Garrett Ervin

Momentum MSCA Postdoctoral Fellow Institute of Mathematics Eötvös Loránd University Pázmány Péter stny. 1/C, 1117 Budapest, Hungary (beginning Feb. 2026)

www.garrettervin.com
garrettervin@gmail.com

Previous Academic Appointments

Harry Bateman Postdoctoral Scholar	2022-2025
Division of Physics, Mathematics and Astronomy, Caltech	
• Special Faculty Lecturer,	2020-2022
Department of Mathematical Sciences, Carnegie Mellon University	
Postdoctoral Associate,	2017-2020
Department of Mathematical Sciences, Carnegie Mellon University	

Education

•	Ph.D. in Mathematics,	2017
	University of California, Irvine	
	Advisor: Martin Zeman	
•	B.S. with Honor in Mathematics and English,	2009
	California Institute of Technology	

Research Interests

Set theory, theory of linear orders, graph theory, theory of submodular functions

Publications and Preprints

- 1. Garrett Ervin, Alberto Marcone, and Thilo Weinert, "Untranscendable order types" (preprint),
- 2. Garrett Ervin and Eric Paul, "The additive arithmetic of linear orders" (preprint),
- 3. Garrett Ervin, "Self-embeddings of linear orders" (preprint),
- 4. Garrett Ervin and Ethan Gu, "Left absorption in products of countable orders" *Order* (2024): 1-25.
- 5. Garrett Ervin, "Decomposing the real line into everywhere isomorphic suborders," *Proceedings of the American Mathematical Society* 152.03 (2024): 925-939.
- 6. Garrett Ervin, "Distinct orders dividing each other on both sides," *Proceedings of the American Mathematical Society* 147 (2019): 3729-3741.
- 7. Garrett Ervin, "Every linear order isomorphic to its cube is isomorphic to its square," *Advances in Mathematics* 313 (2017): 237-281.

Presentations

Invited Talks:

 New arithmetic laws for order types ASL Winter Meeting at the Joint Mathematics Meeting (plenary talk) 	January 2026
 Sums and automorphisms of linear orders UCLA Logic Colloquium 	February 2025
 The arithmetic of linear orders ASL 2024 Fall Western Sectional Meeting 	October 2024
The arithmetic of linear orders UCI Logic Seminar	April 2024
 Infinitary submodular functions and maximum flows ASL 2023 North American Annual Meeting 	March 2023
 Decomposing the real line into everywhere isomorphic suborders UCLA Logic Colloquium 	November 2022
Filter flows Caltech Logic Seminar	May 2022
Paths and boundaries in locally finite graphs UCI Logic Seminar	June 2021
 Self-similar structures ASL 2019 North American Annual Meeting 	June 2019
 Self-similar structures University of Illinois at Urbana-Champaign Logic Seminar 	January 2019
 Sierpiński's cube problem ASL 2018 North American Annual Meeting 	May 2018
The cube problem for linear orders Rutgers Logic Seminar	March 2017
• Linear orders satisfying $L^n = L$ Cornell Logic Seminar	December 2013
Research Talks:	
$ullet$ A dichotomy theorem for order types of orbit equivalence relations on $\mathbb R$ Caltech Logic Seminar	March 2025
The arithmetic of linear orders Caltech Logic Seminar	June 2024
Filter flows CMU Logic Seminar	April 2022
 Maximally splitting pruned trees in locally finite graphs CMU Logic Seminar 	October 2020
 Distinct orders that divide one another on both sides CMU Logic Seminar 	February 2020
 Isoperimetry and matchings in Cayley graphs CMU Logic Seminar 	April 2019
 Decomposing the real line into everywhere isomorphic pieces CMU Logic Seminar 	April 2018
• Sierpiński's cube problem for linear orders CMU Logic Seminar	September 2017

 Every linear order isomorphic to its cube is isomorphic to its square Logic in Southern California Meeting, UCLA 	May 2016
• Sierpiński's cube problem: a complete solution UCI Logic Seminar	March 2016
 Linear orders isomorphic to one of their finite powers Logic in Southern California Meeting, Caltech 	March 2015
Expository Talks:	
 Set theory via order theory Ma 20 "Frontiers in Math" (Caltech Undergraduate Seminar) 	October 2022
 Four theorems of Cantor CMU Summer Undergraduate Research Seminar 	June 2022
 Splitting the real line in two (order-theoretically) CMU Graduate Student and Postdoc Seminar 	February 2022
Iterations of proper forcing UCI Logic Seminar	March 2015
Todorcevic's proof of Baumgartner's Axiom UCI Logic Seminar	October 2014
 The isomorphism problem for κ-dense sets of reals UCI Logic Seminar 	May 2014
Basic applications of Martin's Maximum UCI Logic Seminar	October 2013
 Basic applications of the Proper Forcing Axiom UCI Logic Seminar 	March 2013
The Shoenfield absoluteness theorem UCI Logic Seminar	November 2011

