

MARCELO VIANA

Professor of Mathematics \diamond Director

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BIRTH AND CITIZENSHIP

March 4, 1962 in Rio de Janeiro. Brazilian and Portuguese.

EDUCATION

B. Sc. – Department of Mathematics, University of Porto, 1984.

Ph. D. – Instituto de Matemática Pura e Aplicada, Rio de Janeiro, 1990.

Thesis: *Strange attractors in higher dimensions* Advisor: Jacob Palis

RESEARCH TOPICS

Dynamical Systems, Ergodic Theory, Bifurcation Theory:

- Mathematical theory of chaotic dynamics and strange attractors: physical (Sinai-Ruelle-Bowen) measures, correlation functions, stochastic stability.
- Ergodic and geometric theory of Hénon-like maps and Lorenz-like flows. Multidimensional strange attractors.
- Bifurcations leading to chaotic behavior: homoclinic tangencies, heteroclinic cycles, saddle-node cycles.
- Relative frequency of dynamical phenomena in the unfolding of bifurcations, in two and higher dimensions. Coexistence of infinitely many attractors.
- Fractional invariants, such as Hausdorff dimension, limit capacity, and thickness, and their role in Dynamics.
- Partial hyperbolicity, systems with dominated splittings. Invariant foliations of partially hyperbolic systems. Related rigidity phenomena.
- Non-uniformly hyperbolic systems. Existence and finiteness of physical measures. Thermodynamical formalism, equilibrium states.
- Lyapunov exponents of linear cocycles. Non-vanishing exponents, simplicity of Lyapunov spectra. Dependence of Lyapunov exponents on the dynamics.
- Interval exchange transformations and translation surfaces. Dynamics of Teichmüller flows and renormalization operators. Geometry of flat surfaces.

SELECTED LECTURES

Congress of the GMEL, Coimbra 1985. University of Paris-Sud 1985. *Brazilian Mathematical Colloquium*, IMPA, Rio de Janeiro 1987. *International Workshop on Dynamical Systems*, ICTP, Trieste 1988. *International Workshop on Dynamical Systems*, IMPA, Rio de Janeiro 1989.

1990: *International Colloquium on Dynamical Systems*, ENS, Lyon. *International Conference on Dynamical Systems and Related Topics*, Nagoya. University of Kyoto. *Chilean Symposium on Dynamical Systems*, Santiago de Chile. KTH, Stockholm. University of Dijon.

- 1991: *Extended Midwest Conference on Dynamical Systems*, Northwestern University, Evanston. *Dynamical Systems*, Mathematisches Forschungsinstitut, Oberwolfach. *Brazilian Mathematical Colloquium*, IMPA, Rio de Janeiro. *International Workshop on Dynamical Systems*, ICTP, Trieste. *Workshop on Dynamical Systems*, Euler Institute, Saint-Petersburg. Princeton University. Boston University. Cornell University, Ithaca. University of Paris-Sud.
- 1992: *International Workshop on Dynamical Systems*, ICTP, Trieste. *Workshop on Dynamical Systems*, Mittag-Leffler Institute, Stockholm. *Learning With Artificial Neural Networks*, Trento. University of Groningen. University of Amsterdam.
- 1993: *Conference on Real and Complex Dynamics*, Copenhagen. *Dynamical Systems*, Mathematisches Forschungsinstitut, Oberwolfach. *International Workshop on Dynamical Systems*, IMPA, Rio de Janeiro.
- 1994: University of California at Los Angeles. Princeton University. *International Conference on Dynamical Systems and Chaos*, Tokyo Metropolitan University. University of Michigan. CIMAT, Guanajuato. ETH, Zurich. *International Conference on Dynamical Systems*, Landau Institute, Moscow. University of Barcelona. University of Dijon.
- 1995: *International Workshop on Dynamical Systems*, Montevideo. *International Workshop on Dynamical Systems*, ICTP, Trieste. University of Geneva. *Ergodic Theory and Dynamical Systems*, Warsaw. *International Colloquium Adrien Douady*, University of Paris-Sud. University of Dijon. ENS of Lyon. *Dynamical Systems Conference*, Groningen.
- 1996: *Annual Iranian Mathematical Conference*, Shiraz. *International Conference on Dynamical Systems*, Beijing. University of Porto. *Hyperbolic Systems with Singularities*, Schrödinger Institute, Vienna. University of Dijon. KTH, Stockholm.
- 1997: *International Congress on Dynamical Systems*, CIC, Cuernavaca. *Selected Topics in Dynamical Systems*, ISI, Torino. *Dynamical Systems*, Mathematisches Forschungsinstitut, Oberwolfach. *Quadriennial International Conference on Dynamical Systems*, IMPA, Rio de Janeiro. University of Dijon. University of Paris-Jussieu. University of Porto.
- 1998: *International Conference on Dynamical Systems*, KTH, Stockholm. *International Workshop on Dynamical Systems*, ICTP, Trieste. University of Dijon. University of Paris-Jussieu.
- 1999: University of Warwick. *International Conference on Dynamical Systems*, IST, Lisboa. *XII ELAM Lima*. *International Symposium on Dynamical Systems*, Dijon. *EquaDiff 99*, Berlin.
- 2000: *International Conference on Dynamical Systems*, Porto. Princeton University. *International Conference on Dynamical Systems*, ICMS, Edinburgh. *1st Latin-American Congress of Mathematicians*, IMPA. *4th Brazilian School of Probability*, Angra dos Reis. *International Conference on Dynamical Systems and Differential Equations*, Atlanta. *Nonlinear Analysis*, Courant Institute NYU. University of Paris-Sud Colloquium.
- 2001: University of Maryland Colloquium. KTH, Stockholm. University of Yale Colloquium. *Petrovskii Centenary Conference*, Moscow. *International Conference on Partial Hyperbolicity*, Northwestern University. *Global Analysis of Dynamical Systems*, Groningen. *Dynamical Systems*, Mathematisches Forschungsinstitut, Oberwolfach. *School and Workshop on Dynamical Systems*, ICTP, Trieste. *Dynamical Systems and Statistical Mechanics*, Erdős Center, Budapest. Imperial College, London.
- 2002: University of Rouen Colloquium. *International conference on Dynamical Systems and Differential Equations*, American Mathematical Sciences Institute, Wilmington NC. École Normale Supérieure de Lyon. University of Paris-Sud (Orsay). Institut de Mathématiques de Jussieu, Paris. Harriot-Watt Univ Colloquium, Edinburgh. University of Marseille Colloquium. *New Directions in Dynamical Systems*, Kyoto. *International Conference in honor of H. Rosenberg*, Dijon. Inter-

- national Conference in honor of J. Mather*, Princeton. *Colloque Michael Herman*, Institut Henri Poincaré, Paris. *Workshop on Randomness and Dynamics*, Santiago de Chile.
- 2003: *International Conference in honor of A. Verjovsky*, Cuernavaca, Mexico. *Recent Trends in Dynamics*, Porto. *Equadiff 2003*, Hasselt. *Workshop on Dynamical Systems*, Antofagasta. Imperial College of London. *Annual Meeting of the London Mathematical Society*, Southampton.
- 2004: *Geometry of Submanifolds and Chaotic Dynamics*, Maceió. *International Conference on Dynamical Systems in honor of J. Massera*, Montevideo. *Dynamical Systems and Applications*, Porto. *Multidimensional Chaotic Systems*, CIRM, Luminy. *Summer School and Conference on Dynamical Systems*, ICTP, Trieste. *International Conference in Honor of A. Katok*, Mathematical Sciences Research Institute.
- 2005: Colloquium of the CIM, Coimbra. *Workshop on Differential Geometry and Chaotic Dynamics*, University of Bahia. *Nonlinear Science in Three Continents*, Consortium for the Americas, Santa Fe. *Contemporary Mathematics*, IMU Workshop/IMPA. Imperial College of London. *International Conference on Nonlinear Dynamics and Complexity*, NCTS, Taiwan. Chinese Academy of Sciences. University of Beijing Colloquium. *Colloque International en Systèmes Dynamiques*, Bordeaux. *Chaos and disorder in mathematics and Physics*, in honor of Ya. Sinai, Bresanone. *Santaló Conference*, Madrid. *Brazil-France Inter-Academies Meeting*, Paris. *International Conference in honor of Michael Jakobson*, Penn State University. *XIV ELAM*, Montevideo. Ramanujan Prize Lecture, ICTP, Trieste.
- 2006: *Workshop on partial hyperbolicity, laminations, and Teichmüller flows*, Fields Institute, Toronto. University of Coimbra, Colloquium. *Bienal de Matemática da SBM*. *European Conference on Complex Systems*, Oxford. *International Conference on Dynamical Systems*, Lima.
- 2007: Aula Inaugural do Doutorado, UFF-Niterói. Colloquium, University of Oslo. First IME/IST Joint Meeting, São Paulo. *Workshop on Dynamical Systems*, Penn State University. IST Colloquium, Lisbon. Gulbenkian Foundation, Lisbon.
- 2008: Aula Inaugural do Doutorado, UNESP-S. J. Rio Preto. Séminaire Eliasson-Yoccoz, Jussieu. *Mathematics in the World*, Hungarian Academy of Sciences, Budapest. *Workshop on Probability and Dynamics*, CMM-Santiago de Chile. Santaló Conference, Unión Matemática Argentina, Mendoza. Colloquium, Institute of Physics, University of São Paulo.
- 2009: Annual Meeting, Chinese Mathematical Society, Xiamen. Colloquium, Peking University. *Dynamical Trends in Analysis*, KTH, Stockholm. *Global Dynamics Beyond Uniform Hyperbolicity*, Peking University. *Encontro Brasil-França*, IMPA. Annual Meeting of the Mexican Mathematical Society, Zacatécas. First *Colóquio de Matemática da Região Centro-Oeste*, Universidade Federal do Mato Grosso do Sul, Campo Grande.
- 2010: First *Brazilian School on Dynamical Systems*, Maceió. First *Encontro Internacional de Matemática do Nordeste*, João Pessoa. Aula Inaugural do Mestrado, Universidade Federal de Juiz de Fora. First *Colóquio de Matemática da Região Sul*, Universidade Federal de Santa Maria. Colloquium, Universidade Federal de Santa Catarina. *Semana da Matemática*, Universidade Federal do Rio Grande do Norte, Natal. Inauguration, Chilean Academy of Sciences. First *Colóquio de Matemática da Região Norte*, Universidade Federal do Pará, Belém.
- 2011: Aula Inaugural, Universidade Federal de Minas Gerais. First *Colóquio de Matemática da Região Sudeste*, Universidade Federal de São João del Rei. *Topological methods in Dynamical Systems*, Universidade de Campinas.
- 2012: *International Conference on the Frontiers of Mathematics*, IMPA. *School and Conference on Dynamical Systems*, ICTP, Trieste. First *Palis-Balzan Symposium on Dynamical Systems*, IMPA. 4th *Latin American Congress of Mathematicians*, Córdoba. 6th *Jornadas de Iniciação Científica*, IMPA.

