

Christopher H. Cashen

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

Positions

Technische Universität Wien Project Leader	Vienna, Austria 2025–
University of Vienna Privatdozent/Project Leader Senior Postdoctoral Fellow/Project Leader Postdoctoral Fellow	Vienna, Austria 2021–2025 2014–2020 2012–2014
University of Arkansas Visiting Assistant Professor	Fayetteville, USA 2020–2021
Université de Caen Normandie Postdoctoral Fellow	Caen, France 2011–2012
University of Utah Postdoctoral Fellow	Salt Lake City, USA 2008–2011
Mathematical Sciences Research Institute Postdoctoral Fellow	Berkeley, USA Fall 2007

Academic Qualifications

University of Vienna Habilitation, Mathematics	Vienna, Austria 2020
University of Illinois at Chicago MS, PhD, Mathematics	Chicago, USA 2001, 2007
Loyola University BS, Mathematics	Chicago, USA 2000

Grants

Austrian Science Fund (FWF): PAT7799924 Project Leader <i>Coarse geometry of Coxeter groups</i>	~€430,000 2024–2028
Erwin Schrödinger Institute Workshop Grant GAGTA 2023: <i>Groups & Dynamics</i>	€20,000 2023
Erwin Schrödinger Institute Research in Teams Project <i>Rigidity in Coxeter groups</i>	~€7,000 2023
Austrian Science Fund (FWF): P 34214-N Project Leader <i>Hierarchies and graph products of elementary groups</i>	~€400,000 2021–2024
Austrian Science Fund (FWF): P 30487-N35 Project Leader <i>Generalizations of Hyperbolic Boundaries</i>	~€240,000 2017–2020
Austrian Science Fund (FWF): M 1717-N25 Project Leader <i>Geometric and Analytic Aspects of Free Group Automorphisms</i> Lise Meitner Fellowship	~€140,000 2014–2016

Supervision

Masters.....	
Alexandra Edletzberger, Master Thesis	Vienna, 2019
<i>Residual finiteness in hyperbolic groups</i>	
Charlotte Hoffman, Master Thesis	Vienna, 2020
<i>Generalisations of Small Cancellation: The RSym Algorithm On Hyperbolic One-Relator Groups</i>	
Valentina Marie Dolin, Master Thesis	Vienna, 2023
<i>Hyperbolicity or non-hyperbolicity of certain one-relator groups</i>	
Lena Birschitzky, Master Thesis	Vienna, 2025
<i>Combinatorial Games on Cayley Graphs</i>	
Doctors.....	
Alexandra Edletzberger, PhD	Vienna, 2024
<i>Quasi-Isometries for two-dimensional Right-Angled Coxeter Groups</i>	

Teaching Experience

University	Semester	Course	Level	Enrollment
Illinois	2006 Spring	Calculus III	U	20
Illinois	2006 Fall	Exercise ODEs	U	20
Illinois	2007 Spring	Exercise ODEs	U	22
Utah	2008 Spring	Calculus II	U	46
Utah	2008 Fall	Trigonometry	U	95
Utah	2009 Spring	Real Analysis II	U	26
Utah	2009 Fall	PDEs for Engineers	U	26
Utah	2010 Spring	Riemannian Geometry	G	8
Utah	2010 Fall	Linear Algebra	U	42
Utah	2011 Spring	Calculus I	U	120
Arkansas	2020 Fall	Advanced Calculus	U	15
Arkansas	2021 Spring	Algebraic Topology	G	16
Arkansas	2021 Spring	Topics in Algebra: Coxeter Groups	G	6
Vienna	2022 Spring	Topics in Algebra: Coxeter Groups	G	15
Vienna	2023 Spring	Topics in Algebra: Random Walks in Groups	G	6
Vienna	2024 Spring	Topics in Algebra: Computational Group Theory	G	17

Level: U=Undergraduate/Bachelor, G=Graduate/Master&PhD

Professional Activities

Organization.....	
‘Geometry and Analysis on Groups Seminar’, Vienna, 2014-2020, 2021-	
conference ‘GAGTA 2023: Groups and Dynamics’, Schrödinger Inst., Austria	
Referee/Review.....	
Mathematical Reviews, 50+ reviews	
Referee for various journals	
External grant reviewer for national funding agencies	
Opponent, PhD defense of Leonard Eze, Commenius University Bratislava	
Professional Memberships.....	
American, Austrian, European Math. Societies, Association for Women in Math.	

Research Outputs

Peer-reviewed Publications.....

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.
17. *Short, highly imprimitive words yield hyperbolic one-relator groups*, w/Hoffmann, Experimental Mathematics **32** (2023), no. 4, 631–640.
18. *RAAGedy right-angled Coxeter groups II: in the quasiisometry class of the tree RAAGs*, Proc. Amer. Math. Soc. **153** (2025), no. 12, 5087–5101.
19. *Visual right-angled Artin subgroups of two-dimensional right-angled Coxeter groups*, w/Edletzberger, J. Group Theory **28** (2025), no. 5, 1237–1259.
20. *Asymptotic cones of snowflake groups and the strong shortcut property*, w/Hoda and Woodhouse, Algebr. Geom. Topol. **25** (2025), no. 6, 3429–3501.

Preprints.....

21. *Biggs tree groups*, preprint, arXiv:2511.13292.
22. *RAAGedy right-angled Coxeter groups*, w/Dani, Edletzberger, and Karrer, preprint, arXiv:2506.16789.
23. *Conformal dimension bounds, Pontryagin sphere boundaries, and algebraic fibering of right-angled Coxeter groups*, w/Dani, Schreve, and Stark, preprint, arXiv:2510.03430.

Theses.....

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

Software.....

26. *virtuallygeometric*, w/Manning, (2014), python scripts for working with multiwords in free groups, including relative JSJ decompositions, Whitehead reduction, Stallings folding, checking virtual geometricity, <https://github.com/cashenchris/virtuallygeometric>.
27. *orgcensus — one relator groups census*, Zenodo, (2021), Data set containing census of one-relator groups with defining presentation with at most 4 generators and relator of length at most 16, along with imprimitivity rank of the generator and, when known, hyperbolicity of the group.
28. *RACG*, (2025), Python module for computations in 2-dimensional right-angled Coxeter groups, focused on topics relevant to geometric group theory, <https://github.com/cashenchris/RACG>.
29. *Triangle-free CFS graphs (≤ 12 vertices) and associated RACG data*, Zenodo, (2025), Enumeration of one graph from each isomorphism type of triangle-free CFS graph with at most 12 vertices, and accompanying information about the right-angled Coxeter group defined by the graph; data set and python utilities.