

## Curriculum Vitae

Name : Artur Avila Cordeiro de Melo.

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

Citizenship : Brazilian, French.

Address : Institut für Mathematik, Winterthurerstr. 190, 8057 Zürich, Switzerland.

Email : artur.avila@gmail.com

**PhD** : IMPA, 2001.

Advisor : Welington de Melo.

### **Current positions :**

Since 2018. Professor at the University of Zürich.

Since 2009. Extraordinary researcher (Cátedra Armínio Fraga) at IMPA, CNRS UMI 2294.

### **Previous positions :**

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

From 2003 to 2008. Chargé de recherche at the CNRS.

From 2003 to 2006. Attached to the Laboratoire de Probabilités et Modèles Aléatoires (UMR 7599, CNRS, Université Paris Diderot, UPMC).

From 2006 to 2008. On leave.

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

Since 2008. Directeur de recherche at the CNRS.

From 2008 to 2009. On leave.

From 2009 to 2018. Attached to the Institut de Mathématiques de Jussieu-Paris Rive Gauche (UMR 7586, CNRS, Université Paris Diderot, UPMC).

From 2018. On leave.

### **Prizes and honors**

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

Cours Peccot at the Collège de France, 2005.

Invited address at the ICMP, 2006.

Bronze medal of the CNRS, 2006.

Salem prize, 2006.

Wolff Memorial Lectures, Caltech, 2008.

Invited address at the ECM, 2008

EMS prize, 2008.

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

Porter Lectures, Rice, 2010.

Plenary address at the ICM, 2010.

Blyth Lectures, Toronto, 2011.

Michael Brin prize, 2011.

IAMP Early Career Award, 2012.

Member, Academia Brasileira de Ciências, 2013.

Prêmio da SBM, 2013.

TWAS Prize, 2013.

Bellow Lectures, Northwestern, 2014.

Fields Medal, 2014.

Chevalier de la Légion d'honneur, 2015.

TWAS-Lenovo Science Prize, 2015.

Lojasiewicz Lecture, Krakow, 2017.

### Service

Editorial boards :

Ergodic Theory and Dynamical Systems (current).

Mathematical Proceedings of the Cambridge Philosophical Society.

Publications Mathématiques de l'IHES.

Duke Mathematical Journal.

ERC Starting Grant (2010-2015).

### PhD students

Past :

Maria João Resende (IMPA, 2009, coadvisor Marcelo Viana).

Zhenghe Zhang (Northwestern University, 2014, coadvisor Amie Wilkinson).

Xiaochuan Liu (IMPA, 2016).

Xu Disheng (Université Paris Diderot, 2016, coadvisor Julie Déserti).

Martin Leguil (Université Paris Diderot, 2017, coadvisor Julie Déserti).

Zhiyuan Zhang (Université Paris Diderot, 2017).

Current :

Yi Pan (Université Paris-Diderot, coadvisor Raphaël Krikorian).

### 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) Infinitesimal perturbations of rational maps.  
A. Avila. *Nonlinearity* 15 (2002), 695-704.
- (3) A formula with applications to the theory of Lyapunov exponents.  
A. Avila, J. Bochi. *Israel Journal of Mathematics* 131 (2002), 125-137.
- (4) Statistical properties of unimodal maps : smooth families with negative Schwarzian derivative.  
A. Avila, C. G. Moreira. *Astérisque* 286 (2003), 81-118.
- (5) Regular or stochastic dynamics in real analytic families of unimodal maps.  
A. Avila, M. Lyubich, W. de Melo. *Inventiones Mathematicae* 154 (2003), 451-550.
- (6) Robust transitivity and topological mixing for  $C^1$ -flows.  
F. Abdenur, A. Avila, J. Bochi. *Proceedings of the AMS* 132 (2004), 699-705.
- (7) Convergence of an exact quantization scheme.  
A. Avila. *Communications in Mathematical Physics* 249 (2004), 305-318.
- (8) 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.
- (9) Siegel disks with smooth boundaries.  
A. Avila, X. Buff, A. Chéritat. *Acta Mathematica* 193 (2004), 1-30.

