

Christopher H. Cashen

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Summary

Citizen of the United States of America

Research interests: Geometric Group Theory, Algebra, Low dimensional Geometry/Topology

Positions

University of Vienna	Vienna, Austria
Privatdozent	2020–present
Senior Postdoctoral Fellow	2014–2020
Postdoctoral Fellow	2012–2014
Université de Caen Normandie	Caen, France
Postdoctoral Fellow	2011–2012
University of Utah	Salt Lake City, USA
Postdoctoral Fellow	2008–2011

Education

University of Vienna	Vienna, Austria
Habilitation, Mathematics	2020
University of Illinois at Chicago	Chicago, USA
PhD, Mathematics	2007
Loyola University	Chicago, USA
BS, Mathematics	2000
<i>Magna Cum Laude, Alpha Sigma Nu honor society</i>	

Grants

Austrian Science Fund (FWF): P 30487-N35	~€240,000
Project Leader <i>Generalizations of Hyperbolic Boundaries</i>	2017–2020
Austrian Science Fund (FWF): M 1717-N25	~€140,000
Project Leader <i>Geometric and Analytic Aspects of Free Group Automorphisms</i>	2014–2016
Lise Meitner Fellowship	

Publications

Peer-reviewed.....

1. *Quasi-isometries between tubular groups*, *Groups, Geometry and Dynamics* **4** (2010), no. 3, 473–516.
2. *Line patterns in free groups*, w/Macura, *Geometry & Topology* **15** (2011), no. 3, 1419–1475.
3. *Growth tight actions*, w/Arzhantseva and Tao, *Pacific Journal of Mathematics* **278** (2015), no. 1, 1–49.
4. *Virtual geometricity is rare*, w/Manning, *LMS Journal of Computation and Mathematics* **18** (2015), no. 1, 444–455.
5. *Quasi-isometries need not induce homeomorphisms of contracting boundaries with the Gromov product topology*, *Analysis and Geometry in Metric Spaces* **4** (2016), no. 1, 278–281.
6. *Splitting line patterns in free groups*, *Algebraic & Geometric Topology* **16** (2016), no. 2, 621–673.
7. *Mapping tori of free group automorphisms, and the Bieri-Neumann-Strebel invariant of graphs of groups*, w/Levitt, *Journal of Group Theory* **19** (2016), no. 2, 191–216.
8. *Growth tight actions of product groups*, w/Tao, *Groups, Geometry and Dynamics* **10** (2016), no. 2, 753–770.
9. *A geometric proof of the structure theorem for cyclic splittings of free groups*, *Topology Proceedings* **50** (2017), 335–349.
10. *Characterizations of Morse geodesics via superlinear divergence and sublinear contraction*, w/Arzhantseva, Gruber, and Hume, *Documenta Mathematica* **22** (2017), 1193–1224.
11. *Quasi-isometry classification for [right-angled Coxeter groups defined by suitable subdivisions of] complete graphs*, w/Dani and Thomas, *Journal of Topology* **10** (2017), no. 4, 1066–1106, appendix to Bowditch’s JSJ tree and the quasi-isometry classification of certain Coxeter groups by Dani and Thomas.
12. *Quasi-isometries between groups with two-ended splittings*, w/Martin, *Mathematical Proceedings of the Cambridge Philosophical Society* **162** (2017), no. 2, 249–291.
13. *Negative curvature in graphical small cancellation groups*, w/Arzhantseva, Gruber, and Hume, *Groups, Geometry and Dynamics* **13** (2019), no. 2, 579–632.
14. *A metrizable topology on the contracting boundary of a group*, w/Mackay, *Transactions of the American Mathematical Society* **372** (2019), no. 3, 1555–1600.
15. *Morse subsets of $CAT(0)$ spaces are strongly contracting*, *Geometriae Dedicata* **204** (2020), no. 1, 311–314.
16. *Cogrowth for group actions with strongly contracting elements*, w/Arzhantseva, *Ergodic Theory and Dynamical Systems* **40** (2020), no. 7, 1738–1754.

Preprints.....

17. *Short, highly imprimitive words yield hyperbolic one-relator groups*, w/Hoffmann, preprint (2020).

Theses.....

18. *Quasi-isometries among tubular groups*, Ph.D. thesis, University of Illinois at Chicago, (2007).
19. *Morse, contracting, and strongly contracting sets with applications to boundaries and growth of groups*, Habilitationsschrift, University of Vienna, (2019).

Software.....

20. *virtuallygeometric*, w/Manning, (2014), computer program, `github:cashenchris/virtuallygeometric`.

Supervision

Alexandra Edletzberger, Master Thesis U. Vienna, 2020
Residual finiteness in hyperbolic groups

Charlotte Hoffman, Master Thesis U. Vienna, 2020
Generalisations of Small Cancellation: The RSym Algorithm On Hyperbolic One-Relator Groups

Alexandra Edletzberger, PhD U. Vienna, in progress

Teaching

University of Vienna.....

1 semester external lecturer for Exercises in Probability Theory and Statistics.

5 years as organizer of "Geometry and Analysis on Groups" Proseminar.

Organize student seminar to introduce advanced Undergrad and Master's students to research topics. Guide students in doing readings and preparing 45 minute talk to introduce a topic of the 'Geometry and Analysis on Groups' research seminar.

University of Utah.....

7 semesters as sole instructor for the following courses:

Semester	Course	Enrollment	ICS
2008 Spring	Calculus II	46	4.77
2008 Fall	Trigonometry	95	4.32
2009 Spring	Real Analysis II (undergrad)	26	5.03
2009 Fall	PDE's for Engineers	26	5.05
2010 Spring	Riemannian Geometry (grad)	8	n/a
2010 Fall	Linear Algebra	42	5.17
2011 Spring	Calculus I	120	5.15

ICS = Instructor Composite Score from student evaluations, 1-6 with 6 best.

3 years as organizer of the "Calculus Carnival".

Planned and executed annual event. ~200 undergraduate students play games with Calculus questions. Games have a new theme each year: carnival games, board games, TV game shows, etc.

University of Illinois at Chicago.....

1 semester as lecturer for Multivariable Calculus.

2 years as a teaching assistant for Calculus sequence and Ordinary Differential Equations.

1 year as coordinator of Mathematical Sciences Learning Center.

Ran the MSLC for its first year of operation during search for permanent Director. Trained and supervised tutors for drop-in tutoring center. Organized Peer Led Study Groups for Fr. & So. level Math classes; trained and supervised Peer Leaders for the Study Groups.

Professional Activities

Referee for various journals

Reviewer for Mathematical Reviews

Member: American Math. Society, Austrian Math. Society, European Math. Society, Association for Women in Math.

Organizer: 'Max Dehn Seminar', U. Utah, 2008-2011

Organizer: 'Geometry and Analysis on Groups Seminar', U. Vienna, 2014-2020