Jairo Bochi

Curriculum Vitae

Contact Information

Departamento de Matemática
Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio)
Rua Marquês de São Vicente 225
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Research Interests

Dynamical systems (multiplicative ergodic theory, non-uniform hyperbolicity, generic dynamics, invariant measures, relations with Control Theory, relations with Geometry), Mathematics in general.

Academic History

2001 *Doctor in Mathematics*, IMPA, Rio de Janeiro, Brazil.
Thesis title: *Expoentes de Lyapunov nulos em sistemas conservativos*.
Thesis advisor: Marcelo Viana.

1997 *M.S. in Mathematics*, UFRGS, Porto Alegre, Brazil.
Advisor: Artur O. Lopes.

1996 *B.S. in Mathematics*, UFRGS, Porto Alegre, Brazil.

Employment Record

2011– Associate Professor, PUC-Rio.

2008–2011 Assistant Professor, PUC-Rio.

2005–2007 Assistant Professor, UFRGS, Porto Alegre.

2002–2004 Junior Researcher, IMPA, Rio de Janeiro.

Research Grants

2013– *Produtividade em Pesquisa*, level 1D, CNPq, Brazil.

2012– *Jovem Cientista da Nosso Estado*, FAPERJ, Brazil.

2008–2011 *Incentivo à Produtividade em Pesquisa para Novos Professores*, PUC–Rio, Brazil.

2007–2012 *Produtividade em Pesquisa*, level 2, CNPq, Brazil.

2001–2013 Member of several research teams supported by CNPq, CAPES, FAPERJ.

Honors and Awards

2007–2011 Affiliate Member of the Brazilian Academy of Sciences.

Lectures on International Congresses

2013	Ergodic Optimization and Related Fields. USP, São Paulo, Brazil.
2013	Mathematical Congress of the Americas. Guanajuato, Mexico.
2013	Non-positive curvature, isometric actions and dynamics of cocycles. Cajón de Maipo, Chile.
2012	II Brazilian School on Dynamical Systems. University of São Paulo, São Carlos, Brazil.
2012	Montevideo Dynamical Systems Conference. Universidad de la República, Montevideo, Uruguay.
2011	LX Dynamical Systems Colloquium. Celebrating the 60th anniversary of Rodrigo Bamón. Pucón, Chile.
2011	Workshop on Symplectic Dynamics. Institute for Advanced Study, Princeton, USA.
2011	International Conference on Dynamics Beyond Uniform Hyperbolicity. CIRM, Marseille, France.
2011	International Conference on Topological Methods on Dynamical Systems. UNICAMP, Campinas, Brazil.
2010	Workshop on Ergodic Theory. Institute Mittag-Leffler, Djursholm, Sweden.
2009	III CLAM Congreso Latino Americano de Matemáticos, Santiago, Chile.
2008	School and Workshop on Dynamics. Universidade de la República, Montevideo, Uruguay.
2006	International Symposium on Dynamical Systems, UFBA, Salvador, Brazil.
2006	Young Researchers Symposium, IMPA, Rio de Janeiro, Brazil.
2006	AMS Spring Meeting of the Western Section. San Francisco State University, USA.
2005	XIV Escuela Latinoamericana de Matemática. Solís, Uruguay.
2005	International Conference on Dynamical Systems. Angra dos Reis, Brazil.
2005	Colloquium of Dynamical Systems and Smooth Ergodic Theory. Bordeaux, France.
2004	International Conference on Dynamical Systems in Honor of J. Massera. Universidade de la República, Montevideo, Uruguay.
2004	Systèmes dynamiques multidimensionels non-uniformément hyperboliques. CIRM, Luminy, France.
2003	Recent Trends in Dynamics III. Universidade do Porto, Portugal.
2003	International Workshop on Robustness and Partial Hyperbolicity. Búzios, Brazil.
2003	Research Trimester on Dynamical Systems. Scuola Normale Superiore di Pisa, Italy.
2001	Recent Trends in Dynamics. Universidade do Porto, Portugal.
2001	School and Workshop on Dynamical Systems. ICTP, Trieste, Italy.
2001	International Workshop on Dynamical Systems and Geometry in honor of Prof. Michel Herman. IMPA, Rio de Janeiro, Brazil.
2000	International Conference on Dynamical Systems. IMPA, Rio de Janeiro, Brazil.

Research Visits

Aug. 2013	Universidad de Santiago de Chile, by invitation of Andrés Navas, and Pontificia Universidad Católica de Chile, by invitation of Mario Ponce.
Feb. 2013	Institute of Mathematics, Polish Academy of Sciences (Warsaw), by invitation of Michał Rams.