- 2013: *International Conference on Dynamics Beyond Uniform Hyperbolicity*, Bedlewo. *Second Palis-Balzan Symposium on Dynamical Systems*, Institut Henri Poincaré, Paris. *Simpósio Nacional da Formação do Professor de Matemática*, FINATEC, Brasília. *Third Colóquio De Matemática da Região Centro-Oeste*, Jataí-GO. *International Conference on Dynamical Systems*, IMPA. *Sixth Encontro da Revista do Professor de Matemática*, Campo Grande-MS. *deLeónfest*, ICMAT, Madrid.
- 2014: *80th Birthday Conference of Djairo de Figueiredo*, Universidade de Campinas. Instituto de Matemáticas de Cuernavaca. Instituto de Matemáticas de la UNAM, Mexico City. *3º Diálogo Brasil-Alemanha de Ciência, Pesquisa e Inovação*, São Paulo. *ICTP 50 Years of Science for the Future*, Abdus Salam International Centre for Theoretical Physics, Trieste, 2014.
- 2015: *Encontro de Morungaba sobre Ciência*, Morungaba. *Surfing the Complexity*, Oviedo. *Joint Meeting AMS-EMS-SPM*, Porto. *3rd Palis-Balzan Symposium*, IHP, Paris. *Semana Nacional da Ciência e Tecnologia*, UFAM, Manaus. *First Brazil-Spain Joint Meeting in Mathematics*, Fortaleza.
- 2016: *IMU Colloquium*, RIMS, Kyoto. *Colloquium of RIMS*, Kyoto. *Hoferfest*, ETH, Zurich. *Reunião Anual da SBPC*, Porto Seguro. *Colloquium of the Federal University of Paraná*. *Jornada Yoccoz*, IMPA. *Real Academia de Ciencias Exactas Físicas y Naturales*, Madrid.
- 2017: *Conference in memory of J.-C. Yoccoz*, Collège de France. *Université de la Côte d'Azur*, Nice. *Rafael Labarca 60th birthday conference*, Santiago de Chile. *20º Coloquio Boliviano de Matemáticas*, La Paz. *Semana da Matemática da UTFPR*, Pato Branco. *3º Encontro Regional do PROFMAT*, UFPA, Belém.
- 2018: *Colloquium of the department of mathematics*, University of Southern California, Los Angeles. *Aula Inaugural da Graduação*, Federal University of Rio Grande do Sul, Porto Alegre.
- 2019: *Maths Day for Development*, UNESCO, Paris. *Bienal de Matemática*, Juazeiro do Norte. *Matemáticos Portugueses no Mundo*, University of Porto. *Inaugural conference of the Institute for Mathematical Sciences of the Americas*, Miami. *Tata Institute for Fundamental Research (TIFR) Colloquium*, Mumbai. *ICTS Distinguished Lecture*, International Centre for Theoretical Sciences, Bangalore. *International Congress of Industrial and Applied Mathematics*, Valencia. *Semana da Matemática*, Universidade Federal do Tocantins, Palmas. *Aula Magna* do ICMC-USP São Carlos. *Fields Symposium on the work of Artur Avila*, Fields Institute, Toronto.
- 2020: *Seminários Acadêmicos do INSPER*, São Paulo.

RESEARCH COURSES

Differentiable Ergodic Theory, Summer School on Dynamical Systems, ICTP, Trieste, 1988.

Homoclinic Bifurcations, Chilean School on Dynamical Systems, Santiago de Chile, 1990.

Hyperbolic Dynamics and Homoclinic Bifurcations, Summer School on Dynamical Systems, ICTP, Trieste, 1991.

Nonhyperbolic Dynamics and Strange Attractors, Summer School on Dynamical Systems, ICTP, Trieste, 1992.

Homoclinic Bifurcations and Strange Attractors, Conference on Real and Complex Dynamics, Copenhagen, 1993.

Statistical Properties of Attractors, Conference on Selected Topics in Dynamical Systems, Torino, 1997.

Stochastic Dynamics of Deterministic Systems, Brazilian Mathematical Colloquium, IMPA, Rio de Janeiro, 1997.

Ergodic Properties of Dissipative Dynamics, Summer School on Dynamical Systems, ICTP, Trieste, 1998.

Attractors and Physical Measures, XII ELAM, Lima, 1999.

Ergodic Theory of Chaotic Systems, IST-Technical University of Lisbon, 2000.

Partially Hyperbolic Dynamics, SISSA, Trieste, 2002.

Deterministic Products of Matrices, Scuola Normale Superiore, Pisa, 2002.

Dynamics Beyond Uniform Hyperbolicity, Collège de France, Paris, 2002.

Nonhyperbolic dynamics, Workshop on Dynamical Systems, San Pedro de Atacama, 2003.

Linear Cocycles, New Trends on Dynamical Systems, University of Porto, 2003.

Lyapunov Exponents, DANCE Winter School on Nonlinear Science, Castellon, 2005.

Lyapunov Exponents of Teichmüller Flows, International Conference on Global Dynamics Beyond Uniform Hyperbolicity, Chicago, 2006.

Geometry and Dynamics of Flat Surfaces, CIM-Centro Internacional de Matemática, Coimbra, 2007.

A Stochastic Approach to Deterministic Systems, 2nd School on New Trends in Mathematics of Complex Systems, Institut des Systèmes Complexes, Paris, 2008.

Dynamics in the Moduli Spaces of Flat Surfaces, Summer School on Dynamical Systems, CIM-Centro Internacional de Matemática, Coimbra, 2008.

Physical measures and absolute continuity, International Conference on Global Dynamics Beyond Uniform Hyperbolicity, CIRM, Luminy, 2011.

Dynamics of interval exchange maps, African Institute of Mathematical Sciences, Dakar, 2014.

Lyapunov exponents, School on Contemporary Dynamical Systems, Université de Montréal, 2017.

Lyapunov Exponents, DANCE Winter School on Nonlinear Science, Universidad Autonoma de Barcelona, 2020.

RESEARCH VISITS

- (1984) University of Paris-Sud.
- (1985) University of Paris-Sud.
- (1990) KTH-Stockholm, University of Dijon.
- (1991) IAS-Princeton, Cornell University, University of Santiago de Compostela, University of Paris-Sud (Orsay).
- (1992) Mittag-Leffler Institute-Stockholm, University of Groningen.
- (1993) University of Oviedo.
- (1994) University of California at Los Angeles, Princeton University, CIMAT-Mexico, University of Michigan, ETH-Zurich, University of Porto, University of Barcelona, University of Dijon.
- (1995) University of Geneva, University of Paris-Sud, University of Porto, University of Dijon.
- (1996) KTH-Stockholm, University of Porto, Schrödinger Institute-Vienna, University of Dijon.
- (1997) University of Dijon.
- (1998) University of Dijon.
- (1999) IMCA-Peru, IHES-Paris, University of Dijon.

