

Martin Leguil

Born August 3rd 1989, French citizen.

Postdoctoral fellow at the University of Toronto at Mississauga supervised by Prof. Jacopo De Simoi.

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Studies

- 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, geometry (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

- Marked Length Spectrum, homoclinic orbits & the geometry of open dispersing billiards (joint with Péter Bálint, Jacopo De Simoi, Vadim Kaloshin), to appear in *Communications in Mathematical Physics*.

- 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** (2012), pp. 171–222, Sociedade Brasileira de Matemática.

Submitted

- On the centralizer of vector fields: criteria of triviality and genericity results (joint with Davi Obata, Bruno Santiago), submitted.

In preparation

- Marked Length Spectral determination of analytic chaotic billiards with axial symmetries (joint with Jacopo De Simoi, Vadim Kaloshin).
- Invariant graphs and spectral type of Schrödinger operators (joint with Artur Avila, Kostya Khanin).
- C^r –prevalence of the accessibility property for a class of partially hyperbolic diffeomorphisms (joint with Zhiyuan Zhang).
- Asymptotics of the size of spectral gaps for $1D$ –quasi-periodic Schrödinger operators (joint with Jiangong You, Qi Zhou, Zhiyan Zhao).

Talks

- 2019
- *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

- 2019 • *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

- 2013 Grand prix du stage de recherche, École polytechnique.

Teaching

- 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.