

Antonio Montero

Curriculum Vitae

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Personal information

Date of birth 3 December, 1990.
Place of birth Morelia, Mexico.
Nationality Mexican.

Research Positions

Oct. 2024 – **Asistent (Teaching assistant)**, Faculty of Education, University of Ljubljana, Ljubljana, Slovenia.

Apr. 2022 – Sep. 2025 **Znanstveni sodelavec (Research associate, postdoctoral)**, Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia.
Under the mentorship of Dr. Primož Potočnik.

Sep. 2020 – Mar. 2022 **Becario postdoctoral (Postdoctoral fellow)**, Institute of Mathematics, National Autonomous University of Mexico (UNAM), Mexico City, Mexico.
Under the mentorship of Dr. Isabel Hubard.

Sep. 2019 – Aug. 2020 **Postdoctoral fellow**, Department of Mathematics and Statistics, York University, Department of Mathematics and Statistics, York University Canada.
Under the mentorship of Dr. Asia Ivić Weiss.

Jan. 2017 – Jul. 2017 **Visiting student**, Faculty of Education, University of Ljubljana, Ljubljana, Slovenia.
Under the supervision of Dr. Primož Šparl. Part of my Ph.D. studies.

Education

Jul. 2015 – Aug. 2019 **Ph.D. in Mathematics**, Posgrado Conjunto en Ciencias Matemáticas (Joint Program of Graduate Studies in Mathematics) UMSNH-UNAM, Morelia, Mexico.

Feb. 2013 – Jun. 2015 **M. Sc. in Mathematics**, Posgrado Conjunto en Ciencias Matemáticas (Joint Program of Graduate Studies in Mathematics) UMSNH-UNAM, Morelia, Mexico.

Aug. 2008 – Feb. 2013 **B. Sc. in Physics and Mathematics**, University of Michoacan (UMSNH), Morelia, Mexico.

Honours, awards, appointments

- Jan. 2021 – Dec. 2024 **Candidato a investigador nacional (National research candidate)**, *National Council of Humanities, Science and Technology (CONAHCyT)*, Mexico.
As part of the program *Sistema nacional de investigadores (SNI) (National researchers system)*.
- July 2018 **Best student talk award**, *UP FAMNIT - UP IAM - IMFM*, Slovenia.
Award given to the best talk presented by a student during the 8th PhD Summer School in Discrete Mathematics.
- October 2012 **“Padre de la Patria”**, *Faculty of Physics and Mathematics, UMSNH*, Mexico.
Award given to the best student of each year.
- October 2011 **“Padre de la Patria”**, *Faculty of Physics and Mathematics, UMSNH*, Mexico.
Award given to the best student of each year.

Publications

Published/accepted research articles

- [1] G. Cunningham, E. Mochán and A. Montero. ‘Cayley extensions of maniplexes and polytopes’. In: *Journal of Combinatorial Theory, Series A* 212 (May 2025), p. 106000. DOI: 10.1016/j.jcta.2024.106000.
- [2] A. Montero and M. Toledo. ‘Chiral Extensions of Regular Toroids’. In: *Combinatorica* 45.1 (Dec. 2024), p. 5. DOI: 10.1007/s00493-024-00132-0.
- [3] I. Hubard, E. Mochán and A. Montero. ‘Voltage Operations on Maniplexes, Polytopes and Maps’. In: *Combinatorica* (May 2023). DOI: 10.1007/s00493-023-00018-7.
- [4] J. Collins and A. Montero. ‘Equivelar Toroids with Few Flag-Orbits’. In: *Discrete & Computational Geometry* 65.2 (Jan. 2021), pp. 305–330. DOI: 10.1007/s00454-020-00230-y.
- [5] A. Montero. ‘On the Schläfli symbol of chiral extensions of polytopes’. In: *Discrete Mathematics* 344.11 (Nov. 2021), p. 112507. DOI: 10.1016/j.disc.2021.112507.
- [6] A. Montero and A. I. Weiss. ‘Locally spherical hypertopes from generalised cubes’. In: *Art Discrete Appl. Math.* 4.3 (2021), Paper No. 3.07, 12. DOI: 10.26493/2590-9770.1354.b40.
- [7] A. Montero and A. I. Weiss. ‘Proper locally spherical hypertopes of hyperbolic type’. In: *Journal of Algebraic Combinatorics* (Oct. 2021). DOI: 10.1007/s10801-021-01054-6.
- [8] A. Montero. ‘Regular polyhedra in the 3-torus’. In: *Advances in Geometry* 18.4 (2018), pp. 431–450. DOI: 10.1515/advgeom-2018-0017.

