

CURRICULUM VITAE

THIERRY BARBOT

1. PERSONAL DATA

Full name: Thierry Barbot

Email address: thierry.barbot@univ-avignon.fr

Date and place of birth: October 24 1967, Fougères–France.

Personal address: 16 rue Rouge, 84000 Avignon, France

Position: Professor at the Department of Mathematics-LMA-Avignon University since september 2008.

Professional address: Departement de Mathématiques

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2. ACADEMIC DEGREES AND APPOINTMENTS

- (1) **Chaire franco-brésilienne:** September - november 2016 at UFMG, Belo Horizonte MG - Brazil.
- (2) **Chaire franco-brésilienne:** July-September 2015 at UNICAMP, Campinas SP - Brazil.
- (3) **Délégation CNRS:** September 2013 to February 2014 at UMPA, ENS Lyon - France
- (4) **Professor:** Since september 2008 at LMA, Université d'Avignon - France
- (5) **Habilitation à diriger des recherches:** November 2005 at Université Claude Bernard, Lyon - France.
- (6) **Mise à disposition:** September 2003 to August 2004 at Laboratoire Poncelet - Moscou, Russia.
- (7) **Chargé de Recherche CNRS 1ère cl.:** September 1997 to August 2008 at UMPA, UMR 5669, ENS Lyon - France
- (8) **Mise à disposition:** September 1996 to August 1997 at UFF - Niteroi, Brazil
- (9) **Chargé de Recherche CNRS 2e cl.:** September 1994 to August 1997 at Laboratoire de Topologie, Université de Bourgogne (UMR 755)
- (10) **Post-Doc:** January 1993 to August 1994 at Impa – Rio de Janeiro - Brazil.
- (11) **Ph. D. in Mathematics:** September-1990 to December-1992 at at ENS Lyon, France. Advisor: E. Ghys.
- (12) **Under-graduation and Master degree in Mathematics:** September 1987 to August-1991 at ENS Lyon, France.

3. GRANTS

- AAP 2018 Agorantic project GNOM
- AAP 2018 Agorantic project HCMS
- International Coordinator of MATH-AMSud project GDAR "Geometry, Dynamics and Anosov Representations" (17-MATH-03) 2017-2018. <http://gdar.fr/bienvenue/>
- Prime d'Encadrement Doctoral et de Recherche 2015 - 2020.
- Prime d'Excellence Scientifique 2011-2015
- Leader of ANR Project Geodycos (ANR-07-BLAN-0140-01), 2007–2010.
- Prix Maurice Audin 2006
- Leader of ACI Jeune Chercheur "structures géométriques et trous noirs" 2002–2006.

4. ADMINISTRATIVE RESPONSABILITIES

- Elected member of the CFVU (Conseil de la Formation et de la Vie Universitaire) of Avignon Université (2011-2015, 2016-??),
- Member of the CUFR (Council of Faculty UFR-ip Science et Technology, 2015-2018),
- Member of the council of the LMA (2014-2018),
- Assistant Director of the LMA (2015-2016),
- Director of the LMA (2016-2018),
- Responsable of the relations Avignon University - ESPÉ Aix-Marseille University (2011-2016),
- "Référént Défense et Sécurité" for Avignon University (2018 - ??)
- Participation to several "Comité de Spécialistes" for recruitment in Grenoble, Marseille, Dijon, Avignon Universities.

5. THESIS ADVISED

- (1) R. Smai, "Espaces-temps conformément plats et représentations Anosov", 2019-??
- (2) (Master Thesis) R. Smai, "Représentations Anosov et espaces-temps conformément plats", April-July 2019.
- (3) (Master Thesis) D. Choudhury, "Exotic Anosov Flows And Flag Manifolds" april-June 2018,
- (4) (Bolsa Sanduiche) U. Matos de Almeida, "Contact Anosov actions with smooth invariant bundles" (April-october 2017), defended March 2018,
- (5) M. Hassani, "Cohomogeneity one actions on Einstein space", July 2018, co-advisor P. Ahmadi, Zanjan University, Iran,
- (6) L. Brunswic, "Évolution de surfaces polygonales dans un espace-temps plat", september 2014 – décembre 2017,
- (7) (Bolsa Sanduiche) V. Pardini Valerio, "Anosov representations of Anosov flows", April 2014–March 2015, co-advisor M. J. Dias Carneiro, UFMG, Belo Horizonte, Brazil.
- (8) (Ph. D Thesis) M. Belraouti, "Métriques spéciales sur les surfaces", June 2013.