- (2000) University of Porto, IST-Technical University of Lisbon, University of Dijon.
- (2001) KTH-Stockholm, ICTP-Trieste.
- (2002) University of Paris-Sud, University of Paris-Jussieu, Collège de France, KTH-Stockholm, University of Dijon.
- (2003) Imperial College of London.
- (2004) University of Dijon. Scuola Normale Superiore, Pisa. University of Barcelona. University of Paris-Jussieu.
- (2005) Imperial College of London. University of Beijing.
- (2006) Fields Institute, Toronto.
- (2014) Instituto de Matemáticas, Cuernavaca.

PH.D. STUDENTS

References correspond to papers issued from thesis.

Stefano Luzzatto, Università degli Studi di Trieste and IMPA, June 21, 1995
Critical and singular dynamics in the Lorenz equations (co-supervised with J. Palis).
Astérisque 261 (2000), 201–237.

José Ferreira Alves, IMPA, Aug 11, 1997
SRB measures for nonhyperbolic systems with multidimensional expansion.
Ann. Sci. École Norm. Sup. 33 (2000), 1–32.
Ergod. Th. & Dynam. Sys. 22 (2002), 1–32.

Maria João Costa, IMPA, Feb 09, 1998
Global strange attractors after collision of horseshoes with periodic sinks.
Anais Acad. Bras. Ciências 70 (1998), 393–400.
Disc. & Cont. Dynam. Sys. 9 (2002), 505–548.

Isabel Lugão Rios, IMPA, Oct 14, 1998
Unfolding homoclinic tangencies inside horseshoes: hyperbolicity, fractal dimensions, and persistent tangencies.
Nonlinearity 14 (2001), 431–462.

Vítor Domingos Araújo, IMPA, Nov 19, 1998
Attractors and time averages for random maps.
Annales Sci. de l'Inst. Henri Poincaré - Analyse Non-Linéaire 17 (2000), 307–369.

Augusto Armando de Castro Júnior, Nov 25, IMPA, 1998
Backward inducing and exponential decay of correlations for partially hyperbolic attractors whose central direction is mostly contracting.
Israel J. of Math. 130 (2001), 29–75.

Vanderlei Minori Horita, IMPA, May 24, 1999
Hausdorff dimension of non-hyperbolic repellers derived from Anosov diffeomorphisms.
J. Statistical Physics 105 (2001), 835–862.
Disc. & Cont. Dynam. Sys. 13 (2005), 1125–1152.

Alexandre Tavares Baraviera, IMPA, Nov 16, 2000
Robust nonuniform hyperbolicity for volume preserving maps.

Paulo Rogério Sabini, IMPA, Feb 20, 2001
Nonperiodic bifurcations at the boundary of hyperbolic systems.

Ergod. Th. & Dynam. Sys. 27 (2007), 459–492.
Trans. Amer. Math. Soc. 367 (2015), 8279–8300.

Nivaldo Costa Muniz, IMPA, Jul 12, 2001
Hénon-like attractors in arbitrary dimensions: SRB measures and basin problem.
Disc. & Cont. Dynam. Sys. 15 (2006), 481–504.

Jairo Bochi, IMPA, Jul 13, 2001 (Bolsista Nota 10 - FAPERJ; Affiliated Member Brazilian Academy of Sciences 2007)
Zero Lyapunov exponents.
Ergod. Th. & Dynam. Sys. 22 (2002), 1167–1696.
Annals of Math. 161 (2005) 1423–1485.

Flávio Abdenur, IMPA, Jan 09, 2002
Isolated transitive sets of C^1 generic systems.
Nonlinearity 16 (2001), 301–311.
Annales Sci. École Normale Supérieure 36 (2003), 213–224.
Procs. American Math. Society 132 (2004), 699–705.

Krerley Oliveira, IMPA, Oct 07, 2002
Equilibrium states for non-uniformly hyperbolic maps.
Affiliated Member Brazilian Academy of Sciences 2007.
Ergod. Th. & Dynam. Sys. 23 (2003), 1891–1905.

Mychelle Dysman, IMPA, Apr 14, 2003
Hausdorff dimension of repellers of maps with holes.
J. Statistical Physics 120 (2005), 479–509.

Carlos Matheus, IMPA, Apr 06, 2004 (Bolsista Nota 10 - FAPERJ)
Contributions to the ergodic theory of non-hyperbolic systems.
Comentarii Math. Helvetici 79 (2004), 753–757.
Nonlinearity 17 (2004), 581–593.
J. Statistical Physics 117 (2004), 243–260.

Alexander Arbieto, IMPA, Jun 08, 2004 (Bolsista Nota 10 - FAPERJ; Affiliated Member Brazilian Academy of Sciences 2010; Affiliated Member TWAS 2011)
Topics in conservative dynamics and related problems.
J. Stochastics and Dynamics 3 (2003), 73–81.
Found. Computational Mathematics 4 (2004), 269–275.
Bull. Braz. Math. Soc. 35 (2004), 363–376.

Nuno Luzia, IMPA, Feb 25, 2005
A variational principle for dimension of a class of non-conformal repellers.
Ergod. Th. & Dynam. Sys. 26 (2006), 821–846.

Mário Bessa, IMPA, May 05, 2005
Lyapunov exponents of conservative continuous time systems.
J. Differential Equations 228 (2006), 685–706.
Ergod. Th & Dynam. Sys. 27 (2007), 1445–1472.

Martin Andersson, IMPA, July 12, 2007
Robustness of ergodic properties in partially hyperbolic dynamics.
Trans. Amer. Math. Soc. 362 (2010), 1831–1867.

Jimmy Santamaria, IMPA, August 30, 2007
Cocycles over hyperbolic maps.

Astérisque 358 (2013) 1–12.

Astérisque 358 (2013) 13–74.

Paulo Varandas, IMPA, November 9, 2007

Existence and stability of equilibrium states for non-uniformly expanding maps.

Annales Sci. de l'Inst. Henri Poincaré – Analyse Non-Linéaire 27 (2010), 555–593.

Jiagang Yang, IMPA, June 18, 2008 (Bolsista Nota 10 - FAPERJ)

C^1 dynamics far from tangencies.

Ergod. Th. & Dynam. Sys. 31 (2011), 1537–1562.

Journal of the European Mathematical Society 15 (2013), 2043–2960.

Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 30 (2013), 845–877.

Javier Solano, IMPA, February 19, 2009

Absolutely continuous invariant measures for non-uniformly expanding skew-products.

Bull. Braz. Math. Soc. 44 (2013), 67–103.

Maria João Resende, IMPA, February 27, 2009

Exponential decay for the Teichmüller flow in the moduli space of quadratic differentials.

Comentarii Math. Helvetici 87 (2012), 589–638.

Alien Herrera Torres, IMPA, August 5, 2009

Simplicity of the Lyapunov spectrum for multidimensional continued fraction algorithms.

Carlos Bocker, IMPA. December 14, 2009 (Bolsista Nota 10 - FAPERJ; Best thesis IMPA 2010)

Continuity of Lyapunov exponents for 2D random matrices.

Ergod. Th. & Dynam. Syst. 37 (2017), 1413–1442.

Mohammad Fanaee, IMPA, May 3, 2010

Simple cocycles over Lorenz attractors.

José Régis Azevedo Varão Filho, IMPA, February 28, 2012 (Bolsista Nota 10 - FAPERJ)

Absolute continuity for diffeomorphisms with non-compact center leaves.

Dynamical Systems: an International Journal 30 (2015) 189–199

Ergodic Theory & Dynamical Systems (2015),

Journal of Modern Dynamics 8 (2014) 93–107.

Michel Cambrinha de Paula, IMPA, March 15, 2013

Generic symplectic cocycles are hyperbolic.

Portugaliae Mathematica 73 (2016), 171–176.

Vanessa Ribeiro Ramos, IMPA, May 22, 2013

Equilibrium states for hyperbolic potentials.

Nonlinearity 30 (2017), 825–847.

Elaís Cidely Malheiro, IMPA, July 1, 2014

Lyapunov exponents of linear cocycles over Markov shifts.

Stochastics & Dynamics 15 (2015), 1550020, 27p.

Ricardo Turola Bortolotti, IMPA, July 10, 2014 (Bolsista Nota 10 - FAPERJ)

Physical measures for certain partially hyperbolic attractors on 3-manifolds.

Ergodic Theory and Dynamical Systems 39 (2017), 1–31.

Nonlinearity 31 (2018), 2057–2082.

Lucas Backes, IMPA, February 11, 2015

On fiber-bunched cocycles: cohomology and Lyapunov exponents.

Bulletin of the Brazilian Mathematical Society 46 (2015), 163–179,

Ergodic Theory Dynam. Systems 36 (2016), 1703–1722.