- (10) Statistical properties of unimodal maps : the quadratic family.  
A. Avila, C. G. Moreira. *Annals of Mathematics* 161 (2005), 831-881.
- (11) Statistical properties of unimodal maps : physical measures, periodic orbits and pathological laminations.  
A. Avila, C. G. Moreira. *Pub. Math. IHÉS* 101 (2005), 1-67.
- (12) Generic singular spectrum for ergodic Schrödinger operators.  
A. Avila, D. Damanik. *Duke Mathematical Journal* 130 (2005), 393-400.
- (13) Phase-Parameter relation and sharp statistical properties for general families of unimodal maps.  
A. Avila, C. G. Moreira. *Contemporary Mathematics* 389 (2005), 1-42.
- (14) Smoothness of solenoidal attractors.  
A. Avila, S. Göeuzel, M. Tsujii. *Discrete and Continuous Dynamical Systems* 15 (2006), 21-35.
- (15) Examples of Feigenbaum Julias 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.
- (16) A generic  $C^1$  map has no absolutely continuous invariant measure.  
A. Avila, J. Bochi. *Nonlinearity* 19 (2006), 2917-2925.
- (17) Reducibility or non-uniform hyperbolicity for quasiperiodic Schrödinger cocycles.  
A. Avila, R. Krikorian. *Annals of Mathematics* 164 (2006), 911-940.
- (18) Exponential mixing for the Teichmüller flow.  
A. Avila, S. Gouëzel, J.-C. Yoccoz. *Pub. Math. IHÉS* 104 (2006), 143-211.
- (19) Weak mixing for interval exchange transformations and translation flows.  
A. Avila, G. Forni. *Annals of Mathematics* 165 (2007), 637-664.
- (20) Simplicity of Lyapunov spectra : proof of the Zorich-Kontsevich conjecture.  
A. Avila, M. Viana. *Acta Mathematica* 198 (2007), 1-56.
- (21) Generic expanding maps without absolutely continuous invariant  $\sigma$ -finite measure.  
A. Avila, J. Bochi. *Mathematical Research Letters* 14 (2007), 721-730.
- (22) Simplicity of Lyapunov spectra : a sufficient criterion.  
A. Avila, M. Viana. *Portugaliae Mathematica* 64 (2007), 311-376.
- (23) 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.
- (24) Exponential decay of correlations for the Rauzy-Veech-Zorich renormalization map.  
A. Avila, A. Bufetov. *Fields Institute Communications* 51 (2007), 203-211.
- (25) Hausdorff dimension and conformal measures of Feigenbaum Julia sets.  
A. Avila, M. Lyubich. *Journal of the American Mathematical Society* 21 (2008), 305-363.
- (26) 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.

- (27) 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.
- (28) On the spectrum and Lyapunov exponent of limit periodic Schrödinger operators.  
A. Avila. *Communications in Mathematical Physics* 288 (2009), 907-918.
- (29) The ten martini problem.  
A. Avila, S. Jitomirskaya. *Annals of Mathematics* 170 (2009), 303-342.
- (30) Combinatorial rigidity for unicritical polynomials.  
A. Avila, J. Kahn, M. Lyubich, W. Shen. *Annals of Mathematics* 170 (2009), 783-797.
- (31) 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.
- (32) Uniform exponential growth for some  $SL(2, \mathbb{R})$  matrix products.  
A. Avila, T. Roblin. *Journal of Modern Dynamics* 3 (2009), 549-554.
- (33) 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.
- (34) Almost localization and almost reducibility.  
A. Avila, S. Jitomirskaya. *Journal of the European Mathematical Society* 12 (2010), 93-131.
- (35) 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.
- (36) Extremal Lyapunov exponents : an invariance principle and applications.  
A. Avila, M. Viana. *Inventiones Mathematicae* 181 (2010), 115-174.
- (37) Uniformly hyperbolic finite-valued  $SL(2, \mathbb{R})$  cocycles.  
A. Avila, J. Bochi, J.-C. Yoccoz. *Commentarii Mathematici Helvetici* 85 (2010), 813-884.
- (38) On the regularization of conservative maps.  
A. Avila. *Acta Mathematica* 205 (2010), 5-18.
- (39) 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.
- (40) Hölder continuity of absolutely continuous spectral measures for one-frequency Schrödinger operators.  
A. Avila, S. Jitomirskaya. *Communications in Mathematical Physics* 301 (2011), 563-581.
- (41) Cohomological equations and invariant distributions for minimal circle diffeomorphisms.  
A. Avila, A. Kocsard. *Duke Mathematical Journal* 158 (2011), 501-536.