- (9) (Ph. D Thesis). C. Rossi Salvemini, "Espaces temps conformément plats", May 2012.
- (10) (Bolsa Sanduiche) V. Arakawa, "Anosov actions of codimension 2", March 2010–March 2011, co-advisor C. Maquera ICMC-USP, Sao Carlos, Brazil.
- (11) (Master Thesis) A. Gillote, "Sur les variétés globalement hyperboliques AdS", April 2008 – July 2008.
- (12) (Master Thesis) Q. Mériçot, "Variétés anti-de Sitter globalement hyperboliques et représentations Anosov", April 2005 – July 2005

6. PARTICIPATION TO THESIS COMITEES

- (1) M. Mion-Mouton, "Quelques propriétés géométriques et dynamiques globales des structures Lagrangiennes de contact", december 11th 2020, University of Strasbourg, **Rapporteur**,
- (2) M. Shannon, "Dehn surgeries and smooth structures on 3-dimensional transitive Anosov flows," 11th september 2020, University of Bourgogne,
- (3) F. Mazzoli, "Constant curvature surfaces and volumes of convex co-compact hyperbolic manifolds", 23rd July, University of Luxembourg,
- (4) L. Carvajales, "Quantitative aspects of Anosov subgroups acting on symmetric spaces", 10th July 2020, Institute of Mathematics of Jussieu,
- (5) L. Mehidi, "Points conjugués des tores lorentziens", 2nd december 2019, University of Bordeaux,
- (6) M. Lhuissier, "Le problème mathématique des trois corps, abordé simultanément sous l'angle de la recherche théorique et celui de la diffusion auprès de publics variés", 21st november 2018, ENS Lyon,
- (7) A. Tamburelli, "Anti de Sitter geometry convex domains, foliations and volume", 14th June 2018, University of Luxembourg, **Rapporteur**,
- (8) A. Bellis, "Etude topologique du flot horocyclique: le cas des surfaces géométriquement infinies", 22nd May 2018, University of Nantes, **Rapporteur**,
- (9) S. Marseglia, "Variétés projectives convexes de volume fini", 13rd July 2017, University of Strasbourg, **Rapporteur**,
- (10) N. Ben Khalifa, "Jeux évolutionnaires avec des interactions non uniformes et délais" (Computer Science Ph D Thesis), 16th december 2016, Avignon University.
- (11) O. Romaskevich, "Dynamique des systèmes physiques, formes normales et chaînes de Markov", 7th december 2016, ENS Lyon,
- (12) S. Ghosh, "Thermodynamics of Margulis Space Time" , 10th July 2015, Orsay University, **Rapporteur**,
- (13) A. Seppi, "Surfaces in constant curvature 3-manifolds and the infinitesimal Teichmüller Theory", december 2015, Pavia University,
- (14) M. Kourganoff, "Géométrie et dynamique des espaces de configuration", 4th december 2015, ENS Lyon, **Rapporteur**,

- (15) B. Diallo, "Métriques prescrites sur le bord du coeur convexe d'une variété anti-de Sitter globalement hyperbolique maximale compacte de dimension trois", 21st November 2014, University of Toulouse, **Rapporteur**,
- (16) I. Smilga, "Groupes et semi-groupes libres de transformations affines", 12th November 2014, ENS Ulm, **Rapporteur**,
- (17) D. Monclair, "Dynamique lorentzienne et groupes de difféomorphismes du cercle", 30th June 2014, ENS Lyon, **Rapporteur**,

