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Qualifications

PhD, Mathematics, Dartmouth College, Hanover, NH Fall 2018 - Spring 2023

Advisor: John Voight

Thesis: *Counting elliptic curves with a cyclic m -isogeny over \mathbb{Q}*

MA, Mathematics, Dartmouth College, Hanover, NH Fall 2018 - Winter 2020

Advisor: John Voight

MS, Mathematics, Brigham Young University, Provo, UT Winter 2017 - Summer 2018

Advisors: Michael Griffin and Paul Jenkins

Thesis: *The arithmetic of modular grids*

BS, Mathematics, Brigham Young University, Provo, UT Fall 2013 - Fall 2016

Professional Experience

AI/ML Engineering Manager at ARKA Winter 2025 - Present

My responsibilities are threefold: I innovate in AI and algorithms as an engineer, serve as line manager for both junior and senior AI/ML developers, and act as my company's Algorithm Team Lead. As an engineer, I do cutting edge work on LLMs, with networks, in ELINT, and more. I also cowrite program proposals. As a line manager, I nurture a personal rapport with my people, advocate for their interests, and facilitate their work on projects that engage them and enable them to grow in the ways they wish. I am also on the front lines of company recruitment. As Algorithm Team Lead, I liaise with project leads to provide technical support and connect them with the best employees for their problems, organize and deliver presentations on both foundational and advanced algorithm topics, and serve as our company's algorithms SME.

Principal AI/ML Engineer at ARKA Summer 2023 - Winter 2025

I spearheaded the development of advanced AI solutions across multiple projects, innovating in areas such as cognitive agents, signal segmentation systems, and satellite scheduling algorithms. I conducted novel research within an Agile framework and served as Scrum Master and AI/Algorithms Lead on one project. I delivered dozens of presentations to company leadership and peers on myriad computational and mathematical topics, from automata to quantum computing.

CCR-Princeton SCAMP Summer Associate Summer 2022

I produced research in the discipline of advanced cryptography. My work included design and vulnerability analysis of novel cryptographic protocols, as well as practical and theoretical work on implementations of homomorphic encryption and secure multi-party computation.

NSA Graduate Mathematics Program Intern Summer 2021

I produced research focused on distinguishing between human and synthetic audio, using techniques from machine learning, probability theory, and topological data analysis.

Academic Researcher at BYU and Dartmouth Fall 2013 - Spring 2023

At BYU, I proved results about modular forms and algorithms on graphs. At Dartmouth, I instigated successful research into summing divergent series, the Prisoner's Dilemma, and the Ramanujan-Robin

criterion. My thesis develops the arithmetic statistics of elliptic curves with cyclic m -isogeny. See Research Publications and Research Preprints below.

Math Instructor at BYU and Dartmouth

Winter 2017 - Spring 2023

I taught 30-student calculus courses in three different styles: lecturing, virtually with a “flipped classroom”, and with handouts and group exercises. I TAed for lower-division courses, and by special request for upper-division courses as well. See Teaching Experience below.

Computer Skills

Fluent in...

Bash • Git • \LaTeX • Python • SageMath • YAML

Fair at...

C++ • Go • HTML • Java • Magma • Mathematica • MatLab • R

Familiar with...

gRPC • MongoDB • PARI/GP • Rust • SQL

Books

Puzzle and Proof: A Decade of Problems from the Utah Math Olympiad, with Samuel Dittmer, Hiram Golze, and Caleb Stanford

AK Peters/CRC Recreational Mathematics Series.

This book is a collection of 70 mathematical problems and puzzles from the first ten years of the Utah Math Olympiad (UMO), 2013–2022. These problems are distinguished in two respects. First, they aim to be *understandable* to an advanced high school audience, even if solving them can sometimes be quite difficult. Second, all of the problems ask for not only an answer, but a *proof*.

