

Matthieu Calvez

Curriculum Vitæ

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PhD in Mathematics.
Tenure *Professeur agrégé* of Mathematics.

GENERAL INFORMATION

I. Work experience

- 2021 Post-doctoral position, EPSRC New Investigator Award EP/S010963/1 "Geometry of Artin Group Actions" led by Alexandre Martin, Heriot-Watt University, Edinburgh, UK.
- 2020 (Fall semester) Teaching and Research Assistant, University of Clermont-Ferrand, France.
- 2017–2019 Assistant Professor, University of La Frontera, Temuco, Chile.
- 2016 Research assistant and teacher, University of Santiago, Chile.
- 2013–2015 Post-doctoral position, under the guidance of Andrés Navas, University of Santiago, Chile.

II. Education

- 2009–2012 Doctoral studies.
 - PhD Thesis *Algorithmic problems in braid groups*.
 - Under the joint supervision of
 - Bert Wiest, IRMAR, University of Rennes 1, France,
 - Juan González-Meneses López, Department of Algebra, University of Seville, Spain.
 - Defended on 12 July 2012 at University of Rennes 1, France.
- 2008–2009 Master Degree in Mathematics (second year), University of Rennes 1, France. Master thesis "*Nielsen-Thurston orderings*" under the supervision of Bert Wiest.
- 2007–2008 *Agrégation* of Mathematics, University of Western Brittany, Brest, France. (High-level competitive examination for the recruitment of french teachers, successful).
- 2006–2007 First year of Master Degree in Mathematics, University of Western Brittany, Brest, France.
- 2005–2006 Bachelor Degree in Mathematics, University of Western Brittany, Brest, France.
- 2003–2005 *Classes Préparatoires* (two-year intensive undergraduate studies for preparing the competitive entrance examinations to the French *grandes écoles*), Lycée Brizeux, Quimper, France.

III. Research interests

Geometric Group Theory, in particular: braid groups and their generalizations, Artin-Tits groups, Garside groups, Mapping Class Groups.

IV. Languages and computer skills

French, native; Spanish & English, fluent; German, basic knowledge.
GAP; \LaTeX ; Maple.

V. Additional information

French citizenship.

Born on 10 june 1986 in Quimper, France.

RESEARCH AND SCIENTIFIC POPULARIZATION

I. Publications

Publications in journals

- [10] Curve graphs for Artin-Tits groups of type B , \tilde{A} and \tilde{C} are hyperbolic (with Bruno Cisneros), *Transactions of the London Mathematical Society* 8 (1), 2021, 151-173.
- [9] Hyperbolic structures for Artin-Tits groups of spherical type (with Bert Wiest), arXiv:1904.02234. To appear in *Contemporary Mathematics*.
- [8] Conjugacy stability of parabolic subgroups of Artin-Tits groups of spherical type (with Bruno Cisneros and María Cumplido), *Journal of Algebra* 556, 2020, 621-633.
- [7] Acylindrical hyperbolicity and Artin-Tits groups of spherical type (with Bert Wiest), *Geometriae Dedicata* 191 (1), 2017, 199–215.
- [6] Curve graphs and Garside groups (with Bert Wiest), *Geometriae Dedicata* 188 (1), 2017, 195–213.
- [5] Garside-theoretic analysis of Burau representations (with Tetsuya Ito), *Journal of Knot Theory and its Ramifications* 26 (7), 2017.
- [4] A fast solution to the conjugacy problem in the four-strand braid group (with Bert Wiest), *Journal of Group Theory* 17 (5), 2014, 757–780.
- [3] Fast Nielsen-Thurston classification of braids, *Algebraic and Geometric Topology* 14, 2014, 1745–1758.
- [2] Dual Garside structure and reducibility of braids, *Journal of Algebra* 356 (1), 2012, 355–373.
- [1] Fast algorithmic Nielsen-Thurston classification of four-strand braids (with Bert Wiest), *Journal of Knot Theory and its Ramifications* 21 (5), 2012.

Preprints

- [11] Artin-Tits groups of euclidean type are acylindrically hyperbolic, arXiv:2010.13145.

In progress

- [12] Morse elements in Garside groups are strongly contracting (with Bert Wiest).
- [13] Property R_∞ for some spherical and affine Artin-Tits groups (with Ignat Soroko).

II. Research projects

As principal investigator

- [4] *Artin-Tits groups: hyperbolic features and applications; a question on parabolic subgroups*. Project “Regular” Fondecyt number 1180335. Since 1 April 2018.
- [3] *Geometric group theory*. Project for attraction and insertion of investigators Conicyt, number PAI 79160023. 1 January 2017-31 December 2019.
- [2] *Braid groups: at the interface between surface automorphisms and Garside theory*. “Initiation to research” project Fondecyt number 11140090. 1 November 2015-30 October 2017.
- [1] *Geometric and algorithmic aspects of the conjugacy problem in braid groups*. Postdoc project Fondecyt number 3130569. 1 October 2012-30 September 2014.

