

Alessandro Sisto

Date of Birth: March 8, 1986
Citizenship: Italy

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Positions held

Since June 2020: Assistant Professor at Heriot-Watt University
June 2015 - May 2020: Assistant Professor at ETH Zürich
September 2013 - May 2015: Postdoc at ETH Zürich

Visiting positions

June 2019: Junior Simons professor at IMPAN, Warsaw

Education

July 2013: Ph.D., University of Oxford

Advisor: C. Druţu

Thesis title: Geometric and probabilistic aspects of groups with hyperbolic features

December 2010: "Diploma di Licenza" (Full Diploma), Scuola Normale Superiore

June 2010: "Diploma di Laurea" (Master's degree), University of Pisa

July 2008: "Diploma di Primo Livello" (First Level Diploma), Scuola Normale Superiore

May 2008: "Diploma di Laurea Triennale" (Bachelor's Degree), University of Pisa

Phd students

Davide Spriano, 2016 - 2020

Antoine Goldsborough, 2020 -

Postdocs mentored

Dominik Gruber, 2016 - 2019

Peter Feller, 2017 - 2019

Grants and awards

2018: Kamil Duszenko award

Swiss National Science Foundation grant (PI), *Groups with hyperbolic features*, 2018-2021, 400k CHF

Publications and accepted papers

39. (with J. Behrstock and M. Hagen) Quasiflats in hierarchically hyperbolic spaces
Accepted in *Duke Mathematical Journal*
38. (with D. Gruber) Divergence and quasi-isometry classes of random Gromov's monsters
Accepted in *Mathematical Proceedings of the Cambridge Philosophical Society*
37. (with F. Dahmani and M. Hagen) Dehn filling Dehn twists
Accepted in *Proceedings of the Royal Society of Edinburgh*
36. (with A. Iozzi and C. Pagliantini) Characterising actions on trees yielding non-trivial quasimorphisms
Accepted in *Annales Mathématiques du Québec*
35. (with P. Mathieu) Deviation inequalities and CLT for random walks on acylindrically hyperbolic groups
Accepted in *Duke Mathematical Journal*
34. (with M. Bestvina, K. Bromberg and K. Fujiwara) Acylindrical actions on projection complexes
Accepted in *L'Enseignement Mathématique*
33. (with D. Gruber and R. Tessera) Gromov's random monsters do not act non-elementarily on hyperbolic spaces
Accepted in *Proceedings of the AMS*
32. (with J. MacKay) Quasi-hyperbolic planes in relatively hyperbolic groups *arXiv:1111.2499*
Accepted in *Annales Academiæ Scientiarum Fennicæ Mathematica*
31. (with D. Groves and J. Manning) Boundaries of Dehn fillings
Accepted in *Geometry & Topology*
30. (with J. Behrstock and M. Hagen) Hierarchically hyperbolic spaces II: Combination theorems and the distance formula
***Pacific Journal of Mathematics* 299 (2019) 257-338.**
29. (with T. Hartnick) Bounded cohomology and virtually free hyperbolically embedded subgroups
***Groups, Geometry, and Dynamics* 13 (2019), 677-694.**
28. Many Haken Heegaard splittings
Accepted in *Journal of Topology and Analysis*
27. (with F. Franceschini, R. Frigerio, and B. Pozzetti) The zero norm subspace of bounded cohomology of acylindrically hyperbolic groups
***Commentarii Mathematici Helvetici* 94 (2019) 89-139.**
26. (with D. Gruber) Infinitely presented graphical small cancellation groups are acylindrically hyperbolic
***Annales de L'Institut Fourier* 68 (2018) 2501-2552.**
25. (with D. Hume) Groups with no coarse embeddings into hyperbolic groups
***New York Journal of Mathematics* 23 (2017), 1657-1670.**