Journal of Modern Dynamics 12 (2018), 223–260.

Karina Marín, IMPA, May 27, 2015

C^r -density of (non-uniform) hyperbolicity for partially hyperbolic symplectic diffeomorphisms.

Comment. Math. Helv. 91 (2016), 357–396.

Mauricio Poletti, IMPA, January 13, 2016

Simplicity of the Lyapunov spectrum for linear cocycles over certain partially hyperbolic maps.

Sto. & Dynam. 17 (2017), 1750047, 18 pp.

Discrete Cont. Dynam. Sys. 38 (2018), 5163–5188.

Nonlinearity 32 (2019), 238–284.

Andréa Midori Takai, UFRGS, March 6, 2017

Perspectivas do PROFMAT: política pública em construção.

e-book www.sbm.org.br/wp-content/uploads/2019/08/Perspectivas_do_profmat-final.pdf.

El Hadji Yaya Tall, IMPA, February 28, 2018

Moduli of continuity of Lyapunov exponents of random $GL(2)$ -cocycles.

Trans. Amer. Math. Soc. 373 (2020), 1343–1383.

Adriana Sánchez, IMPA, August 24, 2018

Contributions to the continuity problem for Lyapunov exponents.

Mathematical Research Letters 25 (2018), 1719–1740.

Catalina Freijo, IMPA, April 3, 2019

Continuity of Lyapunov exponents for linear cocycles with a single holonomy.

Ergod. Th. & Dynam. Sys. 1 (2020), 1–28.

Jamerson Douglas, IMPA, July 20, 2020

Randomness in hyperbolic dynamics

Sankhadip Chakraborty, IMPA, November 10, 2021

Hyperbolicity and rigidity for fibred partially hyperbolic systems

Currently supervising: Ana Cristina Araújo Artur Assis Amorim

MASTER'S STUDENTS

José Ferreira Alves, University of Porto, 1992, joint with M. Carvalho. Diss. *Absolutely continuous invariant measures for the quadratic family.*

Fernando Jorge S. Moreira, University of Porto, 1992, joint with M. Carvalho. Diss. *Chaotic dynamics of quadratic maps.*

Roberto Imbuzeiro Moraes Felinto de Oliveira, IMPA, 2000.

Carlos Bocker, IMPA, 2006.

José Regis Azevedo Varão Filho, IMPA, 2007. Bolsista Nota 10–FAPERJ.

Mauricio de Mello Rodrigues Collares Neto, IMPA, 2009.

Philip Thompson, IMPA, 2010.

Rafael Montezuma Cabral, IMPA, 2011.

Bruno Vianna dos Santos, IMPA (PROFMAT), 2013, joint with Victor Giraldo, Diss: *Cálculo no Ensino Médio (I).*

Luiz Amorim Goulart, IMPA (PROFMAT), 2013, joint with Victor Giraldo, Diss: *Cálculo no Ensino Médio (II)*.

Fábio Luís de Brito, IMPA (PROFMAT), 2013, joint with Victor Giraldo, Diss: *Cálculo no Ensino Médio (III)*.

Michael Cristian Soares dos Santos, IMPA (PROFMAT), 2013, joint with Leticia Rangel, Diss: *Tópicos sobre o Ensino de Frações (I): Divisão de Frações*.

Sandro da Costa Loyola, IMPA (PROFMAT), 2013, joint with Leticia Rangel, Diss: *Tópicos sobre o Ensino de Frações (II): Unidade*.

Wagner Rohr Garcez, IMPA (PROFMAT), 2013, joint with Leticia Rangel, Diss: *Tópicos sobre o Ensino de Frações (III): Equivalência*.

Orlando da Silva Júnior, IMPA (PROFMAT), 2014, joint with Victor Giraldo, Diss: *Cálculo no Ensino Médio (IV)*.

William Canellas Batista, IMPA (PROFMAT), 2014, Diss: *Métodos numéricos para a resolução de equações*.

Qiao Liu, IMPA, 2014.

Fábio Henrique Teixeira de Souza, IMPA (PROFMAT), 2016, Diss: *Aproximação polinomial de funções*.

Wenxiang Huang, IMPA, 2016.

Lucas Souza Mota de Aragão, IMPA, 2019.

Currently supervising: Yingjian Liu, IMPA.

PRIZES AND DISTINCTIONS

Undergraduate prizes, awarded by University of Porto: Gomes Teixeira 1983, Gomes Ribeiro 1983, Augusto Martins 1983 and Abílio Aires 1985.

Prize for best undergraduate in Science, Fundação Eng. António José de Almeida, Porto, 1984.

Plenary Speaker, International Congress of Mathematical Physics, Paris, 1994.

Invited Speaker, International Congress of Mathematicians, ICM-Zurich, 1994.

Member, Brazilian Academy of Sciences, elected in 1997.

Third World Academy of Sciences Award in Mathematics, 1998.

Plenary Speaker, International Congress of Mathematicians, ICM-Berlin, 1998.

National Order of Scientific Merit ("Grã Cruz"), granted by the President of Brazil, 2000.

Member, Third World Academy of Sciences, elected in 2000.

UMALCA (União Matemática da América Latina e do Caribe) Award in Mathematics, 2000.

Invited Professor, Collège de France, Paris, 2002.

Santaló Distinguished Lecturer, Universidad Complutense, Madrid, 2005.

Ramanujan Prize, ICTP, 2005.

Corresponding Member, Portuguese Academy of Sciences, elected in 2006.

Prize Universidade de Coimbra, 2007.

Distinction *Grande Cientista Brasileiro*, Universidade Federal Fluminense, 2009.

Corresponding Member, Chilean Academy of Sciences, elected in 2009.

Plenary Speaker, Latin American Congress of Mathematicians, CLAM-Córdoba, 2012.

Grand Prix Scientifique Louis D., Académie des Sciences de Paris, Institut de France, 2016.

Prêmio Anísio Teixeira para a Educação Básica, CAPES, 2016.

Cruz da Referência Nacional, ANCEC – Agência Nacional de Cultura, Empreendedorismo e Comunicação, 2017.

Professor *Honoris Causa*, IEMA - Instituto Maranhense de Educação, Ciência e Tecnologia, 2018.

National Order of Educational Merit ("Comendador"), granted by the President of Brazil, 2018.

Plenary Speaker, International Congress of Industrial and Applied Mathematics, ICIAM-Valencia, 2019.

CBMM Science Prize, Companhia Brasileira de Metalurgia e Mineração, 2019.

ICTS Distinguished Lecturer, ICTS, Bangalore, 2019.

GRANTS AND RESEARCH PROJECTS

Calouste Gulbenkian Foundation Fellowship, 1988–1990

International Mathematical Union Grant to attend the ICM90 - Kyoto, 1990

Guggenheim Foundation Fellowship, 1993–1994

CNPq Research Grant, since 1991, highest level (1A)

coordinator CNPq Research Project "Edital Universal", 2001–2002, 2007–2009, 2009–2011, 2011–2013, 2017–2019.

coordinator FAPERJ Fellowship "Cientista do Nosso Estado", 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, 2009–2011, 2012–2014, 2015–2017, 2018–2020.

coordinator PRONEX/CNPq Research Project "Sistemas Dinâmicos", 2004–2006, 2007–2009, 2010–2012, 2013–2015, 2018–2020.

coordinator PROSUL/CNPq Research Projects "UMALCA na América do Sul", 2004–2005, 2007–2009.

coordinator PROSUL/CNPq Network "Rede Sul-Americana de Sistemas Dinâmicos" for scientific cooperation in South America, 2003–2005, 2006–2008.

coordinator PROCAD/CAPES IMPA/UFES/UFF graduate teaching cooperation project, 2006–2009.

coordinator MathAmSud project DySET-Dynamical Systems and Ergodic Theory, 2009–2012.

"Projeto Klein em Língua Portuguesa", SBM/CAPES, 2010–2014.

"Projeto Integrando a Amazônia", SBM/CNPq, 2012–2015.

PREVIOUS ACADEMIC POSITIONS

Associate Professor, IMPA (Oct 1992 – Jun 1997)

Assistant Professor, IMPA (Dec 1991 – Oct 1992)

Assistant Professor, University of Porto (Sep 1991 – Sep 1993)

Assistant II, University of Porto (Jul 1987 – Sep 1991)

Research Assistant, IMPA (Jun 1987 – Dec 1991)

Assistant I, University of Porto (Oct 1984 – Jul 1987)

EDITORIAL

Dynamics and Stability of Systems, 1995 – 1999.

Nonlinearity, 1996 – 2003.

Ergodic Theory & Dynamical Systems, 1998–2011 (executive editor), 2012–2015 (survey editor), and 2016 to date (associate editor).

Dynamical Systems: An International Journal, since 1999.

Portugaliae Mathematica, since 1999.

Discrete and Continuous Dynamical Systems, 1999–2011.

Stochastics and Dynamics, since 2000.

