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 Leverson

- 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.