7. EVALUATIONS, REFEREES

- Around 15-20 referee reports every year, for the following (non-exhaustive) list of journals: Ergod. Th. & Dynam. Sys, J. Topology, Publication IHES, Journal of Differential Equations, Journal of Mathematical Analysis and Applications, Proceedings of the London Mathematical Society, Geometriae Dedicata, GAFA, Annales scientifiques de l'École normale supérieure, Duke Mathematical Journal, Nonlinearity, Communications in Mathematical Physics, Geometry and Topology, Commentarii Mathematici Helvetici, Journal of Geometry and Physics, Analysis & PDE, Advances in Mathematics, Transactions of the AMS, Annales IHP, Mathematische Zeitschrift, Annales de l'Institut Fourier, Mathematische Annalen.
- Expert for the following agencies: Austrian Science Fund (2020), Fonds national suisse de la recherche scientifique (2020), Marsden Fund Council and the Royal Society of New Zealand, Université Joseph Fourier.

8. LINES OF RESEARCH

Areas: Geometry and Topology, Dynamical Systems.

Key words: Foliations, Anosov flows, Anosov actions of \mathbb{R}^k , Anosov representations, Lorentzian Geometry, Conformal Lorentzian geometry.

My Ph D was devoted to the study of Anosov systems, flows or diffeomorphisms, especially in dimension 3. This topic has evolved to the study of Anosov action of Lie groups (with C. Maquera), and Anosov representations of hyperbolic groups. I have maintained the original activity in Anosov flows in dimension 3 with my partnership with S. Fenley. Recently, and currently the field is receiving a strong impetus by innovative young researchers as T. Barthelmé, K. Mann, J. Bowden, P. Dehornoy and his students.

The other main part of my research activity is devoted to (conformal) lorentzian geometry of constant curvature. The central point is to extract the geometrical properties arising from the "global hyperbolicity" provided by Theoretical Physic

9. PUBLICATIONS

- (1) T. Barbot, F. Fillastre, *Quasi-Fuchsian co-Minkowski manifolds*, <https://arxiv.org/abs/1801.10429>
- (2) T. Barbot, *Lorentzian Kleinian groups*, Handbook of group actions. Vol. III, 311–358, Adv. Lect. Math. (ALM), 40, Int. Press, Somerville, MA, 2018.
- (3) T. Barbot, Gye-Seon Lee, V. Pardini Valério, *Pappus theorem, Schwartz representations and Anosov representations*, Ann. Inst. Fourier (Grenoble) 68 (2018), no. 6, 269–2741.
- (4) T. Barbot, S.R. Fenley, *Free Seifert pieces of pseudo-Anosov flows*, submitted, <http://arxiv.org/abs/1512.06341>
- (5) T. Barbot, C. Maquera, *Nil-Anosov actions*, Mathematische Zeitschrift, 287 (2017), n. 3-4, 1279-1305.
- (6) T. Barbot, *Deformations of Fuchsian AdS representations are quasi-Fuchsian*, Journal of Differential Geometry 101 (2015), Issue 1, 1-46.
- (7) T. Barbot, S.R. Fenley, *Classification and rigidity of totally periodic pseudo-Anosov flows in graph manifolds*, Ergod. Th. & Dynam. Sys., 35 (2015), 1681-1722.
- (8) T. Barbot, F. Bonsante, J.M. Schlenker, *Collisions of particles in locally AdS spacetimes II. Moduli of globally hyperbolic spaces*, Comm. in Math. Physics 327 (2014), no. 3, 691–735.
- (9) T. Barbot, S.R. Fenley, *Pseudo-Anosov flows in toroidal manifolds*, Geometry & Topology, 17 (2013), 1877–1954.
- (10) T. Barbot, C. Maquera, *Algebraic Anosov actions of Nilpotent Lie groups*, Topology and its Applications, 160 (2013), 199–219.
- (11) T. Barbot, Quentin Mérigot *Quasi-Fuchsian AdS representations are Anosov*, Groups, Geometry and Dynamics, 6 (2012), no. 3, 441–483.
- (12) T. Barbot, C. Meusbeurger, *Particles with spin in stationary flat spacetimes*, Geom. Dedicata 161 (2012), no. 1, 23–50.
- (13) T. Barbot, F. Bonsante, J.M. Schlenker, *Collisions of particles in locally AdS spacetimes I. Local description and global examples*, Comm. in Math. Physics 308 (2011), no. 1, 147–200.
- (14) T. Barbot, C. Maquera, *On integrable codimension one Anosov actions of \mathbb{R}^k on closed manifolds*, Discrete and Continuous Dynamical Systems - A 29, Issue 3 (2011), 803–822.
- (15) T. Barbot, C. Maquera, *Transitivity of codimension one Anosov actions of R^k on closed manifolds*, Ergod. Th. & Dynam. Sys. 31, No 1 (2011), 1–22.
- (16) T. Barbot, F. Béguin et A. Zeghib, *Prescribing Gauss curvature of surfaces in 3-dimensional spacetimes, Application to the Minkowski problem in the Minkowski space*, Ann. Instit. Fourier. 61 (2011), no. 2, 511–591.
- (17) T. Barbot, *Three-dimensional Anosov flag manifolds*, Geometry & Topology 14, (2010) 153–191.
- (18) L. Andersson, T. Barbot, F. Béguin et A. Zeghib, *Cosmological time versus CMC time I: Flat spacetimes*, Adv. Theor. Math. Phys. 12 (2008), no. 1, 1–66.