24. (with Y. Antolin, M. Mj, and S. Taylor) Intersection properties of stable subgroups and bounded cohomology
Indiana University Mathematics Journal, 68 (2019) 179-199.
23. (with S. Taylor) Largest projections for random walks
Math. Res. Lett. 26 (2019) 293-321.
22. (with J. Maher) Random subgroups of acylindrically hyperbolic groups and hyperbolic embeddings
International Mathematics Research Notices (2019), 3941-3980.
21. What is a hierarchically hyperbolic space?
Appearing in “Beyond hyperbolicity”, **London Math. Soc. Lecture Note Series** 454, 117-148.
20. (with M. Durham and M. Hagen) Boundaries and automorphisms of hierarchically hyperbolic spaces
Geometry and Topology 21 (2017), 3659-3758.
19. (with J. Behrstock and M. Hagen) Asymptotic dimension and small-cancellation for hierarchically hyperbolic spaces and groups
Proceedings of the London Mathematical Society 114 (2017), 890-926.
18. (with J. Behrstock and M. Hagen) Hierarchically hyperbolic spaces I: curve complexes for cubical groups
Geometry and Topology 21 (2017), 1731-1804.
17. (with J. Behrstock, M. Hagen, and (appendix only) P.-E. Caprace) Thickness, relative hyperbolicity, and randomness in Coxeter groups
Algebraic and Geometric Topology 17 (2017), 1731-1804.
16. Contracting elements and random walks
Journal für die reine und angewandte Mathematik 742 (2018), 79-114.
15. (with Y. Antolin and A. Minasyan) Commensurating endomorphisms of acylindrically hyperbolic groups and applications
Groups, Geometry, and Dynamics 10 (2016), 1149-1210.
14. (with P. Przytycki) A note on acylindrical hyperbolicity of Mapping Class Groups
Advanced Studies in Pure Mathematics 73 (2017), Hyperbolic Geometry and Geometric Group Theory conference proceedings, 255-264.
13. (with R. Frigerio and M.B. Pozzetti) Extending higher dimensional quasi-cocycles
Journal of Topology 8 (2015), 1123-1155.
12. (with J.F. Lafont and R. Frigerio) Rigidity of high dimensional graph manifolds.
Astérisque 372 (2015), xxi+177 pp.
11. Tracking rates of random walks.
Israel Journal of Mathematics 220 (2017), 1-28.
10. Quasi-convexity of hyperbolically embedded subgroups.
Mathematische Zeitschrift 283 (2016), 649-658.
9. (with I. Goldbring) The fundamental group of a locally finite graph with ends: a hyperfinite approach.
Fundamenta Mathematicae 232 (2016), 21-39.

8. (with E. Martínez-Pedroza) Virtual Amalgamation of Relatively Quasiconvex Subgroups.
Algebraic and Geometric Topology 12 (2012), 1993-2002.
7. (with J. MacKay) Embedding relatively hyperbolic groups in products of trees.
Algebraic and Geometric Topology 13 (2013), 2261-2282.
6. Projections and relative hyperbolicity.
L'Enseignement Mathématique 59 (2013), 165-181.
5. (with D. Hume) Embedding universal covers of graph manifolds in products of trees.
Proceedings of the AMS 141 (2013), 3337-3340.
4. Tree-graded asymptotic cones.
Groups, Geometry, and Dynamics 7 (2013), 697-735.
3. Separable and tree-like asymptotic cones of groups.
Münster Journal of Mathematics 5 (2012), 233-248.
2. Exponential triples.
Electronic Journal of Combinatorics 18 (1) (2011)
1. (with R. Frigerio) Characterizing Hyperbolic Spaces and Real Trees.
Geometriae Dedicata 142 (2009), 139-149.

Preprints

9. (with A. Boulanger, P. Mathieu, and C. Sert) Large deviations for random walks on hyperbolic spaces
8. (with P. Feller and G. Viaggi) Uniform models and short curves for random 3-manifolds
7. (with S. Dowdall, M. Durham, and C. Leininger) Extensions of Veech groups are hierarchically hyperbolic
6. (with J. Behrstock, M. Hagen, and A. Martin) A combinatorial take on hierarchical hyperbolicity and applications to quotients of mapping class groups
5. (with R. Frigerio) Central extensions and bounded cohomology
4. (with R. Charney and M. Cordes) Complete topological descriptions of certain Morse boundaries
3. On metric relative hyperbolicity.
2. 3-manifold groups have unique asymptotic cones.
1. (with L. Scheele) Iterated asymptotic cones.

