

Curriculum Vitae : André Belotto da Silva

Personal Information:

Last name Belotto da Silva
First name André
Date of birth March 04, 1987
Nationality Brazil
Webpage andrebelotto.com
E-mail andre.belotto@imj-prg.fr

Current Position:

2021– : Professor (Professeur des Universités), Université Paris Cité.

Previous Positions:

2018–21 : Assistant Professor (Maître de Conférences), Aix-Marseille Université.

2016–18 : Postdoctoral Fellow CIMI LabEx, Université Toulouse III.

2013–16 : Postdoctoral Fellow, University of Toronto.

Education:

2020–21: HdR,
Aix-Marseille Université, Marseille, France.
Memoire: *Singularités, feuilletages et applications à la géométrie quasi-analytique et sous-riemannienne*.

2010–13: PhD,
Université de Haute Alsace, Mulhouse, France.
Thesis: *Resolution of singularities in foliated spaces*.
Adviser: Daniel Panazzolo.

2008–10: Master in Applied Mathematics,
Universidade de São Paulo, São Paulo, Brasil,
Master Thesis: *Bifurcation analysis of a system of population dynamics*.
Adviser: Jorge Manuel Sotomayor Tello.

Fellowships and awards:

2024–28 : Junior member of the Institut Universitaire de France.

2021–24 : Chaire professorale, IDEX UP ANR-18-IDEX-0001, PI, 308k€.

2020–24 : PEDR (Prime d'Encadrement Doctoral et de la Recherche).

2019–20 : PEPS "Jeunes chercheuses et jeunes chercheurs", PI, 4k€.

2016–18 : CIMI LabEx Post-doctoral Fellowship, Université Toulouse III.

2016 : F. V. Atkinson teaching award, University of Toronto, Toronto, Canada.

2013–16 : University of Toronto Post-doctoral Fellowship, University of Toronto.

2014 : PhD Prize SAUAS, Société des amis des universités de l'académie de Strasbourg, France.

Published or accepted articles.

- (1) A. Belotto da Silva, O. Curmi and G. Rond, *On the Nash points of subanalytic sets*, **Journal of Singularities**, volume 27 (2024), 68-88.
- (2) A. Belotto da Silva, M. Klimes, J. C. Rebelo and H. Reis, *A remark on first integrals of vector fields*, to appear in **Publicacions Matemàtiques**.
- (3) A. Belotto da Silva, E. Bierstone, *Monomialization of a quasianalytic morphism*, **Annales scientifiques de l'École normale supérieure**, volume 56, issue 5 (2023).