As researcher

- [8] *Geometry of Artin group actions*. EPSRC New Investigator Award EP/S010963/1. Principal investigator: Alexandre Martin, Heriot-Watt University, Edinburgh, UK. 2021.

- [7] *Transversal challenges in Homotopy Theory, Knots and Groups*. Spanish Ministry of Economy and Competitiveness, number MTM2016-76453-C2-1-P. Principal investigator: Juan González-Meneses López, University of Seville, Spain. 2017-2020.
- [6] *Geometry at the frontier*. Associative research project Anillo ACT1415, Conicyt. Principal investigator: Rubí Rodríguez, University of La Frontera, Temuco, Chile. From 2015 to 2018.
- [5] *Braids: Knots, Garside groups and Mapping Class Groups*. Spanish Ministry of Economy and Competitiveness, number MTM2013-44233-P. Principal investigator: Juan González-Meneses López, University of Seville, Spain. June 2013-June 2016.
- [4] *Dynamical systems in Chile*. Associative research project Anillo ACT1103, Fondecyt. Principal investigator: Andrés Navas, University of Santiago, Chile. November 2012-November 2015.
- [3] *Algebraic and topological properties of of braids and knots*. Spanish Ministry of Science and Innovation, number MTM2010-19355. Principal investigator: Juan González-Meneses López, University of Seville, Spain. 1 January 2011-31 December 2013.
- [2] *Geometric and computational aspects of braid groups*. Project of excellence of Andalusian government number P09-FQM-5112. Principal investigator: Juan González-Meneses López, University of Seville, Spain. 3 February 2010-3 February 2014.
- [1] *Algebraic Geometry, differential systems and singularities*. Research group number FQM-218 Andalusian government. Principal investigator: Luis Narváez Macarro, University of Seville, Spain. Since July 2002.

III. Talks, presentations

Advanced courses

- [2] *Curve graphs and Artin-Tits groups*. Meeting on knots, braids and algebras: algebraic constructions inspired by low-dimensional topology. Mathematics Institute of the National Autonomous University of Mexico (UNAM), Oaxaca, Mexico. 3-10 October 2018.
- [1] *Garside groups*. University of Chile, Santiago, Chile. 16, 23 and 30 November 2012.

Invited talks at conferences

- [7] *Strongly contracting elements in Garside groups*. Workshop “Perspectives on Artin groups”. EPSRC-ICMS Edinburgh, UK. 24-27 May 2021.
- [6] *The complex of parabolic subgroups of an Artin-Tits group*. First meeting in Algebra and Knot theory. University of Valparaíso, Chile. 9-10 January 2020.
- [5] *How to conjugate parabolic subgroups in Artin-Tits groups?* Mathematical Days of the Southern Region, Session of Algebra. Austral University of Chile, Valdivia, Chile. 25-27 April 2018.
- [4] *Algorithmic problems in Artin-Tits groups*. Sub-pleenary conference. LXXXVI annual meeting of Chilean Mathematical Society. University of Talca, Chile. 2-4 November 2017.
- [3] *Acylindrical hyperbolicity of Artin-Tits groups of spherical type*. Mathematical Congress of the Americas, Session “Interactions Between Geometric Group Theory, Low-Dimensional Topology and Geometry, and Dynamics”. McGill University, Montreal, Canada. 24-28 July 2017.
- [2] *Towards an algebraic Nielsen-Thurston classification of braids*. XXI Latine American Algebra Colloquium, Session of Group Theory. University of Buenos Aires, Argentina. 25-29 July 2016.
- [1] *The conjugacy problem in the braid groups*. XIX Latine American Algebra Colloquium, Session of Group Theory. University of La Frontera, Pucón, Chile. 11-14 December 2012.

Contributed talks at conferences

- [4] *Conjugacy stability of parabolic subgroups in spherical type Artin-Tits groups*. Geometric and Asymptotic Group Theory with Applications (GAGTA-12). KIAS, Seoul, Korea. 15-20 July 2018.
- [3] *Towards an algebraic Nielsen-Thurston classification of braids*. Knots in Hellas. Olympia, Greece. 17-23 juillet 2016.
- [2] *Algorithmic consequences of the Linearly Bounded Conjugator Property in braid groups*. Conference “Garside theory; state of the art and prospects”. Cap Hornu, Baie de Somme, France. 30 May-2 June 2012.
- [1] *Fast algorithmic Nielsen-Thurston classification of four-strand braids*. “Winter Braids”, School on algebraic and topological aspects of braid groups. University of Pau, France. 14-16 décembre 2010.

