

Curriculum Vitae

Name : Artur Avila Cordeiro de Melo.

Born : June 29, 1979 - Rio de Janeiro - RJ - Brazil.

Citizenship : Brazilian.

Address : IMPA, Estrada Dona Castorina, 110, Rio de Janeiro, 22460-320, Brazil.

Email : artur@math.sunysb.edu

Internet site : <http://wwwimpa.br/~avila/>

PhD : IMPA, 04/2001. Jury : W. de Melo (advisor), M. Viana, J. Palis, J.-C. Yoccoz, J. Milnor.

Positions :

From 09/2001 to 08/2003. Maître de Conférence Associé at the Collège de France.

From 07/2006 to 06/2009. Research fellow of the Clay Mathematics Institute, attached to the IMPA, CNRS UMI 2294.

From 10/2003. Researcher at the CNRS. Hired CR2, promoted CR1 in 2007, promoted DR2 in 2008.

From 10/2003 to 06/2006. Attached to the LPMA (Paris 6), CNRS UMR 7599.

From 07/2006 to 06/2009. On leave.

From 07/2009. Attached to the IMJ (Paris 7), CNRS UMR 7586.

From 07/2009. Researcher at the IMPA, CNRS UMI 2294.

Prizes and honors

Gold medal at the International Mathematical Olympiad. Canada, 1995.

Cours Peccot at the Collège de France, 2005.

Bronze medal of the CNRS, 2006.

Salem prize, 2006.

Wolff Memorial Lectures at Caltech, 2008.

EMS prize, 2008.

Grand Prix Jacques Herbrand of the French Academy of Sciences, 2009.

Porter Lectures at Rice, 2010.

Plenary address at the ICM, 2010.

Service

Editorial boards : Ergodic Theory and Dynamical Systems, Mathematical Proceedings of the Cambridge Philosophical Society, Publications Mathématiques de l'IHES, Duke Mathematical Journal.

ERC Starting Grant (5 years, starting in 01/12/2010).

Participations in conferences as invited speaker

- (1) Meeting of the American Mathematical Society, Washington DC, 01/2000.
- (2) International Conference on Dynamical Systems, Porto, 05/2000.
- (3) International Conference on Dynamical Systems (Jacob Palis 60 Fest), Rio de Janeiro, 07/2000.
- (4) First Latin American Congress of Mathematics, Rio de Janeiro, 08/2000.
- (5) Special Session on Complex Dynamics and Ergodic Theory, Warwick, 01/2001.
- (6) Dynamical Odyssey, Luminy, 02/2001.
- (7) Recent Trends in Dynamics II, Porto, 05/2001.
- (8) School and Workshop on Dynamical Systems, Trieste, 08/2001.
- (9) Research Trimester on Dynamical Systems, Pisa, 04/2002.
- (10) Recent Trends in Dynamics III, Porto, 05/2002.
- (11) New Directions in Dynamical Systems (ICM satellite conference), Kyoto, 08/2002.
- (12) Dynamical methods in differential equations, Medina del Campo, 09/2002.

- (13) Congrès franco-brésilien en l'honneur d'Harold Rosenberg : Géométrie, feuilletages et systèmes dynamiques, Abbaye de La Bussière, 09/2002.
- (14) Real and Complex One-dimensional Dynamics, Warwick, 12/2002.
- (15) Geometría compleja y sistemas dinámicos (Alberto Fest), Cuernavaca, 01/2003.
- (16) Holomorphic Dynamics, Warwick, 04/2003.
- (17) Recent Trends in Dynamics 2003, Porto, 07/2003.
- (18) Dynamische Systeme, Oberwolfach, 07/2003.
- (19) Geometric Aspects of Dynamical Systems, Warwick, 07/2003.
- (20) Combinatorial Methods in Complex Dynamics, Warwick, 04/2004.
- (21) Multidimensional non-uniformly hyperbolic dynamical systems, CIRM, Luminy, 05/2004.
- (22) Dynamical Systems : from Algebraic to Topological Dynamics, MPIM, Bonn, 07/2004.
- (23) Premier congrès Canada-France des sciences mathématiques, Toulouse, 07/2004.
- (24) Summer School and Conference on Dynamical Systems, ICTP, Trieste, 07/2004.
- (25) Qmath 9, Giens, 09/2004.
- (26) Nonlinear Dynamics, Ergodic Theory and Renormalization, Lorentz center, Leiden, 09/2004.
- (27) Conformal Dynamics, Hyperbolic Geometry, and Continued Fractions, Luminy, 06/2005.
- (28) Colloquium in Dynamical Systems and Smooth Ergodic Theory, Bordeaux, 06/2005.
- (29) 25 Colóquio Brasileiro de Matemática (sessão de sistemas dinâmicos), Rio de Janeiro, 07/2005.
- (30) International Conference on Dynamical Systems, Angra dos Reis, 08/2005.
- (31) Renormalization in dynamical systems workshop, Fields institute, Toronto, 12/2005.
- (32) Partially hyperbolic dynamics, laminations, and Teichmüller flow Workshop, Fields institute, Toronto, 01/2006.
- (33) Complex dynamics and geometry, Luminy, 06/2006.
- (34) Young Researchers Symposium, Rio de Janeiro, 08/2006 (plenary session).
- (35) International Congress on Mathematical Physics, Rio de Janeiro, 08/2006 (dynamical systems session).
- (36) 26 Colóquio Brasileiro de Matemática, Rio de Janeiro, 08/2007 (plenary session).
- (37) Maryland (Brin 60 Fest), 03/2008.
- (38) Teichmüller flow, Roscoff, 06/2008.
- (39) School and workshop on dynamical systems, Trieste, 07/2008.
- (40) 5th European Congress of Mathematics (invited lecture), 07/2008.
- (41) Indo-Brazilian, IMPA, Rio, 07/2008.
- (42) Annual meeting of the German Mathematical Society, Erlangen, 09/2008.
- (43) Low dimensional dynamics, Oberwolfach, 10/2008.
- (44) Maryland, 04/2009.
- (45) Advances in low dimensional dynamics, Stony Brook, 06/2009.
- (46) Luminy (Sibony 60 Fest), 06/2009.
- (47) Luminy (Masur 60 Fest), 06/2009.
- (48) Dynamical Systems, Oberwolfach, 07/2009.

