

Krystal Maughan

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Research Interests: Mathematical Cryptography, Elliptic Curves, Random Processes, Computational Number Theory (Arithmetic Geometry), Coding Theory (Error-Correcting Codes), Algebraic Graph Theory, Quantum Algorithms, Quantum Resource Estimation

University of Vermont, PhD student

2019-present

Computer Science PhD student, minor in Pure Mathematics

(PhD) classes: *Mathematical (Post-Quantum) Cryptography, Elliptic Curves and Modular Forms, Combinatorial Graph Theory, Spectral Graph Theory, Category Theory, Random Probabilistic Graphs, Secure and Distributed Computation, Algebraic Graph Theory and Quantum Computing, Abstract Algebra I (Groups), III (Rings/Fields/Galois Theory), IV (Category Theory, Lie Algebra), Privacy Law and Policy, Machine Learning, Data Privacy, Software Verification (Agda), Computer Human Interaction.*

Oral Qualification Exams in: (1) Quantum Computing, Quantum Algorithms and Classical Mathematical Cryptanalysis, (2) Elliptic Curves (3) Combinatorial Graph Theory

RESEARCH EXPERIENCE:

Research Assistant (Vermont)

2021-present

PhD Supervisors: C. Vincent, J. Near: Research on Isogeny-Based Cryptography

- *Mathematical Cryptography Research*

Supervisor: Joe Near: Research on Provable Fairness and (Differential) Privacy

2019-2020

Using Machine Learning. Funded via Amazon Research Award (2020-2022 PI: J. Near, D. Darais).

Publications

- ❖ *"Machine Learning for Modular Multiplication"* 2024
Women in Numbers VI (2024) : Research Directions in Number Theory
(Lauter K., Li C., **Maughan K.**, PhD, Newton R., Srivastava M.)
- ❖ *Prediction Sensitivity: Continual Audit of Counterfactual Fairness in Deployed Classifiers (**Maughan, K.**, Ngong, I., Near, J.)* 2022
(presented as poster at "Equity and Access in Algorithms, Mechanisms and Optimization (**EAAMO**) Doctoral Consortium")
- ❖ *"Towards a Measure of Individual Fairness for Deep Learning"* 2020
(**Maughan, K.** and Near, J.) - presented as poster for **MD4SG**
(presented at "Mechanism Design for Social Good" conference)
- ❖ *"Towards Auditability for Fairness in Deep Learning"* 2020
(Ngong, I., **Maughan, K.** and Near, J.)- presented as poster for **AFCI at NeurIPS**

Short Technical Papers:

- ❖ “Foldable, Recursive Proofs of Isogeny Computation with Reduced Time Complexity” (submitted) 2024
(**Maughan K.**, Near J., Vincent C.)

Pre-prints:

- ❖ “Improving Utility for Analysis of Correlated Columns using Pufferfish Privacy” 2022
(**Maughan, K.** and Near, J.)
- ❖ “Continual Audit of Individual and Group Fairness in Deployed Classifiers via” 2022
“Prediction Sensitivity” (**Maughan, K.**, Ngong I., Near J.)

Accepted Workshop Conference Posters:

- ❖ Foldable Proofs of Isogeny Knowledge 2024
presented at **11th Heidelberg Laureate Forum** for Flash Poster Session (1 of 30)
- ❖ Post-Quantum Secure Recursive Proofs of Isogeny Knowledge with Reduced Time Complexity (Maughan, K. and Vincent C., and Near, J.) at **CQIQC-X** 2024
- ❖ Post-Quantum Secure Recursive Proofs of Isogeny Knowledge with Reduced Time Complexity (Maughan, K. and Vincent C., and Near, J.) at **USTARS 2024** 2024
- ❖ Post-Quantum Secure Recursive Proofs of Isogeny Knowledge with Reduced Time Complexity (**Maughan, K.**, and Vincent C., PhD) accepted at **QIP 2024** 2024
Poster for Quantum Information Processing conference, Taipei, Taiwan
- ❖ “Compositional Isogeny Schemes”- poster presented, **CrossFyre at Eurocrypt** 2023
Poster for workshop on Provably Robust Schemes, Lyon, France (**Maughan, K**)
- ❖ “Compositional Isogeny Schemes”- presented as poster at **ACM Richard Tapia** 2022
Poster Competition at Conference, Washington, D.C. (**Maughan, K**)
- ❖ “Archipelago Pensée” 2020
(**Maughan, K.**) - presented as a poster for Resistance AI (**RAIS**) at **NeurIPS**