Posters

- [2] *Curve graphs and Garside groups*. Workshop on the Geometry of Groups. Montevideo, Uruguay. 11-15 April 2016.
- [1] *Burau representation from Garside-theoretical viewpoint*. Hyperbolic Geometry and Geometric Group Theory, 7th Seasonal Institute of the Mathematical Society of Japan (MSJ-SI). University of Tokyo, Japan. 30 July, 5 August 2014.

Seminars

- [19] *Curve graphs for Artin-Tits groups*. Seminar of the research team on Algebraic Topology and Group Theory, KU Leuven, Belgium. 25 March 2021.
- [19] *Garside structures in Artin-Tits groups and hyperbolic features*. Seminar of the team of Algebra and Geometry, University of Caen, France. 26 January 2021.
- [18] *Some aspects of braid groups*. Seminar, Geometry group at the Faculty of Science of the Universidad Central del Ecuador, Quito, Ecuador. 25 January 2021.
- [17] *Garside structures in Artin-Tits groups and hyperbolic features*. Seminar of Algebra, Geometry and Topology, University Heriot Watt, Edinburgh, UK. 20 January 2021.
- [16] *Hyperbolic properties for Artin-Tits groups*. Seminar of the team "Geometry, Algebra, operator algebras", University of Clermont-Auvergne, Clermont-Ferrand, France. 2 October 2020.
- [15] *Hyperbolic graphs for Artin-Tits groups*. Virtual French-speaking seminar on Groups and Geometry. 14 May 2020. <https://francoisdahmani.wixsite.com/seminaire-gg>
- [14] *Conjugacy stability of parabolic subgroups in Artin-Tits groups of spherical type*. Online seminar of Geometric Group Theory, Mathematics Institute of the National Autonomous University of Mexico (UNAM), Morelia, Mexico. 23 May 2019.
- [13] *Conjugacy stability of parabolics in Artin-Tits groups*. Meeting of the Associative research project Anillo ACT1415, PIA CONICYT. University of La Frontera, Temuco, Chile. 29 June 2018.
- [12] *Additional length complex*. Geometry Seminar. University of La Frontera, Temuco, Chile. 10 March 2016.
- [11] *Curve complex and Garside groups*. Group Theory Seminar, University of Santiago, Chile. 8 April 2015.
- [10] *Garside theory and Burau representation*. Seminar of the team of Analytic Geometry, IRMAR, University of Rennes 1, France. 20 January 2015.
- [9] *Garside theory and Burau representation*. Seminar of the Department of Algebra, University of Seville, Spain. 13 June 2014.
- [8] *Lyndon equation*. Group Theory Seminar, University of Santiago, Chile. 17 April 2014.
- [7] *Localization in Ore domains*. Group Theory Seminar, University of Santiago, Chile. 22 October 2013.
- [6] *The conjugacy problem in braid groups*. Seminar of the team of Algebra and Geometry, University of Caen, France. 2 October 2012.
- [5] *Algorithmic consequences of the Linearly Bounded Conjugator Property in braid groups*. Seminar of the Department of Algebra, University of Seville, Spain. 17 May 2012.
- [4] *A fast algorithm for the dynamical classification of braids*. Seminar of the team of Analytic Geometry, IRMAR, University of Rennes 1, France. 26 January 2012.
- [3] *A well-order on braids*. Seminar "Pampers" of young researchers in Algebra and Geometry, IRMAR, University of Rennes 1, France. 23 February 2011.
- [2] *Fast algorithmic Nielsen-Thurston classification of four-strand braids*. Seminar of the Department of Algebra, University of Seville, Spain. 7 juin 2010.
- [1] *Garside theory in braid groups*. Seminar "Pampers" of young researchers in Algebra and Geometry, IRMAR, University of Rennes 1, France. 20 January 2010.

Scientific Popularization

- [2] *Simetrías, grupos, juegos*. "Symmetries, groups, games". Highschool Camilo Henríquez, Temuco, Chile. 31 May 2018.
- [1] *Aspectos de los grupos de trenzas*. "Aspects of braid groups". V Day of Mathematics, Department of Mathematics, University of Valparaiso, Chile. 16 January 2014.

