

Florent BALACHEFF
Ramón y Cajal Researcher

Date of birth : 30th December 1977
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Education and Diplomas

- 2012 **Habilitation** (*Habilitation à diriger des recherches*) in Mathematics
Department of Mathematics, University of Lille, France
- 2005 **PhD** in Mathematics under the supervision of Prof. Ivan Babenko
Department of Mathematics, University of Montpellier, France
- 2000 **Master** in Pures Mathematics
University of Paris 7, France
- 1998 - 2002 **Student** of the École Normale Supérieure
École Normale Supérieure de Cachan, France

Professional Experience

- Since 2018 **Ramón y Cajal Researcher**
Department of Mathematics, University Autonomous of Barcelona, Spain
- 2008 - 2018 **Associate Professor** (Maître de Conférence)
Department of Mathematics, University of Lille, France
- 2007 - 2008 **Postdoctoral Researcher**
Institut of Mathematics, University of Neuchâtel, Switzerland
- 2005 - 2007 **Postdoctoral Researcher and Teaching Assistant**
Department of Mathematics, University of Geneva, Switzerland
- 2002 - 2005 **Teaching Assistant**
Department of Mathematics, University of Montpellier, France

Research Interests

Quantitative topology in Riemannian and Finsler geometry, including systolic geometry and topology, and its links with contact geometry, symplectic geometry, convex geometry, dynamical systems, graph theory, geometry of numbers theory, lattices in Euclidean spaces, Teichmüller and moduli spaces.

Publications in Journals

- [21] **The minimal length product over homology bases of manifolds.** With S. Karam and H. Parlier. *Mathematische Annalen*. Published online (2021), DOI 10.1007/s00208-021-02150-5.
- [20] **A curvature-free Log(2k - 1) Theorem.** With L. Merlin. *Proceedings of the American Mathematical Society*. Accepted for publication (2020), DOI 10.1090/proc/15280.
- [19] **Macroscopic Schoen conjecture for manifolds with non-zero simplicial volume.** With S. Karam. *Transactions of the American Mathematical Society*, Vol. 372 (2019), 7071-7086.
- [18] **Systolic geometry and simplicial complexity for groups.** With I. Babenko and G. Bulteau. *Journal für die reine und angewandte Mathematik*, , Vol. 757 (2019), 247-277.
- [17] **Isosystolic inequalities for optical hypersurfaces.** With J.-C. Alvarez Paiva and Kroum Tzanev. *Advances in Mathematics*, Vol. 301 (2016), 934-972.
- [16] **Length product of homologically independent loops for tori.** With S. Karam. *Journal of Topology and Analysis*, Vol. 8 (2016), No 3, 497-500.
- [15] **Measurements of Riemannian two-disks and two-spheres.** *Pacific Journal of Mathematics*, Vol. 275 (2015), No 1, 167-181.
- [14] **Systolic volume of homology classes.** With I. Babenko. *Algebraic and Geometric Topology*, , Vol. 15 (2015), No 2, 733-767.
- [13] **Contact geometry and isosystolic inequalities** With J.-C. Alvarez Paiva. *Geometric And Functional Analysis*, Vol. 24 (2014), No 2, 648-669.
- [12] **Systole growth for finite area hyperbolic surfaces.** With E. Makover and H. Parlier. *Annales de la Faculté des Sciences de Toulouse*, Vol. 23 (2014), No 1, 175-180.
- [11] **Bers' constants for punctured spheres and hyperelliptic surfaces.** With H. Parlier. *Journal of Topology and Analysis*, Vol. 4 (2012), No 3, 271-293.
- [10] **Short loop decompositions of surfaces and the geometry of Jacobians.**
With H. Parlier and S. Sabourau
Geometric And Functional Analysis, Vol. 32 (2012), No 1, 37-73.
- [9] **A local optimal diastolic inequality on the two-sphere.** *Journal of Topology and Analysis*, Vol. 2 (2010), No 1, 109-121.
- [8] **Diastolic inequalities and isoperimetric inequalities on surfaces.** With S. Sabourau. *Annales Scientifiques de l'École Normale Supérieure*, Vol. 43 (2010), No 4, 579-605.
- [7] **A Zoll counterexample to a geodesic length conjecture.** With C. Croke and M.G. Katz. *Geometric and Functional Analysis*, Vol. 19 (2009), No 1, 1-10.
- [6] **Stable norms of non-orientable surfaces.** With D. Massart. *Annales de l'Institut Fourier*, Vol. 58 (2008), No 4, 1337-1369.
- [5] **Volume entropy, weighted girths and stable balls on graphs.** *Journal of Graph Theory*, Vol. 55 (2007), No 4, 291-305.
- [4] **Invariant d'Hermite du réseau des flots entiers d'un graphe pondéré.** *L'Enseignement Mathématique*, Vol. 52 (2006), No 3-4, 255-266.
- [3] **Sur la systole de la sphère au voisinage de la métrique standard.** *Geometriae Dedicata*, Vol. 121 (2006), No 1, 61-71.
- [2] **Sur la forme de la boule unité de la norme stable unidimensionnelle.** With I. Babenko. *Manuscripta Mathematica*, Vol. 119 (2006), No 3, pp. 347-358.
- [1] **Géométrie systolique des sommes connexes et des revêtements cycliques.** With I. Babenko. *Mathematische Annalen*, Vol. 333 (2005), No 1, 157 - 180.