- (4) A. Belotto da Silva, A. Figalli, A. Parusiński and L. Rifford *Strong Sard Conjecture and regularity of singular minimizing geodesics for analytic sub-Riemannian structures in dimension 3*, **Inventiones Mathematicae**, 229, pages 395–448 (2022).
- (5) A. Belotto da Silva, L. Fantini, A. Némethi and A. Pichon, *Polar exploration of complex surface germs*, **Transactions of the American Mathematical Society**, 375(9), 6747–6767, 2022.
- (6) A. Belotto da Silva, L. Fantini and A. Pichon *On Lipschitz normal embedding complex surface germs*, **Compositio Mathematica**, Volume 158, Issue 3, 2022, pp. 623 – 653.
- (7) A. Belotto da Silva, L. Fantini and A. Pichon *Inner Lipschitz geometry of complex surfaces: a valutive approach*, **Geometry & Topology**, 26, (2022) 163–219.
- (8) A. Belotto da Silva, O. Curmi and G. Rond, *A proof of Gabrielov's rank Theorem*, **Journal de l'École polytechnique**, Mathématiques, Tome 8 (2021), pp. 1329-1396.
- (9) A. Belotto da Silva, E. Bierstone and A. Kiro *Sharp Estimates for Blowing Down Functions in a Denjoy-Carleman Class*, **IMRN**, rnaa367, 2021.
- (10) A. Belotto da Silva and M. Gazeau, *A general system of differential equations to model first order adaptive algorithms*, **Journal of Machine Learning Research**, 21(129):1-42, 2020.
- (11) A. Belotto da Silva and J. G. Espín Buendía *Topological classification of limit periodic sets of polynomial planar vector fields*, **Publicacions Matemàtiques**, Volume 63, Number 1 (2019), 105-123pp.
- (12) A. Belotto da Silva and D. Panazzolo *Generalized Flow-Box property for singular foliations*, **RACSAM**, (113), pages 3949-3965, 2019.
- (13) A. Belotto da Silva and L. Rifford *The sub-Riemannian Sard conjecture on Martinet surfaces*, **Duke Mathematical Journal**, Volume 167, Number 8 (2018), 1433-1471.
- (14) A. Belotto da Silva *Local monomialization of a system of first integrals of Darboux type* **Revista Matemática Iberoamericana**, Volume 34, Issue 3, (2018), pp. 967–1000.
- (15) A. Belotto da Silva, E. Bierstone and M. Chow *Composite quasianalytic functions* **Compositio Mathematica**, Volume 154, Issue 9 (2018) pp. 1960-1973.
- (16) A. Belotto da Silva, I. Biborski and E. Bierstone *Solutions of quasianalytic equations* **Selecta Mathematica**, Volume 23, Number 4, (2017), 2523-2552.
- (17) A. Belotto da Silva, E. Bierstone, V. Grandjean and P. Milman *Resolution of singularities of the cotangent sheaf of a singular variety* **Advances in Mathematics** 307, (2017), 780–832.
- (18) A. Belotto da Silva *Local Resolution of Ideals Subordinated to a Foliation* **RACSAM** 110 (2016), no. [2], 841-862 pp.
- (19) A. Belotto *Global resolution of singularities subordinated to a 1-dimensional foliation* **Journal of Algebra** 447 (2016), 397-423 pp.
- (20) A. Belotto *Examples of infinitesimal non-trivial accumulation of secants in dimension three* **J. of Dynamical and Control Systems** 22 (2016), no [1], 45–54.
- (21) A. Belotto *Analytic varieties as limit periodic sets* **Qualitative Theory of Dynamical Systems** 11 (2012), no [2], 449–465 pp.

Submitted articles.

- (1) A. Belotto da Silva, A. Parusinski and L. Rifford, *Abnormal Singular Foliations and the Sard Conjecture for generic co-rank one distributions*, preprint, hal-04265433, 2023.
- (2) A. Belotto da Silva, E. Bierstone and R. Lavie, *Partial desingularization*, preprint, arxiv:2211.15713 [math.AG], 2022.
- (3) A. Belotto da Silva, O. Curmi and G. Rond, *On rank Theorems for morphisms of local rings*, preprint, arxiv:2205.03079, [math.AG], 2022.
- (4) A. Belotto da Silva A. Parusinski and L. Rifford, *Abnormal subanalytic distributions and minimal rank Sard Conjecture*, preprint, hal-03741318, [math.DG], 2022.

Proceedings and book chapters.

- (1) A. Belotto da Silva and E. Bierstone *Resolution of singularities of differential forms and Hsiang-Pati coordinates* Advanced Lectures in Mathematics, Volume 39: Hodge theory and L2 analysis, edited by Lizhen Ji, International Press, (2017), 127-150 pp.

Memoirs.

- (1) A. Belotto da Silva *Singularités, feuilletages et applications à la géométrie quasi-analytique et sous-riemannienne* HDR, Aix-Marseille Université : France, (2021).
- (2) A. Belotto *Resolution of singularities in foliated spaces* PhD thesis Université de Haute-Alsace : France (2013).
- (3) A. Belotto da Silva *Bifurcation analysis of a system of population dynamics* Master thesis, Universidade de São Paulo : Brazil, (2010).

