

Martin Leguil

Born August 3rd 1989, French citizen.

Assistant Professor (maître de conférences) in Mathematics at the Université de Picardie Jules Verne (UPJV), Amiens, France.

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Employment/Studies

- Since 2020 **Université de Picardie Jules Verne, Amiens, France**, *Assistant professor (Maître de conférences)*.
I am working on various rigidity questions for hyperbolic systems. I am also working on a problem in connection with measure rigidity for Anosov diffeomorphisms in a joint project with Sébastien Alvarez, Davi Obata and Bruno Santiago, and on the C^r density of the accessibility property in partially hyperbolic dynamics, in a joint work with Luis Pedro Piñeyrúa.
- 2019 – 2020 **Université Paris-Saclay (Paris 11), Orsay, France**, *Post-doc in Mathematics*.
Post-doctoral position in Dynamical Systems under the supervision of Prof. Sylvain Crovisier. I have been working on rigidity questions for Anosov flows in low dimension and hyperbolic billiards.
- 2017 – 2019 **University of Toronto at Mississauga, Toronto, Canada**, *Post-doc in Mathematics*.
Post-doctoral position in Dynamical Systems under the supervision of Prof. Jacopo De Simoi. I have been working on one project with Péter Bálint, Jacopo De Simoi and Vadim Kaloshin on the spectral rigidity of a class of chaotic billiards, on a project with Kostya Khanin about the links between the existence of invariant graphs for a family of twist maps and the spectral properties of associate Schrödinger operators, and on a project with Davi Obata and Bruno Santiago on the generic triviality of the centralizer of vector fields.
- 2013 – 2017 **Universités Pierre et Marie Curie / Paris Diderot, Paris, France**, *PhD in Mathematics*.
PhD in Dynamical Systems under the supervision of Prof. Artur Avila and Julie Déserti. My first project was about the weak mixing property for interval exchange transformations and translation flows (joint paper with Artur Avila). Later, I have been working on the question of C^r -density of the accessibility property for partially hyperbolic diffeomorphisms (joint work with Zhiyuan Zhang). I have also worked on rigidity properties for billiards in relation to the Birkhoff conjecture. More recently, I have been studying asymptotics for spectral gaps of $1D$ -quasi-periodic Schrödinger operators (joint work with Jiangong You, Qi Zhou, Zhiyan Zhao). Together with Julie Déserti, I have studied dynamical properties of a family of polynomial automorphisms of \mathbb{C}^3 .
- 2012 – 2013 **Université Pierre et Marie Curie, Paris, France**, *Master in Mathematics*.
 - *March-June*: Master thesis in Dynamical Systems under the guidance of Prof. Artur Avila.
 - *September-February*: Classes in Dynamical Systems, Ergodic Theory, Deometry (Differential Geometry, Hyperbolic Geometry, Kähler Geometry, Riemann Surfaces ...).
- Apr.–Jul. 2012 **Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil**.
Internship in geometry (minimal surfaces) under the supervision of Prof. Harold Rosenberg.
- 2009 – 2013 **École polytechnique, Palaiseau, France**.
 - Courses in pure and applied mathematics, physics, computer sciences.
 - Collective work in holomorphic dynamics around the Newton method and other root-finding algorithms. This work was realized under the supervision of Prof. R. Dujardin and C. Favre.
- 2007 – 2009 **Classes préparatoires, Lycée Fabert, Metz, France**.
Highly intensive scientific training in mathematics, physics and computer science.
- 2007 **Baccalauréat Scientifique, Lycée Fabert, Metz, France**, *awarded with very high honors*.