- (49) UMALCA Congress (plenary), Santiago, 09/2009.
- (50) French-Brazilian, Brazilian Academy of Sciences, Rio, 09/2009.
- (51) Progress in Dynamics (Katok 65 Fest), IHP, Paris, 11/2009.
- (52) Yasha Eliashberg's Honoris Causa, ENS Lyon, 12/2009.
- (53) International Congress in Dynamical Systems, Búzios, 02/2010.
- (54) International Congress of Mathematicians (plenaty), Hyderabad, 08/2010.

Short visits

- (1) State University of New York at Stony Brook, 04/1999.
- (2) State University of New York at Stony Brook, 01/2000-02/2000.
- (3) State University of New York at Stony Brook, 11/2000.
- (4) Royal Institute of Technology (KTH), Stockholm, 09/2001.
- (5) State University of New York at Stony Brook, 11/2001-12/2001.
- (6) University of Toronto, 01/2003-02/2003.
- (7) Caltech, 03/2004.
- (8) University of Toronto, 10/2004.
- (9) Scuola Normale Superiore, Pisa, 01/2005-02/2005.
- (10) IMPA, Rio de Janeiro, 08/2005.
- (11) Fields institute, Toronto, 12/2005.
- (12) CMAF, Lisboa, 05/2007.
- (13) Caltech, 02/2008.
- (14) Paris 6, 06/2008.
- (15) Paris 6, 09-10/2008.
- (16) Mittag-Leffler, 05/2010.
- (17) Hausdorff Institute, 06/2010.

Research papers

Published

- (1) On the dynamics of the renormalization operator.
A. Avila, M. Martens, W. de Melo. In "Global Analysis of Dynamical Systems : Festschrift dedicated to Floris Takens for his 60th birthday", Ed. H.Broer, B. Krauskopf, G. Vegter, Institute of Physics Publishing, Bristol and Philadelphia, 2001, pp. 449–460.
- (2) Bifurcations d'applications unimodales.
A. Avila. C. R. Acad. Sci. Paris, Ser. I 334 (2002), 483-488.
- (3) Infinitesimal perturbations of rational maps.
A. Avila. Nonlinearity 15 (2002), 695-704.
- (4) A formula with applications to the theory of Lyapunov exponents.
A. Avila, J. Bochi. Israel Journal of Mathematics 131 (2002), 125-137.
- (5) Statistical properties of unimodal maps : smooth families with negative Schwarzian derivative.
A. Avila, C. G. Moreira. Astérisque 286 (2003), 81-118.
- (6) Regular or stochastic dynamics in real analytic families of unimodal maps.
A. Avila, M. Lyubich, W. de Melo. Inventiones Mathematicae 154 (2003), 451-550.