Mar. 2011	Universidad de Santiago de Chile, by invitation of Andrés Navas.
Feb. 2011	Université de Bourgogne (Dijon), by invitation of Christian Bonatti.
Jan. 2011	Université de Bordeaux, by invitation of Nicolas Gourmelon. (As a invited professor paid by the French government.)
Feb. 2010	Institute Mittag-Leffler (Djursholm), by invitation of Michael Benedicks.
Jan.-Feb. 2009	Université de Bourgogne (Dijon), by invitation of Christian Bonatti. (As a invited professor paid by the French government.)
Jul. 2007	Rice University (Houston), by invitation of David Damanik.
Jul. 2006	IMPA (Rio de Janeiro), by invitation of Artur Avila.
Apr. 2006	Caltech (Pasadena), by invitation of Anton Gorodetski.
Feb. 2006	Collège de France (Paris), by invitation of Jean-Christophe Yoccoz.
Jun. 2004	Université de Paris 13 – Villetaneuse, by invitation of Bassam Fayad.
May-Jun. 2003	Université de Paris 13 – Villetaneuse, by invitation of Bassam Fayad. (As a invited professor paid by the French government.)
Nov. 2002	KTH (Stockholm), by invitation of Michael Benedicks.
May 2001	Université de Paris 7, by invitation of Håkan Eliasson.

Scientific Production

Published articles:

J.B. Generic linear cocycles over a minimal base. *Studia Mathematica*, 218 (2013), no. 2, 167–188. `doi:10.4064/sm218-2-4`

J.B., A. Navas. Almost reduction and perturbation of matrix cocycles. Published online in *Annales de l'Institut Henri Poincaré – Analyse Non linéaire*. `doi:10.1016/j.anihpc.2013.08.004`

J.B., A. Navas. A geometric path from zero Lyapunov exponents to rotation cocycles. Published online in *Ergodic Theory and Dynamical Systems*. `doi:10.1017/etds.2013.58`

J.B., C. Bonatti, L.J. Díaz. Robust vanishing of all Lyapunov exponents for iterated function systems. Published online in *Mathematische Zeitschrift*. `doi:10.1007/s00209-013-1209-y`

J.B., C. Bonatti. Perturbation of the Lyapunov spectra of periodic orbits. *Proceedings of the London Mathematical Society*, 105 (2012), no. 1, 1–48.

A. Avila, J.B. Nonuniform hyperbolicity, global dominated splittings and generic properties of volume-preserving diffeomorphisms. *Transactions of the American Mathematical Society*, 364 (2012), no. 6, 2883–2907.

A. Avila, J.B., D. Damanik. Opening gaps in the spectrum of strictly ergodic Schrödinger operators. *Journal of the European Mathematical Society*, 14 (2012), no. 1, 61–106.

A. Avila, J.B., J.-C. Yoccoz. Uniformly hyperbolic finite-valued $SL(2, R)$ cocycles. *Commentarii Mathematici Helvetici*, 85, no. 4 (2010), 813–884.

J.B. C^1-generic symplectic diffeomorphisms: partial hyperbolicity and zero center Lyapunov exponents. *Journal of the Institute of Mathematics of Jussieu*, 9, no. 1 (2010), 49–93.

A. Avila, J.B., A. Wilkinson. Nonuniform center bunching and the genericity of ergodicity among C^1 partially hyperbolic symplectomorphisms. *Annales Scientifiques de l'École Normale Supérieure*, 42, n. 6 (2009), 931–979.

J.B., N. Gourmelon. Some characterizations of domination. *Mathematische Zeitschrift*, 263, no. 1 (2009), 221–231.

A. Avila, J.B., D. Damanik. Cantor spectrum for Schrödinger Operators with potentials arising from generalized skew-shifts. *Duke Mathematical Journal*, 146, no. 2 (2009), 253–280.

A. Avila, J.B. A uniform dichotomy for generic $\mathrm{SL}(2,\mathbb{R})$ cocycles over a minimal base. *Bulletin de la Société Mathématique de France*, 135 (2007), 407–417.

A. Avila, J.B. Generic expanding maps without absolutely continuous invariant σ-finite measure. *Mathematical Research Letters*, 14 (2007), 721–730.

A. Avila, J.B. A generic C^1 map has no absolutely continuous invariant probability measure. *Nonlinearity*, 19 (2006), 2717-2725.

J.B., B. Fayad. Dichotomies between uniform hyperbolicity and zero Lyapunov exponents for $SL(2,R)$ cocycles. *Bulletin of the Brazilian Mathematical Society*, 37, no. 3 (2006), 307-349.

J.B., B. Fayad, E. Pujals. A remark on conservative diffeomorphisms. *Comptes Rendus Acad. Sci. Paris*, Ser. I 342 (2006), 763-766.

J.B., M. Viana. The Lyapunov exponents of generic volume preserving and symplectic maps. *Annals of Mathematics*, 161 (2005), No. 3, 1423–1485.

J.B., M. Viana. Lyapunov exponents: How frequently are dynamical systems hyperbolic? *Modern dynamical systems and applications*, 271–297, Brin, Hasselblatt, Pesin (eds.) Cambridge Univ. Press, 2004.

A. Arbieto, J.B. L^p-generic cocycles have one-point Lyapunov spectrum. *Stochastics and Dynamics*, 3 (2003), 73–81.

J.B. Inequalities for numerical invariants of sets of matrices. *Linear Algebra and its Applications*, 368 (2003), 71–81.