Papers

Published/to appear

- On the centralizer of vector fields: criteria of triviality and genericity results (joint with Davi Obata, Bruno Santiago), *Math. Z.* **297** (2021), no. 1-2, pp. 283–337.
- Entropy rigidity for 3D conservative Anosov flows and dispersing billiards (joint with Jacopo De Simoi, Kurt Vinhage, Yun Yang), *Geom. Funct. Anal.* **30** (2020), no. 5, pp. 1337–1369.
- Invariant graphs and spectral type of Schrödinger operators (joint with Artur Avila, Konstantin Khanin), *Pure Appl. Funct. Anal.* **5** (2020), no. 6, pp. 1257–1277.
- C^r -prevalence of stable ergodicity for a class of partially hyperbolic systems (joint with Zhiyuan Zhang), à paraître dans *J. Eur. Math. Soc. (JEMS)*.
- Marked Length Spectrum, homoclinic orbits & the geometry of open dispersing billiards (joint with Péter Bálint, Jacopo De Simoi, Vadim Kaloshin), *Communications in Mathematical Physics* **374**(3) (2020), pp. 1531–1575.
- Weak mixing properties of interval exchange transformations & translation flows (joint with Artur Avila), *Bull. Soc. Math. France* **146**(2) (2018), pp. 391–426.
- Dynamics of a family of polynomial automorphisms of \mathbb{C}^3 : a phase transition (joint with Julie Déserti), *J. Geom. Anal.* **28** no. 1 (2018), pp. 190–224.
- On harmonic diffeomorphisms from conformal annuli to Riemannian annuli (joint with Harold W. Rosenberg), *Matemática Contemporânea*, Vol. **43** (2014), pp. 171–222, Sociedade Brasileira de Matemática.

Submitted

- Marked Length Spectral determination of analytic chaotic billiards with axial symmetries (joint with Jacopo De Simoi, Vadim Kaloshin) – 57 pages – arXiv: <https://arxiv.org/abs/1905.00890v3>.
- Smooth conjugacy classes of 3D Axiom A flows (joint with Anna Florio) – 37 pages – arXiv: <https://arxiv.org/abs/2010.04120v5>.

Preprints

- Exponential decay of the size of spectral gaps for quasiperiodic Schrödinger operators – 34 pages – arXiv : <https://arxiv.org/abs/1607.03422v3>.
- Asymptotics of the size of spectral gaps for 1D-quasi-periodic Schrödinger operators (joint with Jiangong You, Qi Zhou, Zhiyan Zhao) – 54 pages – arXiv : <https://arxiv.org/abs/1712.04700v1>.

In preparation

- C^r -density of accessibility for partially hyperbolic diffeomorphisms with 2-dimensional center (joint with Luis Pedro Piñeyrúa).
- U-Gibbs measures for perturbations of volume preserving Anosov diffeomorphisms on \mathbb{T}^3 (en collaboration avec Sébastien Alvarez, Davi Obata, Bruno Santiago).

Talks

- 2021
- *October*: Talk at the “Journée du Laboratoire”, LAMFA, Amiens, France.
 - *September*: Talk at the Workshop on Wild Dynamical Systems (organized by P. Berger) Azores, Portugal.
 - *July*: Mini-course at the Belgrade Summer School on Dynamics (organized by V. Dragović and V. Kaloshin) on “Some rigidity questions for low-dimensional hyperbolic dynamical systems”.
 - *July*: Talk at the Summer School on Dynamical systems organized by the GdR Platon, Brest, France.
 - *June*: Talk (joint with Anna Florio) at the conference for the 60th birthday of Christian Bonatti, CIRM, Marseille, France.
 - *February*: Talk at the “PSU Dynamical Systems Zoom Seminar”, Penn State University, on Zoom.