- (7) Robust transitivity and topological mixing for C^1 -flows.
F. Abdenur, A. Avila, J. Bochi. Proceedings of the AMS 132 (2004), 699-705.
- (8) Bifurcations of unimodal maps.
A. Avila, C. G. Moreira. In Dynamical Systems. Part II : Topological Geometrical and Ergodic Properties of Dynamics. Pubblicazioni della Classe di Scienze, Scuola Normale Superiore, Pisa. Centro di Ricerca Matematica "Ennio De Giorgi" : Proceedings, 2003, pp. 1-22.
- (9) Convergence of an exact quantization scheme.
A. Avila. Communications in Mathematical Physics 249 (2004), 305-318.
- (10) Quasisymmetric robustness of the Collet-Eckmann condition in the quadratic family.
A. Avila, C. G. Moreira. Bulletin of the Brazilian Mathematical Society 35 (2004), 291-331.
- (11) Siegel disks with smooth boundaries.
A. Avila, X. Buff, A. Chéritat. Acta Mathematica 193 (2004), 1-30.
- (12) Statistical properties of unimodal maps : the quadratic family.
A. Avila, C. G. Moreira. Annals of Mathematics 161 (2005), 831-881.
- (13) Statistical properties of unimodal maps : physical measures, periodic orbits and pathological laminations.
A. Avila, C. G. Moreira. Pub. Math. IHÉS 101 (2005), 1-67.
- (14) Generic singular spectrum for ergodic Schrödinger operators.
A. Avila, D. Damanik. Duke Mathematical Journal 130 (2005), 393-400.
- (15) Phase-Parameter relation and sharp statistical properties for general families of unimodal maps.
A. Avila, C. G. Moreira. Contemporary Mathematics 389 (2005), 1-42.
- (16) Dynamics in the moduli space of Abelian differentials.
A. Avila, M. Viana. Portugaliae Mathematica 62 (2005), 531-547.
- (17) Smoothness of solenoidal attractors.
A. Avila, S. Gouëzel, M. Tsujii. Discrete and Continuous Dynamical Systems 15 (2006), 21-35.
- (18) Examples of Feigenbaum Julia sets with small Hausdorff dimension.
A. Avila, M. Lyubich. In "Dynamics on the Riemann Sphere. A Bodil Branner Festschrift", Ed. Poul G. Hjorth, Carsten Lunde Petersen, European Mathematical Society (EMS), Zürich, pp. 71-87, 2006.
- (19) Solving the ten martini problem.
A. Avila, S. Jitomirskaya. Lecture Notes in Physics 690 (2006), 5-16.
- (20) A generic C^1 map has no absolutely continuous invariant measure.
A. Avila, J. Bochi. Nonlinearity 19 (2006), 2917-2925.
- (21) Reducibility or non-uniform hyperbolicity for quasiperiodic Schrödinger cocycles.
A. Avila, R. Krikorian. Annals of Mathematics 164 (2006), 911-940.
- (22) Exponential mixing for the Teichmüller flow.
A. Avila, S. Gouëzel, J.-C. Yoccoz. Pub. Math. IHÉS 104 (2006), 143-211.
- (23) Weak mixing for interval exchange transformations and translation flows.
A. Avila, G. Forni. Annals of Mathematics 165 (2007), 637-664.
- (24) Simplicity of Lyapunov spectra : proof of the Zorich-Kontsevich conjecture.
A. Avila, M. Viana. Acta Mathematica 198 (2007), 1-56.
- (25) Generic expanding maps without absolutely continuous invariant σ -finite measure.
A. Avila, J. Bochi. Mathematical Research Letters 14 (2007), 721-730.