Collaboration on Other Research Projects in Progress:

- ❖ Mathematical Cryptography: Work on Compositional Isogeny Schemes (ongoing) 2022-present
(PI: C. Vincent, Near J. PhD, **Maughan, K.**)
- ❖ Error-correcting codes / LDPC using group algebras 2023-present
(PI: Chimal-Dzul, H., Hoffer W., **Maughan, K.**, Maya N.A., W., Morris K.)
- ❖ Expander properties of Isogenies 2023-present
(Arpin, S., Bowen R., Clements J., Codogni G., Eisenträger K., Ghanous W., Bo Lau J., LeGrow J., Macula J., Mahaney W., **Maughan. K.**, Morrison T., Orvis E., Rickards J., Sabitova M., Scullard G., Zobernig L.)
- ❖ Quantum Backtracking for Constraint Satisfaction Problems (CSP) 2023-present
(Jhunjhunwala V., **Maughan K.** PI: Schirman E.)
- ❖ “Experimental Investigation of Lehmer’s Conjecture for Elliptic Curves”, 2024-present
(Clark J. M., Dombrowsky C., Iranzo M. C., Katz S., **Maughan K.**, Orvis E.,
Supervised by: Looper N., PhD and Chidambaram S., PhD, Silverman J., PhD)
- ❖ Graphs research, Pure Maths 2023-present
(**Maughan K.**, PI: Rombach, P.)
- ❖ Summer Research Project, Advanced Cryptography Group 2024-present
(Alamati N., Chakraborty S., **Maughan K.**, Raghuraman S., Rindal P.)

Collaboration on Other Research Projects in Progress:

- ❖ *Post-Quantum Cryptography project* 2024-present
(**Maughan K.**, and other co-authors, PI: Cherkaoui, I.)
- ❖ *Independent research project* 2023-present
(PI: Lees A., PhD, **K. Maughan**)
- ❖ *Summer of Bitcoin (Virtual) "Price of Anarchy in Selfish Routing on the Lightning Network"* (R. Pickhardt, S. Alscher, **K. Maughan**) 2022

Whitepapers (Data Privacy and Security):

- ❖ *Client Telemetry Aggregation, Microsoft internal (joint work with: P. Angulo, PhD)* 2021

INVITED VISITING PhD STUDENT RESEARCHER (UC Berkeley)

- ❖ *Simons Institute, "Quantum Algorithms, Complexity and Fault Tolerance"* 2024
 - *Invited as a visiting researcher for workshop and Error Correcting Codes*
 - *Participated in Bootcamp (Berkeley, California from Jan 22nd to Feb 16th)*
 - *Hosted by Irani, S., PhD (UC Irvine, Simons Associate Director)*
 - *Provided with Funding for Travel, Lodging and Per-Diem (1 of 8, \$3,500 U.S.)*

SPECIAL HONOURS

- ❖ *Invited Student Participant, 11th Heidelberg Laureate Forum (HLF)* 2024
 - *Handpicked as 1 of 100 candidates in Maths (or Computer Science) to attend the Forum in Heidelberg. Chosen candidates represent promising young researchers who are given the opportunity to interact with the brightest minds in Mathematics and Computer Science (i.e. winners of the Turing award, The ACM Prize in Computing, Fields Medal, IMU Abacus Medal and Nevanlinna Prize).*
- ❖ *Chosen as 1 of 30 to present a poster at the Heidelberg Laureate Forum* 2024
 - *chosen participants receive a certificate*
- ❖ *Named on LDV Capital List as 1 of 120 Brilliant Women in Visual Tech and AI* 2024

TEACHING EXPERIENCE

- ❖ **PhD Teaching Fellow**, iSchool Inclusion Institute (i3), "Computational Thinking" 2023
 - *1 of 2 PhD applicants chosen to design and teach curriculum for 10-day Summer course at the University of Texas at Austin (with S. Stueve, co-teaching fellow)*
 - *Provided salary and funded with accommodation, flight and stipend for supplies.*
- ❖ **Guest Lecturer**, "Privacy Law and Policy", University of Vermont (UVM) 2021
 - *Presented research work on Impacts of Data Leakage and Data Privacy*
- ❖ **Graduate Teaching Assistant**, University of Vermont (Fall / Spring) 2019-2020
 - Compiler Construction (with Haskell), Programming for Engineers (with Matlab), Data Privacy (Differential Privacy, K-anonymity, Machine Learning with Python),*
- ❖ **Graduate Teaching Assistant**, University of Vermont (Fall / Spring) 2019-2020
 - Advanced Web Design (Lead Teaching Assistant)*