Publications in Proceedings

- Optimalité systolique infinitésimale de l'oscillateur harmonique.** With J.-C. Alvarez Paiva. *Séminaire de Théorie Spectrale et de Géométrie de Grenoble*, Vol. 27 (2009), 11 - 16.
- Sur des problèmes de la géométrie systolique.** *Séminaire de Théorie Spectrale et de Géométrie de Grenoble*, Vol. 22 (2004), 71-82.

Preprints

- [23] **Santaló point for the Holmes-Thompson boundary area.** With G. Solanes and K. Tzanev. Preprint (2020).
- [22] **Systoles and diameters of hyperbolic surfaces.** With V. Despré and H. Parlier. Preprint (2020).

Invited Talks (since 2015)

October 2020	Barcelona Mathematical Days (Online)
February 2020	Geometry Seminar (Bordeaux, France)
August 2019	Meeting in Geometry and Topology (INU, Albi)
July 2019	1st Joint Meeting Brazil-France in Mathematics (IMPA, Brazil)
June 2019	CONNECT Research Day (Universitat Politècnica de Catalunya, Spain)
Abril 2019	Workshop Riemannian and Simplicial Volume (KIT, Germany)
March 2019	Geometry Seminar (University of Luxembourg, Luxembourg)
October 2018	Geometry and Dynamic Seminar (University of Lille, France)
June 2018	Geometry Seminar (Universitat Autònoma de Barcelona, Spain)
May 2018	Workshop New methods in Finsler geometry (CRM of Pise, Italy)
February 2018	Conference on Geometry of Groups and 3-manifolds (CIRM, France)
January 2018	Darboux Seminar (University of Montpellier, France)
November 2017	Conference in honor of C. Bavard (Université de Bordeaux, France)
July 2017	Conference on Hamiltonian and Reeb Dynamics (Lorentz Center, Holland)
June 2017	Conference on Metric and Finsler geometry (University of Montpellier, France)
June 2017	Seminar on symplectic and contact geometry (University of Bochum, Germany)
November 2016	Geometry Seminar (Universitat Autònoma de Barcelona, Spain)
November 2016	Symplectix Seminar (IHP, France)
April 2016	Geometry, Dynamics and Topology Seminar (University of Marseille 2, France)
March 2016	Differential Geometry Seminar (University of Nancy, France)
February 2016	Analysis and Geometry Seminar (Jussieu Institute of Mathematics, France)
January 2016	Seminar of Geometry, Topology and Dynamics (University of Orsay, France)
December 2015	Differential Geometry Session, CMS Winter Meeting (Montréal, Canada)
September 2015	Ergodic Theory Seminar (University of Rennes 1, France)
February 2015	Geometry Seminar (Jussieu Mathematical Institut, France)