Nonlinear Differential Equations and Applications, 2001–2008.

Dynamics of Partial Differential Equations, since 2004.

Journal of the European Mathematical Society, 2014–2016.

Bulletin of the Brazilian Mathematical Society, since 2016.

Transactions of the London Mathematical Society, since 2021.

Referee for *Annals of Mathematics*, *Inventiones Mathematicae*, *Publications Mathématiques de l’IHES*, *Annales Scientifiques de l’ENS*, *Ergodic Theory & Dynamical Systems*, *Nonlinearity*, *Annales Sci. de l’Institut Henri Poincaré*, *Commentarii Mathematici Helvetici*, *Proceedings of the AMS*, *Comptes Rendus de l’Académie des Sciences de Paris*, *Discrete and Continuous Dynamical Systems*, *Journal of Complexity*, *Communications in Mathematical Physics*, *Israel Journal of Mathematics*, *Journal of Differential Equations*, and other journals.

ORGANIZATION

International Conference on Dynamical Systems, Porto, August 1992.

International Conference on Dynamical Systems, 25th anniversary of IMPA’s Dynamical Systems Seminar, September 1994.

Workshop *Bifurcations to chaos and low-dimensional dynamics* in *Ergodic Theory & Dynamical Systems*, Warsaw, June 1995.

Workshop on Non-uniformly hyperbolic dynamics, Atlanta, May 2000.

International Conference on Dynamical Systems, celebrating the 60th birthday of J. Palis, IMPA, July 2000.

School and Workshop on Dynamical Systems, ICTP-Trieste, August 2001.

Workshop on Robustness and Partial Hyperbolicity, Rio de Janeiro, November 2003.

Workshop on the Geometry of Submanifolds and Chaotic Dynamics, Maceio, February 2004.

Workshop on Dynamical Systems and Applications, Porto, May 2004.

2nd Latin American Congress of Mathematicians, Cancún, June 2004.

Summer Conference and School on Dynamical Systems, ICTP-Trieste, July–August 2004.

1^{as} Jornadas de Iniciação Científica, IMPA, November 2004.

Workshop on Chaotic Dynamics and Differential Geometry, Salvador, March 2005.

25th Brazilian Mathematical Colloquium, IMPA, July 2005.

International Congress on Dynamical Systems, Angra, August 2005.

1st Workshop on Conservative Dynamics and Symplectic Geometry, IMPA, August 2005.

2^{as} Jornadas de Iniciação Científica, IMPA, November 2005.

ICTP-CNPq School and Workshop on Dynamical Systems, IMPA, January 2006.

1st Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2006.

International Congress on the Applications of Mathematics ICAM 2006, CMM, Santiago de Chile, March 2006.

International Conference on Dynamics Beyond Uniform Hyperbolicity, Chicago, May 2006.

International Congress of Mathematical Physics/Young Researchers Symposium 2006, IMPA, August 2006.

Symposium of Dynamical Systems, celebrating the 60th birthday of W. de Melo, Salvador, October 2006.

3^{as} Jornadas de Iniciação Científica, IMPA, November 2006.

2nd Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2007.

Escola de Altos Estudos-CAPES (Profs. G. Tian and L. Florit), IMPA, July 2007.

2nd Workshop on Conservative Dynamics and Symplectic Geometry, IMPA, August 2007.

3rd Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2008.

School and Workshop on Dynamical Systems, ICTP-Trieste, June-July 2008.

CIM School on Dynamical Systems, CIM-Coimbra, July 2008.

4^{as} Jornadas de Iniciação Científica, IMPA, November 2008.

EMALCA da Região Central, Rondonópolis, MT, January 2009.

4th Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2009.

5th TWAS-ROLAC Young Scientist Conference, Rio de Janeiro, May 2009.

International Conference on Dynamics Beyond Uniform Hyperbolicity, Beijing, August 2009.

EMALCA da Amazonia, Manaus, August 2009.

3rd Workshop on Conservative Dynamics and Symplectic Geometry, IMPA, August 2009.

3rd Latin American Congress of Mathematicians, Santiago de Chile, September 2009.

Séminaire Brésil-France en Mathématiques, Brazilian Academy of Sciences, September 2009.

1º Colóquio de Matemática da Região Centro-Oeste, Universidade Federal do Mato Grosso do Sul, Campo Grande, October 2009.

6th TWAS-ROLAC Young Scientist Conference, Rio de Janeiro, December 2009.

5th Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2010.

International Conference on Dynamical Systems, celebrating Jacob Palis' 70th birthday, Búzios, Rio de Janeiro, March 2010.

1º Colóquio de Matemática da Região Sul, Universidade Federal de Santa Maria, April 2010.

7th TWAS-ROLAC Young Scientist Conference, Rio de Janeiro, May 2010.

1º Colóquio de Matemática da Região Norte, Universidade Federal do Pará, Belém, September 2010.

8th TWAS-ROLAC Young Scientist Conference, Rio de Janeiro, December 2010.

1º Colóquio de Matemática da Região Nordeste, Universidade Federal do Sergipe, Aracaju, March 2011.

6th Workshop on Topology and Dynamical Systems, Universidade Federal Fluminense, February 2011.

International Conference on Dynamical Systems, celebrating the 90th birthday of Maurício Peixoto, IMPA, April 2011.

1º Colóquio de Matemática da Região Sudeste, Univ. Federal de São João del Rei, April 2011.

Mathematics in the Americas, IMPA, May 2011.

International Conference on Global Dynamics Beyond Uniform Hyperbolicity, CIRM, Luminy, June 2011.

7th Workshop on Topology and Dynamical Systems, Univ. Federal Fluminense, February 2012.

Klein Workshop Panoramas of Mathematics in the 20th Century, IMPA, April 2012.

International Conference on the Frontiers of Mathematics, IMPA, April 2012.

School and Conference on Dynamical Systems, ICTP, Trieste, May 2012.

IMPA 60 years, IMPA, October 2012.

International Conference on Dynamics Beyond Uniform Hyperbolicity, Bedlewo, June 2013.

Workshop on Combinatorics, Number Theory and Dynamical Systems, IMPA, August 2013.

1st Mathematical Congress of the Americas, Guanajuato, 2013.

Workshop on Conservative Dynamics and Symplectic Geometry, IMPA, September 2013.

International Conference on Dynamical Systems, IMPA, November, 2013.

Semester Dynamics Beyond Uniform Hyperbolicity, IMPA, August - November, 2013.

Klein Project Conference, IMPA, April 2014.

3º Colóquio de Matemática da Região Norte, Universidade Federal do Amazonas, October 2014.

School and Conference on Dynamical Systems, ICTP, Trieste, July 2015.

First Joint Meeting Brazil-Italy in Mathematics, IMPA, July 2016.

School on Contemporary Dynamical Systems, Université de Montréal, 2017.

2nd Mathematical Congress of the Americas, McGill University, Montréal, July 2017.

Biênio da Matemática, Brazil, January 2017 – December 2018.

Festival da Matemática, Rio de Janeiro, April 2017.

International Mathematical Olympiad, Rio de Janeiro, July 2017.

Semana Nacional da Ciência e Tecnologia: A matemática está em tudo, Brazil, October 2017.

2018 IMU General Assembly, São Paulo, July 2018.

2018 International Congress of Mathematicians, Rio de Janeiro, August 2018.

Workshop Matemática e Indústria do IMPA, February 2020.

Festival Nacional da da Matemática, Rio de Janeiro, September 2022.

ACADEMIC ADMINISTRATION

Chair, Department for Scientific Activities of IMPA, 1996–2004, 2012–2015.

Elected Member, Directing Council of Brazilian Mathematical Society, 1997–2001.

Scientific Coordinator, Mathematical Union of Latin America and the Caribbean (UMALCA), 2001–2004, 2005–2008.

Deputy Director, IMPA, 2004–2007.

Elected Member, Executive Committee of International Mathematical Union, 2007–2010.

Chair, Forum for Research and Graduate Studies in Mathematics, 2008–2010.

Member, Directing Council CNPq, 2009–2013.

Vice-president, Brazilian Mathematical Society, 2009–2013

Chair, Regional Office for Latin America and the Caribbean, Academy of Sciences for the Developing World (TWAS), 2009–2010.

Vice-president, International Mathematical Union, 2011–2012, 2013–2014.

Chair, PROFMAT (Nationwide Master Program for High-School Teachers in Brazil) Directing Council, 2010–2016

Chair, Department for Scientific Activities of IMPA, 2012–2015.

President, Brazilian Mathematical Society, 2013–2015.

Elected Member, Executive Committee, Mathematical Council of the Americas, 2013–2018.

Director, IMPA, 2015–2019, 2019–2023.

Treasurer, Mathematical Council of the Americas, 2016–2017, 2018–2023.

Member, Directing Council, FAPERJ, 2019–2022.

COMMITTEE MEMBERSHIP

Chair, Committee for Mathematics and Statistics, CNPq, 1998–2001.