GRANT WRITING / PROPOSALS (SELECTED)

- ❖ *Summer of Bitcoin, "Price of Anarchy in Selfish Routing On the Lightning Network" (Research proposal with 0.4% acceptance rate, Awarded \$3,000)* 2022

GRANT WRITING / PROPOSALS (SELECTED)

- ❖ COST Action Proposal OC-2021-1-25315 “Mathematics and Algorithmics of Group actions and Isogenies for Cryptography” (Secondary Proposer) 2021
- ❖ Microsoft Research, Reinforcement Learning Open Source Festival Proposal (Awarded \$10,000) 2021
- ❖ Google Summer of Code, Proposal to Haskell.org (Awarded \$6,000) 2018
- ❖ Helium Grant, (for exploring questions on the edge of mainstream thinking) (1 of 11 chosen out of 700 applicants; Awarded \$1,000) 2018

RESEARCH AWARDS (SELECTED)

2nd Place Winner, Best Research Project (tie with X. Zhang), 2022
UVM CS Research Day for “Price of Anarchy in Selfish Routing on the Lightning Network”
Best Poster, Brilliant Idea Category, Mediterranean Machine Learning Summer School 2021

ACADEMIC REVIEWER (SELECTED)

AAAI-24 Workshop on Privacy-Preserving Artificial Intelligence (2024), Safe and Trustworthy AI (STAI) at International Conference on Logic Programming 2023 (ICLP),
Algorithmic Fairness through the Lens of Time at NeurIPS 2023 (AFT), AAAI 2023 Workshop on Privacy Preserving Artificial Intelligence (PPAI), PML4DC (Practical Machine Learning for Developing Countries), ICLR / NeurIPS: Algorithmic Fairness through the Lens of Causality and Privacy, ICLR Distributed and Private Machine Learning (DPML), Tiny Papers Workshop at ICLR 2023, Black in AI Workshop @ NeurIPS (2020-present), Springer’s AI Ethics Journal

REVIEWER (OTHER)

Effective Haskell, by R. Skinner: book on Haskell programming.

SUMMER SCHOOLS

(all summer schools were fully funded: lodging, flight, registration provided)

- Participant, QSim (Quantum Simulation) Summer School 2024
 - (August 8th through 11th, Rhode Island)
- Participant, SLMATH 1068, IBM Research Zurich, (Zurich, Switzerland) 2024
 - “Introduction to Quantum-Safe Cryptography” (June 24th to July 5th),
 - Covers lattice, code-based, isogeny-based and multivariate cryptography
 - Organised by Bootle J., and De Feo L.
- Virtual Participant intern, Co-design Center for Quantum Advantage (C²QA) 2024
 - QIS 102 Applied Quantum Computing Summer School at Brookhaven National Laboratory (June 10th-June 28) (provided \$500 weekly stipend) (I Personally declined opportunity because of my internship offer)
- Hausdorff Research for Mathematics: Formalization of Mathematics (Bonn) 2024
 - Workshop focused on formalising Mathematics in proof assistant
 - In either Lean, sTEX, Naproche, Coq, Isabelle HOL, etc (May 13-17)
- Participant, IAS/ PCMI Graduate Research Summer School, (3 weeks) 2023
 - Topic of “Quantum Computing” covered algorithms, information theory, Cryptography and error-correcting codes.

RESEARCH PhD INVITATIONS (ABRIDGED)

