## Garrett Ervin

Momentum MSCA Postdoctoral Fellow (*beginning Feb. 2026*)
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**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* — January 2026
  ASL Winter Meeting at the Joint Mathematics Meeting (plenary talk)
- *Additive commutativity for order types* — December 2025
  UCI Logic Seminar
- *Sums and automorphisms of linear orders* — February 2025
  UCLA Logic Colloquium
- *The arithmetic of linear orders* — October 2024
  ASL 2024 Fall Western Sectional Meeting
- *The arithmetic of linear orders* — April 2024
  UCI Logic Seminar
- *Infinitary submodular functions and maximum flows* — March 2023
  ASL 2023 North American Annual Meeting
- *Decomposing the real line into everywhere isomorphic suborders* — November 2022
  UCLA Logic Colloquium
- *Filter flows* — May 2022
  Caltech Logic Seminar
- *Paths and boundaries in locally finite graphs* — June 2021
  UCI Logic Seminar
- *Self-similar structures* — June 2019
  ASL 2019 North American Annual Meeting
- *Self-similar structures* — January 2019
  University of Illinois at Urbana-Champaign Logic Seminar
- *Sierpiński's cube problem* — May 2018
  ASL 2018 North American Annual Meeting
- *The cube problem for linear orders* — March 2017
  Rutgers Logic Seminar
- *Linear orders satisfying $L^n = L$* — December 2013
  Cornell Logic Seminar

### Research Talks:

- *A dichotomy theorem for order types of orbit equivalence relations on $\mathbb{R}$* — March 2025
  Caltech Logic Seminar
- *The arithmetic of linear orders* — June 2024
  Caltech Logic Seminar
- *Filter flows* — April 2022
  CMU Logic Seminar
- *Maximally splitting pruned trees in locally finite graphs* — October 2020
  CMU Logic Seminar
- *Distinct orders that divide one another on both sides* — February 2020
  CMU Logic Seminar
- *Isoperimetry and matchings in Cayley graphs* — April 2019
  CMU Logic Seminar
- *Decomposing the real line into everywhere isomorphic pieces* — April 2018
  CMU Logic Seminar

- *Sierpiński's cube problem for linear orders* — September 2017
  CMU Logic Seminar
- *Every linear order isomorphic to its cube is isomorphic to its square* — May 2016
  Logic in Southern California Meeting, UCLA
- *Sierpiński's cube problem: a complete solution* — March 2016
  UCI Logic Seminar
- *Linear orders isomorphic to one of their finite powers* — March 2015
  Logic in Southern California Meeting, Caltech

**Expository Talks:**

- *Set theory via order theory* — October 2022
  Ma 20 "Frontiers in Math" (Caltech Undergraduate Seminar)
- *Four theorems of Cantor* — June 2022
  CMU Summer Undergraduate Research Seminar
- *Splitting the real line in two (order-theoretically)* — February 2022
  CMU Graduate Student and Postdoc Seminar
- *Iterations of proper forcing* — March 2015
  UCI Logic Seminar
- *Todorcevic's proof of Baumgartner's Axiom* — October 2014
  UCI Logic Seminar
- *The isomorphism problem for $\kappa$-dense sets of reals* — May 2014
  UCI Logic Seminar
- *Basic applications of Martin's Maximum* — October 2013
  UCI Logic Seminar
- *Basic applications of the Proper Forcing Axiom* — March 2013
  UCI Logic Seminar
- *The Shoenfield absoluteness theorem* — November 2011
  UCI Logic Seminar

## 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 $\mathbb{R}$.
- Undergraduate Research in Mathematics (Stanford): Summer 2024 - present
  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): Summer 2023
  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): Summer 2022
  Conducted joint research on linear orders with CMU undergraduate Ethan Gu, resulting in a submitted paper ("Left absorption in products of countable orders").

**Graduate research:**

- Graduate research in symbolic dynamics (Caltech): 2023 - 2024
  Collaborated with Caltech graduate student Kimberly Golubeva on research on automorphism groups of minimal subshifts of symbolic dynamical systems.

**Undergraduate reading:**

- Reading in Model Theory: Winter 2023
  Supervised reading of *Model Theory: An Introduction* by David Marker, Chapters 4-7, with Caltech undergraduate Joseph Litvin Spring 2024
- Reading on Linear Orders: Spring 2022
  Supervised reading of *Linear Orderings* by Joseph Rosenstein, with CMU undergraduate Ethan Gu; led to a summer research project
- Reading in Model Theory: Spring 2019
  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

**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)
- As TA: 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