IV. Organisation of scientific events

Conferences

- [6] *XXXVIII Meeting of the Chilean Mathematical Society*. University of La Frontera, Temuco, Chile. 13-15 October 2019. This meeting had to be canceled due to the protests occurring at that time.
- [5] *Symposium of Young Researchers in Dynamics and Geometry*. University of La Frontera, Temuco, Chile. 30-31 March 2017. [//geometry.ufro.cl/workshops/](http://geometry.ufro.cl/workshops/)
- [4] *SUMA 2016, first joint meeting of the Chilean Mathematical Society and the Argentinian Mathematical Union. Session : "Group theory: geometry, topology and representations"*. Valparaiso, Chile. 14-17 December 2016. 52.67.44.135/web/suma2016/
- [3] *Orderable groups*. Cajón del Maipo, Chile. 1-5 September 2014. www.sistemasdinamicos.cl/conferences/OrderableGroups/
- [2] *First Spanish Meeting of Young Topologists*. University of Seville, Spain. 10-14 September 2012. www.imus.us.es/FSMYT12/
- [1] *Braids in Seville*. University of Seville, Spain. 13-17 June 2011. www.imus.us.es/ACT/braids2011/php/index.php.

Regular seminar

- [1] Biweekly seminar "Cruz del Sur". Department of Mathematics and Statistics, University of La Frontera, Temuco, Chile. 2017-2018.

Scientific Popularization

- [1] Co-organizer of the series of mathematical lectures *Aún queda mucho por descubrir* ("There is still a lot to discover") and *Problemas inocentes, soluciones profundas* ("Innocent problem, deep solutions"). Highschool Camilo Henríquez, Temuco, Chile. 2017-2018.

V. Other service

- Evaluation of postulations for PhD grants, Conicyt (National Commission of Scientific and Technological Research), Chile. 2015-2020.
- Reviewer for MathSciNet since August 2020.
- Referee for *Glasgow Mathematical Journal*, *Journal of Algebra* and *Journal of the London Mathematical Society*.
- Chair in the Virtual Geometric Group Theory conference, held at CIRM 1-5 June 2020.

TEACHING

University of Clermont-Auvergne, Clermont-Ferrand, France

2020, Autumn semester

- “Mathematics Semester 1” (basics in linear algebra, real analysis and complex numbers), first year of undergraduate in sciences. (72 hours).
- “Math Common Core Course” (Real functions, Vectorial Geometry and Integrals), first year of undergraduate in sciences. (11 hours).

University of La Frontera, Temuco, Chile

2019

- “Linear Algebra”, first year of undergraduate degree in engineering. (128 hours).
- “Multivariable calculus”, second year of undergraduate degree in engineering. (80 hours).
- Abstract Algebra, elementary course for the first year of PhD in Mathematics. (120 hours).
(The first six chapters of T. Hungerford, *Algebra*, Springer 1974.)

2018

- “Precalculus” and “calculus”, first year of undergraduate degree in engineering. (192 hours).

2017

- Abstract Algebra, elementary course for the first year of PhD in Mathematics. (120 hours).
(The first six chapters of T. Hungerford, *Algebra*, Springer 1974.)
- Geometric group theory, optional course for the second year of PhD program in Mathematics. (80 hours).
(Free groups, presentations, actions on trees. Coarse geometry, Svarc-Milnor, growth.
Gromov-hyperbolic spaces and hyperbolic groups.
References: C. Löh, *Geometric Group Theory. An introduction*, Universitext, Springer, 2018.
J. Meier, *Groups, graphs and trees*, Cambridge University Press, 2008.)
- Basic real Analysis, second year of undergraduate degrees in biochemistry and pedagogy of science. (64 hours).

University of Santiago, Chile

2016

- Complex Analysis, elementary course for the first year of PhD in Mathematics. (51 hours).
(The first seven chapters of J. Conway, *Functions of one complex variable*, Springer-Verlag 1978.)
- Linear Algebra, second year of undergraduate degree in mathematical engineering. (102 hours).

2015

- Complex Analysis, elementary course for the first year of PhD in Mathematics. (51 hours).
(The first seven chapters of J. Conway, *Functions of one complex variable*, Springer-Verlag 1978.)
- “Calculus IV”, complex analysis, second year of undergraduate degree in mathematical engineering. (102 hours).

University of Rennes 1, France

2011–2012, 2010–2011

- Tutorials of Linear Algebra, second year of Bachelor Degree. (36 hours).
- Tutorials of Number Theory, first year of Master Degree. (24 hours).
(Finite fields, Rings of integers, Pell-Fermat, Dirichlet’s Unit Theorem).
- Oral examinations of Differential Calculus and Linear Algebra, third year of Bachelor Degree. (4 hours).

2009–2010

- Tutorials of Linear Algebra, second year of Bachelor Degree. (36 hours).
- Tutorials of basic Analysis, first year of Bachelor Degree in Biology. (24 hours).