- 2020
- *December*: Talk at the meeting “Jeunes Géomètres dynamiques” organized by the GdR Platon, on Zoom.
 - *December*: Talk at the “Budapest-Wien Dynamics Seminar”, on Zoom.
 - *November*: Talk at the Seminar Teich (organized by T. Coulbois, P. Hubert, Olga Paris-Romaskevich), Aix-Marseille Université, on Zoom.
 - *May*: Talk at the “DinAmicl: Another Internet Seminar” (DAI Seminar, organized par A. Bianchi, C. Bonanno, M. Lenci, M. Seri, A. Sorrentino), on Zoom.
 - *April*: Talk at the “Séminaire international et très sérieux de Géométrie et dynamique” (organized by J. Toulisse et S. Ghazouani), on Zoom.
 - *March*: Talk at the working group on Hamiltonian Dynamics (organized by J. Féjoz), Université Paris-Dauphine, Paris, France.
 - *February*: Talk at “Journée GAD”, Laboratoire J.A. Dieudonné, Université Côte d’Azur, Nice, France.
 - *January*: Talk at the Seminar of Dynamics and Probability, LAMFA, Université de Picardie Jules Verne, Amiens, France.
 - *January*: Talk at the Institut Fourier, Université Grenoble Alpes, Grenoble, France.
- 2019
- *December*: Mini-course on Rigidity Problems and the Birkhoff conjecture for billiards, Conference on Dynamical Systems, Aussois, France.
 - *November*: Talk at the Seminar of Topology and Dynamics, Université Paris-Sud, Orsay, France.
 - *November*: Talk at the Seminar DynamiX, École polytechnique, Palaiseau, France.
 - *November*: Talk at the Seminar of Dynamical Systems, Université Paris 13, Villetaneuse, France.
 - *October*: Talk at the “Dynamics Days 2019”, Université Paris Diderot, Paris, France.
 - *October*: Talk at the Geometry and Topology Seminar at Université du Luxembourg, Luxembourg.
 - *October*: Talk at the Seminar of Geometry, Bordeaux, France.
 - *September*: Talk at the Conference “Dynamics, Equations & Applications”, University AGH, Krakow, Poland.
 - *July*: Talk at the Conference “Dynamische Systeme”, MFO, Oberwolfach, Germany.
 - *May*: Talk at the Seminar of Dynamical Systems, Universidad de la República, Montevideo, Uruguay.
 - *May*: Talk at the Seminar of students, Conference “Beyond Uniform Hyperbolicity”, CIRM, Marseille, France.
 - *February*: Talk at the Seminar of Dynamical Systems, University of Chicago, Chicago, Illinois, USA.
 - *February*: Talk at the Seminar of Ergodic Theory and Dynamical Systems, University of California Riverside, Riverside, California, USA.
- 2018
- *November*: Talk at the Ergodic Theory Seminar, University of Toronto, Toronto, Canada.
 - *November*: Talk at the workshop “Théorie spectrale des opérateurs quasi-périodiques et aléatoires”, Université de Montréal, Montréal, Canada.
 - *October*: Talk at the Seminar of Dynamical Systems, Budapest University of Technology and Economics, Budapest, Hungary.
 - *April*: Talk at the post-doc Seminar, University of Toronto, Ontario, Canada.
 - *February*: Talk at the Seminar of Dynamical Systems, University of Chicago, Illinois, USA.
- 2017
- *October-November*: two Talks at the working Seminar of Dynamical Systems, University of Toronto, Ontario, Canada.
 - *October*: Talk at the post-doc Seminar, University of Toronto, Ontario, Canada.
 - *October*: Talk at the Mini-Workshop on Reflectionless Operators: “The Deift and Simon Conjectures”, Oberwolfach, Germany.
 - *October*: Talk at the Seminar of Dynamical Systems, University of Pennsylvania, State College, Pennsylvania, USA.

- *September*: Talk at the Seminar of Dynamical Systems, University of Toronto, Ontario, Canada.
 - *August*: Talk at the Conference “Dynamics in Number Theory and Geometry”, Queens University, Ontario, Canada.
 - *June*: Talk at the International Conference “Dynamics Beyond Uniform Hyperbolicity”, Brigham Young University, Provo, Utah, USA.
 - *February*: Talk at the “Imperial-ICTP-Loughborough Conference on Dynamical Systems”, Imperial College, London, United Kingdom.
 - *February*: Talk at a student Seminar of Dynamical Systems, Université Paris Diderot, Paris, France.
 - *January*: Talk at the Seminar of Dynamical Systems, Institut de Mathématiques de Bourgogne, Dijon, France.
- 2016
- *November*: Talk at the Seminar of Dynamical Systems (Teich), FRUMAM, Marseille, France.
 - *November*: Talk at the Seminar of Dynamical Systems, Université Nice Sophia Antipolis, Nice, France.
 - *October*: Talk at the working group on Ergodic Theory and Dynamical Systems, Université Paris-Sud, Orsay, France.
- 2015
- *November*: Talk at the student Seminar of Institut de Mathématiques de Bourgogne (IMB), Dijon, France.
- 2014
- *September*: Talk at the student Seminar of Institut de Mathématiques de Jussieu (IMJ-PRG), Paris, France.
- 2013-2015
- Various Talks at the PhD students’ Seminar of Université Paris Diderot, Paris, France.
- 2012
- *October*: Talk at the Seminar of differential geometry of Institut de Mathématiques de Jussieu (IMJ-PRG), Paris, France.
 - *July*: Talk at the Seminar of differential geometry of Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil.

