

# Raphaël Barish Walker

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## Papers

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

*Siam Journal of Discrete Mathematics*, Vol. 36 No. 3

2022

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

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.