Member, Geometry and Dynamics Panel, NSF, 2003.

Area Coordinator for Mathematics, FAPERJ, 2004–2008.

Member, Membership Selection Committee, Brazilian Academy of Sciences, 2004–2009.

Chair, Committee for Mathematics and Statistics, CNPq, 2004–2007.

Member, Committee for Mathematics and Statistics, CAPES, 2005–2007.

Member, Scientific Council, Centro Internacional de Matemática (CIM), 2005–present.

Member, Membership Advisory Committee, Academy of Sciences for the Developing World (TWAS), 2007–2009, 2010–2012.

Member, L'Oréal Grant Committee for Women in Science, 2007–present.

President, International Jury, Ibero-American Mathematical Olympiad, 2008.

Member, Brin Prize Committee, University of Maryland, 2007–2011.

Chair, Committee for Mathematics and Statistics, CAPES, 2008–2010.

Member, Ramanujan Prize Committee, ICTP/IMU, 2008–2010.

Member, Committee for the ELAM-Latin American School of Mathematics, UMALCA, 2009-2012.
Member, Advisory Board, Universidade do Minho, FCT, 2009–2011.
Member, Steering Committee of the Mathematical Congress of the Americas, 2011–2013.
Member, ICSU-ROLAC 2015 evaluation panel.
Member, Steering Committee of the Mathematical Congress of the Americas, 2014–2017.
Member, External Advisory Committee, Joint Doctoral Program Universities of Porto and Coimbra, FCT, 2017–2020.
Member, Steering Committee of the Mathematical Congress of the Americas, 2018–2021.
Board Member, Rede de Ciência para Educação, 2019–2022.
Chair, Scientific Advisory Board, Instituto Serrapilheira, 2020-2023.
Panel Member, Advanced Grants Program, European Research Council, 2019–2022.

MEMBERSHIP

Brazilian Mathematical Society, since 1987.
American Mathematical Society, since 1994.

RESEARCH PAPERS

The differentiability of the hairs of $\exp(z)$, Procs. A. M. S. Vol 103, 4 (1988), 1179–1184.
Continuity of Hausdorff dimension and limit capacity for horseshoes, with J. Palis, *Dynamical Systems*, Lect. Notes in Math. 1331, 150–160, Springer Verlag (1988).
Discontinuity of Hausdorff dimension and limit capacity on arcs of diffeomorphisms, with L. J. Díaz, *Ergod. Th. & Dynam. Sys.* 9 (1989), 403–425.
Abundance of strange attractors, with L. Mora, *Acta Math.* 171 (1993), 1–71.
Strange attractors in higher dimensions, *Bull. Braz. Math. Soc.* 24 (1993), 13–62.
High dimension diffeomorphisms displaying infinitely many periodic attractors, with J. Palis, *Annals of Math.* 140 (1994), 207–250.
Discontinuity of the Hausdorff dimension of hyperbolic sets, with C. Bonatti and L. J. Díaz, *C.R.A.S.* 320, série I (1995), 713–718.
Strange attractors in saddle-node cycles: prevalence and globality, with L. J. Díaz and J. Rocha, *Invent. Math.* 125 (1996), 37–74.
Strong stochastic stability and rate of mixing for unimodal maps, with V. Baladi, *Annales Sci. E.N.S.* série 4, t-29 (1996), 483–517.
Multidimensional nonhyperbolic attractors, *Publ. Math. IHES.* 85 (1997), 63–96.
Lorenz-like attractors with arbitrary unstable dimension, with C. Bonatti and A. Pumariño, *C.R.A.S.* 325, série I (1997), 883–888.
Infinite-modal maps with global chaotic behavior, with M. J. Pacifico and A. Rovella, *Annals of Math.* 148 (1998), 1–44.
Positive Lyapunov exponents for Lorenz-like families with criticalities, with S. Luzzatto, *Astérisque* 261 (2000), 201–237.

- SRB measures for partially hyperbolic systems whose central direction is mostly contracting*, with C. Bonatti, Israel Journal of Math. 115 (2000), 157–193.
- SRB measures for partially hyperbolic systems whose central direction is mostly expanding*, with J. F. Alves and C. Bonatti, Invent. Math. 140 (2000), 351–398.
- Solution of the basin problem for Hénon-like attractors*, with M. Benedicks, Invent. Math. 143 (2001), 375–434.
- Homoclinic bifurcations and fractal invariants in arbitrary dimension*, with C. G. Moreira and J. Palis, C.R.A.S. 333 (2001), 475–480.
- Hausdorff dimension for non-hyperbolic repellers I. Maps with holes*, with V. Horita, J. Statistical Physics 105 (2001), 835–862.
- Statistical stability for a robust class of maps with non-uniform expansion*, with J. F. Alves, Ergod. Th. & Dynam. Sys. 22 (2002), 1–32.
- Uniform (projective) hyperbolicity or no hyperbolicity: a dichotomy for generic conservative systems*, with J. Bochi, Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 19 (2002), 113–123.
- Généricité d'exposants de Lyapunov non-nuls pour des produits déterministes de matrices*, with C. Bonatti and X. Gomez-Mont, Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 20 (2003), 579–624.
- Parameter exclusions in Hénon-like systems*, with S. Luzzatto. Russian Math. Surveys 58 (2003), 1053–1092.
- Lyapunov exponents with multiplicity 1 for deterministic products of matrices*, with C. Bonatti, Ergod. Th. & Dynam. Sys. 24 (2004), 1295–1330.
- Abundance of stable ergodicity*, with C. Bonatti, C. Matheus, A. Wilkinson, Commentarii Math. Helvetici 79 (2004), 753–757.
- The Lyapunov exponents of generic volume preserving and symplectic systems*, with J. Bochi, Annals of Mathematics 161 (2005) 1423–1485.
- Hausdorff dimension for non-hyperbolic repellers II: DA diffeomorphisms*, with V. Horita, Discrete & Continuous Dynamical Systems 13 (2005), 1125–1152.
- Dynamics in the moduli space of Abelian differentials*, with A. Avila, Portugaliae Mathematica 62 (2005) 531–547.
- Random perturbations and statistical properties of Hénon-like maps*, with M. Benedicks, Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 23 (2006), 713–752.
- Ergodic theory of interval exchange maps*, Revista Matemática Complutense 19 (2006), 7-100.
- Existence and uniqueness of maximizing measures for robust classes of local diffeomorphisms*, with K. Oliveira, Discrete & Continuous Dynamical Systems 15 (2006), 225–236.
- Simplicity of Lyapunov spectra: a sufficient criterion*, with A. Avila, Portugaliae Mathematica 64 (2007) 311–376.
- Simplicity of Lyapunov spectra: proof of the Zorich-Kontsevich conjecture*, with A. Avila, Acta Mathematica 198 (2007), 1–56.
- Lyapunov exponents of Teichmüller flows*, Fields Institute Communications 51 (2007) 139–201.
- Almost all cocycles over any hyperbolic system have non-zero Lyapunov exponents*, Annals of Mathematics 167 (2008), 643–680.

- Thermodynamical formalism for an open class of potentials and non-uniformly hyperbolic systems*, with K. Oliveira, Ergod. Th & Dynam. Sys. 28 (2008), 501–533.
- Singular hyperbolic attractors are chaotic*, with V. Araújo, M. J. Pacifico, E. Pujals, Trans. Amer. Math. Soc. 361 (2009), 2431–2485.
- Invariant measures for interval maps with critical points and singularities*, with V. Araújo and S. Luzzatto, Advances in Mathematics 221(2009), 1428–1444.
- Existence, uniqueness, and stability of equilibrium states for non-uniformly expanding maps*, with P. Varandas, Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 27(2010), 555–593.
- Extremal Lyapunov exponents: an Invariance Principle and applications*, with A. Avila, Inventiones Mathematicae 181(2010), 115–189.
- Entropy conjecture for diffeomorphisms away from tangencies*, with G. Liao and J. Yang, Journal of the European Mathematical Society 15 (2013), 2043–2060.
- Physical measures and absolute continuity for one-dimensional center direction*, with J. Yang, Annales Sci. Inst. Henri Poincaré - Analyse Non-Linéaire 30 (2013), 845–877.
- Cocycles over partially hyperbolic maps*, with A. Avila, J. Santamaria, and A. Wilkinson, Astérisque 358 (2013) 1–12.
- Holonomy invariance: rough regularity and applications to Lyapunov exponents* with A. Avila and J. Santamaria, Astérisque 358 (2013) 13–74.
- Absolute continuity, rigidity, and Lyapunov exponents I: geodesic flows*, with A. Avila, A. Wilkinson, Journal of the European Mathematical Society 17 (2015), 1435–1462.
- Lyapunov exponents of linear cocycles over Markov shifts*, with Elais C. Malheiro, Stochastics & Dynamics 15 (2015), 1550020, 27 pp.
- Geometric and measure-theoretical structures of maps with mostly contracting center*, with D. Dolgopyat and J. Yang, Comm. Math. Physics. 341 (2016), 991–1014.
- Equilibrium states for hyperbolic potentials*, with V. Ramos, Nonlinearity 30 (2017), 825847.
- Measure-theoretical properties of center foliations*, with J. Yang, Contemporary Math. 692 (2017), 291–320.
- Continuity of Lyapunov exponents for 2D random matrices*, with C. Bocker, Ergod. Th. & Dynam. Syst. 37 (2017), 1413–1442.
- Lyapunov exponents of probability distributions with non-compact support*, with A. Sánchez, preprint 2018.
- Continuity of Lyapunov exponents in the C^0 topology*, with J. Yang, Israel J. of Math. 229 (2019), 461–485.
- Simple Lyapunov spectrum for certain linear cocycles over partially hyperbolic maps*, with M. Poletti, Nonlinearity 32 (2019), 238–284.
- Moduli of continuity for the Lyapunov exponents of random $GL(2)$ -cocycles*, with E. Y. Tall, Trans. Amer. Math. Soc. 373 (2020), 1343–1383.
- (Dis)continuity of Lyapunov exponents*. Ergod. Th. & Dynam. Sys. 40 (2020), 577–611.
- Stable accessibility with 2-dimensional center*, with A. Avila, Astérisque 416 (2020), 301–320.
- Maximal entropy measures of diffeomorphisms of circle fiber bundles*, with R. Ures and J. Yang, Journal of the London Math. Soc., 103 (2021), 1016–1034.