Conferences and Visits

- 2021
- *September*: Workshop on Wild Dynamical Systems organized by P. Berger, Azores, Portugal.
 - *August*: CIME Summer School “Modern Aspects of Dynamical Systems”, Cetraro, Italy.
 - *July*: Belgrade Summer School on Dynamics (organized by V. Dragović, V. Kaloshin), Belgrade, Serbia.
 - *July*: International Conference “Dynamische Systeme”, MFO, Oberwolfach, Germany.
 - *July*: Summer School in Dynamical Systems organized by the GdR Platon, Brest, France.
 - *June*: Stay at CIRM for the 60th birthday conference of Christian Bonatti, Marseille, France.
- 2020
- *December*: Conference “Parole aux Jeunes Géomètres dynamiques” (organized by the GdR Platon), on Zoom.
 - *February*: Visit at the Laboratoire J.A. Dieudonné, Université Côte d’Azur (invited by Prof. Laurent Stolovitch and Zhiyan Zhao), Nice, France.
- 2019
- *December*: Conference on Dynamical Systems, Aussois, France.
 - *November*: Conference “Parole aux Jeunes Chercheurs en Dynamique” (organized by the GdR Platon) Nancy, France.
 - *November*: Fields Medal Symposium in honour of Prof. Artur Avila, Fields Institute, Toronto, Canada.
 - *October*: Conference “Dynamics Days 2019”, Université Paris-Diderot, Paris, France.
 - *September*: International Conference “Dynamics, Equations and Applications (DEA)”, University AGH, Krakow, Poland.
 - *July*: International Conference “Dynamische Systeme”, MFO, Oberwolfach, Germany.
 - *May-June*: Visit at the Universidad de la República (invited by Prof. Martín Sambarino), Montevideo, Uruguay.

- *May*: International Conference “Dynamics Beyond Uniform Hyperbolicity”, CIRM, Marseille, France.
 - *February*: Visit at the University of Chicago, Chicago, Illinois, USA (invited by Prof. Aaron Brown).
 - *February*: Visit at the University of California Riverside, Riverside, California, USA (invited by Prof. Zhenghe Zhang).
- 2018
- *November*: Participation in the workshop “Théorie spectrale des opérateurs quasi-périodiques et aléatoires”, Université de Montréal, Montréal, Canada.
 - *October*: Visit at the Budapest University of Technology and Economics (invited by Prof. Péter Bálint), Budapest, Hungary.
 - *October*: Fall meeting of the Semi-annual Workshop in Dynamical Systems and Related Topics (dedicated to the memory of Anatole Katok), Pennsylvania State University, State College, Pennsylvania, USA.
 - *August*: Participation in the International Congress of Mathematicians, Rio de Janeiro, Brazil.
 - *July*: Workshop on Groups, Geometry and Dynamics (Satellite Conference of the ICM, with a homage to Ricardo Mañé), Montevideo, Uruguay.
 - *May*: Visit at the University of Maryland (invited by Prof. Vadim Kaloshin), College Park, Maryland, USA.
 - *March*: Conference on “New Developments in Open Dynamical Systems and Their Applications”, Banff International Research Station, Banff, Alberta, Canada.
 - *February*: Visit at the University of Chicago, Chicago, Illinois, USA.
- 2017
- *October*: Mini-Workshop on Reflectionless Operators: “The Deift and Simon Conjectures”, Oberwolfach, Germany.
 - *October*: Visit at the Pennsylvania State University (invited by Prof. Federico Rodriguez-Hertz), State College, Pennsylvania, USA.
 - *August*: Conference “Dynamics in Number Theory and Geometry”, Queens University, Ontario, Canada.
 - *July*: Séminaire de mathématiques supérieures - School on contemporary Dynamical Systems, Université de Montréal - Fields Institute, Montréal, Québec, Canada.
 - *June*: International Conference “Dynamics Beyond Uniform Hyperbolicity”, Brigham Young University, Provo, Utah, USA.
 - *May*: Visit at Université Nice Sophia Antipolis (invited by Zhiyan Zhao), Nice, France.
 - *March*: Imperial-ICTP-Loughborough Conference on Dynamical Systems, Imperial College, London, United Kingdom.
 - *February*: Winter school on “Conservative Dynamics”, Engelberg, Switzerland.
- 2016
- *November*: Visit at Université Nice Sophia Antipolis (invited by Laurent Stolovitch and Zhiyan Zhao), Nice, France.
 - *October*: School on surface dynamics, Centre International de Rencontres Mathématiques (CIRM), Marseille, France.
 - *July*: School on Dynamical Systems and partial differential equations, Barcelona, Spain.
 - *June*: Dynamics, Geometry and Number Theory, A Conference in honor of Gregory Margulis, Institut Henri Poincaré, Paris, France.
 - *June*: Géométrie ergodique, Conference in honour of François Ledrappier, Université Pierre et Marie Curie, Paris, France.
 - *January*: Visit at Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil.
- 2015
- *July-August*: School and Conference in Dynamical Systems, International Centre for Theoretical Physics (ICTP), Trieste, Italy.
 - *June*: Third Palis-Balzan Conference, Institut Henri Poincaré (IHP), Paris, France.