Ongoing/submiteted research articles

- [9] I. Hubard, E. Mochán and A. Montero. ‘Symmetries of voltage operations on polytopes, maps and maniplexes’. Under review.

- [10] A. Montero and P. Potočník. 'Vertex transitive graphs with small motion and permutation groups with small minimal degree'. Under review.

Outreach articles

- [11] A. Montero. 'Simetrías de polígonos, poliedros y otras policosas (Symmetries of polygons, polyhedra and other poly-things)'. In: *BUM* 10.62 (2016), p. 5.
- [12] A. Montero. 'Simetrías: Las matemáticas detrás de la belleza (Symmetry: the mathematics behind beauty)'. In: *Saber Más* 4.24 (2016), pp. 21–23.

Theses

- [13] A. Montero. 'Chiral extensions of toroids'. Ph. D. Thesis. UNAM-UMSNH, 2019.
- [14] A. Montero. 'Realizaciones regulares de poliedros en el 3-toro (Realizations of regular polyhedra in the 3-torus)'. Master's thesis. UNAM-UMSNH, 2015.
- [15] A. Montero. 'Poliedros regulares en el 3-toro (Regular polyhedra in the 3-torus)'. Undergraduate thesis. UMSNH, 2013.

Academic service

Students supervision

- May 2022 **Committee member for predoctoral exam**, *Politopos hiperbólicos (Hyperbolic polytopes)*, PhD research project presented by Ernesto Vázquez under the supervision of Profr. Isabel Hubbard, UNAM, Mexico.
- May 2022 **Committee member for predoctoral exam**, *Politopos quirales en espacios euclidianos (Chiral polytopes on Euclidean spaces)*, PhD research project presented by Briseida Trejo under the supervision of Profr. Isabel Hubbard, UNAM, Mexico.
- June 2021 **Committee member for PhD disertation**, *Abstract polytopes from their symmetry type graph*, Thesis presented by Elías Mochán under the supervision of Profr. Isabel Hubbard, UNAM, Mexico.

Journal Reviewer

- Ars Mathematica Contemporanea
- Discrete Mathematics
- Contributions to Discrete Mathematics
- The Art of Discrete and Applied Mathematics
- Journal of the Australian Mathematical Society

Organising committees

- June 2023 **10th Slovenian Conference on Graph Theory**, Kranjska Gora, Slovenia. Member of the organising committee.
- May 2021 - Nov. 2021 **Mexican Mathematical Olympiad in Michoacan**, Morelia, Mich., Mexico. Member of the local committee.
- February 2018 **Degustaciones Matemáticas 2018**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Morelia, Mich., Mexico. Cycle of talks in the Faculty of Physics and Mathematics, UMSNH.

- February 2017 **Degustaciones Matemáticas 2017**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Morelia, Mich., Mexico.
Cycle of talks in the Faculty of Physics and Mathematics, UMSNH.
- February 2016 **Degustaciones Matemáticas 2016**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Morelia, Mich., Mexico.
Cycle of talks in the Faculty of Physics and Mathematics, UMSNH.
- February 2015 **Degustaciones Matemáticas 2015**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Morelia, Mich., Mexico.
Cycle of talks in the Faculty of Physics and Mathematics, UMSNH.
- Aug. 2014 - Jun. 2015 **Graduate students seminar**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Morelia, Mich., Mexico.
- March 2013 **XXVIII Colloquium “Victor Neumann-Lara” of graph theory, combinatorics and its applications**, Morelia, Mich., Mexico.
Member of the local committee.
- Other
- May 2023 **European Girls Math Olympiad (EGMO)**, Portorož, Slovenia.
Coordinador of Problem 4.

