

Raphaël Barish Walker

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Papers

A Small Maximal Sidon Set in \mathbb{Z}_2^n

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Maximus Redman, Lauren Rose, Raphael Walker

A Sidon set is a subset of an Abelian group with the property that each sum of two distinct elements is distinct. We construct a small maximal Sidon set of size $O((n \cdot 2^n)^{1/3})$ in the group \mathbb{Z}_2^n , generalizing a result of Ruzsa concerning maximal Sidon sets in the integers.

Academic Experience

Université Paris-Saclay Orsay, France

Fall 2021—Spring 2023 (Anticipated)

Master of Science, Mathematics of Artificial Intelligence

Bard College Annandale-On-Hudson, New York

Fall 2019—Spring 2021

Bachelor of Arts, Mathematics Major

GPA 4.0

Artine Artinian Scholar 2019–2020

Mathematics and computer science tutor

Bard Senior Project

Fall 2020—Spring 2021

Senior Project in Mathematics

Advisor: Prof. Caitlin Levenson

- Studied Legendrian knots and Lagrangian cobordisms.
- Found families of Legendrian ribbon knots which admit constructable Lagrangian cobordisms from minimally-stabilized unknots.

Bard Summer Research Institute

Summers 2020, 2021

Research Assistant, Mathematics

Mentor: Prof. Lauren Rose

- Investigated the size of maximal and minimal generalized caps in finite affine spaces.
- Introduced other students in the research group to the material and supported their exploration of related problems.
- Wrote programs to compute cap sizes in specific affine spaces through optimized brute-force search.
- Created a webapp to visualize generalized affine caps.

Bard College at Simon's Rock Great Barrington, Massachusetts

Fall 2017—Spring 2019

Associate of Arts

GPA 3.9

Mathematics, computer science, and French tutor

Dean's List

Berkeley High School Berkeley, California

Fall 2014—Spring 2017

Work Experience

Invisible College

2021—

Full Stack Developer

- PeeryView.org
- Prototyped and built an online tool implementing decentralized and subjective peer review, and archival and discussion of web links.
- Collaborated with the PeeryView design team to determine the tooling needs of the scientific community.

Invisible College

Summers 2019, 2020

Research Assistant

- Designed and developed a set of decentralized synchronization protocols and algorithms.
- Co-authored IETF draft for universal synchronization protocol.
- Created Javascript and NodeJS tools to analyze and debug synchronization algorithms, including a universal protocol translation demo and a peer-to-peer sync visualization.
- Contributed to client and server code for the BraidJS library.

Speakeasy Digital Media

September—December 2018

Web Developer

Part-time

- Created and modified WordPress PHP templates for company blogs.
- Improved page load times by up to ten times by optimization on both front-end page loading and back-end content generation.

Storefront Political

Summer 2018

Data Science Intern

- Analyzed pre-electoral polls, including weighting, cross-tabulating, raking, and cleaning.
- Created R and Python scripts to automate common tasks such as matching ZIP codes to voting districts and visualizing survey results.
- Designed and implemented a webapp for interactive visualization of survey results.
- Managed large PostgreSQL databases containing voter information.

Omnisparx

November 2017—April 2018

Intern

- Researched and reported on the state of blockchain technology to educate app users and inform development for blockchain startup.
- Reported directly to CEO.