- (19) L. Andersson, T. Barbot, F. Béguin et A. Zeghib, *Cosmological time versus CMC time II: the de Sitter and anti-de Sitter cases*, Adv. Theor. Math. Phys. 12 (2008), no. 6, 1209–1257.
- (20) T. Barbot, *Causal properties of AdS-isometry groups II: BTZ multi black-holes*, Adv. Theor. Math. Phys. 12 (2008), no. 6, 1209–1257.
- (21) T. Barbot, *Causal properties of AdS-isometry groups I: Causal actions and limit sets*, Adv. Theor. Math. Phys. 12 (2008), no. 1, 1–66.
- (22) T. Barbot, F. Béguin, A. Zeghib, *Constant mean curvature foliations of globally hyperbolic spacetimes locally modelled on AdS₃*, Geometriae Dedicata, Volume 126 (2007), 71–129.
- (23) L. Andersson, T. Barbot & al., *Notes on: "Lorentz spacetimes of constant curvature"*, Geometriae Dedicata, Volume 126 (2007), 47–70.
- (24) T. Barbot, *Flat globally hyperbolic spacetimes*, Journal of Geometry and Physics, Volume 53, Issue 2 (2005), 123–165.
- (25) Barbot T., F. Béguin et A. Zeghib *Feuilletages des espaces temps globalement hyperboliques par des hypersurfaces à courbure moyenne constante*, C.R.A.S. Volume 336, Issue 3 (2003), 245–250.
- (26) T. Barbot, *Feuilletages transversalement projectifs sur les variétés de Seifert*, Ann. Inst. Fourier 53 (2003), no. 5, 1551–1613.
- (27) T. Barbot, *Flag Structures on Seifert Manifolds*, Geometry & Topology 5, (2001) 227–266.
- (28) T. Barbot, *Plane affine Geometry of Anosov flows*, Annales Scientifiques de l'École Normale Supérieure 34, No 6, (2001) 871–889.
- (29) T. Barbot, *Variétés affines radiales de dimension trois*, Bull. Soc. Math. de France 128 (2000), 347–389.
- (30) T. Barbot, *Actions de groupes sur les 1-variétés non séparées et feuilletages de codimension un*, Ann. Fac. Sci. Toulouse (6), 7, (1998), No 4, 559–597.
- (31) T. Barbot, *Generalizations of the Bonatti-Langevin example of Anosov flow and their classification up to topological equivalence*, Comm. in Anal. and Geom. 6, vol 4 (1998), 749–798.
- (32) T. Barbot, *Flots d'Anosov sur les variétés graphées au sens de Waldhausen*, Ann. Inst. Fourier 46 (1996), 1451–1517.
- (33) T. Barbot, *Mise en position optimale de tores par rapport à un flot d'Anosov*, Comment. Math. Helvetici 70 (1995), 113–160.
- (34) T. Barbot, *Caractérisation des flots d'Anosov en dimension 3 par leurs feuilletages faibles*, Ergod. Th. & Dynam. Sys. 15 (1995), 247–270.

