

Arturo Merino

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Personal Information

Full name Arturo Ignacio Merino Figueroa
D.O.B. 24/08/1993
P.O.B. Ñuñoa, Santiago, Chile
Citizenship Chilean

Professional Experience

- Universidad de O'Higgins** *Rancagua, Chile*
Assistant Professor *2024 - Current*
- Assistant professor at the Engineering Institute of the Universidad de O'Higgins.
- Universität des Saarlandes and Max Planck Institut für Informatik** *Saarbrücken, Germany*
Postdoctoral Researcher *2023-2024*
- Researcher within the algorithms group.
- Center for Mathematical Modeling - Resource management laboratory** *Santiago, Chile*
Project Engineer *2018-2019*
- Designer and developer of heuristics and algorithms for vehicle routing problems.

Education

- Technische Universität Berlin** *Berlin, Germany*
Dr. rer. nat. *2019 - 2023*
- Graduated summa cum laude. Supervised by Prof. Torsten Mütze within the Combinatorial Optimization and Graph Algorithms group.
Thesis title: "Combinatorial Generation: Greedy Approaches and Symmetry."
Awardee of the 2023 MATH+ Dissertation award.
DOI: 10.14279/depositonce-19653.
- Universidad de Chile** *Santiago, Chile*
M.Eng. in Applied Mathematics *2017 - 2018*
- Graduated with highest distinction (6.8/7.0). Supervised by Prof. José Soto.
Thesis title: "Optimal Bases of Uncertainty Matroids and How to Compute Them With Queries of Minimum Cost."
Available at Universidad de Chile's repository: repositorio.uchile.cl/handle/2250/168154.
- Universidad de Chile** *Santiago, Chile*
B.Eng. Mathematical Engineering *2012 - 2018*
- Graduated with highest distinction (7.0/7.0).

Publications

JOURNAL ARTICLES

- [J1] **On the Two-Dimensional Knapsack Problem for Convex Polygons** *TALG*
(with Andreas Wiese) *2024*
- ACM Transactions on Algorithms
DOI: 10.1145/3644390
 - Conference version: [C2]
- [J2] **On a Combinatorial Generation Problem of Knuth** *SICOMP*
(with Ondřej Mička and Torsten Mütze) *2022*
- SIAM Journal on Computing
DOI: 10.1137/20M1377394
 - Conference version: [C3]

[J3]	Combinatorial Generation via Permutation Languages. III. Rectangulations (with Torsten Mütze) <ul style="list-style-type: none">Discrete & Computational Geometry DOI: 10.1007/s00454-022-00393-wConference version: [C4]	DCG 2022
[J4]	Combinatorial Generation via Permutation Languages. IV. Elimination trees (with Jean Cardinal and Torsten Mütze) <ul style="list-style-type: none">ACM Transactions on Algorithms DOI: 10.1145/3689633Conference version: [C5]	TALG 2024
[J5]	Star Transposition Gray Codes for Multiset Permutations (with Petr Gregor and Torsten Mütze) <ul style="list-style-type: none">Journal of Graph Theory DOI: 10.1002/jgt.22915Conference version: [C6]	JGT 2023
[J6]	The Hamilton Compression of Highly Symmetric Graphs (with Petr Gregor and Torsten Mütze) <ul style="list-style-type: none">Annals of Combinatorics DOI: 10.1007/s00026-023-00674-yConference version: [C8]	AOCO 2023
[J7]	Combinatorial Generation via Permutation Languages. V. Acyclic orientations (with Jean Cardinal, Hung P. Hoang, Ondřej Mička, and Torsten Mütze) <ul style="list-style-type: none">SIAM Journal on Discrete Mathematics DOI: 10.1137/23M1546567Conference version: [C9]	SIDMA 2023
[J8]	Kneser Graphs are Hamiltonian (with Torsten Mütze and Namrata) <ul style="list-style-type: none">Advances in Mathematics DOI: 10.1016/j.aim.2025.110189Conference version: [C10]	Adv 2025
[J9]	Traversing Combinatorial 0/1-Polytopes via Optimization (with Torsten Mütze) <ul style="list-style-type: none">SIAM Journal on Computing DOI: 10.1137/23M1612019Conference version: [C11]	SICOMP 2024
[J10]	Graphs that Admit a Hamiltonian Path are Cup-Stackable (with Petr Gregor, Torsten Mütze, and Francesco Verciani) <ul style="list-style-type: none">Discrete Mathematics DOI: 10.1016/j.disc.2024.114375	DM 2025