Organization of Scientific Meetings:

- 2025 : Co-organizer, Conference "*Foliations, birational geometry and applications*", CIRM, France.
- 2024 : Co-organizer, Conference "*Singularities in Paris*", Paris, France (65 participants).
- 2023 : Organizer of the "Journée des Doctorant", of the team Geometrie et Dynamique, UPC.
- 2022 : Organizer of the "Journée de Rentrée", of the IMJ-PRG.
- 2022 : Co-organizer, Conference "*Singularities in Paris*", Paris, France (50 participants).
- 2022 : Co-organizer, Conference "*Meeting of the GDR singularities*", Aussois, France, (50 participants).
- 2021 : Co-organizer, Conference "*Géométrie Lipschitz : nouvelles méthodes et applications*", CIRM, France (60 participants).
- 2021 : Co-organizer, Conference "*O-minimality and foliations*", CIRM, France (70 participants).
- 2018– : Organizer of 3 seminars: "*Singularités*", UPC, 2021-present; "*Geometry, Topology, Dynamics*", Aix-Marseille, 2019-21; "*Singularités*", Aix-Marseille, 2018-21).
- 2018– : Organizer of 2 reading seminars ("*Singulier*" and "*Géométrie o-minimale*", Aix-Marseille).

PhD training:

- 2022–25 : PhD thesis, Yueting Jiang, Université Paris Cité.
Topic: Functorial resolution of the cotangent sheaf of three-folds.
Funding: Professor Chair (IDEX UP ANR-18-IDEX-0001).
- 2022–25 : PhD thesis, Kémo Morvan, Université Paris Cité.
Topic: Contracting automorphisms in singular spaces.
Co-adviser: Matteo Ruggiero.
Funding: IMJ-PRG
- 2020–24 : PhD thesis, Yenni Cherk, Aix-Marseille Université.
Title : Inner rates of finite morphisms.
PhD defense : 17 January 2024.
Co-adviser: Anne Pichon.
Funding: bourse CNRS avec mobilité en UMI.

Postdoctoral training:

- 2023–25 : Postdoctoral Fellow, François Bernard, Université Paris Cité.
Funding: Professor Chair (IDEX UP ANR-18-IDEX-0001).
- 2019–20 : Postdoctoral Fellow, Octave Curmi, Aix-Marseille Université.
Co-adviser: Guillaume Rond.
Funding: ATER Aix-Marseille Université.
- 2018–19 : Postdoctoral Fellow, Lorenzo Fantini, Aix-Marseille Université.
Co-adviser: Anne Pichon.
Funding: ANR LISA (17-CE40-0023).

Other training:

- 2018– : Training of 2 graduate projects (L3/M1), 2 Master projects (M2) and 2 Summer Research

Awards Fields Institute (L3/M1).

Other institutional responsibilities:

2024–28 : Director of the Network Algebraic Geometry and Singularities (300 tenured faculty members in France).

2023– : Member of the Scientific Committee, UFR Mathématiques, Université Paris Cité.

2023–24 : Director of the GDR Singularities and Applications (107 members).

2019–21: Member of the Prospective Committee, I2M, Aix-Marseille Université. (The objective was to set priorities for the hiring of new McF and PR at the Department; 12 members).

2022– : Member of 1 MCF Hiring Committee (Lille).

2022– : President of 1 PhD jury (Daniele Cannarsa, at UPC).

2018-21 : Local organizer (Aix-Marseille Université) of the GDR GAGC.

Reviewing activities: I have served as a referee for many international mathematical journals including: Acta Applicandae Mathematicae, Canadian Journal of Mathematics, Compositio Mathematica, International Mathematics Research Notices, Inventiones Mathematicae, Journal de l'École Polytechnique, Journal de Mathématiques Pures et Appliquées, Journal of Algebraic Geometry, Journal of Differential Equations, Journal of Dynamical and Control Systems, Journal of Singularity, Journal of the European Mathematical Society, Manuscripta Mathematica, Publications mathématiques, Qualitative Theory of Dynamical Systems, Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas, Studia Mathematica, Transactions of the American Mathematical Society.

Rapporteur de la thèse: *Advances in the study of Topological properties of analytic flows on surfaces*, José Ginés Espín Buendía, Universidad de Murcia, Spain, 2017.

Invited Conferences and Colloquium talks:

Graduate Course in a thematic program:

2022 : *Resolution of singularities in quasianalytic classes*,
– Thematic Program on Tame Geometry, Transseries and Applications to Analysis and Geometry, Fields Institute, Toronto, Canada.