- Participant, Twelfth Summer School on Formal Techniques + FMITF Bootcamp 2023
 - Two-week workshop in Atherton, California covering Alloy, PVS, Vampire
 - And interactive proof checkers for applied formal methods domains
- Virtual Participant, Physics of Quantum Information, Perimeter Institute (Canada) 2024
- Participant, 10th International Conference on Quantum Information and Quantum Control (CQIQC-X) at the Fields Institute (Toronto, Canada) 2024
- Participant, Underrepresented Students in Topology and Algebra Research Symposium 2024
 - USTARS: granted lodging, travel, meals (University of Iowa)
- Virtual Participant, Summer of Quantum, Laboratory for Physical Sciences (LPS) (2 wks) 2023
 - Qubit fundamentals, hardware, Quantum Algorithms, error-correcting codes
- Participant, QSim Summer School (Rhode Island) (Rhode Island, United States) 2024
- Mentee, Supervised Program for Alignment Research (SPAR) 2024
 - Chosen to work on research for Satisfia research project by PI Heitzig J.
- Virtual Participant, "Connecting Heavy Tails and Differential Privacy in Machine Learning" 2024
 - Hosted by the Alan Turing Institute and the Newton Gateway for Mathematics
- Participant, WIN6, (mentors: Lauter K., Newton R.) 2023
 - Research project at BIRS, to be published in 10th WIN proceedings 2024 (Banff, Canada)
 - Received award for lodging, travel (~1 of 42) (March 26th to March 31st)
- Participant, American Institute of Mathematics (AIM) workshop on 2024
"Post-Quantum Group-Based Cryptography" (Pasadena, California) (\$750 funding)
- Participant, Hausdorff Research Institute for Mathematics, "Formal Mathematics" (Lean) 2024
 - Given housing, funding for flight (1100 Euro)
- Participant, BIRS, Isogeny-based cryptography Banff research workshop 2023
 - Co-organized by de Quehen, Petit C. and Martindale C.
- Participant, SQuInT Chemistry Fellowship (to attend Southwest Quantum Information 2023
- Invited Participant, 2023 Fields Medal Student Symposium, Birkar C., (Virtual) 2023
- Participant, Quantum Workshop at North Carolina State (Nov 18-19) 2023
- Participant, High Assurance Cryptographic Software (HACS) (Toronto, Canada) 2024
 - Received funding for flight, lodging, and granted free registration (\$1200 funding)
- Participant, IPAM "Machine Assisted Proofs" (Feb 13-17), (Los Angeles, California) 2023
 - Formal methods at the intersection of Pure Mathematics and Computer Science
 - Received award for lodging, waived registration
- (organized by E. Abraham, J. Avigad, J. Ellenberg, M. Heule, T. Tao, K. Buzzard, T. Gowers)
- Participant, PCMI Graduate Summer School (1 of 50), "Quantum Computation" (3 weeks) 2023
 - Awarded full funding (housing, registration, flight) (July 16-August 5th)
 - Coursework on: Quantum and quantum-inspired linear algebra,
 - Quantum fourier transforms and quantum information theory, LDPC codes
 - Topological aspects of quantum codes, quantum hamiltonian complexity
 - Quantum learning theory
- Participant, Rethinking Number Theory (4th edition) 2023
 - Collaborative research in Number Theory (June 12th to 23rd and beyond)
 - Organized by A. Serrano López, M. West, H. Goodson

RESEARCH PhD INVITATIONS (ABRIDGED)