- *January*: Visit at Instituto de Matemática Pura e Aplicada (invited by Prof. Marcelo Viana), Rio de Janeiro, Brazil.
- 2014 • *June-July*: Workshop on groups, numbers and dynamics, Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom.
 - *March-April*: School on geometry and dynamics, Centre International de Rencontres Mathématiques (CIRM), Marseille, France.
- 2013 • *June*: Second Palis-Balzan Conference, Institut Henri Poincaré (IHP), Paris, France.
 - *April*: Visit at Instituto de Matemática Pura e Aplicada (invited by Prof. Artur Avila), Rio de Janeiro, Brazil.
- 2012 • *July*: XVII Brazilian School of Differential Geometry, Manaus, Brazil.
 - *April-July*: Internship in differential geometry under the supervision of Prof. Harold Rosenberg, Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil.

Awards

- 2020 Ranked 1st for an assistant professor position (auditions maîtres de conférences) at the Université de Picardie Jules Verne (UPJV), Amiens, France.
- 2019 Ranked 2nd for an assistant professor position (auditions maîtres de conférences) at the Aix-Marseille Université, Marseille, France.
- 2019 2-year Post-doctoral fellowship (ERC project of Prof. Sylvain Crovisier), Université Paris-Saclay.
- 2017 2-year Post-doctoral fellowship, University of Toronto.
- 2016 1/2 ATER, Université Paris-Diderot.
- 2013 PhD grant (AMX).
- 2013 Grand prix du stage de recherche, École polytechnique.
- 2012 Funding of the French-Brazilian network in Mathematics.

Teaching

- 2021 • Courses at the preparation for “Agrégation externe de Mathématiques”, 5th year, Université de Picardie Jules Verne, Amiens, France.
 - Course on Dynamical Systems, 4th year, Université de Picardie Jules Verne, Amiens, France.
 - Course on Probability Theory, 3rd year, Université de Picardie Jules Verne, Amiens, France.
- 2020 • Courses at the preparation for “Agrégation externe de Mathématiques”, 5th year, Université de Picardie Jules Verne, Amiens, France.
 - Statistics for Management, 3rd year, Université de Picardie Jules Verne, Amiens, France.
- 2019 • Introduction to Discrete Mathematics (instructor), UTM, Mississauga, Ontario, Canada.
- 2018 • Introduction to Discrete Mathematics (instructor), UTM, Mississauga, Ontario, Canada.
 - Introduction to Partial Differential Equations (instructor), University of Toronto at Mississauga (UTM), Mississauga, Ontario, Canada.
- 2017 • Complex variables (instructor), University of Toronto at Mississauga, Mississauga, Ontario, Canada.
 - Calculus and linear algebra, Université Paris Diderot, Paris, France.
- 2015-2016 • Calculus/Linear algebra, Université Pierre et Marie Curie, Paris, France.
- 2014-2015 • Calculus/Linear algebra, Université Pierre et Marie Curie, Paris, France.
 - Preparation for oral examinations in Mathematics, Université Pierre et Marie Curie, Paris, France.
- 2013-2014 • Assistantship in Linear Algebra, Université Pierre et Marie Curie, Paris, France.

Various skills

- Languages French (mother tongue), English (fluent), German (good communication skills), Portuguese (basic communication skills).
- Computing Java, Office, Scilab, Maple, \LaTeX .

Music Gold medals in piano and organ.

Other work experiences

- Aug. 2011 Internship in a research center of Saint-Gobain, Pont-à-Mousson, France.
- 2010 Military service in the French Navy.