Mini-courses:

2024 : *Resolution of singularities of Foliations*
– Workshop, Non-archimedean and birational geometry, Heidelberg, Germany.

2023 : *Sard Conjecture and Sub-analytic geometry*
– Workshop, Research School in Real Algebraic Geometry, Trieste, Italy.

2020 : Monomialization of quasianalytic morphisms and calculus of log-derivations.
– Conference, Singularities and Applications, Paris, France.

2018 : *On quasianalytic geometry*
– Workshop Séminaire Quim périodique, France.

2017 : *Resolution of Singularities and the invariant of Bierstone and Milman*
– Curso de Doctorado, Universidad de Valladolid, Valladolid, Spain.

Invited talks in Conferences:

2024 : *Resolution of foliated orbifolds*
– 18th International Workshop on Real and Complex Singularities, Spain.

2024 : *Sard Conjecture in analytic manifolds*
– Topology & Dynamical Systems, Croatia.

2023 : *On rank Theorems for morphisms of local rings*
– Algebraic Geometry, Lipschitz Geometry and Singularities, Brazil.

2023 : *On the minimal rank Sard Conjecture in analytic manifolds*,
– Geometry and Control in Cortona, Italy.

2023 : *Sard Conjecture in Sub-Riemannian geometry*
– Advances in Qualitative Theory of Differential Equations, Mallorca, Spain.

2022 : *Splittable foliations and the Sard Conjecture*
– Foliations in Algebraic and Birational geometry, Bernoulli Center, Suisse.

2022 : *A general system of differential equations to model first order adaptive algorithms:*

Application to Adam

- Probabilistic Numerical Methods for Machine Learning : Recent Trends, Angers.
- 2021 : *Polar exploration of complex surface germs*
 - Lipschitz Geometry: New Methods and Applications, CIRM.
- 2021 : *Polar explorations*
 - Metric Geometry of Singularities, Paris.
- 2020 : *A proof of A. Gabrielov's rank Theorem*
 - 16th International Workshop on Real and Complex Singularities, São Carlos, Brasil.
- 2020 : *Strong Sard Conjecture in Sub-Riemannian geometry*
 - Sub-Riemannian Geometry and Interactions, Paris, France.
- 2019 : *Strong Sard Conjecture in Sub-Riemannian geometry*
 - 1st Joint Meeting Brazil-France in Mathematics, Rio de Janeiro, Brasil.
- 2019 : *Monomialization of quasianalytic morphisms*
 - 1st Joint Meeting Brazil-France in Mathematics, Rio de Janeiro, Brasil.
- 2019 : *Strong Sard Conjecture in Sub-Riemannian geometry*
 - Foliations and Algebraic geometry, Grenoble, France.
- 2019 : *Resolution of singularities of differential forms*
 - Workshop: Lipschitz Geometry of Singularities, Marseille, France.
- 2019 : *Monomialization of quasianalytic morphisms*
 - Singularités réelles et complexes, Cargèse, France.
- 2017 : *Monomialization of the cotangent sheaf of a singular variety*
 - Foliations in Strasbourg, Strasbourg, France.
- 2017 : *Monomialization of a system of first integrals of Darboux type*
 - Mathematical Congress of the Americas, Montréal, Canada.
- 2017 : *Monomialization of the cotangent sheaf of a singular variety*
 - Brazil - Mexico, 3rd meeting on Singularities, Cuernavaca, Mexico.
- 2017 : *Solutions des équations quasi-analytiques*
 - Mathematics Research Institute, Casas del Tratado, Tordesillas, Spain.
- 2015 : *Monomialization of differential forms*
 - Real Analytic Geometry and Trajectories of Vector Fields, (CIRM), France.
- 2014 : *Exemplos não triviais de acumulações de secante*
 - I Congresso Brasileiro de Jovens Pesquisadores em Matemática Pura e Aplicada, Universidade de São Paulo, São Paulo, Brésil.

Science Outreach Presentations

- 2021 : *Sobre a regularidade das geodésicas em geometria sub-Riemanniana.*
 - 33o Colóquio Brasileiro de Matemática, IMPA, Brasil.
- 2020 : *Sur la régularité des géodésiques en géométrie sous-riemannienne.*
 - Aix-Marseille Université, Marseille, France.
- 2019 : *A general system of differential equations to model first order adaptive algorithms.*
 - Capgemini, Nantes, France.