10. SELECTED INVITED TALKS IN PAST 12 YEARS

- “Quasi-Fuchsian representations into $SO(2,n)$ ”,
AMS national meeting, San Diego (CA, USA), january 2008
- “Quasi-Fuchsian representations into $SO(2,n)$ ”,
Workshop “Discrete Groups and Geometric Structures, with Applications III”, Kortrijk (26/05/08 - 30/05/08)
- “Metric convergence of spacelike slices”,

- “Combinatorics of moduli spaces, Hurwitz numbers, and cluster algebras”, Laboratoire Poncelet, Moscou, june 2008
- “Spacetimes with particles: mathematical aspects,”
Workshop “Flat conformal Lorentzian structures” Princeton University, february 2010
 - “Singular constant curvature spacetimes”,
Final Workshop GeomEinstein, Université de Nantes, march 2010
 - “Particles with spin in flat spacetimes”,
Workshop “Aspects géométriques de la relativité générale”, Institut Elie Cartan, Nancy, june 2010
 - “Particles with spin in flat spacetimes”,
Colloque “Black Holes, General Relativity, Waves”, Roscoff, november 2010
 - “Spacetimes in expansion”,
87th Encounter between Mathematicians and Theoretical Physicists, “Lorentz geometry in Mathematics and in Physics” Institut de Recherche Mathématique Avancée (University of Strasbourg), june 2011
 - “Particles with spin in spacetimes in expansion”,
3rd Workshop on Combinatorics of Moduli Spaces, Cluster Algebras, Knots, and Topological Recursion Laboratoire J.-V. Poncelet, Steklov Mathematical Institute, and the Higher School of Economics Moscow, june 2012
 - “Initial singularity of flat Lorentzian spacetimes”,
Algebra and Geometry International Conference dedicated to the 65-th anniversary of Askold G. Khovanskii Moscow; Higher School of Economics, Independent University of Moscow, june 2012
 - “Anosov pseudo-Anosov flows in toroidal 3-manifolds”,
Montevideo Dynamical Systems Conference 2012 IMERL Montevideo, Uruguay, august 2012
 - “The geometry of spacetimes of constant curvature”,
Conférence Euro-Maghrébine de géométrie Université de Nice, 10-12 octobre 2012
 - “Particles in spacetimes in expansion”,
Workshop on Higher Teichmuller-Thurston Theory, CRM, Montreal, Canada, October 15-19, 2012
 - “Structure of pseudo-Anosov flows in periodic Seifert pieces and rigidity of totally periodic flows, Part II”,
Topology and Dynamics 2013, Fluminense Federal University, Niteroi, Brazil; 18-22 février 2013
 - “The geometry of the initial singularity of space-times of constant curvature”,
Meeting “The geometry of the initial singularity of space-times of constant curvature”, MFO Oberwolfach, Germany, 30 June - 6 July 2013
 - “Space-times with particles in expansion”,
Workshop Exotic Geometric Structures, ICERM, Brown University, Providence, USA, September 16-20, 2013