- (42) Density of positive Lyapunov exponents for  $SL(2, \mathbb{R})$  cocycles.  
A. Avila. *Journal of the American Mathematical Society* 24 (2011), 999-1014.
- (43) A KAM scheme for  $SL(2, \mathbb{R})$  cocycles with Liouvillean frequencies.  
A. Avila, B. Fayad, R. Krikorian. *Geometric and Functional Analysis* 21 (2011), 1001-1019.
- (44) Mixing for time-changes of Heisenberg nilflows.  
A. Avila, G. Forni, C. Ulcigrai. *Journal of Differential Geometry* 89 (2011), 369-410.
- (45) The full renormalization horseshoe for unimodal maps of higher degree : exponential contraction along hybrid classes.  
A. Avila, M. Lyubich. *Publications Mathématiques de l'IHÉS* 114 (2011), 171-223.
- (46) Nonuniform hyperbolicity, global dominated splittings and generic properties of volume-preserving diffeomorphisms.  
A. Avila, J. Bochi. *Transactions of the American Mathematical Society* 364 (2012), 2883-2907.
- (47) Opening gaps in the spectrum of strictly ergodic Schrödinger operators.  
A. Avila, J. Bochi, D. Damanik. *Journal of the European Mathematical Society* 14 (2012) 61-106.
- (48) Exponential Mixing for the Teichmüller flow in the Space of Quadratic Differentials.  
A. Avila, M.J. Resende. *Commentarii Mathematici Helvetici* 87 (2012), 589-638.
- (49) Small eigenvalues of the Laplacian for algebraic measures on moduli space, and mixing properties of the Teichmüller flow.  
A. Avila, S. Gouëzel. *Annals of Mathematics* 178 (2013), 385-442.
- (50)  $SL(2, \mathbb{R})$ -invariant probability measures on the moduli spaces of translation surfaces are regular.  
A. Avila, C. Matheus, J.-C. Yoccoz. *Geometric and Functional Analysis* 23 (2013), 1705-1729.
- (51) Holonomy invariance : rough regularity and applications to Lyapunov exponents.  
A. Avila, J. Santamaria, M. Viana. *Astérisque* 358 (2013), 13-74.
- (52) On rigidity of critical circle maps.  
A. Avila. *Bulletin of the Brazilian Mathematical Society* 44 (2013), 611-619.
- (53) Singular density of states measure for subshift and quasi-periodic Schrödinger operators.  
A. Avila, D. Damanik, Z. Zhang. *Communications in Mathematical Physics* 330 (2014), 469-498.
- (54) Complex one-frequency cocycles.  
A. Avila, S. Jitomirskaya, C. Sadel. *Journal of the European Mathematical Society* 16 (2014), 1915-1935.
- (55) On manifolds supporting distributionally uniquely ergodic diffeomorphisms.  
A. Avila, B. Fayad, A. Kocsard. *Journal of Differential Geometry* 99 (2015), 191-213.

- (56) On the Kotani-Last and Schrödinger conjectures.  
A. Avila. *Journal of the American Mathematical Society*, 28 (2015) 579-616.
- (57) Absolute continuity, Lyapunov exponents and rigidity I : geodesic flows.  
A. Avila, M. Viana, A. Wilkinson. *Journal of the European Mathematical Society* 17 (2015), 1435-1462.
- (58) The visits to zero of a random walk driven by an irrational rotation.  
A. Avila, D. Dolgopyat, E. Duryev, O. Sarig. *Israel Journal of Mathematics* 207 (2015), 653-717.
- (59) Monotonic cocycles.  
A. Avila, R. Krikorian. *Inventiones Mathematicae* 202 (2015), 271-331.
- (60) Global theory of one-frequency Schrödinger operators.  
A. Avila. *Acta Mathematica* 215 (2015), 1-54.
- (61) Weak mixing directions in non-arithmetic Veech surfaces.  
A. Avila, V. Delecroix. *Journal of the American Mathematical Society* 29 (2016), 1167-1208.
- (62) Towers for commuting endomorphisms, and combinatorial applications.  
A. Avila, P. Candela. *Annales de l'Institut Fourier* 66 (2016), 1529-1544.
- (63) An integrable deformation of an ellipse of small eccentricity is an ellipse.  
A. Avila, J. de Simoi, V. Kaloshin. *Annals of Mathematics* 184 (2016), 527-558.
- (64) On the Hausdorff dimension of the Rauzy gasket.  
A. Avila, P. Hubert, A. Skripchenko. *Bulletin de la Société Mathématique de France* 144 (2016), 539-568.
- (65) Diffusion for chaotic plane sections of 3-periodic surfaces.  
A. Avila, P. Hubert, S. Skripchenko. *Inventiones Mathematicae* 206 (2016), 109-146.
- (66) Diffeomorphisms with positive metric entropy.  
A. Avila, S. Crovisier, A. Wilkinson. *Publications Mathématiques de l'IHES* 124 (2016), 319-347.
- (67) Spectral Theory of Extended Harper's Model and a Question by Erdős and Szekeres.  
A. Avila, S. Jitomirskaya, C. Marx. *Inventiones Mathematicae* 210 (2017), 283-339.
- (68) Sharp Phase transitions for the almost Mathieu operator.  
A. Avila, J. You, Q. Zhou. *Duke Mathematical Journal* 166 (2017), 2697-2718.
- (69) Symplectic and isometric  $SL(2, \mathbb{R})$  invariant subbundles of the Hodge bundle.  
A. Avila, A. Eskin, M. Möller. *Journal für die reine und angewandte Mathematik* 732 (2017), 1-20.
- (70) Second phase transition line.  
A. Avila, S. Jitomirskaya, Q. Zhou. *Mathematische Annalen* 370 (2018), 271-285.
- (71) Zorich conjecture for hyperelliptic Rauzy-Veech groups.  
A. Avila, C. Matheus, J.-C. Yoccoz. *Mathematische Annalen* 370 (2018), 785-809.

