (Advisor), USP - São Carlos.
- 2017 Fulbright Visiting Associate Professor at Stanford University.
- 2015 Simons Associate Fellow of ICTP - Trieste (2015 - 2020).
- 2014 Elected Affiliated Member of the Brazilian Academy of Sciences (2014 - 2018).
- 2009 Member of the Institute for Advanced Study, Princeton.
- 2009 Frank Gerth III Outstanding Dissertation Award - The University of Texas at Austin
- 2007 Frank Gerth III Teaching Award - The University of Texas at Austin.
- 2006 Frank Gerth III Graduate Excellence Award - The University of Texas at Austin.

#### **GRANTS AND FELLOWSHIPS**

- 2017 Fulbright Junior Faculty Award.
- 2015 Simons Associate Fellow of ICTP - Trieste (2015 - 2020).
- 2015 Faperj Junior Scientist (2015 - 2018).
- 2015 CNPq Resarcher - Level 1D (2015 - 2019).
- 2014 Edital Universal CNPq.
- 2012 Faperj Junior Scientist (2012 -2015).
- 2012 CNPq Resarcher - Level 2 (2012 - 2015).
- 2011 Edital Universal - CNPq.
- 2011 J. T. Oden Faculty Fellow, ICES - The University of Texas at Austin.
- 2008 Homer Lindsey Bruce Endowed Fellow - The University of Texas at Austin.
- 2005 CAPES/Fulbright Ph.D. Fellow (2005 - 2009).

#### **VISITING SCHOLAR POSITIONS (>1 MONTH)**

- 2017 ICTP - Trieste, Italy.
- 2017 Stanford University, USA.
- 2016 ICTP - Trieste, Italy.
- 2014 Hausdorff Institute für Mathematik, Bonn, Germany.
- 2013 Oxford University, UK.
- 2012 The University of Texas at Austin, USA.
- 2011 The University of Texas at Austin, USA.

## PLENARY ADDRESSES

### INTERNATIONAL EVENTS:

- 2021 12th International Conference on Harmonic Analysis and Partial Differential Equations - El Escorial, Spain (upcoming).
- 2019 HIM Follow-up Workshop in Harmonic Analysis and PDEs - Bonn, Germany.
- 2018 ICM 2018 Satellite Conference in Harmonic Analysis - Porto Alegre, Brazil.
- 2018 UFSCar International Workshop on Partial Differential Equations and Complex Analysis - São Carlos, Brazil.
- 2018 Symposium in Harmonic Analysis and Geometric Measure Theory - Ribeirão Preto, São Paulo, Brazil.
- 2017 CIMPA Research School - IX Escuela Santaló - Harmonic Analysis, Geometric Measure Theory and Applications - Buenos Aires, Argentina.
- 2015 1st Joint Meeting Brazil - Spain in Mathematics - Fortaleza, Brazil.
- 2014 Workshop on Real Analysis, Hausdorff Institute of Mathematics - Bonn, Germany.
- 2013 CIMPA Research School New Trends in Applied Harmonic Analysis - Mar del Plata, Argentina.
- 2013 XXXVII Symposium on Real Analysis - São Carlos, Brazil.
- 2011 International Meeting on Differential Geometry and Partial Differential Equations - Fortaleza, Brazil.

### NATIONAL EVENTS (IN BRAZIL):

- 2017 5th Workshop on Analysis and PDEs - Aracaju, Brazil.
- 2015 IX EMED - Encontro Mineiro de Equações Diferenciais - Minas Gerais, Brazil.
- 2014 III Colóquio de Matemática da Região Nordeste - Fortaleza, Brazil.
- 2013 II Colóquio de Matemática da Região Norte - Santarém, Brazil.
- 2012 VI ENAMA - Aracaju, Brazil.

## DEPARTMENT COLLOQUIA

- 2019 Université de Nantes, France.
- 2017 Basic Notions Colloquium, ICTP - Trieste, Italy.
- 2017 UFJF - Juiz de Fora, Brazil.
- 2015 PUC - Rio de Janeiro, Brazil.
- 2014 University of Oregon, USA.
- 2014 USP - São Paulo, Brazil.
- 2014 UFGRS - Porto Alegre, Brazil.
- 2014 Universidad de Costa Rica.
- 2014 IMCA - Lima, Peru.
- 2014 UFC - Fortaleza, Brazil.
- 2012 USP - São Carlos, Brazil.
- 2012 UFSC - Florianópolis, Brazil.
- 2012 North Dakota State University, USA.
- 2011 UFMG - Belo Horizonte, Brazil.