J.B., M. Viana. Pisa Lectures on Lyapunov Exponents. *Dynamical Systems – Part II: Topological, Geometrical, and Ergodic Properties of Dynamics*, 23–47. Scuola Normale Superiore, Pisa 2003.

F. Abdenur, A. Avila, J.B. Robust transitivity and topological mixing for C^1 flows. *Proceedings of the American Mathematical Society*, 132 (2003), 699–705.

J.B., M. Viana. Uniform (projective) hyperbolicity or no hyperbolicity: a dichotomy for generic conservative maps. *Annales de l'Institut Henri Poincaré – Analyse non linéaire*, 19 (2002), 113–123.

J.B. Genericity of zero Lyapunov exponents. *Ergodic Theory and Dynamical Systems*, 22 (2002), 1667–1696.

A. Avila, J.B. A formula with some applications to the theory of Lyapunov exponents. *Israel Journal of Mathematics*, 131 (2002), 125–137.

Preprints:

J.B., I.D. Morris. Continuity properties of the lower spectral radius. `arXiv:1309.0319` (44 pages).

J.B., N. Gourmelon. Universal regular control for generic semilinear systems. `arXiv:1201.1672` (47 pages).

Citations: Cited 221 times by 105 authors, H number $= 8$, according to AMS MathSciNet (September 2013).

Teaching Experience

Advanced minicourses:

C^1 perturbation techniques in the neighborhood of periodic orbits, Institute of Mathematics, Polish Academy of Sciences (Będlewo), 2013. 6h course, joint with Christian Bonatti.

Quasi-periodic cocycles with Liouvillean frequencies, Scuola Normale Superiore, Pisa, 2010. One week course, joint with Raphaël Krikorian.

Lyapunov exponents, ICTP, Trieste, 2008. Two week course, joint course with Artur Avila.

Lyapunov exponents for generic volume preserving maps, Morningside Center for Mathematics, Chinese Academy of Sciences, Beijing, 2007. One week course.

Deterministic products of matrices, Scuola Normale Superiore, Pisa, 2002. Joint course with Marcelo Viana.

Graduate Teaching:

Ergodic Theory, PUC-Rio (2012), UFRGS (2006), IMPA (2003, 2002).
Differential Topology, PUC-Rio (2011).
Measure Theory, PUC-Rio (2011), IMPA (2004).
Analysis in $\mathbb{R}^n$, PUC-Rio (2010), IMPA (2003).
Dynamical Systems, PUC-Rio (2009, 2008).
General Topology, UFRGS (2006).
Algebraic Topology, UFRGS (2005).
Hyperbolic Dynamics, IMPA (2002).

Undergraduate Teaching:

Discrete Mathematics, PUC-Rio (2013, 2010, 2009).
Introduction to Analysis, PUC-Rio (2013, 2011, 2009), UFES Summer School (2006).
Multivariate Calculus, PUC-Rio (2012).
Linear Algebra, PUC-Rio (2012, 2008), UFRGS (2006).
Introduction to Probability, PUC-Rio (2012, 2010).
Differential Equations, PUC-Rio (2011, 2010), UFRGS (2005).
Univariate Calculus, PUC-Rio (2009), UFRGS (2007).
Lebesgue Integration, UFRGS (2007).
Analytical Geometry, UFRGS (2007, 2006).

Undergraduate Advising: 3 students at PUC-Rio, 1 student at UFRGS.

School-level Teaching:

Leader of the project *Mathematics for Highly Capable Students*, Anne Frank High School, Porto Alegre (2006).

Graduate Students Advising

Current students:

2013 Paulo Orenstein. MSc student. Project: "Optimal transport and the Wasserstein metric". Co-advised by Carlos Tomei.

Former students:

2012–2013 Cong Zhou. MSc, PUC-Rio. Dissertation: "Multiplicative ergodic theorem in non-positively curved spaces".

2009–2012 Miguel Schnoor. PhD, PUC-Rio. Thesis: "The non-existence of absolutely continuous invariant probabilities is C^1-generic for flows".

2009–2011 Pedro Milet Pereira. MSc, PUC-Rio. Dissertation: "Peano curves and line fields".

Academic Administration

Mar.2011 – Feb.2013 Department's Director of Graduate Studies, PUC-Rio.

Event Organization

2013	Dynamical Systems Session of the 29th Brazilian Mathematical Colloqium (IMPA).
2010–2012	EDAI (monthly Dynamical Systems joint seminar of PUC-Rio, UFRJ and UFF universities). www.mat.puc-rio.br/edai
2010	VIII Oktobermat, PUC-Rio. www.mat.puc-rio.br/oktober2010

Supplementary Information

Born June 12, 1975 in Porto Alegre, Brazil.

Married, no children.

Languages: Portuguese (mother language), English (good), French (basic), Spanish (basic).

Member of SBM (Brazilian Mathematical Society) and AMS (American Math. Soc.).

`www.mat.puc-rio.br/~jairo`

December 23, 2013