(72) Livsic theorem for diffeomorphism cocycles.  
A. Avila, A. Kocsard, X.-C. Liu. *Geometric and Functional Analysis* 28 (2018), 843-964.

(73) Statistical properties of quadratic polynomials with a neutral fixed point.  
A. Avila, D. Cheraghi. *Journal of the European Mathematical Society* 20 (2018), 2005-2062.

#### **Accepted for publication**

(74) Recurrence for the wind-tree model.  
A. Avila, P. Hubert. To appear in : *Annales de l'Institut Henri Poincaré-Analyse Non Linéaire*.

(75) Weak mixing properties of interval exchange transformations and translation flows.  
A. Avila, M. Leguil. To appear in : *Bulletin de la Société Mathématique de France*.

#### **Submitted for publication**

(76) On mixing diffeomorphisms of the disk.  
A. Avila, B. Fayad, P. Le Calvez, D. Xu, Z. Zhang.

(77) Lebesgue measure of Feigenbaum Julia sets.  
A. Avila, M. Lyubich.

(78) The Kontsevich-Zorich cocycle over Veech-McMullen family of symmetric translation surfaces.  
A. Avila, C. Matheus, J.-C. Yoccoz.

(79) Smooth Siegel disks everywhere.  
A. Avila, X. Buff, A. Chéritat.

(80) Some monoids of Pisot matrices.  
A. Avila, V. Delecroix.

(81)  $C^1$ -density of stable ergodicity.  
A. Avila, S. Crovisier, A. Wilkinson.

(82) Stable accessibility with 2-dimensional center.  
A. Avila, M. Viana

#### **Preprints**

(83) Smooth Siegel disks via semicontinuity : a remark on a proof of Buff and Cheritat.  
A. Avila.

(84) The absolutely continuous spectrum of the almost Mathieu operator.  
A. Avila.

(85) On point spectrum at critical coupling.  
A. Avila.

(86) Distortion elements in  $\text{Diff}^\infty(\mathbb{R}/\mathbb{Z})$ .  
A. Avila.

(87) Almost reducibility and absolute continuity I.  
A. Avila.

#### **Expository**

- (88) Bifurcations d'applications unimodales.  
A. Avila. *C. R. Acad. Sci. Paris, Ser. I* 334 (2002), 483-488.
- (89) 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.
- (90) Dynamics in the moduli space of Abelian differentials.  
A. Avila, M. Viana. *Portugaliae Mathematica* 62 (2005), 531-547.
- (91) Solving the ten martini problem.  
A. Avila, S. Jitomirskaya. *Lecture Notes in Physics* 690 (2006), 5-16.
- (92) Chaoticity of the Teichmüller flow.  
A. Avila. *Clay Mathematics Proceedings* 10 (2010), 321-338.
- (93) Dynamics of renormalization operators.  
A. Avila. In "Proceedings of the International Congress of Mathematicians 2010. Volume 1." World Scientific Publishing, pp. 154-175.
- (94) Cocycles over partially hyperbolic maps.  
A. Avila, M. Viana, A. Wilkinson. *Astérisque* 358 (2013), 1-12.