Participant, Twelfth Summer School on Formal Techniques + FMITF Bootcamp	2023
<ul style="list-style-type: none">- Received admission, housing and funding for flight- Labs using Vampire Theorem Prover, Alloy, TPTP, PVS, Easycrypt- Guest lecture on Paxos by L. Lamport (May 23rd to June 2nd) (Menlo College, Atherton)	
Participant, ICERM's LMFDB, Computation and Number Theory (LuCaNT) workshop	2023
<ul style="list-style-type: none">- (Provided housing, registration)	
Invited Participant, Lorentz Center, "Machine-Checked Proofs", Leiden, the Netherlands	2023
<ul style="list-style-type: none">- Lean Workshop, Funding (provided housing, funding for travel)	
Invited Participant, High Assurance Crypto Software (HACS) (Tokyo, Japan)	2023
<ul style="list-style-type: none">- (Post-quantum) cryptographic verification workshop (conflicted with WIN6)	
Invited Participant, CrossFyre at Eurocrypt (Lyon, France)	2023
<ul style="list-style-type: none">- Cryptography, Robustness and Provably Secure Schemes for Female Young Researchers: presented research poster	
(Received funding for accommodation, registration and flight courtesy of PQ-Shield)	
Participant, Arizona Winter School, "Abelian Varieties"	2024
<ul style="list-style-type: none">- Abelian Varieties (Tucson, AZ)	
Participant, Arizona Winter School, "Point Counting and Applications" (J. Pila)	2023
<ul style="list-style-type: none">- Applications of Point-counting for algebraic points of bounded degree (Tucson, AZ)	
Virtual Participant, "Algebraic Cycles, L-Values, and Euler Systems": MSRI	2023
<ul style="list-style-type: none">- Originally granted registration but opted for virtual attendance	
Virtual Participant, Research Institute for Mathematical Sciences (RIMS)	2023
<ul style="list-style-type: none">- Zeta functions and their representations	
Participant, 1st Roots of Unity reunion, American Institute of Mathematics, Pasadena CA	2023
Participant, Doctoral Consortium at ACM Richard Tapia Conference (Washington, D.C.)	2022
Participant, 1st Roots of Unity Summer School: Arithmetic Geometry group (fully-funded)	2022
<ul style="list-style-type: none">- focus on Arithmetic Geometry and Arithmetic Statistics with six PhD students	
Invited to proceeding AWM Research Symposium at University of Minnesota (UMN))	2022
Invited Participant, IAS/ Park City Mathematics Institute (PCMI)	2022
<ul style="list-style-type: none">- Graduate Summer School, Computational Number Theory (fully-funded: declined offer)	
Virtual Participant, BIRS, Algebraic Methods in Coding Theory and Communication	2022
Virtual Participant, COGENT: Cohomology, Geometry and Explicit Number Theory	2022
Virtual Participant, Stinson66: New Advances in Designs, Codes and Cryptography	2022
Virtual Participant, Arizona Winter School, Southwest Arithmetic Geometry Center	2022
<ul style="list-style-type: none">- Automorphic Forms beyond GL₂: Unitary Groups Study Group (mentor E. Eischen)	
Virtual Participant, West Coast Number Theory (WCNT): Problems in Number Theory	2021
Selected Participant, GREPSEC VI (1 of 42)	2023
Participant, GREPSEC V:	2021
<ul style="list-style-type: none">- (Graduate Students in Privacy and Security Early Career Workshop)	
Participant, Isogeny-Based Cryptography Winter School	2021
Participant, Post-Quantum Networks Workshop	2021
Participant, PRIMA Summer School	2021
<ul style="list-style-type: none">- Rational curves and moduli spaces in arithmetic geometry	

MERIT-BASED GRANTS / FELLOWSHIPS / SCHOLARSHIPS (ABRIDGED)

Fellow, SQulnT Chemistry Fellowship (to attend Southwest Quantum Information And Technology (SQulnT) (flight, housing and registration covered) (1 of 5)	2023
Fellow, Institute for Logic and Data Science (ILDS) Coq and Lean Autumn School	2023
- Part of the Working Formal Methods Symposium (Bucharest, Romania)	
SOUPS 2023 Grant for Black Computer Science Students (USENIX 2023)	2023
Initiative for Cryptocurrencies and Contracts (IC3) Blockchain Bootcamp	2021
- Worked on group project : Fairness consensus for Miner Extractable Value (MEVs)	
- Implemented Aequitas protocol from paper with authors for fairness simulation	
- One of top 4 teams in hackathon	
Participant, Self Organizing Conference on Machine Learning (SOCML)	2021
- Machine Learning, and Privacy session, Moderated by U. Erlingsson	2021
- organized by I. Goodfellow (1 of 9 chosen)	
(Privacy Engineering Practice and Respect) PEPR Grant, S&P Oakland	2022
Fellow, BlackComputeHER (2022-2023) (1 of 11)	2022
Scholarship winner (to attend Richard Tapia Celebration of Diversity in Computing)	2022
- (registration, flight, hotel costs, Washington D.C. courtesy BNY Mellon)	
Google Grace Hopper Conference (GHC) Scholarship	2021
WISP & Black Hat USA Briefings Scholarship (1 of 25)	2021
Kernel Fellowship Block III via Gitcoin (Security: Zero Knowledge Proofs project)	2021
Gitcoin Scholarship for Women (for Kernel Fellowship Block III)	2021
She256 Mentorship focused on ZK Snarks (6 months)	2021

OTHER GRANTS/ FELLOWSHIPS (ABRIDGED)