Partially volume expanding diffeomorphisms, with S. Gan, M. Li and J. Yang, *Annales Henri Poincaré*, 22 (2021), 331–346.

Absolute continuity, rigidity, and Lyapunov exponents II: systems with compact center leaves, with A. Avila and W. Wilkinson, *Ergod. Th. & Dynam. Sys.* 42 (2022), 437–490.

Thermodynamical u-formalism I: measures of maximal u-entropy for maps that factor over Anosov, with R. Ures, F. Yang and J. Yang, preprint 2020.

Hyperbolicity and rigidity for fibred partially hyperbolic systems, with S. Chakraborty, preprint 2022.

BOOKS

Stochastic dynamics of deterministic systems, 196 pages, XXI Braz. Math. Colloq., IMPA, Rio de Janeiro, 1997. ISBN 978-852-4401-26-8.

Lecture notes on attractors and physical measures, 102 pages, monograph XIII ELAM, IMCA-Lima, 1998.

Geometric methods in Dynamics (I), with W. de Melo and J.-C. Yoccoz (ed), *Astérisque* 286 (2003), xxviii+308 pages. ISBN 978-285-6291-38-2

Geometric methods in Dynamics (II), with W. de Melo and J.-C. Yoccoz (ed), *Astérisque* 287 (2003), xxii+272 pages. ISBN 978-285-6291-39-9

Dynamics beyond uniform hyperbolicity: A global geometric and probabilistic perspective, with C. Bonatti and L. J. Díaz. *Encyc. Math. Sciences*, vol 102, xviii+384 pages, Springer Verlag, 2004. ISBN 978-3-540-26844-4.

Fundamentos da Teoria Ergódica, xvi + 496 pages, with K. Oliveira, *Coleção Fronteiras da Matemática*, Sociedade Brasileira de Matemática, 2014. ISBN 978-85-8337-119-9.

Lectures on Lyapunov exponents, x + 202 pages, Cambridge University Press, 2014. ISBN 978-110-7081-73-4

Dynamics, games and science, with J.-P. Bourguignon, R. Jeltsch and A. A. Pinto (ed), *CIM Series in Mathematical Sciences* 1, xviii+772 pages, Springer Verlag, 2015. ISBN 978-3-319-16118-1.

Mathematics of energy and climate change, with J.-P. Bourguignon, R. Jeltsch and A. A. Pinto (ed), *CIM Series in Mathematical Sciences* 2, xvi+430 pages, Springer Verlag, 2015. ISBN 978-3-319-16121-1.

Foundations of Ergodic Theory, with K. Oliveira, Cambridge University Press, xvi + 530 pages, 2016. ISBN 978-131-6422-60-1.

Proceedings of the International Congress of Mathematicians, ICM 2018 Rio de Janeiro, with B. Sirakov and P. N. de Souza (ed), vols 1–4, Brazilian Mathematical Society & World Scientific, 2019. ISBN 978-981-3272-87-3.

Fundamentos da Teoria Ergódica, approx. 500 pages, with K. Oliveira, 2ª edição, *Coleção Fronteiras da Matemática*, Sociedade Brasileira de Matemática, 2019. ISBN 978-85-8337-017-8.

Differential equations: a dynamical systems approach to theory and practice, approx. 500 pages, with J. Espinar and the collaboration of G. T. Goedert and H. Mesa, *Graduate Studies in Mathematics*, Volume 212, American Mathematical Society, 2021. ISBN 978-1-4704-5114-1.

PROCEEDINGS, SURVEYS, ENCYCLOPEDIA ARTICLES

Persistence of strange attractors when unfolding homoclinic tangencies, in *Dynamical Systems and Related Topics*, K. Shiraiwa (ed.), *Advanced Series in Dynamical Systems* 9, 539-549, World Scientific 1990.

Prevalence of Hénon-like attractors in the unfolding of saddle-node cycles, Procs. XVIII Braz. Math. Colloquium, IMPA, Rio de Janeiro, 1991.

Homoclinic bifurcations and strange attractors, in Real and Complex Dynamical Systems, B. Branner, P. Hjorth (eds.), NATO ASI Series C-464, 231-264, Kluwer Academic Publishers, Dordrecht, 1995.

Chaotic dynamical behaviour, in Procs. XI International Congress of Mathematical Physics ICMP94 Paris, D. Iagolnitzer (ed.), 142-154, International Press, Boston, 1995.

Homoclinic bifurcations and persistence of nonuniformly hyperbolic attractors, in Procs. International Congress of Mathematicians, ICM94 Zurich, 1221-1229, Birkhäuser, Basel, 1995.

Global attractors and bifurcations, in Nonlinear Dynamical Systems and Chaos, H.W. Broer, S.A. van Gils, I. Hoveijn, F. Takens (eds.), Progress in Nonlinear Partial Differential Equations and Applications (PNLDE no 19), 299-324, Birkhäuser, 1996.

The statistics of attractors, Procs. 27th Annual Iranian Mathematical Conference (1996), Shiraz University, Iran, 305–318.

Dynamics: a probabilistic and geometric perspective, Documenta Mathematica - ICM98 Berlin vol. 2 (1998), 557-578.

Towards a theory of chaotic dynamics, 1998 Award Lecture, Procs. Third World Academy of Sciences, 2000.

What's new on Lorenz strange attractors ?, Math. Intelligencer 22-3 (2000), 6-19.

Lorenz attractors with arbitrary expanding dimension, with C. Bonatti and A. Pumariño, International Conference on Differential Equations, Vol. 1, 2 (Berlin, 1999), 39–44, World Sci. Publishing, 2000.

Dynamical Systems: moving into the next century, in Mathematics Unlimited: 2001 and Beyond, 1167–1178. Springer Verlag.

The intermittency route to chaotic dynamics, with L. J. Díaz and I. L. Rios, in Global Analysis of Dynamical Systems (F. Takens Festschrift), H. Broer, B. Krauskopf, G. Vegter (eds.), 309–327, IOP Publ., 2001.

Pisa lectures on Lyapunov exponents, with J. Bochi, in Dynamical Systems. Part II: Topological, geometrical and ergodic properties of dynamics, 23–47. Scuola Normale Superiore, Pisa, 2004.

Lyapunov exponents: how frequently are dynamical systems hyperbolic ?, with J. Bochi, Modern Dynamical Systems and Applications, 271–297, Cambridge University Press, 2004.

Lyapunov exponents and strange attractors, Encyclopedia of Mathematical Physics, eds. J.-P. Francoise, G.L. Naber and Tsou S.T., Elsevier, 2006, volume 3, page 349.

Géométrie et dynamique des surfaces plates, Images des Mathématiques 2006, 147–154.

Hyperbolic dynamical systems, with V. Araújo, Encyclopedia of Complexity and Systems Science, Ed. Robert M. Meyers, Springer Verlag, 2008, 4723–4737.

POPULARIZATION, MAGAZINES

Avaliação objetiva (?) da Ciência, Jornal da Ciência, July 7, 2008.

Jornadas de IC: realizações, desafios e oportunidades, with H. N. Lopes, R. I. Oliveira, W. Santos. Matemática Universitária 44 (2008), 34–38.

Mathematical Congress of the Americas, with S. Friedlander, Notices of the A.M.S., February 2012.

Geometria e dinâmica das superfícies planares, Revista Matemática Universitária 52/53 (2012), Sociedade Brasileira de Matemática, 2015.