- “Sous groupes convexe cocompacts de AdS^3 ”
Meeting ANR Géode, Rennes, 4-6 september 2013
- “Particles in 3-dimensional spacetimes of constant curvature”
Teichmüller Theory and Interfaces with Ergodic Theory and Group Actions, School of Physical Sciences Jawaharlal Nehru University New Delhi, INDIA, 28 October – 1 November, 2013
- “ Globally hyperbolic spacetime of constant curvature”,
Teichmüller theory and surfaces in 3-manifolds, CRM De Giorgi, Pisa, 26 May - 20 June 2014
- “Construction of flat spacetimes in expansion with particles”,
Geometry on Groups and Spaces, ICM Satellite Conference on Geometric Group Theory & Geometric Structures August 7 - 12, 2014. KAIST, Daejeon, Korea
- “Pseudo Anosov flows in three manifolds : construction and classification”,
Journée Thématique Géométrie et Dynamique in honor of Patrick Foulon december 11th 2014, Université Cergy-Pontoise
- “Surfaces polygonales fuchsiennes et espace de Teichmüller décoré”,
Mathematical General Relativity. Analysis and geometry of spacetimes with low regularity, May 27, 2015, Université Pierre et Marie Curie, Paris
- “Fuchsian polygonal surfaces in Minkowski and the decorated Teichmüller space”,
Recent Advances in Surface Group Representations, September 25 - October 2, 2015, IRMA, Strasbourg
- “Fuchsian polygonal surfaces in Minkowski and the decorated Teichmüller space”,
Workshop Recent Advances in General Relativity October 26-29, 2015, IHP, Paris
- IV Workshop em Sistemas Dinâmicos January 26-28, 2016, UFMG, Belo Horizonte, Brazil
- IV Escola Brasileira de Sistemas Dinâmicos October 3-8, 2016, Unicamp, Campinas, Brazil
- “O Teorema de Pappus e representações do grupo modular”,
EDAI, October 14th, 2016, UFRJ, Rio de Janeiro, Brazil
- “New results on Anosov representations”,
Colloquium, November 3rd, 2016, UFMG, Belo Horizonte, Brazil
- “Espace-temps plats de dimension 2+1 avec singularités: vers une classification (selon L. Brunswic)”,
Séminaire Quimpériodique, January 19th 2017, Quimper, France
- “Le Théorème de Pappus et représentations du groupe modulaire”,
IHES, January 17th 2017, Paris, France
- “Collisions of particles and piecewise transformations of the circle”,
GDAR event, Universidad de Santiago de Chili, July 2017
- ”Polygones, polyèdres, espace de Minkowski et espace de Teichmüller décoré”, Colloque ”Géométrie et Topologie” (en l’honneur de C. Bavard), Bordeaux, november 2017.

- “Espace de co-Minkowski et norme asymétrique de Thurston sur l’espace de Teichmüller”, Séminaire de Topologie, Institut Fourier, Grenoble, January 2018.
- “The co-Minkowski space and an asymmetric norm on the Teichmüller space”, Topology seminar of University of Luxembourg, January 2018.
- “The co-Minkowski space and an asymmetric norm on the Teichmüller space”, Conference “Geometric Structures and Representation Varieties”, Heidelberg, February 2018.
- Three lectures on Geometries of 3-dimensional AdS manifolds, KIAS, Séoul, South Korea, May 2018
- “Convex cocompact groups and multiblack-holes: further projects”, GDAR event, UFRJ, Rio de Janeiro, July 2018
- “Concluding the classification of Handel-Thurston examples”, XXI BRAZILIAN TOPOLOGY MEETING Satellite conference of ICM 2018, UFF, Niteroi, Brazil, August 2018
- “Conformally flat Lorentzian spacetimes as conformal boundaries of black-holes and Anosov representations” at “The mathematics of Gravitation and Black Holes”, 103e rencontre entre mathématiciens et physiciens théoriciens, IRMA, University of Strasbourg, June 2019,
- “Orbital equivalence classes of Anosov flows on circle bundles over surfaces”, Congress “Low dimensional actions of 3-manifold groups”, University of Dijon, November 2019,
- “Conformally flat Lorentzian spacetimes and Anosov representations”, Dynamical Aspects of Pseudo-Riemannian Geometry (DAPRG 2020), 2nd-6th March 2020,

11. ORGANISATION OF CONGRESS, WORKSHOPS

- Session “Geometry and Dynamics of Constant Curvatures Spaces” at the “1st Joint Meeting Brazil-France in Mathematics”, 14th-19th July 2019, IMPA, Rio de Janeiro, Brazil,
- “Géométrie et Dynamique: de A à Z” Colloque en l’honneur des 60 ans de A. Zeghib, Avignon Université, June 17th-19th 2019,
- “Géométrie pseudo-riemannienne et représentations Anosov”, co-organizer, University of Luxembourg, 11th-14th 2018,
- “Regards croisés sur les structures géométriques et la géométrie lorentzienne”, Avignon Université, 8th-10th 2014,