Quantum Information Processing (QIP) Student Stipend	2024
USENIX Security Conference 2021 (via USENIX Diversity Grant via GREPSEC V)	2021
TechX Social Impact / Harvard Franklin Fellowship (1 of 12)	2020
USENIX Enigma Grant	2021
NCAS Workshop participant (NASA Community College Aerospace Scholars)	2016
Who's Who/ Peggy Williams Memorial Scholarship/ Best BFA Award (Best of Major)	2008
Northeast Combinatorics, Discrete Maths Day (lodging)	2022
Upstate Number Theory Conference 2021 (lodging provided)	2021
IEEE Symposium on Security and Privacy (student travel grant, complimentary ticket)	2021
4th Annual ZK-Proof Workshop (complimentary ticket)	2021
WISP Privacy+Security Conference	2021
- EU Data Law / De-Identification Workshop (Scholarship via WISP)	
ICERM (Brown University) Variable Precision in Mathematical & Scientific Thinking	2020
RWC2020 (Real World Crypto: registration, flight, lodging) Grant via IACR	2020
PL+HCI Swimmer Summer School (on Programming Languages and Usability)	2020
Sage-Days-104 : To work on SageMath Software: Arithmetic Dynamics	2019
Simons Institute (Berkeley) Error-Correcting Codes and High-Dimensional Expansion Boot Camp (attendee)	2019
ICERM (Brown University) Encrypted Search Workshop Grant (Lodging provided)	2019
Cornell Number Theory Conference Grant (Lodging provided)	2019
MSRI (Mathematical Sciences Research Institute) Grants to attend:	
Optimal Transport and applications to machine learning and statistics	2020

OTHER GRANTS/ FELLOWSHIPS (ABRIDGED)

Connections for Women:	2019
- Derived Algebraic Geometry, Birational Geometry and Moduli Spaces workshop	
- Introductory Workshop: Derived Algebraic Geometry and Birational Geometry And Moduli Spaces	
Racket Summer School (National Science Foundation Grant)	2018-2019
PLMW (Programming Languages Mentorship Workshop)	2018
ICFP (International Conference Functional Programming)	
PLMW(Programming Languages Mentorship Workshop)	2018
PLDI (Programming Languages Design and Implementation)	
OPLSS (Oregon Programming Languages Summer School Grant) - declined offer	2018

INSTITUTIONAL PROSPECTIVE FACULTY PhD INVITATIONS

❖ Invited Participant, Rochester Institute of Technology: RIT Pathways to RIT (Pathways from PhD to Faculty programme)	2023
❖ Invited Participant, Rochester Institute of Technology: Pathways to RIT Computing edition	2023

INDUSTRY PhD INVITATIONS (ABRIDGED)

Participant, Goldman Sachs' Women's Possibilities Summit (~10% of 11,000 applicants)	2024
Participant, Adobe's Experience Day for Research	2023
Participant, Goldman Sachs HackerRank Prep	2023
Participant, Meta's Uniting Scholars in Research (Menlo Park, Palo Alto) (1 of 35)	2022
Virtual Participant, Jane Street's Preview Program, The Game Show / Trading Games	2022
Virtual Participant, Adobe's Experience Day:Research Track (Emerging Devices)(1 of 35)	2022
Participant, Facebook, Amplified: Above & Beyond Computer Science Program (PhDs)	2021
Participant, Facebook's Amplified: Virtual Vivid in Research (1 of 30)	2021
Participant, Galois 1st Summer School on Trustworthy Machine Learning (1 of 35)	2021
Participant (via CSRMP), Google PhD Fellowship Summit	2021
Participant, Jane Street PhD Symposium (New York, remote) (Quant Research)	2021
Participant, TwoSigma Mock Interview Day for Early Career Women (Quant Research)	2021
Participant, Twitter PhD ML Flock Event (New York, Boston office)	2019

GRADUATE SCHOOL INTERNSHIPS

Visa Research, Staff Research Scientist Intern, Advanced Cryptography Group	2024
JP Morgan, Quantitative AI Research, Summer Associate (New York) (1 of 10)	2022
Summer of Bitcoin, Blockchain (Lightning Network) PhD Research intern (remote)	2022
Microsoft Research, Independent Contractor, Summer 2021 (New York: remote)	2021
Microsoft, PhD Intern, Summer 2021 (Redmond: remote)	2021
Autodesk, PhD Intern, Summer 2020 (Pier 9, San Francisco: remote)	2020

RELEVANT WORK / INDUSTRY EXPERIENCE (Pre-Grad school)

Mercury Banking (Haskell fintech) : Software Engineering Intern (San Francisco)	2019
Apple, Inc.: Software Engineering Intern (Sunnyvale)	2019
Google Summer of Code: Developer for Haskell.org	2018
Mozilla: Increasing Rust's Reach Developer	2018

OTHER (ACADEMIC) TALKS (ABRIDGED)