Research Publications

A database of basic numerical invariants of Hilbert modular surfaces, with Eran Assaf, Angelica Babei, Ben Breen, Edgar Costa, Juanita Duque-Rosero, Aleksander Horawa, Jean Kiefer, Avinash Kulkarni, Sam Schiavone, and John Voight

Contemp. Math., vol. 796, 2024, Amer. Math. Soc., Providence, RI, 285–312. arXiv: 2301.10302

We describe algorithms for computing geometric invariants for Hilbert modular surfaces, and we report on their implementation.

Counting elliptic curves over the rationals with a 7-isogeny, with John Voight

Research in Number Theory **9**, 75 (2023). arXiv: 2212.11354

We count by height the number of elliptic curves over the rationals, both up to isomorphism over the rationals and over an algebraic closure thereof, that admit a cyclic isogeny of degree 7.

Reactive means in the Iterated Prisoner’s Dilemma, with Caroline Hammond and Feng Fu Applied Mathematics and Computation **458** 128201 (2023). arXiv: 2302.13909

The Iterated Prisoner’s Dilemma (IPD) is a well studied framework for understanding direct reciprocity and cooperation in pairwise encounters. However, measuring the morality of various IPD strategies is still largely lacking. Here, we partially address this issue by proposing a suit of plausible morality metrics to quantify four aspects of justice. We focus our closed-form calculation on the class of reactive strategies because of their mathematical tractability and expressive power. We define reactive means as a tool for studying how actors in the IPD and Iterated Snowdrift Game (ISG) behave under typical circumstances. We compute reactive means for four functions intended to capture human intuitions about “goodness” and “fair play”. Two of these functions are strongly anticorrelated with success in the IPD and ISG, and the other two are weakly anticorrelated with success. Our results will aid in evaluating and comparing powerful IPD strategies based on machine learning algorithms, using simple and intuitive morality metrics.

7 internal NSA papers, with IDA Research Team

Summer 2022.

Abstracts redacted.

9 internal IDA blog posts

Summer 2022.

Abstracts redacted.

Generating and detecting synthetic speech: a technical report, with NSA Research Team

Internal NSA Paper (Summer 2021).

We present methods for distinguishing between human and synthesized audio, assess their efficacy, and suggest directions for future development. We also present methods for generating realistic-sounding synthetic speech that mimics a human voice, and for confusing machine learning systems such as speaker ID and detection algorithms into believing the generated synthetic speech is real.

The arithmetic of modular grids, with Michael Griffin and Paul Jenkins

Mathematika **68**, 1080-1119 (2022). arXiv: 2012.14403

A modular grid is a pair of sequences $(f_m)_m$ and $(g_n)_n$ of weakly holomorphic modular forms such that for almost all m and n , the coefficient of q^n in f_m is the negative of the coefficient of q^m in g_n . Zagier proved this coefficient duality in weights $1/2$ and $3/2$ in the Kohnen plus space, and such grids have appeared for Poincaré series, for modular forms of integral weight, and in many other situations. We give a general proof of coefficient duality for canonical row-reduced bases of spaces of weakly holomorphic modular forms of integral or half-integral weight for every group $\Gamma \subseteq \mathrm{SL}_2(\mathbb{R})$ commensurable with $\mathrm{SL}_2(\mathbb{Z})$. We construct bivariate generating functions that encode these modular forms, and study linear operations on the resulting modular grids.

Odd, spoof perfect factorizations, with Nickolas Andersen, Spencer Durham, Michael Griffin, Jonathon Hales, Paul Jenkins, Ryan Keck, Hankun Ko, Eric Moss, Pace Nielsen, Kyle Niendorf, Vandy Tombs, Merrill Warnick, and Dongsheng Wu

Journal of Number Theory **234**, 31-47 (2022). Quanta article. Veritasium video. arXiv: 2006.10697

