

# Waylon Jepsen

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Primitive Bits inc.

waylonjepsen1@gmail.com

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## Education

Aug. 2022 - (On Leave)

Colorado State University  
*Computer Science Ph.D. Program*

Thesis Topic: Economic activity in distributed ledgers.

Jan 2020 - May 2022

Colorado State University  
*Master of Science M.S*

Thesis Topic: Tropical Algebraic Modeling of TCP Congestion.

Aug. 2012 - May 2017

Colorado State University  
*Bachelor of Science in General Mathematics & Philosophy*

Thesis Topic: Elliptic Curve Cryptography

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## Experience

*Principal Research Engineer, Primitive Bits, April 2022 - Current.*

- Perform research and development of decentralized financial instruments possible in the EVM. Particularly dynamic automated market makers.
- Participated in discussion and implementation details of EIPs
- Built Rust ethereum modeling architecture: Arbiter
- Contributed the Reth, Revm, and ethers-rs
- Wrote technical educational content on rebalancing, arbitrage and constant function market makers.
- Developed and maintained security and analysis tools for the EVM in rust used by the greater community.

*Ethereum Foundation, Grant Recipient, Part time, December 2023*

- Received a grant to perform Cryptanalysis of Poseidon algebraic Hash function.
- Focused on algebraic attacks over small fields.

- Documented our work: Poseidon

*Optimism, Developer Advisory Board, Part time, November 2023 - Present*

- I Serve on a technical board for optimism governance to ensure the technical quality of projects receiving funding from the optimism foundation.
- We evaluate the technical integrity of blockchain projects.

*Aztec, Contractor, Part time, July 2022*

- Wrote Zero knowledge proving infrastructure in Rust

*Hacker Houses, Part time, September 2022 - Present*

- Ran developer communities Wehack
- raised over \$250k in grants from 30+ protocols and VCs
- organized 6 hacker house series with over 2800 visitors in 3 continents
- hosted 200 residential hackers who hacked 90 projects and raised about \$30M for their projects
- Supported 25 super cracked hackers and growing on a monthly 0.5 Eth (up to \$25k/month) in UBI (Universal Basic Income) for their open-source work

*Researcher, Network Engineering, Colorado State University, May 2021 - May 2022.*

- Investigated the tropical algebraic semirings.
- Modeled TCP Congestion with tropical algebra.
- Built discrete event simulators to validate the model.

*Developer Relations, Hedera Hashgraph, July 2021 - April 2022.*

- Produced written and recorded content to educate software engineers on how to use our software development kits.
- Led workshops to teach software engineers how to write and deploy their smart contracts to the Hedera network (Besu EVM).
- Worked on open cryptography problems concerning threshold cryptography and Shamir's Secret Sharing.

*Systems Administrator, Colorado State University Aug 2020 - Dec 2021.*

- Assisted the systems team with the administration of over 500 Linux workstations.
- Built automation scripts, recorded offline backups, and managed security upgrades.
- Performed database management using MariaDB, PostgreSQL, and MongoDB.

*Cyber Security Analyst, Academic Computing and Networking services* Jan 2017 - 2018.

- Performed research and development of distributed ledger technology to improve the security of our University networks.
  - Presented on identity authentication and phishing attacks.
  - Created voting security software using distributed ledger technology.
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## Research

1. W. Jepsen, *Replicating Portfolios: Constructing Permissionless Derivatives*, preprint, 2022. Available at arXiv: 2205.09890.
2. W. Jepsen *Cyclic Redundancy Checks and Error Detection*, preprint, 2022. Available arxiv: 2205.11344
3. W. Jepsen, C. Roberts *Analysis of the RMM-01 Market Maker*, Available here
4. A. Angel, W. Jepsen, C. Roberts, E. Sterrett *Financial Virtual Machine*, Available here

## Talks

*Introduction to Decentralized Finance*. Financial Technology Seminar at Colorado State University, Nov 2022

*Analysis of Statistical Arbitrage in Blockchains*. Database Security Group at Colorado State University, Oct 2022

*Analysis of Constant Function Market Makers*. DARPA Riser at Colorado State University, Sep 2022

*Constant Function Market Makers*. Database Security Group at Colorado State University, Aug 2022

*Tropical Algebraic Analysis of TCP*. Computer Science Seminar at Colorado State University, May 2022

*Cyclic Redundancy Checks and Error Detection*. Computer Science Seminar at Colorado State University, Aug 2021

*The Lazarus Group: North Korea's Cyber War*. Cyber Security Seminar at Colorado State University, May 2021

*Epistemic Temporal Logic and Information flow Security*. Cyber Security Seminar at Colorado State University, Jan 2021

*HTTPS What it is and why it's Important*. Cyber Security Seminar at Colorado State University, Aug 2019

*The Mathematics of Elliptic Curve Cryptography*. Cyber Security Seminar at Colorado State University, April 2019

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## Industry Involvement

Zuzalu Resident, explored the future of city states with other leaders in the industry  
Ethereum Denver Hosted hacker house sponsored by Paradigm, Flashbots, Risc0, and Celestia (ETHDEN'23)  
ETHGlobal: Ethereum San Francisco (ETHSF'22)  
Crypto Economics Security Conference (CESC'22)  
Zero-Knowledge Proof Workshop (affiliated with CESC22)  
ACM Conference on Economics and Computation (EC'22)  
Ethereum Denver (Speaker) (ETHDEN'22)

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## Teaching and Awards

CS 364: Computer Security, *Supervised College Teaching*  
DARPA Riser *Research Award*

Spring 2022  
Fall 2022

## Masters Advisor

<b>Name</b>	Craig Partridge
<b>Department</b>	Colorado State Computer Science
<b>Position</b>	Department Chair
<b>Contact</b>	Craig.Partridge@colostate.edu

## Doctoral Advisor

<b>Name</b>	Amani Altarawneh
<b>Department</b>	Colorado State Computer Science
<b>Position</b>	Assistant Professor
<b>Contact</b>	Amani.Altarawneh@colostate.edu