- (26) Simplicity of Lyapunov spectra : a sufficient criterion.
A. Avila, M. Viana. *Portugaliae Mathematica* 64 (2007), 311-376.
- (27) A uniform dichotomy for generic $SL(2, \mathbb{R})$ cocycles over a minimal base.
A. Avila, J. Bochi. *Bulletin de la Société Mathématique de France* 135 (2007), 407-417.
- (28) Exponential decay of correlations for the Rauzy-Veech-Zorich renormalization map.
A. Avila, A. Bufetov. *Fields Institute Communications* 51 (2007), 203-211.
- (29) Hausdorff dimension and conformal measures of Feigenbaum Julia sets.
A. Avila, M. Lyubich. *Journal of the American Mathematical Society* 21 (2008), 305-363.
- (30) Absolute continuity of the integrated density of states for the almost Mathieu operator with non-critical coupling.
A. Avila, D. Damanik. *Inventiones Mathematicae* 172 (2008), 439-453.
- (31) Cantor Spectrum for Schrödinger Operators with Potentials arising from Generalized Skew-shifts.
A. Avila, J. Bochi, D. Damanik. *Duke Mathematical Journal* 146 (2009), 253-280.
- (32) On the spectrum and Lyapunov exponent of limit periodic Schrödinger operators.
A. Avila. *Communications in Mathematical Physics* 288 (2009), 907-918.
- (33) The ten martini problem.
A. Avila, S. Jitomirskaya. *Annals of Mathematics* 170 (2009), 303-342.
- (34) Combinatorial rigidity for unicritical polynomials.
A. Avila, J. Kahn, M. Lyubich, W. Shen. *Annals of Mathematics* 170 (2009), 783-797.
- (35) Nonuniform center bunching and the genericity of ergodicity among C^1 partially hyperbolic symplectomorphisms.
A. Avila, J. Bochi, A. Wilkinson. *Annales Scientifiques de l'Ecole Normale Supérieure* 42 (2009), 931-979.
- (36) Almost localization and almost reducibility.
A. Avila, S. Jitomirskaya. *Journal of the European Mathematical Society* 12 (2010), 93-131.
- (37) Uniform exponential growth for some $SL(2, \mathbb{R})$ matrix products.
A. Avila, T. Roblin. *Journal of Modern Dynamics* 3 (2009), 549-554.
- (38) Density of positive Lyapunov exponents for quasiperiodic $SL(2, \mathbb{R})$ cocycles in arbitrary dimension.
A. Avila. *Journal of Modern Dynamics* 3 (2009), 629-634.
- (39) Bulk universality and clock spacing of zeros for ergodic Jacobi matrices with a.c. spectrum.
A. Avila, Y. Last, B. Simon. *Analysis & PDE* 3 (2010), 81-118.
- (40) Extremal Lyapunov exponents : an invariance principle and applications.
A. Avila, M. Viana. *Inventiones Mathematicae* 181 (2010), 115-174.
- (41) Uniformly hyperbolic finite-valued $SL(2, \mathbb{R})$ cocycles.
A. Avila, J. Bochi, J.-C. Yoccoz. *Commentarii Mathematici Helvetici* 85 (2010), 813-884.
- (42) On the regularization of conservative maps.
A. Avila. *Acta Mathematica* 205 (2010), 5-18.
- (43) Parapuzzle of Multibrot sets and typical dynamics of unimodal maps.
A. Avila, M. Lyubich, W. Shen. *Journal of the European Mathematical Society* 13 (2011), 27-56.
- (44) Hölder continuity of absolutely continuous spectral measures for one-frequency Schrödinger operators.
A. Avila, S. Jitomirskaya. *Communications in Mathematical Physics* 301 (2011), 563-581.

Accepted for publication

- (45) Nonuniform hyperbolicity, global dominated splittings and generic properties of volume-preserving diffeomorphisms.
A. Avila, J. Bochi. To appear in : Transactions of the American Mathematical Society.
- (46) Opening gaps in the spectrum of strictly ergodic Schrödinger operators.
A. Avila, J. Bochi, D. Damanik. To appear in : Journal of the European Mathematical Society.
- (47) Cohomological equations and invariant distributions for minimal circle diffeomorphisms.
A. Avila, A. Kocsard. To appear in : Duke Mathematical Journal.
- (48) A KAM scheme for $SL(2, \mathbb{R})$ cocycles with Liouvillean frequencies.
A. Avila, B. Fayad, R. Krikorian. To appear in : Geometric and Functional Analysis.
- (49) Density of positive Lyapunov exponents for $SL(2, \mathbb{R})$ cocycles.
A. Avila. To appear in : Journal of the American Mathematical Society.

Submitted for publication

- (50) Exponential Mixing for the Teichmüller flow in the Space of Quadratic Differentials.
A. Avila, M.J. Resende.
- (51) Mixing for time-changes of Heisenberg nilflows.
A. Avila, G. Forni, C. Ulcigrai.
- (52) The full renormalization horseshoe for unimodal maps of higher degree : exponential contraction along hybrid classes.
A. Avila, M. Lyubich.
- (53) Small eigenvalues of the Laplacian for algebraic measures on moduli space, and mixing properties of the Teichmüller flow.
A. Avila, S. Gouëzel.

Preprints

- (54) Smooth Siegel disks via semicontinuity : a remark on a proof of Buff and Cheritat.
A. Avila.
- (55) On rigidity of critical circle maps.
A. Avila.
- (56) The absolutely continuous spectrum of the almost Mathieu operator.
A. Avila.
- (57) On point spectrum at critical coupling.
A. Avila.
- (58) Distortion elements in $\text{Diff}^\infty(\mathbb{R}/\mathbb{Z})$.
A. Avila.
- (59) Global theory of one-frequency Schrödinger operators I : stratified analyticity of the Lyapunov exponent and the boundary of nonuniform hyperbolicity.
A. Avila.
- (60) Global theory of one-frequency Schrödinger operators II : acriticality and finiteness of phase-transitions for typical potentials. hyperbolicity.
A. Avila.
- (61) Cocycles over partially hyperbolic maps.
A. Avila, J. Santamaria, M. Viana.