Eli C. Naig

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Education

Tulane University LA, 70118
B.S. in Mathematics, GPA: 3.97 2024 –2028

Experience

Undergraduate Researcher New Orleans, LA
Advisor: Mahir Bilen Can, Tulane University Aug 2025 - Present

- Algebraic geometry, coding theory, and cryptography
- Conduct research and advanced reading in algebraic and combinatorial methods relevant to error-correcting codes and post-quantum cryptography.
- Completed a rigorous reading of Huffman and Pless's *Fundamentals of Error-Correcting Codes*, covering linear codes, bounds, cyclic codes, and decoding algorithms.
- Develop proof-based understanding of algebraic structures underlying coding-theoretic and cryptographic constructions.
- Present ongoing research progress through written notes and seminar-style discussions.

QSPARC Labs New Orleans, LA
Co-Founder and CEO Aug 2025 - Present

- Quantum encryption and post-quantum security
- Co-founded a quantum encryption startup focused on secure communication primitives and post-quantum threat models.
- Lead financial planning and operational strategy; coordinate research-to-product translation and technical roadmapping.
- Support technical writing (manuscripts and internal reports) and intellectual property development (patent applications in progress).
- Invited participant in an NSF-funded I-Corps style innovation mentorship program through MIT.

Louisiana State University Baton Rouge, LA
RTG Summer Math Program Summer 2025

- Combinatorics, hyperplane arrangements, and matroid theory
- Conducted rigorous daily study of Stanley's *Hyperplane Arrangements*, focusing on structural and enumerative properties such as geometric lattices, Möbius functions, and characteristic polynomials.
- Delivered lectures and written expositions on proofs, key theorems, and open problems in a peer-led seminar environment.
- Applied combinatorial techniques to questions motivated by coding theory and cryptographic constructions.

Publications

[1] M. B. Can, S. Chakrabartty, and **E. Naig**, "Post-quantum key establishment on a self-powered timekeeping device", Preprint, 2025.

[2] M. B. Can and **E. Naig**, "Quasi-circulant trapdoor construction for niederreiter-type key encapsulation", Preprint, 2025.

[3] **E. Naig**, "Lower bounds for minimum nrt distance from generator and parity-check matrices", Technical note, 2025.

Skills

- **Coding Languages:** Python, SQL, R, MATLAB, Java, JavaScript, Rust, C++
- **Tools:** Git, GitHub, LaTeX, Linux

Languages

- **English:** Native
- **Chinese:** Conversational

Scholarships and Awards

- Tulane Honors Scholar 2024–2028
- Deans List Tulane University Fall 2024
- Deans List Tulane University Spring 2025
- Deans List Tulane University Fall 2025

Extracurricular Activities

- Co-Founder and Vice President of Logistics, Tulane Science Olympiad 2025–Present
  Co-founded Tulane's first Science Olympiad invitational and led all logistical planning for a large-scale competition hosting 13 teams and over 450 students from multiple states. Managed outreach, registration, website development, test coordination, volunteer scheduling, and event execution. Secured and coordinated the use of chemistry, biology, and physics labs as well as over 60 classrooms across campus.
- Trip Leader, Tulane Outdoor Adventures 2024–Present
  Lead outdoor trips for student groups, managing logistics, route planning, risk assessment, and participant safety. Coordinate pre-trip planning meetings and ensure compliance with university safety standards.
- Founder, Tulane Math Circle Spring 2025–Present
  Founded and organize a weekly problem-solving seminar focused on proof-based mathematics. Prepare problem sets and lead collaborative discussions in algebra, combinatorics, and geometry.

Courses

- MATH-2210: Multivariable calculus Fall 2024
- MATH-3660-03Sp25 Spring 2025
- MATH-2010: Math Modeling of World Spring 2025
- MATH-3090: Linear Algebra Spring 2025
- DATA Spring 2025
- MATH-3000: Discrete Structures (UMSL) Summer 2025
- MATH-3110: Abstract Algebra 1 Fall 2025
- MATH-3050: Real analysis 1 Fall 2025
- MATH-3070: Introduction to Probability Fall 2025
- MATH- Abstract Algebra 2 Spring 2026
- MATH- Real Analysis 2 Spring 2026
- MATH- Combinatorics Spring 2026

Self Study

- Undergraduate Algebraic Geometry Summer 2025
  Independent study of foundational algebraic geometry concepts with connections to modern coding theory and cryptography.

- Error Correcting Codes Summer 2025
  Textbook: Huffman and Pless, Fundamentals of Error-Correcting Codes. Studied linear codes, bounds (Singleton, Hamming, Gilbert–Varshamov), cyclic and BCH codes, and algebraic decoding techniques.

Personal Development

- Machine Learning Onramp Dec 2024
  Completed the Machine Learning Onramp by MathWorks, gaining hands-on experience with fundamental machine learning concepts, algorithms, and practical MATLAB applications.
- Google AI Essentials Dec 2024
  Acquired foundational knowledge in artificial intelligence, including machine learning, data science, and ethical AI practices, with practical insights into real-world applications.
- Google Data Analytics Certification Mar 2023
  Developed strong skills in Microsoft Excel, SQL, Tableau, and R, with experience in preparing, processing, analyzing, and communicating data to support informed decision-making.

add all my papers, spotkd, BCR, circuliant, and also talk at innovation insitute mixer.