Organization of Scientific Activities (since 2014)

2019	Intensive Research Program entitled "Laboratory of Interactions between Geometry, Algebra and Topology" co-organized with C. Broto and F. Perera <i>CRM, Spain</i>
Since 2018	Geometry Seminar <i>Universitat Autònoma de Barcelona, Spain</i>
2016	International conference entitled "Quantitative topology in Riemannian Geometry" co-organized with S. Karam <i>Lille, France</i>
2014	International conference in honor of I. Babenko entitled "Systolic Geometry, Topology and Beyond" co-organized with G. Bulteau, D. Massart and S. Sabourau <i>Montpellier, France</i>

Scientific Projects and Awards

2018 - 2021	Grant PGC2018-095998-B-I00 <i>Local and global invariants in geometry</i>
2018 - 2023	Grant Ramón y Cajal <i>Local and global systolic geometry and topology</i>
2009 - 2018	Award for Scientific Excellence <i>Allowance awarded by the French government</i>
2012 - 2016	Member of the grant ANR <i>Geometry of Finsler and applications</i>
2010 - 2012	Co-coordinator of the grant BQR <i>Geodesic flows and their quantification</i>

Research Supervision

2020 - present	Supervision of David Fisac Camara <i>Doctoral Fellow (Barcelona & Luxembourg)</i>
2020 - present	Supervision of Teo Gil Moreno de Mora i Sardà <i>Bachelor's degree final project (UAB, Spain)</i>
2014 - 2016	Supervision of Steve Karam <i>Postdoctoral fellow of the grant Labex CEMPI (Lille, France)</i>
2016	Supervision of Simon Allais <i>Bachelor's degree final project (ENS of Lyon, France)</i>

Administrative Activities

2015 - 2017	Director of the Master in Mathematics <i>Department of Mathematics, University of Lille, France</i>
2011 - 2017	Member of the National University Council (25th section) <i>France</i>
2010-2014	Member of the Department Board <i>Department of Mathematics, University of Lille, France</i>
2003 - 2005	Member of the Department Board <i>Department of Mathematics, University of Montpellier, France</i>

Teaching Activities (since 2015)

2020 - 2021	<i>Lectures and Tutorials on Riemannian Geometry, 4th year</i> <i>Tutorials on Statistics, Biologists 1st year</i>
2019 - 2020	<i>Lectures and Tutorials on Riemannian Geometry, 4th year</i> <i>Tutorials on Statistics, Biologists 1st year</i>
2018 - 2019	<i>Lectures on Riemannian Geometry, Master 1st year</i>
2017 - 2018	<i>Sabbatical Semester</i> <i>Lectures and Tutorial on Differential Geometry and Equations, Master 1st year</i>
2016 - 2017	<i>Lectures and Tutorial on Differential Geometry and Equations, Master 1st year</i> <i>Tutorials in Analysis, Bachelor 1st year</i>
2015 - 2016	<i>Tutorial on Linear Algebra, Bachelor 1st year</i> <i>Lectures and Tutorial on Differential Geometry and Equations, Master 1st year</i>

Referee Activities

- May 2020** Referee of the PhD thesis by E.Borghini, supervised by G.Minian
University of Buenos Aires (Argentina)
- July 2017** Referee of two Master thesis, supervised by M.Troyanov
EPFL (Switzerland)
- June 2016** Referee of the PhD thesis by Y. Zeina, supervised by S.Sabourau
Université de Paris Est Créteil (France)
- November 2013** Referee of the PhD thesis by S.Karam, supervised by S.Sabourau
Université de Tours (France)

Journal referee for the following Journals :

Algebraic and Geometric Topology, Canadian Mathematical Bulletin, **Duke Mathematical Journal**, Differential Geometry and its Applications, l'Enseignement Mathématique, **Geometric and Functional Analysis**, **Geometry and Topology**, **Journal of the AMS**, Journal and Proceedings of the London Mathematical Society, Journal of Topology and Analysis, **Mathematische Annalen**, Mathematische Zeitschrift, Revista Colombiana de Mathematicas, Topology and Its Applications, Transactions of the AMS.