## INVITED SEMINARS

- 2019 Analysis Seminar - UAB/CRM, Barcelona, Spain.
- 2019 Number Theory Seminar, Max Planck Institut für Mathematik - Bonn, Germany.
- 2019 Analysis Seminar - Univ. of Bristol, England.
- 2019 Analysis/PDE Seminar - ICMAT/UAM - Madrid, Spain.
- 2019 Analysis Seminar - SISSA - Trieste, Italy.
- 2019 Analysis Seminar - LMU Munich, Germany.
- 2018 AMS Special Session on Diophantine Approximation and Analytic Number Theory - in honor of Jeffrey Vaaler - AMS/MAA Joint Meetings - San Diego, USA.
- 2018 Caltech Analysis Seminar, Pasadena, USA.
- 2017 Analysis/PDE Seminar, Universität Bonn, Germany.
- 2017 Number Theory Seminar, ICTP - Trieste, Italy.
- 2017 Number Theory Seminar, EPFL - Lausanne, Switzerland.
- 2017 II Mathematical Congress of Americas, Analysis & Number Theory Session / Advances in Algebraic and Analytic Number Theory Session - Montreal, Canada.
- 2017 Joint Analytic Number Theory/Harmonic Analysis Seminar, MSRI - Berkeley, USA.
- 2017 Number Theory Seminar, Stanford University, USA.
- 2016 Analysis Seminar, ICTP - Trieste, Italy.
- 2016 Number Theory Session of the XXI Coloquio Latinoamericano de Algebra - Buenos Aires, Argentina.
- 2016 Nonlinear PDE's at IMPA, Brazil.
- 2016 Analysis/PDE Seminar, UFRJ - Rio de Janeiro, Brazil.
- 2015 Workshop on Geometry, Algebra and Analysis of Algebraic Numbers - Banff, Canada.
- 2015 Analysis Seminar, Universidade de Coimbra, Portugal.
- 2015 Geometric Aspects of Harmonic Analysis - AMS/EMS/SPM Meeting - Porto, Portugal.
- 2015 Number Theory Seminar, University of Michigan - Ann Arbor, USA.
- 2015 Number Theory Seminar, UnB - Brasilia, Brazil.
- 2015 COLGA (Colóquio de Geometria e Aritmética do Rio de Janeiro), UFF - Niterói, Brazil.
- 2014 Oberseminar Analysis, Universität Bonn, Germany.
- 2014 Real and Harmonic Analysis, Oberwolfach, Germany.
- 2014 Number Theory at Illinois, *in honor of the Batemans and H. Halberstam*, USA.
- 2014 Number Theory Seminar, University of Mississippi, USA.
- 2014 V Intl. Conf. in Computational and Applied Harmonic Analysis, Vanderbilt Univ., USA.
- 2014 Number Theory Seminar, University of Oregon, USA.
- 2014 Analysis Seminar, University of Oregon, USA.
- 2014 Analysis/PDE Seminar, Oregon State University, USA.
- 2013 I Mathematical Congress of Americas, Number Theory Session - Guanajuato, Mexico.
- 2013 XXIX Brazilian Colloquium of Mathematics, PDE Session - Rio de Janeiro, Brazil.
- 2013 Analysis/PDE Seminar UNICAMP - Campinas, Brazil.
- 2013 Analysis Seminar, Université Pierre et Marie Curie, Paris VI - Jussieu - Paris, France.
- 2013 Analysis Seminar, University of Edinburgh, UK.
- 2013 Number Theory Seminar, Oxford University, UK.

- 2013 Number Theory Seminar, UnB - Brasilia, Brazil.
- 2012 Number Theory Seminar, The University of Texas at Austin, USA.
- 2012 Analysis/PDE Seminar, The University of Texas at Austin, USA.
- 2011 MathAmSud Seminar, Assunción, Paraguai.
- 2010 Number Theory Seminar, The University of Texas at Austin, USA.
- 2010 Analysis Seminar, Univ. of Pennsylvania, USA.
- 2010 Analysis/Math Physics Seminar, Institute for Advanced Study, Princeton, USA.
- 2010 PDE/Applied Math Seminar, University of Maryland, USA.
- 2009 PDE/ Applied Math Seminar, Brown University, USA.
- 2009 Analysis Seminar, The University of Texas at Austin, USA.
- 2009 Analysis/PDE Seminar, University of Iowa, USA.
- 2008 II Workshop on Harmonic Analysis and Partial Differential Equations - Merida, Mexico.
- 2008 24th Southeastern Analysis Meeting, Vanderbilt Univ., USA.

## GRADUATE STUDENTS

### Ph.D.

- 7. Oscar Emilio Quesada Herrera, Ph.D. IMPA, 2022 (expected).
- 6. Cristian Andres Gonzalez Riquelme, Ph.D. IMPA, 2021 (expected).
- 5. Carlos Andrés Chirre Chavez, Ph.D. IMPA, 2019.  
 Thesis: *Bounds for the Riemann zeta-function via Fourier analysis*.  
 IMPA Best Thesis Prize, 2020.  
 Carlos Gutierrez Thesis Prize, USP - São Carlos, 2020.  
 CAPES Thesis Prize, 2020.  
 Later: NTNU - Norwegian Univ. of Science and Technology (2019 - 2021).
- 4. Mateus Sousa, Ph.D. IMPA, 2017.  
 Thesis: *Some sharp inequalities in harmonic analysis*.  
 Later: Univ. of Buenos Aires (2018); LMU Munich (2018 - 2021).
- 3. Renan Finder, Ph.D. IMPA, 2016.  
 Thesis: *Variation-diminishing maximal operators and the argument of L-functions*.  
 Later: Univ. Göttingen - Germany (2016 - 2019).
- 2. Jose Ramon Madrid Padilla, Ph.D. IMPA, 2016.  
 Thesis: *Regularity of fractional maximal functions and extremal functions of exponential type*  
 Later: Aalto Univ.-Helsinki (2016 - 2017); ICTP - Trieste (2017 - 2018); UCLA (2018 - 2021).
- 1. Felipe Gonçalves, Ph.D. IMPA, 2016.  
 Thesis: *Extremal problems, reconstruction formulas and approximations of Gaussian kernels*.  
 IMPA Best Thesis Prize, 2017.  
 Carlos Gutierrez Thesis Prize, USP - São Carlos, 2017.  
 CAPES Thesis Prize, 2017.  
 Later: Univ. of Alberta - Canada (2016 - 2018); Universität Bonn (2018 - 2023).