We investigate the integer solutions of Diophantine equations related to perfect numbers. These solutions generalize the example, found by Descartes in 1638, of an odd, “spoof” perfect factorization $3^2 \cdot 7^2 \cdot 11^2 \cdot 22021^1$. More recently, Voight found the spoof perfect factorization $3^4 \cdot 7^2 \cdot 11^2 \cdot 19^2 \cdot (-127)^1$. No other examples appear in the literature. We compute all nontrivial, odd, primitive spoof perfect factorizations with fewer than seven bases – there are twenty-one in total. We show that the structure of odd, spoof perfect factorizations is extremely rich, and there are multiple infinite families of them. This implies that certain approaches to the odd perfect number problem that use only the multiplicative nature of the sum-of-divisors function are unworkable. On the other hand, we prove that there are only finitely many nontrivial, odd, primitive spoof perfect factorizations with a fixed number of bases.

Zagier duality for level p weakly holomorphic modular forms, with Paul Jenkins

The Ramanujan Journal **50**, 93–109 (2019). arXiv: 1709.10023

We prove Zagier duality between the Fourier coefficients of canonical bases for spaces of weakly holomorphic modular forms of prime level p with $11 \leq p \leq 37$ with poles only at the cusp at ∞ , and special cases of duality for an infinite class of prime levels. We derive generating functions for the bases for genus 1 levels.

Graphs with the strong Havel-Hakimi property, with Michael Barrus

Graphs and Combinatorics **32**, 1689–1697 (2016). arXiv: 1505.00085

The Havel–Hakimi algorithm iteratively reduces the degree sequence of a graph to a list of zeroes. As shown by Favaron, Mahéo, and Saclé, the number of zeroes produced, known as the residue, is a lower bound on the independence number of the graph. We say that a graph has the strong Havel–Hakimi property if in each of its induced subgraphs, deleting any vertex of maximum degree reduces the degree sequence in the same way that the Havel–Hakimi algorithm does. We characterize graphs having this property (which include all threshold and matrogenic graphs) in terms of minimal forbidden induced subgraphs. We further show that for these graphs the residue equals the independence number, and a natural greedy algorithm always produces a maximum independent set.

Research Preprints

Positive spoof Lehmer factorizations, with Guntas Singh

Preprint. arXiv: 2409.17076

We investigate the integer solutions of Diophantine equations related to Lehmer's totient conjecture. We give an algorithm that computes all nontrivial positive spoof Lehmer factorizations with a fixed number of bases r , and enumerate all nontrivial positive spoof Lehmer factorizations with 6 or fewer factors.

Multiplicative summations into algebraically closed fields, with Robert Dawson

Preprint. arXiv: 2111.09938

In this paper, extending our earlier program, we derive maximal canonical extensions for multiplicative summations into algebraically closed fields. We show that there is a well-defined analogue to minimal polynomials for a series algebraic over a ring of series, the "scalar polynomial". When that ring is the domain of a summation \mathfrak{S} , we derive the related concepts of the \mathfrak{S} -minimal polynomial for a series, which is mapped by \mathfrak{S} to a scalar polynomial. When the scalar polynomial for a series has the form $(t - a)^n$, a is the unique value to which the series can be mapped by an extension of the original summation.

Telescopic, multiplicative, and rational extensions of summations, with Robert Dawson

Preprint. arXiv: 2105.04592

A summation is a shift-invariant \mathbb{R} -module homomorphism from a submodule of \mathbb{R} to \mathbb{R} or another ring. Dawson formalized a method for extending a summation to a larger domain by telescoping. In this paper, we revisit telescoping, we study multiplicative closures of summations (such as the usual summation on convergent series) that are not themselves multiplicatively closed, and we study rational extensions as a generalization of telescoping.

Expository Notes

Minimalist practical numbers

Unpublished.

A natural number n is practical if every smaller number can be written as a sum of distinct divisors of n . We say that a practical number n is minimalist if this representation is unique. In this note, we prove that a practical number is minimalist if and only if it is a power of 2.