CONFERENCE ARTICLES

[C1]	The Minimum Cost Query Problem on Matroids with Uncertainty Areas (with José A. Soto) <ul style="list-style-type: none">In Proc. 46th International Colloquium on Automata, Languages, and Programming DOI: 10.4230/LIPIcs.ICALP.2019.83Journal version in preparation	ICALP 2019
[C2]	On the Two-Dimensional Knapsack Problem for Convex Polygons (with Andreas Wiese) <ul style="list-style-type: none">In Proc. 47th International Colloquium on Automata, Languages, and Programming DOI: 10.4230/LIPIcs.ICALP.2020.84Journal version: [J1]	ICALP 2020
[C3]	On a Combinatorial Generation Problem of Knuth (with Ondřej Mička and Torsten Mütze) <ul style="list-style-type: none">In Proc. 32nd SIAM Symposium on Discrete Algorithms DOI: 10.5555/3458064.3458110Journal version: [J2]	SODA 2021

[C4]	Efficient Generation of Rectangulations via Permutation Languages (with Torsten Mütze) <ul style="list-style-type: none">• In Proc. 37th Symposium on Computational Geometry DOI: 10.4230/LIPIcs.SoCG.2021.54• Journal version: [J3]	SoCG 2021
[C5]	Efficient Generation of Elimination Trees and Graph Associahedra (with Jean Cardinal and Torsten Mütze) <ul style="list-style-type: none">• In Proc. 33rd SIAM Symposium on Discrete Algorithms DOI: 10.1137/1.9781611977073.84• Journal version: [J4]	SODA 2022
[C6]	Star Transposition Gray Codes for Multiset Permutations (with Petr Gregor and Torsten Mütze) <ul style="list-style-type: none">• In Proc. 39th Symposium on Theoretical Aspects of Computer Science DOI: 10.4230/LIPIcs.STACS.2022.34• Journal version: [J5]	STACS 2022
[C7]	All Your Base(s) Are Belong to Us: Listing All Bases of a Matroid by Greedy Exchanges (with Torsten Mütze and Aaron Williams) <ul style="list-style-type: none">• In Proc. 11th International Conference on Fun with Algorithms DOI: 10.4230/LIPIcs.FUN.2022.22• Journal version in preparation	FUN 2022
[C8]	The Hamilton Compression of Highly Symmetric Graphs (with Petr Gregor and Torsten Mütze) <ul style="list-style-type: none">• In Proc. 47th Mathematical Foundations of Computer Science DOI: 10.4230/LIPIcs.MFCS.2022.54 MFCS 2022 best paper award• Journal version: [J6]	MFCS 2022
[C9]	Zigzagging Through Acyclic Orientations of Graphs and Hypergraphs (with Jean Cardinal, Hung P. Hoang, and Torsten Mütze) <ul style="list-style-type: none">• In Proc. 34th SIAM Symposium on Discrete Algorithms DOI: 10.1137/1.9781611977554.ch117• Journal version: [J7]	SODA 2023
[C10]	Kneser Graphs are Hamiltonian (with Torsten Mütze and Namrata) <ul style="list-style-type: none">• In Proc. 55th ACM Symposium on Theory of Computing DOI: 10.1145/3564246.3585137• Journal version: [J8]	STOC 2023
[C11]	Traversing Combinatorial 0/1-Polytopes via Optimization (with Torsten Mütze) <ul style="list-style-type: none">• In Proc. 64th IEEE Symposium on Foundations of Computer Science DOI: 10.1109/FOCS57990.2023.00076• Journal version: [J9]	FOCS 2023
[C12]	On the Hardness of Gray Code Problems for Combinatorial Objects (with Namrata and Aaron Williams) <ul style="list-style-type: none">• In Proc. 18th Workshop on Algorithms and Computation DOI: 10.1007/978-981-97-0566-5_9• Journal version in preparation	WALCOM 2024
[C13]	Generating All Invertible Matrices by Row Operations (with Petr Gregor, Hung P. Hoang, and Ondřej Mička) <ul style="list-style-type: none">• In Proc. 35th International Symposium on Algorithms and Computation DOI: 10.4230/LIPIcs.ISAAC.2024.35• Journal version in preparation	ISAAC 2024
[C14]	Impartial Selection under Combinatorial Constraints (with Javier Cembrano and Max Klimm) <ul style="list-style-type: none">• To appear in Proc. 20th Workshop on Internet and Network Economics Available on arXiv:2409.20477• Journal version in preparation	WINE 2024