Talks

Mini-courses:

Workshop on nonpositively curved groups and spaces, University of Regensburg, September 2017, 3 lectures on acylindrically hyperbolic groups

Université de Marseille, March 2015, 4 lectures on Mapping Class Groups and curve complexes

Seoul National University, September 2014, 2 lectures on acylindrically hyperbolic groups

Mini-workshop on hyperbolic geometry and mapping class groups, University of Pisa, June 2013, 3 lectures on Gromov boundaries and relative hyperbolicity

Université de Caen, April 2013, 4 lectures on relatively hyperbolic spaces and random walks

Conferences:

Miniworkshop on Geometric Group Theory, Munich, November 2019, (Hierarchically) hyperbolic quotients of mapping class groups

Groups and geometry in the South East, University College, London, October 2019, (Hierarchically) hyperbolic quotients of mapping class groups

Workshop on bounded cohomology, July 2019, Bounded cohomology of acylindrically hyperbolic groups

Aspects of Non-Positive and Negative Curvature in Group Theory, Mladen Bestvina's 60th birthday conference June 2019, Dehn filling Dehn twists

Nonpositive curvature, Warsaw, May 2019, Dehn filling Dehn twists

Groups, Geometries, and Space, Alessandra Iozzi's 60th birthday conference, Zurich, January 2019, Cubulation of hulls of points in hierarchically hyperbolic spaces

Graphs, surfaces, and cube complexes, Warwick, July 2018, Cubulation of hulls of points in hierarchically hyperbolic spaces

Topology, Oberwolfach, July 2018, What does a generic 3-manifold look like?

Nonpositively curved groups on the Mediterranean, Haifa, May 2018, Actions and geometry of Gromov's monsters

Workshop on Large Scale Geometry and Applications, Toronto, May 2018, Actions and geometry of Gromov's monsters

Manifolds and groups, Regensburg, September 2017, Quasiflats in hierarchically hyperbolic spaces

GAGTA: Geometric and Asymptotic Group Theory with Applications, Bilbao, July 2017, Quasiflats in hierarchically hyperbolic spaces

Geometrical and probabilistic properties of infinite groups, Lille, June 2017, Random walks on mapping class groups and subsurface projections

Spring topology and dynamics conference, New Jersey, March 2017, Boundaries at infinity of Dehn fillings

Nonpositive curvature in action, Cambridge, January 2017, Bounded cohomology via hyperbolically embedded subgroups

Groups acting on CAT(0) spaces, Berkeley, September 2016, Hierarchically hyperbolic structures on cube complexes and applications

Beyond hyperbolicity, Cambridge, June 2016, Introduction to hierarchically hyperbolic spaces

Advanced school on Geometric Group Theory and Low-dimensional Topology, Trieste, June 2016, Boundaries of hierarchically hyperbolic spaces

Measured Group Theory, Vienna, February 2016, Central Limit Theorem for acylindrically hyperbolic groups

Cohomology and Large Scale Geometry, Regensburg, July 2015, Acylindrical hyperbolicity and bounded cohomology

Geometric Topology, Geometric Group Theory and Dynamical Systems, Dubrovnik, June 2015, Boundaries at infinity of Dehn fillings

Random walks on graphs and potential theory, Warwick, May 2015, Central Limit Theorem for acylindrically hyperbolic groups

Groups and geometry in the South East, Southampton, December 2014, Deviation estimates for random walks and acylindrically hyperbolic groups

Geometry on Groups and Spaces, Seoul, August 2014, On the bounded cohomology of acylindrically hyperbolic groups

Joint meeting of the Spanish and Italian Mathematical Societies, session on Geometric topology, Bilbao, July 2014, On the bounded cohomology of acylindrically hyperbolic groups

Geometric, dynamical, and combinatorial aspects of infinite groups, Rennes, June 2014, On the bounded cohomology of acylindrically hyperbolic groups

Discrete Groups and Geometric Structures with Applications V, Leuven, June 2014, Deviation estimates for random walks and acylindrical actions

Ninth Barcelona Weekend in Group Theory, May 2014, Bounded cohomology of acylindrically hyperbolic groups

Young geometric group theory meeting 3, Luminy, January 2014, Quasi-cocycles detect hyperbolically embedded subgroups

Canadian Mathematical Society Winter Meeting, Ottawa, December 2013, Quasi-cocycles detect hyperbolically embedded subgroups

Canadian Mathematical Society Winter Meeting, Ottawa, December 2013, Tracking rates of random walks

Young topology meeting UK, Imperial College, London, April 2013, Fundamental groups of 3-manifolds and products of trees

Outer automorphisms of free groups, Barcelona, November 2012, Actions on hyperbolic spaces and random walks