<i>"Experimental Investigation of Lehmer's Conjecture for Elliptic Curves", (20 minutes)</i>	2024
<ul style="list-style-type: none">- Talk at the Arizona Winter School, on the topic of Abelian Varieties.- Joint with Clark J. M., Dombrowsky C., Iranzo M. C., Katz S., Orvis E., (SW-AWS)	
<i>Invited Talk, Carnegie Mellon University Graduate Computer Science Seminar (20 mins)</i>	2024
<ul style="list-style-type: none">- "Post-Quantum Secure Recursive Proofs of Isogeny Knowledge with Reduced Time Complexity; a case for Formal Methods", SSSG seminar	
<i>Simons Institute, Quantum Fault Tolerance workshop Lightning Talk (10 mins)</i>	2024
<i>Presenter, Google CSRMP, "Quantum backtracking and implications to cryptography"</i>	2023
<i>Number Theory in Quantum, American Institute of Mathematics (AIM),</i>	2023
<i>Roots of Unity Workshop, Caltech (Pasadena, Los Angeles)</i>	
<i>"Compositional Isogeny Schemes", Tapia Doctoral Consortium (45 minutes)</i>	2022
<i>"A Journey through Unboundedness of ranks of Elliptic Curves", (15 minute talk)</i>	2022
<i>Roots of Unity Workshop (joint talk with O. Del Guercio and M. Bustos Gonzalez)</i>	
<i>Brown University, Fair February talk on Security, Privacy, Fairness (30 minutes)</i>	2022
<i>Meetup "Math for Math's Sake", Virtual Lightning Talk (10-15 minutes)</i>	2022
<i>"Isogenies, Elliptic Curves and Random Walks on Random Graphs"</i>	
<i>"Composable Forgetful Isogenies", Google CSRMP Research Alumni Talk (30 minutes)</i>	2022
<i>"Price of Anarchy in Selfish Routing", Graph Theory and Spectral Graph Theory (15 min)</i>	2022
<i>"Price of Anarchy in Selfish Routing", Google CSRMP Research Alumni Talk (30 minutes)</i>	2022
<i>CS Research Day, "Price of Anarchy in Selfish Routing", UVM (16 min)</i>	2022
<i>"Composable Forgetful Isogeny Graph Cryptography", Google CSRMP Research</i>	2021
<i>"Isogeny Cryptography", School for Poetic Computation, Re-learning to love Maths</i>	2021
<i>PLAID Lab Speaker, "Information Theory: from Spacecraft to Blockchain"</i>	2021

INDUSTRY TALKS (ABRIDGED)

<i>IBM Research "Foldable Schemes for Isogeny-Based Cryptography" (10 minutes)</i>	2024
<ul style="list-style-type: none">- Talk given at SL Math's "Quantum Safe Cryptography" workshop in Zurich	
<i>"Isogeny-Based Cryptography", JP Morgan AI Research Cryptography Group (1 hour)</i>	2022
<i>JP Morgan AI Research Weekly Technical Meeting, (New York) (20 min)</i>	2022
<i>JP Morgan AI Research Reading Group Meeting (30 min)</i>	2022
<i>JP Morgan Summer Symposium (10 min)</i>	2022
<i>Women Who Code: SageMath: "Computational (Pure) Mathematics/Graph Theory"</i>	2022
<ul style="list-style-type: none">- Lightning Talk (2-4 min)	
<i>"Prediction Sensitivity for Fairness in AI", Jane Street Symposium (15 minutes)</i>	2021
<i>"Renyi-Differential Privacy", Autodesk UX Group (20 minutes)</i>	2020

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS (SELECTED)

<i>Mentee, Goldman Sachs Possibilities Mentorship, Noonan, H.</i>	2024
<i>Mentee, Black Scholars Doctoral Mentorship</i>	2023
<ul style="list-style-type: none">- Mentor: K. Clark, PhD.	
<i>Mentee, Institute for African-American Mentoring in Computing Sciences (IAAMCS)</i>	2023
<ul style="list-style-type: none">- Mentor: J. Gilbert, PhD	
<i>Mentee, LXAI Computer Vision (LXCV) at CVPR (Computer Vision) workshop</i>	2023
<ul style="list-style-type: none">- Mentor: F. N. Paravecino, PhD (Research collaborations)	

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS (SELECTED)

