Daniel W. Valvo

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Education

- ► Ph.D., Mathematics, Virginia Tech, May 2023
    - ○ **Dissertation:** Linear exact repair schemes for distributed storage and distributed matrix multiplication (Advisor: Dr. Gretchen Matthews)
    - ○ Nominated for College of Science Outstanding Phd Student Award (2023)
- ► M.S., Mathematics, Virginia Tech, May 2020
- ► B.S., Mathematics, Virginia Tech, May 2018 (Statistics Minor)

Research Interests   Applied algebra, coding theory

codes for error correction and erasure recovery, secure distributed matrix multiplication

Teaching Experience

- ► Instructor of Record (11 courses)

    Sole instructor for
    - ○ STEP Program Math Instructor - Bridge between MATH 1014 and MATH 1025
    - ○ Discrete Mathematics - MATH 2534 - Sp 23, F/Su/Sp 22, F/Sp 21, F/Su 20
    - ○ Engineering Calculus II - MATH 1226 - Spring 2020
    - ○ Engineering Calculus I - MATH 1225 - Fall 2019
    - ■ Average effectiveness rating of 5.68/6 vs the university of average of 4.83/6
- ► Course Creator (Summer 2021)

    Helped develop the lesson plan and materials for a section of discrete math being taught with a flipped classroom model
- ► Graduate Grader (Spring 2019)

    Graded for a section of Number Theory (MATH 4134)
- ► Graduate Tutor (Fall 2018)

    Worked at a tutoring facility helping students in all freshman math classes
- ► First Year Experience Mentor (Fall/Spring 2018)

Worked with freshmen in the first year experience course, advising research projects, running group activities, and mentoring on a personal level

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Mathematics Communication

► Crack OAT - Created 63 educational math videos for the Optometry Admission Test prep website

► Chillaxiom - Mathematics Education YouTube Channel -
https://www.youtube.com/channel/UCBVSmaHk_grc-PjRcitfH4Q

Research Experience

► Developed secure distributed matrix multiplication schemes which utilize evaluation codes.

► Developed the first T-secure method to utilize m-variate evaluation codes for distributed matrix multiplication.

► Studied linear exact repair schemes for high rate multivariate evaluation codes based on the Guruwarmi and Wooters repair scheme for RS codes.

► Developed methods for extending the known linear exact repair schemes to repair an arbitrary number of erasures.

► Developed novel linear exact repair schemes to repair erasures in Cartesian codes.

Publications

► H. H. Lopez, G. Matthews, D. Valvo. *Secure MatDot codes: a secure, distributed matrix multiplication scheme*. Information Theory Workshop, November 2022.

► H. H. Lopez, G. Matthews, D. Valvo. *Erasure repair for decreasing monomial-Cartesian and augmented Reed-Muller codes of high rate*. IEEE Transactions on Information Theory, 2022.

► H. H. Lopez, G. Matthews, D. Valvo. *Augmented Reed Muller codes of high rate and erasure repair*. IEEE International Symposium on Information Theory, May 2021.

Invited Talks

- ▶ D. Valvo. *Secure Matrix Multiplication Schemes via Locally Recoverable Codes.* Joint Mathematics Meeting, AMS Special Session on Coding Theory for Modern Applications (January 2023).

- ▶ D. Valvo. *Secure MatDot codes: a secure, distributed matrix multiplication scheme.* Information Theory Workshop. Online (November 2022)

- ▶ D. Valvo. *Linear Exact Repair Schemes for Multivariate Evaluation Codes.* PostGraduate International Coding Theory Seminar (PICS). Online (March 2022).

- ▶ D. Valvo. *Repairing High-Rate Augmented Reed-Muller Codes.* Society for Industrial Applied Mathematics Applied Algebraic Geometry (SIAM AG). Online (August 2021).

- ▶ D. Valvo. *Augmented Reed-Muller Codes of High Rate and Erasure Repair.* IEEE Symposium on Information Theory (ISIT). Online (May 2021).

Outreach

- ▶ <u>Math Circle Session Leader (2022 - Present)</u> - Run sessions for kids (8 - 13) to learn about engaging real world mathematics they will not see in a classroom. Including but not limited to cryptography, coding theory, etc.

- ▶ <u>Recruiter and Tour Guide (2020 - Present)</u> - Create videos to recruit potential graduate students to VT, as well as tour visiting graduate applicants.

- ▶ <u>BEPUR Speaker (2021 - Present)</u> - Speak to undergraduate students about my graduate school experience for BEPUR (Broadening Engagement and Participation in Undergraduate Mathematics) event.

- ▶ <u>Interview Assistant (2020 - 2022)</u> - Helped facilitate interview sessions for candidate postdocs and professors organized by Dr. Matthews.

- ▶ <u>First Year Menor (2017 - 2018)</u> - Mentored freshman math students through introductory research projects. Also mentored them on a personal level as they experienced their first year in a university environment.