

Macarena Arenas

CONTACT INFORMATION

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RESEARCH INTERESTS

Geometric group theory, and geometric, combinatorial, and low-dimensional topology.

In particular:

- hyperbolic and non-positively curved groups and spaces,
- the theory of non-positively curved cube complexes and its applications,
- finiteness properties of groups,
- combinatorial properties of curves on surfaces.

ACADEMIC POSITIONS

Clare College, University of Cambridge

- Denman Baynes Junior Research Fellow (postdoc), current.
- Denman Baynes Senior Student, 2022-2023.

EDUCATION

University of Cambridge

- PhD, Mathematics, August 2023
 - Supervisor: Prof. Henry Wilton
Thesis title: *Cubical small cancellation theory and large-dimensional hyperbolic groups*
- CULP Award in advanced Russian, 2023

McGill University

- M.Sc., Mathematics, June 2020
 - Supervisor: Prof. Daniel T Wise
Thesis title: *A linear isoperimetric function for genus 0 diagrams*

Universidad Nacional Autónoma de México

- B.Sc., Mathematics (*Licenciatura*), April 2018
Graduated with Honourific Mention
 - Supervisor: Prof. Max Neumann-Coto
Thesis title: *Medidas de complejidad de curvas en superficies*

RESEARCH PAPERS

1. *Asphericity of cubical presentations: the general case*, in preparation.
2. *Taut smoothings of arcs and curves* with Max Neumann-Coto, submitted.
3. *The Cohen-Lyndon property in non-metric small-cancellation*, submitted.
4. *Asphericity of cubical presentations: the 2-dimensional case*, IMRN.
5. *Hyperbolicity in non-metric cubical small cancellation* with Kasia Jankiewicz and Daniel T. Wise, submitted.
6. *A cubical Rips construction*, accepted at Algebraic & Geometric Topology.
7. *Linear isoperimetric functions for surfaces in hyperbolic groups* with Daniel T. Wise, submitted.
8. *Measuring complexity of curves on surfaces* with Max Neumann-Coto, Geometriae Dedicata.

EXPOSITORY PAPERS

- *Grupos y geometría cubular*, Memorias de la Sociedad Matemática Mexicana.
- *Papel Doblado, Geometría y la Conquista del Espacio* accepted at Universo.Math.

HONOURS AND AWARDS

July 2022	LMS Grant for Early Career Researchers
July 2022	LMS Kovalevskaya Grant for the ICM 2022
March 2022	Smith Knight and Rayleigh Knight Prize, group 3
2020 - 2023	Cambridge International & Newnham College Scholarship
2018 - 2019	Beca Complemento SEP
2015 - 2018	Scholarship student at IMATE-UNAM
2017	Scholarship for the XXVII Summer Research Programme of the Mexican Academy of Sciences
2016 - 2017	Beca de Excelencia Béalos - UNAM Licenciatura
2016	Second place, Mathematical Essay Competition, Universo.Math magazine
2015 - 2016	Beca de Excelencia Béalos - UNAM Licenciatura
2015	First place in the "XIII Leamos La Ciencia Para Todos" Competition organized by the Fondo de Cultura Económica, category D
2015	Scholarship for the XXV Summer Research Programme of the Mexican Academy of Sciences

TEACHING, SUPERVISING, AND MARKING

2024	Lecturer, Part III Cubulating spaces and groups, University of Cambridge
2023	Supervisor, Part IA Groups, University of Cambridge
2023	Supervisor, Part IB Groups, Rings & Modules, University of Cambridge
2022	Supervisor, Part IA Groups, University of Cambridge
2022	Lecturer, <i>Grupos y Geometría Cubular</i> mini-course, Geometric Group Theory summer school in Morelia, Mexico
2022	Grader, Part III Coxeter Groups, University of Cambridge
2022	Supervisor, Part IB Geometry, University of Cambridge
2021	Supervisor, Part II Algebraic Topology, University of Cambridge
2021	Lecturer, <i>A crash course on isoperimetry</i> mini-course, Geometric group theory without boundaries summer school, online
2021	Supervisor, Part IB Geometry, University of Cambridge
2019	Grader, Topology & Geometry I, McGill University
2019	Teaching Assistant, Algebra I, McGill University
2018	Teaching Assistant, Algebra I, McGill University
2018	Teaching Assistant, Groupoids in Topology, UNAM
2018	Teaching Assistant, Topology I, UNAM
2017	Teaching Assistant, Vector Bundles & K Theory, UNAM