### M.Sc.

- 6. Tainara Gobetti Borges, M.Sc. IMPA, 2020.
- 5. Cynthia Bortolotto, M.Sc. IMPA, 2020.
- 4. Gerardo Sigfredo Fisch Paredes, M.Sc. IMPA, 2019.
- 3. Alvaro Almeida Gomez, M.Sc. IMPA, 2017.
- 2. Itamar Sales de Oliveira, M.Sc. UFC, 2016 (co-advised with Diego Moreira - UFC).

1. Renan Finder, M.Sc. IMPA, 2012.

#### **Diploma students at ICTP.**

2. Khakimboy Egamberganov, 2019.
1. Carlos Ospina, 2019.

#### **(CO)-ORGANIZATION OF EVENTS**

- 2018 Member of the Executive Committee of the International Congress of Mathematicians  
Chair of the Scientific Program Subcommittee - Rio de Janeiro.
- 2017 Harmonic Analysis Session - Brazilian Colloquium of Mathematics - IMPA.
- 2016 Special Session “Harmonic Analysis and Geometric Measure Theory” at the V Latin American  
Congress of Mathematicians, Colombia.
- 2015 International Conference in Number Theory and Physics - IMPA.
- 2015 Thematic Program Current Trends in Analysis and Partial Differential Equations - IMPA.
- 2015 School of High Studies CAPES - featuring Luis Caffarelli - IMPA.
- 2015 International Conference on Current Trends in Analysis and Partial Differential Equations -  
IMPA.
- 2015 International Workshop on Elliptic and Kinetic PDEs - IMPA.
- 2015 Harmonic Analysis Session - Brazilian Colloquium of Mathematics - IMPA.
- 2011 Analysis/PDE Session - Brazilian Colloquium of Mathematics - IMPA.
- 2011 Co-organizer of the Analysis/PDE Seminar at IMPA (2011 - 2018).

#### **TEACHING**

- 2021 Real Analysis
- 2020 Functional Analysis
- 2019 Functional Analysis
- 2018 Topics in Analysis: Sphere packings, Fourier analysis and beyond
- 2018 Analytic Number Theory
- 2018 Elements of Analysis
- 2016 Partial Differential Equations II
- 2016 Linear Algebra
- 2015 Harmonic Analysis
- 2015 Analytic Number Theory
- 2014 Spectral Theory
- 2014 Functional Analysis
- 2013 Topics in Analysis: Hilbert spaces of entire functions
- 2013 Analytic Number Theory
- 2012 Harmonic Analysis
- 2012 Functional Analysis
- 2011 Partial Differential Equations I

#### **EDITORIAL SERVICE**

- 2020 Member of Editorial Board of the Annals of the Brazilian Academy of Sciences.
- 2017 Chief of Scientific Information - IMPA (2017 - 2018)  
(*overseeing IMPA Library, IMPA Publications and IMPA Videos / Multimedia*).

2014 Member of Editorial Board of IMPA Monographs - Springer (2014 - present).

### **DISSEMINATION AND OUTREACH WORK**

As part of the dissemination effort, over the last years I had five of my courses at IMPA and one course at ICTP entirely recorded, in a total more than 120 lectures of 1:30h to 2h each. These are on the IMPA channel and the ICTP - Diploma channel at YouTube.com, available for free to the general public.

2019 Functional Analysis - 20 lectures.

2018 Sphere packings, Fourier analysis and beyond (Ph.D.) - with Felipe Gonçalves - 25 lectures.

2015 Harmonic Analysis (Ph.D.) - 30 lectures.

2015 Analytic Number Theory (Ph.D.) - 20 lectures.

2013 Hilbert Spaces of Entire Functions (Ph.D.) - 25 lectures.

2011 Partial Differential Equations (M.Sc.) - 25 lectures.

Before going to the U.S. for my Ph.D., I was a high school teacher for almost seven years in my hometown of Fortaleza, Brazil. I served at the Brazilian Mathematical Olympiad Executive Board (from 2000 - 2016) and I was a member of IMO 2017 Problem Coordination. Every year I deliver lectures aimed at undergrads, high school and middle school students.

### **COMMITTEE SERVICE**

2011 Graduate School Committee at IMPA (2011 - 2018).

2015 Planning and Projects Committee at IMPA (2015 - 2018).