Christian Pratt

Physics Ph.D. Candidate
University of California, Davis

czpratt@ucdavis.edu
czpratt.github.io

Education

2021 —	Ph.D. *Physics*, University of California, Davis Advisor: Prof. James P. Crutchfield — Expected graduation date: Spring 2026
2022	M.Sc. *Physics*, University of California, Davis
2021	B.Sc. *Physics*, University of California, Davis
2019	A.A. *Mathematics*, San Diego Community College District

Research positions

2022 —	Graduate student researcher Complexity Sciences Center and Department of Physics and Astronomy University of California, Davis Advisor: Prof. James P. Crutchfield Investigating the fundamental physics of computation using superconducting circuits with tools from stochastic thermodynamics and dynamical systems theory. Skills: Python, SPICE, C++, PyTorch, JAX
2019 - 2021	Undergraduate student researcher Experimental high energy physics University of California, Davis Advisor: Prof. Michael Mulhearn Re-purposed smartphone camera sensors for detecting cosmic ray muons in table top experiments.

Publications

Peer reviewed

2025 **C. Z. Pratt**, K. J. Ray, and J. P. Crutchfield. Controlled erasure as a building block for universal thermodynamically robust superconducting computing. *Chaos*. 10.1063/5.0227130

2025 **C. Z. Pratt**, K. J. Ray, and J. P. Crutchfield. Extracting equations of motion from superconducting circuits. *Physical Review Research*. 10.1103/PhysRevResearch.7.013014

In prep

C. Z. Pratt, K. J. Ray and J. P. Crutchfield. Comparing Langevin and SPICE simulations of dynamical energy landscape computations in superconducting circuits.

C. Z. Pratt, K. J. Ray and J. P. Crutchfield. Dynamical computing with potential energy landscapes: A primer.

C. Z. Pratt, K. J. Ray and J. P. Crutchfield. On infinitely-fast parameter switching computational protocols in connection to SPICE simulations of superconducting circuits.

Other

2021 J. Swaney, M. Mulhearn, **C. Z. Pratt**, C. Shimmin, and D. Whiteson. Measurement of smartphone sensor efficiency to cosmic ray muons. arXiv:2107.06332

Presentations

Comparing Langevin and SPICE Simulations of Dynamical Landscape Computations in Superconducting Circuits

2025 Information Engines at the Frontiers of Nanoscale Thermodynamics. Telluride, Colorado.

Controlled Erasure as a Building Block for Universal Thermodynamically-Robust Superconducting Computing

2025 Society for Industrial and Applied Mathematics (SIAM) Conference on Applications of Dynamical Systems (DS25). Denver, Colorado.

2025 **Invited technical seminar**. Molecular Foundry, Lawrence Berkeley National Laboratory. Berkeley, California.

2025 APS March Meeting 2025. Anaheim, California.

2025 **Invited poster**. Interdisciplinary Graduate Research Exhibition. University of California, Davis.

2024 Recorded technical seminar. Complexity Sciences Center, University of California, Davis.

Universal Dynamical Computing on the Nanoscale

2024 Dynamic Days 2024. Davis, California.

2023 Information Engines at the Frontiers of Nanoscale Thermodynamics. Telluride, Colorado.

2023 Army Research Office on-site visit. Complexity Sciences Center, University of California, Davis.

Teaching

2025 256A: Physics of Information
256B: Physics of Computation

2021 - 2022 7B: Fluid mechanics, electrical circuits, Newtonian mechanics
7C: Modern physics, waves, optics
9A: Classical mechanics

Awards & Honors

2025	Ryan Couch Memorial Travel Award Department of Physics and Astronomy University of California, Davis
Fall 2025, Winter 2025, Spring 2024, Spring 2023	Graduate Student Researcher Fellowship Department of Physics and Astronomy University of California, Davis
2018	NASA Community College Aerospace Scholar
2016 - 2019	Dean's Honors List San Diego Community College District

Service and Outreach

2025	Workshop Volunteer Organizer. *Physics of Agency*. Beyond Institute for Theoretical Science (BITS). Pioneer, California.
2025	Session Chair for CS28: Electronic, Optical, and Condensed Matter Systems. *Society for Industrial and Applied Mathematics (SIAM) Conference on Applications of Dynamical Systems (DS25)*. Denver, Colorado.
2020 - 2021	Mentor, Support Encourage and Develop For Children (SendForC)
2018	Volunteer, New Story Charity
2017 - 2018	Volunteer, San Diego Rescue Mission
2016 - 2018	Volunteer, San Diego Air and Space Museum

Last updated: October 2, 2025