Fast-growing series are transcendental, with Robert Dawson

Unpublished. arXiv: 2102.12995

Let R be a subring of $\mathbb{C}[[z]]$, and let $X \in \mathbb{C}[[z]]$. The Newton-Puiseux Theorem implies that if the coefficients of X grow sufficiently rapidly relative to the coefficients of the series in R , then X is transcendental over R . We provide an alternative proof of this result by establishing a relationship between the coefficients of $A(X)$ and $A'(X)$, where $A(T)$ is a polynomial over $\mathbb{C}[[z]]$.

Awards and Fellowships

Dartmouth Graduate Fellowship

Fall 2018 - Summer 2023

Gridley Fund for Graduate Mathematics

Fall 2018 - Summer 2019

NSF Graduate Research Fellowship Honorable Mention

April 2018

BYU Academic Scholarship

Spring 2015 - Winter 2016

BYU Math Department Scholarship

Fall 2016

BYU Math Department Scholarship

Fall 2015

BYU Academic Scholarship

Fall 2013 - Winter 2014

Teaching Experience

Dartmouth College, Hanover, NH (Instructor)

Math 8 (Calculus of One and Several Variables) Fall 2021

Math 1 (Algebra and Calculus) Fall 2020

Dartmouth College, Hanover, NH (Teacher's Assistant)

Math 100 / Computer Science 49/149 (Random Walk) Spring 2022

Math 100 / Computer Science 49/149 (Decision Theory) Spring 2021

Math 23 (Differential Equations) Winter 2020

Math 3 (Calculus) Fall 2019

Math 22 (Linear Algebra) Spring 2019

Math 22 (Linear Algebra) Fall 2018

Brigham Young University, Provo, UT (Instructor)

Math 112 (Calculus I) Summer 2017

Brigham Young University, Provo, UT (Teacher's Assistant)

Math 112 (Calculus I) Fall 2017

Math 113 (Calculus II) Winter 2017

Brigham Young University, Provo, UT (Grader)

Math 570 (Matrix Analysis) Winter 2017

Math 112 (Calculus I) Fall 2015

Leadership and Community Service

Referee

Experimental Mathematics • *Journal of Mathematical Analysis and Applications* •
Journal of Number Theory • *Mathematische Zeitschrift* • *Theory and Decision*

Reviewer

zbMATH Open • *CRC Press*

K-12 Outreach

Utah Math Olympiad Committee Member 2015 - Present

Lumiere Mentor 2024

Activity Leader at Dartmouth Science Day (Games & Surreal Numbers) April 8, 2023

Activity Leader at Lebanon Ward Pi Day
(Trachtenberg Arithmetic & Random Walk) March 25, 2023

Session Leader at Dartmouth Sonia Kovalevsky Day
(Trachtenberg Arithmetic) May 21, 2022

Activity Leader at Lebanon Ward Pi Day (Random Walk) April 8, 2022

Exploring Mathematics Camp Leader (Graph Theory) July 27-31, 2020

Exploring Mathematics Camp Leader (Cryptography) July 13-17, 2020

Activity Leader at Lebanon Ward Pi Day (Random Walk) March 7, 2020

Volunteer at Dartmouth Sonia Kovalevsky Day May 11, 2019

Activity Leader at Dartmouth Science Day (Nim) May 4, 2019

Math Circles Guest Speaker (Tropical Algebra) February 24, 2018

Math Circles Guest Speaker (Continued Fractions)	October 21, 2017
Proofreader for Utah State Math Contest	February 2017
Math Circles Counselor	2013 - 2015

Dartmouth Graduate Student Council

Ad Hoc Healthcare Committee Founder and Co-Chair	2022 - 2023
◦ <i>Budget Committee Member</i>	Summer 2022
Finance Officer	2021 - 2022
◦ <i>Budget Committee Member</i>	Summer 2021
Representative for Math Department	2020 - 2021
◦ <i>Service Committee Member</i>	2020 - 2021
◦ <i>Budget Committee Member</i>	Summer 2020