Mentoring

Undergraduate research:

- Undergraduate Research in Mathematics (Caltech / UC Berkeley): January 2025 present
 Ongoing research project with Mohammedsaid Alhalimi, recent
 undergraduate in math at Caltech and current Berkeley graduate
 student in math, on ordered full groups of orientation preserving
 homeomorphisms of R.
- Undergraduate Research in Mathematics (Stanford):
 Ongoing research project with Álvaro Diaz Ramos, current senior in mathematics at Stanford, on associative sums of linear orders and groups (also joint with Saharon Shelah).
- Summer Undergraduate Research Fellowship (SURF) (Caltech): Summer 2024 Conducted joint research on linear orders and ordered groups with Caltech undergraduate Eric Paul, resulting in a forthcoming paper ("The additive arithmetic of linear orders").
- Summer Research in Mathematics (Caltech):

 Conducted joint research on linear orders with Caltech undergraduate

 Eric Paul, resulting in a forthcoming paper ("Absorption and cancellation in products of linear orders").

• Summer Research in Mathematics (CMU): Conducted joint research on linear orders with CMU undergraduate Ethan Gu, resulting in a submitted paper ("Left absorption in products of countable orders").	Summer 2022
Graduate research:	
 Graduate research in symbolic dynamics (Caltech): Collaborated with Caltech graduate student Kimberly Golubeva on research on automorphism groups of minimal subshifts of symbolic dynamical systems. 	2023 - 2024
Undergraduate reading:	
 Reading in Model Theory: Supervised reading of Model Theory: An Introduction by David Marker, Chapters 4-7, with Caltech undergraduate Joseph Litvin 	Winter 2023 Spring 2024
 Reading on Linear Orders: Supervised reading of <i>Linear Orderings</i> by Joseph Rosenstein, with CMU undergraduate Ethan Gu; led to a summer research project 	Spring 2022
 Reading in Model Theory: Supervised reading of Model Theory: An Introduction by David Marker, Chapters 1-4, with CMU undergraduate Katalin Berlow; led to an original exposition of Scott's Isomorphism Theorem 	Spring 2019
Advancement committees:	
 Sat on the committee for Caltech graduate student Kimberly Golubeva's advancement to candidacy examination 	Spring 2024
 Sat on the committee for Caltech graduate student Michael Wolman's advancement to candidacy examination 	Spring 2023
Teaching	
Caltech:	
Computability Theory I, II	Winter 2025 Fall 2024
• Set Theory I, II	Spring 2024 Winter 2024
Model Theory	Fall 2023
Computability Theory II, III	Spring 2023 Winter 2023
• Linear Orders	Fall 2022
Carnegie Mellon:	
• Concepts of Mathematics	Spring 2022 Fall 2021 Spring 2021 Summer 2020 Spring 2020

	Spring 2019 Summer 2018
Linear Algebra for Data Science	Fall 2021
• Eureka! Discovery and Its Impact	Fall 2021
Integration and Approximation	Fall 2020 Fall 2019
• Logic	Fall 2018
• Calculus in Three Dimensions	Spring 2018
Matrix Algebra	Fall 2017

UCI:

- As instructor: Differential Calculus (x3)
- <u>As TA</u>: Combinatorics, Linear Algebra, Multivariable Calculus I (x2), Multivariable Calculus II, Probability and Statistics, Integral Calculus (x2)

Refereeing

• Referee for various journals and publishers, including *Israel Journal of Mathematics*, *Order*, *AMS Books*, and *Mathematical Logic Quarterly*

Outreach

Helped organize and lead the Math Circle at UC Irvine for gifted high school and middle school students.

Math Circles led:

"Summing Ordinals"	Winter 2016
 "Random walks and even more peregrinations" 	Winter 2015
• "Infinite sums, self-reference, and related peregrinations"	Fall 2014
• "Minimum number of experiments"	Fall 2014
• "Insane tic-tac-toe"	Spring 2014
 "Some problems and questions in probability" 	Fall 2013

Diversity, Equity, Inclusion

Participated in the course SEC 201: Advancing Inclusion in College Teaching in the Winter 2023 quarter at Caltech.

- Topics covered included: writing an inclusive syllabus, getting feedback from students, inclusivity and active learning, group work, deficit versus asset thinking, and alternative grading schemes.
- I led a class day on stereotype threat and how to combat it with a values affirmation exercise.

Citizenship

American, Canadian