PREPRINTS

[P1]	Set Selection with Uncertain Weights: Non-Adaptive Queries and Thresholds (with Christoph Dürr, José A. Soto, and José Verschae) • Available on arXiv:2404.17214	arXiv 2024
[P2]	A Dynamic Programming Framework for Generating Approximately Diverse and Optimal Solutions (with Waldo Gálvez, Mayank Goswami, Gi Beom Park, Meng-Tsung Tsai, and Victor Verdugo) • Available on arXiv:2501.12261	arXiv 2025
[P3]	An Easier to Trust Demi-God Number for the Rubik's Cube (with Bernardo Subercaseaux) • Available on arXiv:2501.00144	arXiv 2025
[P4]	Minimum Maximal Matchings in Permutahedra (with Sofia Brenner, Jiří Fink, Hung P. Hoang, and Vincent Pilaud) • Available on arXiv:2502.09968	arXiv 2025
[P5]	Computing Diverse and Nice Triangulations (with Waldo Gálvez, Mayank Goswami, Gi Beom Park, and Meng-Tsung Tsai) • Available on arXiv:2506.01323	arXiv 2025

Grants & Awards

2025-2028	FONDECYT Iniciación grant , Chilean Science Foundation (ANID). <i>Application ranked 3rd out of 48 applicants in the Mathematics group.</i>	Chile
2024	Richard Rado Prize nominee , Discrete Mathematics Section of the German Mathematical Society. <i>Awarded biyearly to an outstanding dissertation in discrete mathematics.</i>	Berlin, Germany
2023	MATH+ Dissertation award , Berlin Mathematical School and Einstein Foundation. <i>Awarded to at most three mathematics and applications dissertations in Berlin each year.</i>	Berlin, Germany
2022	Best paper award , International Symposium on Mathematical Foundations of Computer Science. <i>Sponsored by the European Association for Theoretical Computer Science.</i>	Vienna, Austria
2019-2023	Becas Chile Ph.D. fellowship , Chilean Science Foundation (ANID). <i>Application ranked 6th out of 586 applicants.</i>	Chile
2015-2017	Outstanding student , Universidad de Chile Engineering School. <i>Granted to top 5% students each year.</i>	Santiago, Chile

Selected Talks

Set Selection with Uncertain Weights

- Optimization Oberseminar, 2024
 - DISCOGA seminar, 2024.
- RPTU, Germany
TU Berlin, Germany

Kneser Graphs are Hamiltonian

- Annual meeting of the German Mathematical Society, 2023.
 - Graph Theory Seminar, 2023.
- Ilmenau, Germany
TU Ilmenau, Germany

Traversing Combinatorial 0/1-Polytopes via Optimization

- Algorithms Lunch Seminar, 2024.
 - Theory of Computing Seminar, 2023.
 - Computer Science Colloquium, 2023.
 - 64th Symposium on the Theory of Computing, 2023.
 - Algorithms and Complexity noon seminar, 2023.
 - 3rd Workshop on Combinatorial Reconfiguration, 2023.
 - Beyond Permutahedra and Associahedra workshop, 2023.
 - DISC seminar, 2022.
 - AGCO seminar, 2022.
 - DISCOGA seminar, 2022.
- U. Libré de Bruxelles, Belgium
Charles U., Czechia
Queens College CUNY, USA
Santa Cruz, USA
MPI for Informatics, Germany
U. of Paderborn, Germany
Weissensee, Austria
U. Adolfo Ibañez, Chile
U. de Chile, Chile
TU Berlin, Germany

The Hamilton Compression of Highly Symmetric Graphs

- Graph Theory Seminar, 2022.
- U. de Chile, Chile

Efficient Generation of Rectangulations via Permutation Languages

- Theory of Combinatorial Algorithms Mittagsseminar, 2022.
- ETH Zürich, Switzerland

All your Bases are Belong to Us

- 11th International Conference on Fun with Algorithms, 2022.

Favignana, Italy

Greedy Generation for Hamilton Paths in Rectangulations, Elimination Trees, and Matroids

- Institute of Geometry seminar, 2022.

TU Graz, Austria

Greedy Generating All Bases of a Matroid by Base Exchanges

- Applied Mathematics Noon Lecture, 2022.

Charles U., Czechia

Efficient Generation of Elimination Trees and Graph Associahedra

- 33rd ACM-SIAM Symposium on Discrete Algorithms, 2022.
- IOL & DISCOGA seminar, 2021.
- Discrete Mathematics Mittagsemnar, 2021.