Dartmouth Directed Reading Program

Mentor (Fuzzy Logic)	Winter 2023
Mentor (Decision Theory)	Spring 2022
Mentor (Fractional Calculus)	Winter 2022

Other

LMFDB Contributor	2019 - 2023
Dartmouth Algebra and Number Theory Seminar Organizer	2019 - 2022
CCR-P SCAMP Number Theory Discussion Group Organizer	Summer 2022
BYU Putnam Team Captain	2014 - 2016

Thesis Defenses

Counting elliptic curves with a cyclic m-isogeny over \mathbb{Q}	April 24, 2023
Dartmouth College PhD Thesis Defense	
The arithmetic of modular grids	June 22, 2018
BYU Master's Thesis Defense	

Invited Talks

Quantum communication & computing	January 27, 2025
2025 ARKA Tech Day	
Counting elliptic curves with a cyclic m-isogeny	February 9, 2023
Job Talk at Metron	
A family of analogues to the Ramanujan-Robin criterion	February 2, 2023
Job Talk at Center for Computer Science, Bowie	
Counting elliptic curves with a 7-isogeny	January 19, 2023
BYU Colloquium	
Counting elliptic curves with a 7-isogeny	January 11, 2023
Simons Collaboration Annual Meeting	
Counting 7-isogenies	January 6, 2023
2023 Joint Mathematics Meeting	
Counting elliptic curves with a 7-isogeny	December 15, 2022
NSA Seminar (Virtual)	

Title redacted Next Generation Cryptography	November 16, 2022
A family of analogues to the Ramanujan-Robin Criterion BYU Number Theory Seminar	October 27, 2022
Title redacted Briefing to General Paul Nakasone, then-Director of the NSA	July 26, 2021
Title redacted Briefing to Center for Computing Sciences, Bowie	June 25, 2021

Other Conference Talks

Intersecting varieties with transcendental graphs Arizona Winter School 2023: Unlikely Intersections	March 8, 2023
The LCM product and Grönwall's theorem 2021 Maine-Québec Number Theory Conference (virtual)	October 3, 2021
Formal summation of divergent series 2020 Conférence de Théorie des Nombres Québec-Maine (virtual)	September 26, 2020
The arithmetic of modular grids 2019 Maine-Québec Number Theory Conference	October 5, 2019
The arithmetic of modular grids 33 rd Automorphic Forms Workshop	March 8, 2019
The arithmetic of modular grids Building Bridges: 4th EU/US Summer School + Workshop on Automorphic Forms	July 17, 2018
Zagier duality in level p modular spaces 32 nd Automorphic Forms Workshop	March 21, 2018
Zagier duality in level p modular spaces 2018 BYU Student Research Conference	March 3, 2018
Zagier duality in level p modular spaces Modular Forms are Everywhere Conference	May 24, 2017
Weakly holomorphic modular forms of level 11 31 st Automorphic Forms Workshop	March 7, 2017
Weakly holomorphic modular forms of level 11 2017 BYU Student Research Conference	March 4, 2017
Congruence relations in modular forms of prime levels greater than 7 2015 BYU Student Research Conference	March 21, 2015
Residues and independence numbers of graphs 2014 BYU Student Research Conference	March 15, 2014

Other Seminar Talks

Is chain-of-thought reasoning a mirage? ARKA Paper Book Club	October 28, 2025
Algorithms in 2025: a CCCG/WADS retrospective ARKA Algorithm Development Tech Titan Presentation	September 12, 2025