British Topology Meeting, Cambridge, September 2012, Mapping tori of pseudo-Anosovs

Measure and asymptotics in group theory and low-dimensional geometry, Dublin, August 2012, Random walks on groups with contracting elements

Model theory of groups, Luminy, November 2011, Asymptotic cones via nonstandard analysis

Seminar talks:

University of Pisa, May 2020, Colloquium talk, Gromov-hyperbolicity and beyond

University of Strasbourg, January 2020, Groups that do not coarsely embed into hyperbolic groups

University of Strasbourg, January 2020, (Hierarchically) hyperbolic quotients of mapping class groups

Colloquium talk at IMPAN, July 2019, Gromov-hyperbolicity and beyond

University of Pisa, November 2018, Short curves in hyperbolic 3-manifolds via knots on Heegaard surfaces

University of Bristol, October 2018, Dehn fillings, Dehn drillings, and versions of Cannon's conjecture

Yale University, January 2018, Quasiflats in hierarchically hyperbolic spaces

EPFL, November 2017, Bounded cohomology of acylindrically hyperbolic groups

University of Illinois at Urbana-Champaign, August 2017, Quasiflats in hierarchically hyperbolic spaces

University of Cambridge, February 2017, Quasi-flats in hierarchically hyperbolic spaces

San Francisco State University, November 2016, Haken manifolds from Heegaard splittings

Brown University, January 2016, Asymptotic dimension of hierarchically hyperbolic spaces

EPFL, November 2015, Asymptotic dimension of hierarchically hyperbolic spaces

University of Pisa, October 2015, Boundaries at infinity of Dehn fillings

Université de Marseille, March 2015, Central Limit Theorem for acylindrically hyperbolic groups

University of Utah, February 2015, Deviation estimates for random walks and acylindrically hyperbolic groups

Vanderbilt University, February 2015, Deviation estimates for random walks and acylindrically hyperbolic groups

University of Toronto, January 2015, CAT(0) cube complexes, distance formulas and quasi-flats

Columbia University, January 2015, Deviation estimates for random walks and acylindrically hyperbolic groups

Karlsruhe Institute of Technology, December 2014, Bounded cohomology of acylindrically hyperbolic groups

University of Oxford, November 2014, CAT(0) cube complexes, distance formulas and quasi-flats

Seoul National University, September 2014, Deviation estimates for random walks and acylindrically hyperbolic groups

Université Rennes 1, May 2014, Deviation estimates for random walks and acylindrically hyperbolic groups

Fribourg University, May 2014, Quasi-symmetric maps between boundaries of relatively hyperbolic groups

Bristol University, February 2014, Actions of (random) right-angled Coxeter groups on hyperbolic spaces

University of Warwick, February 2014, Bounded cohomology via hyperbolically embedded subgroups

University of Pisa, January 2014, Tracking rates of random walks

ETH, Zürich, January 2014, Generic objects in Geometric Group Theory

Columbia University, December 2013, Relative hyperbolicity vs thickness of (random) right-angled Coxeter groups

CUNY, December 2013, Boundaries of relatively hyperbolic groups

University of Michigan, December 2013, Quasi-isometric embeddings of 3-manifold groups in products of trees

Université de Grenoble, November 2013, Non-vanishing of bounded cohomology in degree 3

University of Vienna, November 2013, Random walks and relative hyperbolicity

Université de Genève, November 2013, Tracking rates of random walks

University of Bern, October 2013, Actions on hyperbolic spaces of (random) right-angled Coxeter groups

Université de Neuchâtel, October 2013, Relative hyperbolicity vs thickness of (random) right-angled Coxeter groups

ETH, Zürich, October 2013, Relative hyperbolicity vs thickness of (random) right-angled Coxeter groups

ETH, Zürich, May 2013, Metric embeddings of relatively hyperbolic groups

University of Wrocław, April 2013, Metric embeddings of relatively hyperbolic groups

Polish Academy of Sciences, April 2013, Random walks and relative hyperbolicity

University of Southampton, March 2013, Metric embeddings of relatively hyperbolic groups

University of Oxford, February 2013, Relatively hyperbolic groups, mapping class groups and random walks

Université Rennes 1, December 2012, Comparing boundaries of relatively hyperbolic groups

Hebrew University of Jerusalem, December 2012, Statistical properties of groups

Bar-Ilan University, Tel Aviv, December 2012, Actions on hyperbolic spaces and random walks