Teaching Experience

Lecturer/course coordinator

- Oct. 2024 - Jan. 2025 **Matematične tehnologije (Mathematical technologies)**, *Faculty of Education, University of Ljubljana*, Undergraduate course, taught in Slovene.
- Jan. 2024 - Jun. 2024 **Topics in discrete mathematics: permutation groups and actions on discrete structures**, *Faculty of Mathematics and Physics, University of Ljubljana*, Graduate course.
- Jan. 2022 - Jun. 2022 **Discrete Mathematics 2**, *Faculty of Mathematics and Physics, University of Ljubljana*, Undergraduate course for the mathematics program.
- Mar. 2021 - Aug. 2021 **Seminar of combinatorial analysis: Regular polyhedra**, *Faculty of Sciences - UNAM*, Undergraduate course for the mathematics program.
- Jan. 2020 - Apr. 2020 **Introduction to Sets and Logic**, *Department of Mathematics and Statistics - York University*, Undergraduate course (MATH 1190).
- Aug. 2015 - Dec. 2015 **Introductory course in mathematics**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course.

Teaching Assistant

- Oct. 2024 - Jan. 2025 **Abstraktna algebra (Abstract algebra)**, *Faculty of Education, University of Ljubljana*, Undergraduate course, taught in Slovene.
- Jan. 2019 - Jun. 2019 **Linear Algebra**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Information technologies for sciences program.
- Aug. 2018 - Dec. 2018 **Discrete Mathematics**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Information technologies for sciences program.
- Aug. 2018 - Dec. 2018 **Analytic Geometry**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Information technologies for sciences program.

- May 2018 **Linear Algebra**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Preparatory course for the graduate program.
- Aug. 2017 - Dec. 2017 **Discrete Mathematics**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Information technologies for sciences program.
- Aug. 2017 - Dec. 2017 **Analytic Geometry**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Information technologies for sciences program.
- Jan. 2016 - Jun. 2016 **Linear Algebra and Differential Equations**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Geosciences program.
- Jan. 2016 - Jun. 2016 **Calculus**, *National School of Higher Studies (ENES) - UNAM Morelia*, Undergraduate course in the Geosciences program.
- June 2016 **Linear Algebra and Topics in Combinatorics**, *Joint Program of Graduate Studies in Mathematics UMSNH-UNAM*, Preparatory course for the graduate program.

Mathematical education

- December 2016 **Logic and Combinatorics**, *Taller "Métodos naturales para la resolución de problema en matemáticas" (Workshop "Natural methods for problem solving in mathematics")*, Workshop taught to highschool teachers.
- Aug. 2014 - Jan. 2015 **Geometry**, *Taller de actualización docente para profesores de bachillerato (Update workshop for highschool teachers)*, Workshop taught to highschool teachers.

Other

- July 2024 **Are your polyhedra the same as my polyhedra?**, *Symmer school "Mathematics in Ljubljana 2024"*, Minicourse
- 2012- 2019 **Combinatorics**, *Mexican Mathematical Olympiad*.
Trainer of the local team that participates in the Mexican Mathematical Olympiad.
- June 2014 **Teselaciones simétricas de 3-variedades planas (Symmetric tesellations of flat 3-manifolds)**, *XIV Summer school in mathematics CCM - UNAM*, Minicourse.
- Jun. 2011 - Jun. 2013 **Club de Mate**, *Centro de ciencias matemáticas UNAM*.
"Club de Mate" is a program of UNAM that works with children younger than 15 years to encourage their mathematical reasoning.

Conferences, colloquia and seminars

I have participated in several conferences with both national and international audience, as well as several colloquia and seminars. I have given more than thirty talks in those events. The following list enumerates a selection of them; you can find the complete list of talks on *my website (click)*. My participation is marked as follows:

- (**): I was a plenary/invited speaker.
- (*): I was an invited speaker but all the other speakers were also invited.
- No mark: Contributed talk.
- No title: I only participated as an attendant.

