Colin P. Roberts

Denver, CO

Mathematics:
Mathematical Modeling, Data Analysis (incl. TDA), Computational Methods, PDEs, Dynamical Systems, Discrete Geometry, Pure Math, Algebra, Topology, Differential Geometry

Software Engineering:
Architecture, Simulation, Parallel Computing, Async/Await, Concurrency, Rust, Python, Git, Linux

Cryptography & Security:
Zero-Knowledge Proofs (ZKPs), MPC, TEEs, Proving Systems, Elliptic Curves, Lattices, Codes

Leadership & Communication:
Technical Leadership, Mentorship, Open Source Mgt., Cross-functional Collaboration, Technical Writing, Presentations

OVERVIEW

Mathematician and physicist turned research engineer with expertise in modeling, simulation, cryptography, and distributed systems. My focus is on architecting innovative solutions for complex challenges and leading teams to impactful execution. I want to be challenged and to make a difference.

EDUCATION

Colorado State University

Ph.D. Mathematics **2022**
Focus: Geometric Inverse Problems

B.S. Mathematics & Physics **2017**
Honors Program

HOBBIES

- Mountain biker
- Runner
- Health enthusiast
- OSS contributor and maintainer
- Self hosting
- Electronics hobbyist
- Technical writer

WHAT SETS ME APART

A leader that is not afraid to speak up even when it's unpopular. This courage has led to high-impact decisions for product and engineering, ushering a team to pivot into a new direction. Since I'm a teacher at heart, I'm able to communicate complex ideas simply, effectively, and pedagogically.

EXPERIENCE

Staff Research Engineer | Cryptography — **2024 – 2025**
Pluto

- Led cryptography R&D team of three to develop a memory-bound NIVC proving system Web Prover and Edge with Circom and Noir for fast proving on mobile devices and browsers
- Designed and implemented folding-based Circom circuits to enable extracting data from HTTPS transcripts
- Researched ZK, MPC, and TEEs for secure computation and which led to a team-wide decision to use TEEs for creating Web Proofs
- Managed Ronkathon, an open-source cryptography repository with 15+ contributors, multiple bounty paying issues, and hackathon prizes

Staff Research Engineer | DeFi & Simulations — **2022 – 2024**
Primitive

- Lead developer of Arbiter; Open source Rust-based multi-agent simulation framework with 700+ stars, 30+ contributors
- Led simulations using Arbiter to study Primitive's various DeFi protocols; found vulnerabilities that other auditors missed
- Researched, designed, and built novel AMMs for DeFi on Ethereum such as DFMM and RMM, both of which allow for dynamic liquidity allocation
- Contributed to solstat for onchain statistical function approximation
- Contributed to multiple open-source blockchain projects (e.g., revm, ethers-rs)

NASA Intern | Plasmas & TDA — **2021**
NASA Glenn Research Center

- Developed geometric framework for Maxwell-Vlasov equation for deeper theoretical understanding of plasma physics
- Researched cellular sheaves and their applications to space networks to improve network design and resilience

Research | Data Assimilation & Modeling — **2019 - 2022**
AIM & MCRN

- Collaborated to develop novel data assimilation software for high-dimensional nonlinear systems and presented at numerous conferences [Paper]
- Developed multiscale epidemic model incorporating real-world data which was used by JBS Foods in Greeley, CO for workplace safety planning

Graduate Student | Research & Teaching — **2017 – 2022**
Colorado State University

- Attained new results on geometric inverse problems using Clifford analysis and Hodge theory [Paper] [Thesis]
- Taught seven different courses (including three courses that were self-coordinated) and developed open-source educational materials including a textbook: Applied Mathematics for Physicists and Chemists