Talks in research seminars

- 2024 : *Sard Conjecture in Sub-Riemannian geometry*
 - Avignon, France.
- 2023 : *Resolution of singularities and the inner metric,*
 - Colloquium "Geometrie et Dynamique" IMJ-PRG, France.
- 2023 : *Partial desingularization*
 - Imperial College, London, England.
- 2023 : *Splittable foliations and the Sard Conjecture*
 - Università di Milano Bicocca, Milano, Italy.
- 2023 : *Splittable foliations and the Sard Conjecture*
 - Université de Rennes, Rennes, France.
- 2023 : *Sard Conjecture in Sub-Riemannian geometry*

- IMPA, Rio de Janeiro, Brasil.
- 2022 : *Splittable foliations and the Sard Conjecture*
– Université de Lyon, Lyon, France.
- 2022 : *On rank Theorems and the Nash points of subanalytic sets*
– Université Savoie Mont Blanc, Chambéry, France.
- 2022 : *On rank Theorems and the Nash points of subanalytic sets*
– Université Paris Cité, Paris, France.
- 2021 : *Strong Sard Conjecture in Sub-Riemmanian geometry*
– Université de Paris, Paris, France.
- 2021 : *Real perspectives on monomialisation*
– Géométrie et Théorie des Modèles, Paris, France.
- 2021 : *Polar exploration of complex surface germs,*
– Singularity Theory Seminar, Universidade de Fortaleza, Brasil.
- 2021 : *Sur la composition des fonctions quasianalytiques*
– Université Côte d'Azur, Nice, France.
- 2021 : *Strong Sard Conjecture in Sub-Riemmanian geometry*
– Iberoamerican Webminar of Young Researchers in Singularity Theory.
- 2021 : *Une approche différentielle aux algorithmes d'optimisation adaptatifs*
– Université Côte d'Azur, Nice, France.
- 2021 : *Strong Sard Conjecture in Sub-Riemmanian geometry*
– Université de Rennes, Rennes, France.
- 2021 : *Strong Sard Conjecture in Sub-Riemmanian geometry*
– Université d'Angers, Angers, France.
- 2020 : *A proof of Gabrielov's rank Theorem*
– Fields Institute, Toronto, Canada.
- 2020 : *A proof of Gabrielov's rank Theorem*
– Weizmann Institute, Rehovot, Israel.
- 2020 : *A proof of Gabrielov's rank Theorem*
– Aix-Marseille Université, Marseille, France.
- 2019 : *Strong Sard Conjecture in Sub-Riemmanian geometry*
– Université de Grenoble, Grenoble, France.
- 2019 : *Resolution of singularities of the cotangent sheaf of a singular variety.*
– Joint Seminar Bochum-Essen-Köln-Wuppertal, Germany.
- 2018 : *The Sard Conjecture on Martinet surfaces*
– Université Aix-Marseille, Marseille, France.
- 2018 : *Resolution of singularities of the cotangent sheaf of a singular variety*
– University of Freiburg, Freiburg, Allemagne.
- 2018 : *Topological classification of limit periodic sets*
– Université Nice Sophia-Antipolis, Nice, France.
- 2018 : *The Sard Conjecture on Martinet surfaces*
– Université de Lille, Lille, France.
- 2018 : *Solutions des équations quasi-analytiques*
– Université Aix-Marseille, Marseille, France.
- 2018 : *Resolution of singularities of the cotangent sheaf of a singular variety*
– Université Aix-Marseille, Marseille, France.
- 2018 : *Solutions des équations quasi-analytiques*
– Université de Chambéry, Chambéry, France.
- 2018 : *The Sard Conjecture on Martinet surfaces*
– University of Toronto, Toronto, Canada.
- 2018 : *The Sard Conjecture on Martinet surfaces*
– University of Western Ontario, London, Canada.
- 2017 : *The Sard Conjecture on Martinet surfaces*
– Universidad de Murcia, Murcia, Espagne.