- February 2024 **Vertex-transitive graphs with (very) small movement**, *Conference “Symmetries of discrete objects”*, Auckland, New Zealand.
- June 2023 **Cayley extensions of maniplexes and polytopes**, *10th Slovenian Conference on Graph Theory*, Kranjska Gora, Slovenia.
- November 2022 **(*) Voltage operations on maniplexes, maps and polytopes**, *Mathematics research seminar*, Koper, Slovenia.
- March 2021 **(*) Highly symmetric polytopes with prescribed local combinatorics**, *Algebraic Graph Theory International Webinar*, Online webinar.
- November 2021 **(**) Toros cuadriculados muy simétricos (Highly symmetric squared tori)**, *Encuentro Nororiental de Matemáticas 2020 (Northeast meeting of mathematics (University of Pamplona, Colombia))*, Online for the University of Pamplona, Colombia.
- December 2019 **(*) A family of regular hypertopes built from regular polytopes**, *Session Interplay between Discrete Geometry, Analysis and Combinatorics of the 2019 CMS Winter Meeting*, Toronto On., Canada.
- July 2018 **Chiral extensions of regular toroids**, *8th PhD Summer School in Discrete Mathematics*, Rogla, Slovenia.
This talk was awarded with the “Best student talk award”.
- August 2017 **(*) Chiral extensions of chiral polytopes**, *3rd Conference of the Pacific Rim Mathematical Association*, Oaxaca Oax., Mexico.
- February 2016 **Equivelar toroids with few flag-orbits**, *Conference Symmetries and Covers of Discrete Objects*, Queenstown, New Zealand.
- June 2015 –, *8th Slovenian Conference on Graph Theory*, Kranjska Gora, Slovenia.
- July 2014 **Regular polyhedra in the 3-torus**, *5th Workshop Symmetries in Graphs Maps and Polytopes (SIGMAP)*, West Malvern, U.K..

Outreach activities

I have participated in several outreach events and activities as coordinator, volunteer and organiser. The following list enumerates some of them.

- April 2019 **“Feria Matemática de Morelia 2019”**, *CCM UNAM*, Morelia, Mich., Mexico.
- April 2018 **“Feria Matemática de Morelia 2018”**, *CCM UNAM*, Morelia, Mich., Mexico.
- October 2017 **“Fiesta de las Ciencias y las Humanidades”**, *Dirección General de Divulgación de la Ciencia UNAM*, Morelia, Mich., Mexico.
- April 2016 **“Feria Matemática de Morelia 2016”**, *CCM UNAM*, Morelia, Mich., Mexico.
- December 2015 **“Una ventana discreta”**, *UNAM Juriquilla*, Juriquilla, Qro. Mexico.
- May 2015 **“El universo en tu escuela”**, *CRyA UNAM*, Morelia, Mich. Mexico.
- April 2015 **“Feria Matemática de Morelia 2015”**, *CCM UNAM*, Morelia, Mich., Mexico.
- November 2014 **“Noche de Estrellas”**, *UNAM*, Morelia, Mich. Mexico.
- October 2014 **“Fiesta de las Ciencias y las Humanidades”**, *Dirección General de Divulgación de la Ciencia UNAM*, Morelia, Mich., Mexico.

November 2013 **“Feria Matemática de Morelia 2013”**, *CCM UNAM*, Morelia, Mich., Mexico.
April 2013 **“XXIII Tianguis de la Ciencia”**, *UMSNH*, Morelia, Mich., Mexico.
November 2012 **“Feria Matemática de Morelia 2012”**, *CCM UNAM*, Morelia, Mich., Mexico.
April 2013 **“XXII Tianguis de la Ciencia”**, *UMSNH*, Morelia, Mich., Mexico.
Jun. 2011 - Jun. 2013 **“Club de Mate”**, *CCM UNAM*, Morelia, Mich., Mexico.

Languages

Spanish Native speaker.
English C1 (2014).
Slovene A1 course finished, basic communication.

Computational skills

Programming languages Java, Python.
Scientific programming languages SageMath, GAP.
Productivity Inkscape, \LaTeX , Git.
Other Ardour 6 (audio production), KDeLive (video editing).