Université catholique de Louvain, November 2012, Comparing boundaries of relatively hyperbolic groups

ENS Lyon, November 2012, Actions on hyperbolic spaces and random walks

Max Planck Institute, Bonn, October 2012, Quasi-isometric embeddings in products of trees

Université Paris-Sud 11, September 2012, Boundaries of relatively hyperbolic groups

University of Southampton, March 2012, Hyperbolic directions in non-hyperbolic groups

University of Pisa, November 2009, Graphs of manifolds of nonpositive curvature

Services to the mathematical community

Conferences organised

Co-organiser of Young Geometric Group Theory VII, March 2018, Les Diablerets, Switzerland

Co-organiser of Groups with hyperbolic features, August 2019, Zurich, Switzerland

Teaching and supervision

Teaching

- 2019: Bachelor course “Algebraic Topology I” at ETH
- 2019: Bachelor course “Topology” at ETH
- 2018: Bachelor course for civil engineers “Analysis III” at ETH
- 2018: Master course “Geometric Group Theory” in Bern (for CUSO)
- 2018: Bachelor course “Topology” at ETH
- 2017: Bachelor course for civil engineers “Analysis III” at ETH
- 2017: Bachelor course “The 2-Sphere and the Hyperbolic Plane” at ETH
- 2017: Student seminar “Hyperbolic surfaces” at ETH
- 2016: Graduate course “Geometric Group Theory” at ETH
- 2015: Graduate course “Surfaces and 3-manifolds” at ETH
- 2014: Student seminar “Embedded surfaces in 3-manifolds” at ETH
- 2014: Graduate course “Geometric Group Theory” at ETH
- 2012: Teaching Assistant for “Geometry of Surfaces” (3 classes) at Oxford

Supervised theses

- 2018/2019
 - Lukas Böke, *Three-dimensional geometries and Seifert manifolds*. ETH, Master thesis.
 - Andrej Steinhauser, *Free and Schottky groups*. University of Zurich, Master thesis.
 - Massimo Jörin, *Universality Properties of the Sierpinski Carpet*. ETH, Bachelor thesis.
 - Stefanie Zbinden, *Hanna Neumann Conjecture*. ETH, Bachelor thesis.
 - Pascal Schwendimann, *Introduction to Mapping Class Groups*. ETH, Bachelor thesis.
 - Manuel Trachsler, *Topological characterizations of fractals*. ETH, Bachelor thesis.
 - Charlotte Dombrowsky, *Growth of nilpotent groups*. ETH, Bachelor thesis.
 - Johannes Hruza, *Residual properties of groups via topology*. ETH, Bachelor thesis.
 - Michael Vogel, *The Dehn-Nielsen-Baer Theorem*. ETH, Bachelor thesis.
- 2017/18
 - Jacopo Nannini, *Graphs and subgroups of free groups*. ETH, Bachelor thesis.
 - Elyas Erdogan, *A survey on quasiconformal mappings and Teichmüller theory*. ETH, Master thesis.
 - Dominique Heyn, *CAT(0) spaces*. ETH, Bachelor thesis.
 - Florian Rossmannek, *The Moduli Space of Hyperbolic Surfaces*. ETH, semester project.
- 2016/17
 - Benjamin Vera, *Heegaard distance*. University of Zurich, Master thesis.
co-supervised with Viktor Schroeder.
 - Philip Föhn, *The Gromov boundary of hyperbolic spaces*. ETH, Bachelor thesis.
- 2015/16
 - Meret Perrot, *Mapping Class Groups and curve complexes*. ETH, Master thesis.
 - Anh Huy Truong, *Mapping class groups and hyperbolic geometry of surfaces*. ETH, Master thesis.
 - Alessio Pellegrini, *Knot groups and the Alexander polynomial*. ETH, Bachelor thesis.
 - Petra Poklukar, *Recognition of the sphere*. ETH, semester project.
 - Nicolas Müller, *Property (T) in random groups*. ETH, semester project.
- 2014/15
 - Severin Kappeler, *Dehn fillings*. ETH, Master Thesis.
 - Paul Pedrazzini, *The Thurston norm and its polyhedral unit ball*. ETH, Master thesis.
- 2013/14
 - Brunella Torricelli, *Hyperbolic surfaces and bounded cohomology*. ETH, Bachelor Thesis,
co-supervised with Marc Burger.