- 2017 : *The Sard Conjecture on Martinet surfaces*
– Université de Poitiers, Poitiers, France.
- 2017 : *The Sard Conjecture on Martinet surfaces*
– Université Angers, Angers, France.
- 2017 : *The Sard Conjecture on Martinet surfaces*
– Université de Toulouse, Toulouse, France.
- 2017 : *Topological classification of Limit periodic sets*
– Université Nice Sophia-Antipolis, Nice, France.
- 2017 : *The Sard Conjecture on Martinet surfaces*
– University of Jyväskylä, Jyväskylä, Finland.
- 2017 : *Resolution of singularities of the cotangent sheaf of a singular variety*
– Seminar in Universidad Autonoma de Madrid, Madrid, Spain.
- 2017 : *Resolution of singularities of the cotangent sheaf of a singular variety*
– Universidad de Valladolid, Valladolid, Spain.
- 2017 : *Solutions des équations quasi-analytiques*
– Université Nice Sophia-Antipolis, Nice, France.
- 2016 : *Monomialization of first integrals of Darboux type*
– Université de Haute-Alsace, Mulhouse, France.
- 2016 : *Solutions des équations quasi-analytiques*
– Université de Bordeaux, Bordeaux, France.
- 2016 : *Solutions des équations quasi-analytiques*
– Université Rennes I, Rennes, France.
- 2016 : *Solutions des équations quasi-analytiques*
– Université Paul-Sabatier, Toulouse, France.
- 2016 : *Solutions des équations quasi-analytiques*
– Université de Haute-Alsace, Mulhouse, France.
- 2016 : *Resolution of singularities of the cotangent sheaf of a singular variety*
– Algebra Seminar, Purdue University, West Lafayette, USA.
- 2016 : *Résolution des singularités des formes différentielles*
– Université Nice Sophia-Antipolis, Nice, France.
- 2016 : *Résolution des singularités des formes différentielles*
– Université de Bourgogne, Dijon, France.
- 2016 : *Résolution des singularités des formes différentielles*
– Université Paul Sabatier, Toulouse, France.
- 2015 : *Hsiang-Pati coordinate system*
– Algebra Seminar, University of Missouri, Columbia, USA.
- 2014 : *Monomialization of first integrals*
– Logic and Geometry Seminar, Fields Institute, Toronto, Canada.
- 2014 : *Hsiang-Pati coordinate system*
– Séminaire Equations fonctionnelles, Université de Strasbourg, Strasbourg, France.
- 2013 : *A problem of little return time*
– Logic and Geometry Seminar, Fields Institute, Toronto, Canada.
- 2013 : *Resolution of singularities in Foliated Spaces*
– Universidad de Valladolid, Valladolid, Spain.
- 2013 : *Non-trivial examples of Accumulation of secants*
– Universidad de Valladolid, Valladolid, Spain.
- 2013 : *A problem of little return time*
– Séminaire de géométrie analytique, Université Rennes 1, Rennes, France.
- 2013 : *A problem of little return time*
– Séminaire d'équations différentielle, Université Paul Sebatier, Toulouse, France.
- 2013 : *A problem of little return time*
– Séminaire d'Analyse, Université de Haute-Alsace, Mulhouse, France.
- 2013 : *A problem of little return time*

– Seminário Iberoamericano de Matemáticas em Tordesilhas, Universidad de Valladolid, Tordesilhas, Spain.

2012 : *A problem of little return time*

– Seminário do Depto de Matemática, Universidade Federal do Ceará, Brasil.

2011 : *16th Hilbert Problem and Roussarie's Program*

– Seminário Iberoamericano de Matemáticas em Tordesilhas, Universidad de Valladolid, Tordesilhas, Spain.

Poster presentation in a Conference

2021 : *An ODE to Model First-Order Adaptive Algorithms.*

– Mathematics, Signal Processing and Learning, CIRM, Marseille, France.

2012 : *Stand still or go away.*

– Feuilletages et equations différentielles complexes, CIRM, Marseille, France.

2011 : *Desingularization and limit periodic sets of analytic planar vector fieldse.*

– Advances in Qualitative Theory of Differential Equations, Castro Urdiales, Spain.