INVITED CONFERENCE TALKS

July 2024	<i>TBD</i> , XXIV Coloquio Latinoamericano de Álgebra, Santiago de Chile, Chile
June 2024	<i>TBD</i> , X Dubrovnik Topology Conference, Dubrovnik, Croatia
June 2024	<i>TBD</i> , Ian Leary's 60th birthday conference, Bristol, UK
April 2024	Early-career speaker (title TBD), Young Geometric Group Theory XII, Bristol, UK
May 2023	<i>Classifying spaces for cubically presented groups</i> , Interactions between Geometric group theory and Algebraic topology (BIRS Workshop), Casa Matematica Oaxaca.
May 2023	<i>Classifying spaces for cubically presented groups</i> , Geometry of Subgroups conference, Montreal.
April 2023	<i>On the structure of quotients of cubulated groups</i> , North British Geometric Group Theory meeting, Glasgow.
Feb. 2023	5-minute lightning talk, Young Geometric Group Theory XI, Munster
Feb. 2023	<i>Rips constructions and large dimensional hyperbolic groups</i> , Groups Topology and Applications Gran Bilbao IV.
Nov. 2022	<i>A cubical Rips construction</i> , (Virtual) 3rd International Meeting on Geometric Group Theory and Low Dimensional Topology.
Sept. 2022	<i>A cubical Rips construction</i> , Modern Advances in geometric group theory Workshop, Manchester.
Sept. 2022	<i>A cubical Rips construction</i> , World of geometric group theory, Zoom.
June 2022	5-minute lightning talk, Hyperbolic groups and their generalisations (conference), IHP, Paris.
Oct. 2021	<i>Isoperimetría e hiperbolicidad</i> , 54th National Congress of the Mexican Mathematical Society, special session in Geometric Group Theory, BUAP, Mexico (online).

INVITED SEMINAR TALKS

April 2023	<i>TBD</i> , Madrid Group Theory Seminar.
Jan 2023	<i>Taut surgeries on curves</i> , Cambridge DG&T Seminar.
Jan 2023	<i>Taut surgeries on curves</i> , Birmingham Analysis Seminar.
Dec 2023	<i>Asphericity and the Cohen-Lyndon property in small-cancellation</i> , Vienna Geometry and Analysis on Groups Seminar.
Dec 2023	<i>Asphericity and the Cohen-Lyndon property in small-cancellation</i> , Groups and Geometry in the Southeast, Southampton.

Nov 2023	<i>The Cohen-Lyndon property and asphericity in small-cancellation</i> , Karlsruhe Topology and Geometric Group Theory seminar.
May 2023	<i>On quotients of cubulated groups</i> , University of Newcastle Algebra Seminar.
April 2023	<i>On quotients of cubulated groups</i> , Oxford Geometric Group Theory Seminar.
Oct. 2022	<i>A cubical Rips construction</i> , Topology Seminar at UW-Milwaukee (online).
Oct. 2022	<i>A cubical Rips construction</i> , Herriot-Watt algebra, geometry, and topology Seminar.
Oct. 2022	<i>A cubical Rips construction</i> , Bristol geometry and topology Seminar.
Sept. 2022	<i>Cancelaciones pequeñas y construcciones de Rips</i> , University of Buenos Aires topology seminar (online).
May 2022	<i>A cubical Rips construction</i> , Strasbourg Geometry and Topology seminar.
April 2022	<i>A cubical Rips construction</i> , Bilbao Algebra seminar.
Feb. 2022	<i>A cubical Rips construction</i> , Geometry & Topology Online (GaTO) seminar.
Feb. 2022	<i>A cubical Rips construction</i> , Warwick Dynamics and Group Geometry Early Researchers (DAGGER) seminar.
Feb. 2021	<i>Diagramas, superficies, isoperimetría, e hiperbolicidad</i> , Seminario a Distancia en Teoría geométrica de grupos, UNAM
Jan. 2021	<i>Linear isoperimetric functions for surfaces in hyperbolic groups</i> , Queen's University Dynamics, Geometry & Groups Seminar.
Jan. 2021	<i>Linear isoperimetric functions for surfaces in hyperbolic groups</i> , Oxford Junior Group Theory Seminar.
Nov. 2020	<i>Linear isoperimetric functions for surfaces in hyperbolic groups</i> , Cambridge Geometric Group Theory Seminar.
Oct. 2020	<i>Linear isoperimetric functions for surfaces in hyperbolic groups</i> , ENS Paris Group Theory Seminar.
May 2020	<i>Linear isoperimetric functions for surfaces in hyperbolic groups</i> , Fico González Acuña Low Dimensional Topology Seminar
Sept. 2018	<i>Measuring complexity of curves on surfaces</i> , Geometric Group Theory Seminar, McGill University
Oct. 2016	<i>Una cota para la longitud de las palabras que representan a un lazo en una esfera con hoyos</i> , Geometry and Topology Workshop UABJO, Oaxaca.