Math in Brazil: sowing the seeds, Notices of the A.M.S., March, 2017.

Teoremas e emoções, Magazine Quatro Cinco um, October 2020.

NEWSPAPER ARTICLES

A chave mágica para tudo que nos rodeia, Folha de São Paulo, October 07, 2016.

Quanto vale a matemática para o Brasil?, Folha de São Paulo, March 03, 2017.

Meninas podem ser o que quiserem, inclusive matemáticas, Folha de São Paulo, March 10, 2017.

Descobertas matemáticas nas praias do Rio, Folha de São Paulo, March 17, 2017.

Quando um planeta foi descoberto na ponta de uma caneta, Folha de São Paulo, March 24, 2017.

Pai de armas infernais e gênio matemático: redescubra Arquimedes, Folha de São Paulo, March 31, 2017.

Um projeto para fazer alunos campeões, Folha de São Paulo, April 07, 2017.

Número π parece esquisitão mas é fonte inesgotável de maravilhas, Folha de São Paulo, April 14, 2017.

Festival mostra como matemática transforma vidas e é divertida, Folha de São Paulo, April 21, 2017.

O dia em que o Ceará comprovou a teoria da relatividade, Folha de São Paulo, April 28, 2017.

Festival prova o teorema: matemática é um barato!, Folha de São Paulo, May 05, 2017.

Elon Lages Lima foi o matemático que amava os livros, Folha de São Paulo, May 12, 2017.

A escola e seus problemas começaram há milênios, Folha de São Paulo, May 19, 2017.

Maioria dos calculadores prodigiosos é, na verdade, ruim de matemática, Folha de São Paulo, May 26, 2017.

Frações são as vilãs da matemática?, Folha de São Paulo, June 02, 2017.

Pais podem diminuir ansiedade matemática dos filhos, Folha de São Paulo, June 09, 2017.

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Com 5ª maior delegação em congresso matemático, Brasil ganha destaque, Folha de São Paulo, June 23, 2017.

Brincadeiras e jogos aproximam crianças da matemática, Folha de São Paulo, June 30, 2017.

Memorização tem lugar na sala de aula, Folha de São Paulo, July 07, 2017.

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Paradoxos estão por toda parte, Folha de São Paulo, July 21, 2017.

Tomar decisões é difícil, mas a matemática pode ajudar, Folha de São Paulo, July 28, 2017.

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Uma nação que pretende ser forte precisa de ciência, dizia Napoleão, Folha de São Paulo, September 15, 2017.

Formação é calcanhar de Aquiles dos professores de matemática do Brasil, Folha de São Paulo, September 22, 2017.

A criptografia moderna não existiria sem os números primos, Folha de São Paulo, September 29, 2017.

Outros animais têm o sentido do número, mas só a humanidade conta, Folha de São Paulo, October 06, 2017.

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Impa celebra 65 anos de contribuições à matemática e ao Brasil, Folha de São Paulo, October 20, 2017.

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A matemática molda trajetórias de vida, Folha de São Paulo, November 17, 2017.

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Olimpíada de matemática também descobre professores de excelência, Folha de São Paulo, December 15, 2017.

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Grafos permitem entender a matemática por trás dos jogos, Folha de São Paulo, December 29, 2017.

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Nem 4% dos nossos jovens dominam a matemática, Folha de São Paulo, January 07, 2018.

Pál Erdos, para quem matemática era vida, Folha de São Paulo, January 12, 2018.

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Cotas não resolvem, mas ajudam, Folha de São Paulo, January 21, 2018.

Poincaré e Oscar 2º, o rei que amava a matemática, Folha de São Paulo, January 26, 2018.

Brasil sobe da 5ª divisão à elite da pesquisa matemática, Folha de São Paulo, February 02, 2018.

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Quatro cores bastam para colorir qualquer mapa, Folha de São Paulo, March 02, 2018.

Documentos de identidade em Portugal foram emitidos com erros matemáticos, Folha de São Paulo, March 09, 2018.

Primos gêmeos constituem um dos mistérios mais intrigantes da aritmética, Folha de São Paulo, March 16, 2018.

Grandes professores de matemática inspiram e moldam destinos, Folha de São Paulo, March 23, 2018.

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Para Einstein, o princípio criativo da física reside na matemática, Folha de São Paulo, April 13, 2018.

Para Einstein, o princípio criativo da física reside na matemática, parte 2, Folha de São Paulo, April 20, 2018.

A matemática deve estar sempre presente, Folha de São Paulo, May 02, 2018.

Manfredo do Carmo foi o professor de todos os geometras, Folha de São Paulo, May 09, 2018.

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Todo ser humano nasce apto para a matemática, Folha de São Paulo, May 30, 2018.

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Mega-Sena ilustra os mistérios do acaso, Folha de São Paulo, June 27, 2018.

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Pedro Nunes, matemático entre dois mundos, Folha de São Paulo, August 22, 2018.

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Professor, escultor de almas e destinos, Folha de São Paulo, October 17, 2018.

Conjectura abc causa discussão no reino da matemática, Folha de São Paulo, October 24, 2018.

Olimpíada de matemática das escolas públicas abre as portas aos pequenos, Folha de São Paulo, October 31, 2018.

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Maior de todos os cientistas, Newton não foi um grande ser humano, Folha de São Paulo, November 14, 2018.

Emmy Noether, "pai" da álgebra moderna, Folha de São Paulo, November 21, 2018.

Pitágoras não é o autor do teorema matemático que carrega seu nome, Folha de São Paulo, November 28, 2018.

Quem quer ser um matemático milionário?, Folha de São Paulo, December 05, 2018.

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Mulher semilendária, Hipátia foi a primeira matemática, Folha de São Paulo, February 6, 2019.

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Os marcianos já caminharam na Terra, Folha de São Paulo, February 20, 2019.

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Para que serve a ciência de Einstein?, Folha de São Paulo, March 20, 2019.

Sem descobertas 'inúteis' de Einstein, GPS não existiria, Folha de São Paulo, March 27, 2019.

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Maurício Peixoto se confunde com a história da matemática, Folha de São Paulo, May 1, 2019.

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A notável família matemática Bernoulli era problemática, Folha de São Paulo, May 22, 2019.

Hoje comemoramos o acerto de Einstein, mas ele também errou, Folha de São Paulo, May 29, 2019.

Somos bons em muitas coisas, mas probabilidade não é uma delas, Folha de São Paulo, June 5, 2019.

Como ganhar dinheiro com jogos de azar?, Folha de São Paulo, June 12, 2019.

Quanto vale uma aposta?, Folha de São Paulo, June 19, 2019.

O segredo para ganhar no jogo, Folha de São Paulo, June 26, 2019.

Apps de navegação começaram como brincadeira, Folha de São Paulo, July 3, 2019.

Informática da Holanda começou com computador que não funcionava, Folha de São Paulo, July 10, 2019.

Campeão de matemática desfila em carro de bombeiros, Folha de São Paulo, July 17, 2019.

Bill Gates não caiu na pegadinha de Warren Buffett, Folha de São Paulo, July 24, 2019.

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O que querem as mulheres matemáticas, afinal?, Folha de São Paulo, August 07, 2019.

Bela Adormecida está apreensiva, Folha de São Paulo, August 14, 2019.

O Universo é feito de simetrias, Folha de São Paulo, August 21, 2019.

Os matemáticos acharam todas as simetrias, Folha de São Paulo, August 28, 2019.

Bolsas do CNPq e Mais Médicos se encontram em Cocal dos Alves, Folha de São Paulo, September 04, 2019.

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Tales de Mileto foi o primeiro matemático, Folha de São Paulo, September 18, 2019.

Para que servem seno e cosseno?, Folha de São Paulo, September 25, 2019.

Sem trigonometria, não existiria cartografia nem GPS, Folha de São Paulo, October 02, 2019.

Índia criou numeração moderna, mas não a fórmula de Bhaskara, Folha de São Paulo, October 09, 2019.

Índia tem 3.000 anos de matemática, Folha de São Paulo, October 16, 2019.

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Matemático Von Neumann contribuiu para a era do computador, Folha de São Paulo, February 26, 2020.

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Morre John Conway, matemático inventor do Jogo da Vida, Folha de São Paulo, April 15, 2020.

O Jogo da Vida, Folha de São Paulo, April 22, 2020.

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Epidemias fazem parte da história da humanidade, Folha de São Paulo, June 03, 2020.

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O valor da ciência, Folha de São Paulo, July 08, 2020.

Há paradoxos para todos os gostos, Folha de São Paulo, July 15, 2020.

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A América foi descoberta muitas vezes, Folha de São Paulo, August 05, 2020.

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Desafios matemáticos para encerrar o ano de 2020, Folha de São Paulo, December 30, 2020.

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Cometa Halley é relógio matemático do espaço, Folha de São Paulo, January 20, 2021.

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