*Alexandria, USA
TU Berlin & ZIB, Germany
TU Berlin, Germany*

Efficient Generation of Rectangulations and Elimination Trees

- Séminaire de Combinatoire du Plateau de Saclay, 2021.

U. Paris-Saclay, France

Efficient Generation of Rectangulations via Permutation Languages

- Applied Mathematics Noon Lecture, 2021.
- Workshop on Combinatorial Reconfiguration, 2021.
- 37th International Symposium on Computational Geometry, 2021.
- IOL & DISCOGA seminar, 2020.

*Charles U., Czechia
U. of Glasgow, Scotland
U. of Buffalo, USA
TU Berlin, Germany*

Pattern-Avoiding Permutations and Rectangulations

- 19th International Conference on Permutation Patterns, 2021.

U. of Strathclyde, Scotland

Greedy Strategies for Exhaustive Generation

- IOL & DISCOGA seminar, 2021.

TU Berlin & ZIB, Germany

Symmetric Hamilton Cycles on Symmetric Graphs

- Berlin Mathematical School conference, 2021.
- Graph Theory seminar, 2020.

*Berlin, Germany
U. de Chile, Chile*

On the Two-Dimensional Knapsack Problem for Convex Polygons

- AGCO seminar (available here), 2020.
- 47th International Colloquium on Automata, Languages and Programming (youtube), 2020.
- COGA seminar, 2020.

*U. de Chile, Chile
U. des Saarlandes, Germany
TU Berlin, Germany*

How to Pack Objects into a Knapsack

- Berlin Mathematical School Conference, 2020.

Berlin, Germany

The Minimum Cost Query Problem on Matroids with Uncertainty Areas

- COGA Seminar, 2019.
- 46th International Colloquium on Automata, Languages and Programming, 2019.
- DISC seminar, 2019.
- 14th Summer School in Discrete Mathematics, 2019.

*TU Berlin, Germany
U. of Patras, Greece
U. Adolfo Ibañez, Chile
Valparaíso, Chile*

Teaching

AS MAIN LECTURER

Theory of Algorithms

- Fall 2025.

U. de O'Higgins, Chile

Linear Algebra

- Spring 2024, Fall 2025

U. de O'Higgins, Chile

Linear Algebra Crash Course

- Summer 2021.

U. de Chile, Chile

AS TEACHING ASSISTANT

Mixed Linear Programming: Theory and Laboratory

- Fall 2017, Fall 2018.

U. de Chile, Chile

Calculability and Computation Complexity

- Fall 2018.

U. de Chile, Chile

Differential and Integral Calculus

- Spring 2017.

U. de Chile, Chile

Combinatorial Algorithms

- Spring 2017.

U. de Chile, Chile

Introduction to Algebra

- Fall 2015, Spring 2016, Fall 2017.

U. de Chile, Chile

Linear Algebra

- Spring 2014, Spring 2015, Fall 2016, Spring 2016.

U. de Chile, Chile

Combinatorics

- Fall 2016.

U. de Chile, Chile

AS GUEST LECTURER

Combinatorial Generation: Graphs, Structures, and Algorithms

- Winter 2022, Winter 2023

Charles U., Czechia

Language Skills

Spanish Native speaker

English Fluent

German Basic

International Conferences Attendance

FOCS 2023, CORE 2023, FUN2022, SODA2022, CORE 2021, ICALP 2021, PP2021, SoCG 2021, SODA 2021, SAGT 2020, ICALP 2020, IPCO 2020, ICALP 2019.

Service

REVIEWING FOR INTERNATIONAL CONFERENCES

STACS 2025, APPROX2024, WG 2024, ICALP 2024 (x2), FPSAC 2024, SoCG 2024, LATIN 2024, SOSA 2024, SODA 2024, WAOA 2023, ESA 2023, ISAAC 2023, SoCG 2023, IPCO 2023, ESA 2022, ICALP 2022, ESA 2021, LAGOS 2021.

REVIEWING FOR JOURNALS

Information and Computation, ACM Transactions on Algorithms (x2), Theory of Computing Systems, IEICE Transactions on Information and Systems, Electronic Journal of Combinatorics, Theoretical Computer Science, Discrete Applied Mathematics, Graphs and Combinatorics, Annals of Combinatorics.

REVIEWING FOR GRANTS

USACH 2023 Internal Grant.

ORGANIZER

SOMACHI 2023 Discrete Math session.