CONTRIBUTED TALKS

Nov. 2022	<i>Cube complexes for the uninitiated</i> , Cambridge Junior Geometry Seminar.
March 2022	<i>A cubical Rips construction</i> , Topological and Homological Methods in Group Theory 2022.
Feb. 2022	<i>A cubical Rips construction</i> , Cambridge Geometric Group Theory Seminar.
Feb. 2022	<i>A cubical Rips construction</i> , Cambridge Junior Geometry Seminar.
July 2020	<i>Measuring complexity of curves on surfaces</i> , Georgia Tech Topology Students Workshop.
Oct. 2019	<i>On Enzymes, or Why Your Earphones Are Always Tangled</i> , McGill Math and Stats Graduate Student Seminar.
Oct. 2018	<i>OuLiPo</i> , McGill Math and Stats Graduate Student Seminar.
April 2018	<i>Medidas de complejidad de curvas en superficies</i> , Seminario de Becarios, Iamate, UNAM.
Sep. 2017	<i>OuLiPo!</i> , Seminario de Becarios, Iamate, UNAM.
Feb. 2017	<i>Un algoritmo para levantar curvas inmersas en una superficie a encajes</i> , Seminario de Becarios, Iamate, UNAM.
Oct. 2016	<i>Papel doblado, Geometría y la conquista del espacio</i> , Aquelarre Matemático, UNAM

ACADEMIC VISITS

May-June 2024	Visitor/programme participant at the Fields Institute <i>Thematic Program on Randomness and Geometry</i>
April 2024	One-week visit to Andrei Jaikin-Zapirain and Pablo Sanchez Peralta at the ICMAT (Madrid)
Dec. 2023	One-week visit to Chris Cashen at the University of Vienna

CONFERENCE ATTENDANCE

Sept 2024	BIRS Workshop on Combinatorial Nonpositive Curvature, Banff Research Station, Canada
June 2024	X Dubrovnik Topology Conference, Dubrovnik, Croatia
June 2024	Ian Leary 60th birthday conference, Bristol
April 2024	Young Geometric Group Theory XII, Bristol
July 2023	Women in groups, geometry, & dynamics retreat, Idaho, USA
June 2023	Cube Complexes and Combinatorial Geometry, CRM, Montreal
June 2023	Groups around 3-Manifolds, CRM, Montreal
May 2023	BIRS Workshop on the interactions between Geometric group theory and Algebraic topology, Casa Matematica Oaxaca
May 2023	Geometry of Subgroups, CRM, Montreal
Feb. 2022	Young Geometric Group Theory XI, Munster
Feb. 2022	GTA Gran Bilbao IV
Jan. 2023	LMS South West and South Wales Regional Meeting 2023, Southampton
Nov. 2022	(Virtual) 3rd International Meeting on Geometric Group Theory and Low Dimensional Topology
Sep. 2022	Modern advances in geometric group theory, Manchester, UK
April-Jun. 2022	Groups acting on fractals, hyperbolicity and self-similarity, Institut Henri Poincare, Paris, France
March 2022	Topological and Homological Methods in Group Theory, Bielefeld, Germany
Feb. 2022	Workshop on Finiteness Properties, KIT, Karlsruhe, Germany
July 2021	Young Geometric Group Theory X, Newcastle (online)
June 2021	Geometric Group Theory Without Boundaries II, virtual summer school (co-organiser)
Jan. 2021	Postgraduate Group Theory Conference 2020, University of Southampton (via Zoom)
July 2020	Geometric Group Theory Without Boundaries, virtual summer school (co-organiser)
June 2020	Topology Students Workshop, Georgia Tech (via Zoom)
Feb. 2020	Young Geometric Group Theory IX, Saint-Jacut-de-la-Mer, France
Jul. 2019	Aspects of Geometric Group Theory, IHÉS
Jul. 2019	Young Geometric Group Theory VIII, Universidad del País Vasco
May-Jun. 2019	Simons Semester on Geometric and Analytic Group Theory, IMPAN
Aug. 2017	PRIMA Third Congress, Oaxaca, México.
Jul. 2017	Summer School, Centre of Mathematical Sciences UNAM, Morelia.
Dec. 2016	Winter School Fico Gonzalez Acuña de Nudos y 3-Variedades, Guanajuato.

SERVICE

May 2025 –	Summer school: Homological aspects of groups and their classifying spaces, co-organiser.
2024 –	Internationalisation Commission of the Mexican Mathematical Society, member.
2023 –	Cambridge Geometric Group Theory Seminar, organiser.
Fall 2023	<i>Pares Ordenados</i> (Latin-American undergraduate mentorship scheme), mentor.
Oct 2023	<i>Quimera Matemática</i> (conference for Mexican undergraduate students), participated in a panel discussion on pursuing graduate studies abroad.
2022 –2023	Cambridge Women and non-binary mentorship scheme, mentor.
2021 –2023	Cambridge Junior Geometry Seminar, organiser.
June 2021	<i>Geometric Group Theory without Boundaries II</i> Virtual Summer School, co-organiser
July 2020	<i>Geometric Group Theory without Boundaries</i> Virtual Summer School, co-organiser
2018–2020	McGill's Geometric Group Theory Seminar, co-organiser
2016–2018	Students' Seminar, IMATE-UNAM, co-organiser
2017	VII <i>Festival Matemático</i> , volunteer and co-organiser
2017	<i>Jornada Universitaria por la Igualdad 2017</i> (panel discussion on equality and diversity), Mathematics Institute, UNAM, speaker
2016	VI <i>Festival Matemático</i> , volunteer
2015	V <i>Festival Matemático</i> , volunteer.

LANGUAGES

- Spanish (native)
- English (fluent)
- French (proficient)
- Russian (conversant)
- Hebrew (elementary)