Bayesian stochastic blockmodeling	July 9, 2025
ARKA Lunch & Learn Series	
Testing, testing, testing	June 6, 2025
ARKA Algorithm Development Tech Titan Presentation	
Procrustes analysis	April 9, 2025
ARKA Lunch & Learn Series	
Algorithms and computational complexity	February 21, 2025
ARKA Algorithm Development Tech Titan Presentation	
Robust optimization	December 5, 2024
ARKA Algorithm Development Tech Titan Presentation	
Linear programming	November 21, 2024
ARKA Algorithm Development Tech Titan Presentation	
The comedy of errors	October 24, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	September 27, 2024
ARKA Tech Overlord Presentation	
Applied category theory	September 12, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	July 26, 2024
ARKA Tech Overlord Presentation	
Neurofuzziness	June 27, 2024
ARKA Artificial Intelligence Tech Titan Presentation	
Fuzzy logic	June 6, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	April 26, 2024
ARKA Tech Overlord Presentation	
Finite automata for the software engineer	April 25, 2024
ARKA Algorithm Development Tech Titan Presentation	
Quantum computing IV: Shor's algorithm	March 28, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	March 22, 2024
ARKA Tech Overlord Presentation	
Quantum computing III: QML	March 21, 2024
ARKA Artificial Intelligence Tech Titan Presentation	
Spacepower: doctrine for Space Forces	February 29, 2024
ARKA SDA & Space Control Tech Titan Presentation	
Quantum computing II: algorithm fundamentals	February 29, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	February 23, 2024
ARKA Tech Overlord Presentation	
Quantum computing I: bits and qubits	February 15, 2024
ARKA Algorithm Development Tech Titan Presentation	
Title redacted	January 26, 2024
ARKA Tech Overlord Presentation	

Neural differential equations ARKA Artificial Intelligence Tech Titan Presentation	January 25, 2024
Topological data analysis ARKA Algorithm Development Tech Titan Presentation	December 7, 2023
Geometric deep learning ARKA Artificial Intelligence Tech Titan Presentation	October 19, 2023
Symbolic segmentation II ARKA Algorithm Development Tech Titan Presentation	September 14, 2023
Title redacted ARKA Tech Overlord Presentation	September 22, 2023
Symbolic segmentation I ARKA Algorithm Development Tech Titan Presentation	September 14, 2023
Title redacted ARKA Tech Overlord Presentation	August 25, 2023
The Fox H-function Dartmouth Graduate Student Seminar	March 28, 2023
Geometric deep learning Dartmouth Graduate Student Seminar	February 14, 2023
Nearing nearrings Dartmouth Graduate Student Seminar	September 14, 2022
6 internal IDA bull session talks Center for Communications Research, Princeton	Summer 2022
Universal algebra and coalgebra Dartmouth Graduate Student Seminar	March 30, 2022
Cogalois theory Dartmouth Graduate Student Seminar	February 16, 2022
Cyclic resolution of singularities Reading Seminar on Hilbert Modular Surfaces	January 25, 2022
What if the Riemann hypothesis is false? Dartmouth Graduate Student Seminar	January 19, 2022
Inverse semigroups: groups without identity Dartmouth Graduate Student Seminar	November 9, 2021
Counting 7-isogenies Dartmouth Algebra and Number Theory Seminar	November 8, 2021
A sober look at pointless topology Dartmouth Graduate Student Seminar	September 21, 2021
8 internal NSA bull session talks Fort George G. Meade	Summer 2021
Fast-growing series are transcendental Dartmouth Graduate Student Seminar (virtual)	April 21, 2021
Coalgebras and Hopf algebras Reading Seminar on Affine Group Schemes (virtual)	April 15, 2021
Absurd equalities and Runge's method: the degenerate case Dartmouth Algebra and Number Theory Seminar (virtual)	March 30, 2021

p-adic Hodge theory	March 2, 2021
Reading Seminar on Classical and Quadratic Chabauty (virtual)	
Odd, spoof quasiperfect factorizations	February 9, 2021
Dartmouth Algebra and Number Theory Seminar (virtual)	
A primer in social choice theory	January 20, 2021
Dartmouth Graduate Student Seminar (virtual)	
Examples of Kedlaya's algorithm	November 19, 2020
Reading Seminar on Classical and Quadratic Chabauty (virtual)	
The LCM product and Grönwall's theorem	November 17, 2020
Dartmouth Algebra and Number Theory Seminar (virtual)	
Reactive means and the prisoner's dilemma	October 7, 2020
Dartmouth Graduate Student Seminar (virtual)	
Formal summation of divergent series: an algebraic approach	April 28, 2020
Dartmouth Algebra and Number Theory Seminar (virtual)	
On the infinitude of the natural numbers	February 12, 2020
Dartmouth Graduate Student Seminar	
Variations of Hodge structures	November 26, 2019
Reading Seminar on Shimura Varieties	
Hodge structures	November 14, 2019
Reading Seminar on Shimura Varieties	
Savage's expected utility and making good decisions	November 13, 2019
Dartmouth Graduate Student Seminar	
Geometric and generalized calculus	October 8, 2019
Dartmouth Graduate Student Seminar	
Summing divergent series	July 31, 2019
Dartmouth Graduate Student Seminar	
Real analysis: a nonstandard approach	April 17, 2019
Dartmouth Graduate Student Seminar	
Why save the universe? Set theory with a universal set	January 16, 2019
Dartmouth Graduate Student Seminar	
The arithmetic of modular grids	September 26, 2018
Dartmouth Graduate Student Seminar	
Dioids and idempotent geometry II	March 13, 2018
BYU Algebra Seminar	
Dioids and idempotent geometry I	February 27, 2018
BYU Algebra Seminar	
Zagier duality in level p modular spaces	February 22, 2018
BYU Number Theory Seminar	
Average values of arithmetic functions	October 12, 2017
BYU Number Theory Seminar	
Weakly holomorphic modular forms of level 11	February 9, 2017
BYU Number Theory Seminar	

Generating functions for canonical bases of certain level 11 weakly holomorphic modular forms	January 26, 2017
BYU Number Theory Seminar	
High rank elliptic curves with prescribed torsion	December 1, 2016
BYU Number Theory Seminar	
Heuristics for elliptic curves of high rank	October 20, 2016
BYU Number Theory Seminar	
A lemma regarding the Feit-Thompson conjecture	November 12, 2015
BYU Number Theory Seminar	
Algebraic number theory and the Feit-Thompson conjecture	October 1, 2015
BYU Number Theory Seminar	
Congruence relations in modular forms of prime levels greater than 7	March 19, 2015
BYU Number Theory Seminar	
Hensel's lemma	February 12, 2015
BYU Number Theory Seminar	
Newton polynomials	March 27, 2014
BYU Number Theory Seminar	

Other

Achievements and Honors

3 rd Place in the Virginia Tech Regional Math Competition	October 2016
2 nd Place in the Search for High Rank Elliptic Curve	
at 2016 Connecticut Summer School in Number Theory	August 2016
Gold Palm Eagle Scout	December 2012
Black Belt (Taekwondo)	August 2012

Special Training

Dale Carnegie Training: Leadership Training for Managers	Summer 2025
Dartmouth Mathematics Teaching Seminar	Spring 2020
BYU Mathematics Teaching Seminar	Fall 2018

Academic Interests

Analytic Number Theory • Arithmetic Geometry • Game Theory • Logic

Personal Interests

Hiking • Philosophy • Piano • Poetry • Stories

Conferences and Workshops Attended

<i>CCCG/WADS 2025</i>	August 11 - 15, 2025
York University, Toronto	
<i>Qubits 2025: Quantum Realized</i>	March 31 - April 1, 2025
Virtual (Scottsdale, Arizona)	
<i>2025 Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Annual Meeting</i>	January 15-16, 2025
Virtual (Simons Foundation's Gerald D. Fischbach Auditorium, New York City)	

2024 <i>Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Annual Meeting</i> Virtual (Simons Foundation's Gerald D. Fischbach Auditorium, New York City)	January 11-12, 2024
<i>Big Data Conference 2023</i> Virtual (Harvard University, Cambridge)	August 31 - September 1, 2023
<i>Hilbert Modular Forms Infrastructure Week 4</i> Dartmouth College, Hanover	May 8-12, 2023
<i>Arizona Winter School 2023: Unlikely Intersections</i> University of Arizona, Tucson	March 4-8, 2023
2023 <i>Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Annual Meeting</i> Simons Foundation's Gerald D. Fischbach Auditorium, New York City	January 11-12, 2023
2023 <i>Joint Mathematics Meetings</i> Hynes Convention Center, Boston	January 4-7, 2023
<i>Hilbert Modular Forms Infrastructure Week 3</i> Dartmouth College, Hanover	December 12-16, 2022
<i>Next-Generation Cryptography</i> Center for Communications Research, La Jolla	November 14-18, 2022
<i>Modular Curves Workshop 2</i> MIT, Boston	November 5-9, 2022
<i>Big Data Conference 2022</i> Virtual (Harvard University, Cambridge)	August 26, 2022
<i>Graph Fest 2022</i> NSA Internal Conference	June 29-30, 2022
<i>Explicit Methods for Modularity</i> Virtual (Simons Collaboration)	April 11-15, 2022
<i>Arizona Winter School 2022: Automorphic Forms Beyond GL_2</i> Virtual (University of Arizona, Tucson)	March 5-9, 2022
<i>Hilbert Modular Forms Infrastructure Week 2</i> Dartmouth College, Hanover	February 21-25, 2022
2021 <i>Maine-Québec Number Theory Conference</i> Virtual (University of Maine, Orono)	October 2-3, 2021
<i>MathFest 2021</i> NSA Internal Conference	June 4, 2021
<i>Spring 2021 Algebraic Geometry Northeastern Series</i> Virtual (Brown University, Providence)	May 4-5, 2021
21 st <i>Algebra, Geometry and Combinatorics Day</i> Virtual (University of Notre Dame, Notre Dame)	April 10, 2021
2021 <i>Joint Mathematics Meetings</i> Virtual (American Math Society, Mathematical Association of America)	January 6-9, 2021
<i>Fall 2020 Algebraic Geometry Northeastern Series</i> Virtual (Stony Brook University, Stony Brook)	October 23-25, 2020

2020 <i>Conférence de Théorie des Nombres Québec-Maine</i> Virtual (Université Laval, Québec)	September 26-27, 2020
14 th <i>Algorithmic Number Theory Symposium</i> Virtual (University of Auckland, Auckland)	June 29 - July 4, 2020
<i>UNCG Summer School in Computational Number Theory and Algebra:</i> <i>Ergodic Theory with Applications to Continued Fractions</i> Virtual (University of North Carolina, Greensboro)	May 18-22, 2020
2019 <i>Maine-Québec Number Theory Conference</i> University of Maine, Orono	October 5-6, 2019
<i>Fall 2019 Algebraic Geometry Northeastern Series</i> Boston College, Boston	September 20-22, 2019
33 rd <i>Automorphic Forms Workshop</i> Duquesne University, Pittsburgh	March 6-10, 2019
<i>Building Bridges: 4th EU/US Summer School +</i> <i>Workshop on Automorphic Forms and Related Topics</i> Alfréd Rényi Institute of Mathematics, Budapest	July 9-20, 2018
32 nd <i>Automorphic Forms Workshop</i> Tufts University, Medford	March 19-22, 2018
<i>Modular Forms are Everywhere</i> Max Planck Institute for Mathematics, Bonn	May 15-26, 2017
31 st <i>Automorphic Forms Workshop</i> East Tennessee State University, Johnson City	March 6-9, 2017
2017 <i>BYU Student Research Conference</i> Brigham Young University, Provo	March 4, 2017
2016 <i>Connecticut Summer School in Number Theory</i> University of Connecticut, Storrs	August 8-14, 2016
2015 <i>BYU Student Research Conference</i> Brigham Young University, Provo	March 21, 2015
2014 <i>BYU Student Research Conference</i> Brigham Young University, Provo	March 15, 2014