Mentee, Algorithmic Game Theory Workshop (AGT), Economics and Computation	2022
- (mentor: H. Zhang, PhD), paper dissection and Ask me Anything session	
Mentee, MD4SG Mentorship Program, with J. Finocchi, PhD (1 of 3)	2022-2023
Mentee, AiC Connectors Program with Facebook, with S. Lim, PhD	2022
Mentee, BlackComputeHer Fellowship, with Y. Rankin, PhD, A. Robinson, M.Ed	2022
Mentee, Microsoft's Tech Resilience (mentors: O. Kroshkina, M. Ward)	2022
Mentee, Google's CS Research Mentorship Program (CSRMP) with A. Lees, PhD	2021
Mentee, AiC Connectors Program with Facebook with O. Dalleau, PhD	2021
Mentee, She256 Blockchain Group with P. Mishra, PhD	2021
Mentee, Women in Privacy and Security (WISP), D. Sharma, PhD	2021
Mentee, Algorithmic Game Theory (AGT), Economics and Computation Conference	2020
- Global Outreach Mentorship with S. Gupta, PhD (EC 2020)	
Mentee, Mentored by A. Ahmed, PhD,	2020-present
- ICFP 2020, ACM SIGPLAN-Mentorship, organized by T. Ringer	

CLASSES (AUDIT)

Preliminary Arizona Winter School, "Abelian Varieties over Finite Fields", by L. Dembele	2023
Preliminary Arizona Winter School, Model Theory and Applications, taught by R. Nagloo	2022-2023
QWorld QClass 551: Quantum Software Development with Classiq	2023
- Quantum Algorithm Research Project under mentorship of a Principal Investigator	
- Requires project written manuscript (1 out of 80 accepted from ~400 applicants)	
- Received Classiq Bootcamp certificate (10/13/23)	
Stanford: EE 374 : Internet-Scale Consensus in the Blockchain Era (Spring)	2021
- Information Theory class focused on scalability and protocols in Blockchain	
- Taught by D. Tse, PhD through Stanford University	
- Audited class, scribed for Lecture 11, Spring 2021	
Matroids & Polytopes, Theory of Algebraic Differential Equations, Elementary Number Theory, Fundamentals of Mathematics, Extremal Graph Theory, Model Theory and Applications	
- IBM Qiskit Global Summer School (Quantum Computation using Qiskit)	2020

HACKATHON (Quantum Computing) 2023-2024

- Project: "Quantum project using noisy intermediate-scale quantum (NISQ) Devices"
 - Project on homomorphic encryption for federated quantum models using Genomic DNA data (team of 3).
 - Used Qiskit, PennyLane, Flwr, Tenseal, implemented Differential Privacy And Homomorphic encryption to win First place (\$10,000 team award)

Skills: Python, LaTeX, SageMaths, Qiskit, Classiq, Haskell, Matlab, Jupyter, Pytorch, SQL, AWS, Azure, PySpark, Git, Lean (3; not 4...yet!), Z3, writing proofs.

PRESS (SELECTED)

Blogpost for the Mathematical Association of America (MAA) Grad Student Blog (April)	2024
Publication Featured in Montreal AI Ethics Institute (MAIEI) newsletter	2022
Publication work Featured in BitMEX Research blog	2022
Featured / interviewed in articles / media by Coursera, NASA-JPL, Google, Udacity, The MacArthur Foundation, Venture Beat, The Data Standard, Corecursive Podcast,	2016-present

PRESS (SELECTED)

OpenMined, Career Girls, Dataiku, Scott Hanselman's Podcast, BlackComputeHer, NASA Tech Briefs (40th anniversary), Variety, ACM SPLASH 2022 PLMW Perspectives, the Los Angeles Times, Black Girls Code colouring book on Women Scientists, Women of Silicon Valley, CareerGirls, The Summer of Bitcoin experience (SBOE), Technovation, Rewriting the Code, Montreal AI Ethics Institute, Code 2040 Alumni event (2024) QC-AI Meetup, etc.

LEADERSHIP and SERVICE (SELECTED)

Co-Workshop Organizer, Tiny Papers Track at ICLR (Vienna, Austria)	2024
Student Volunteer, IEEE International Conference on Quantum Computing And Engineering (QCE)	2023
(Junior) Program Committee, Safe and Trustworthy AI (STAI) at the International Conference on Logic Programming (ICLP)	2023
Co-Committee / Area Chair, Broadening Participation and Tiny Papers Workshop at International Conference of Learning Representation (ICLR)	2023
Co-Committee, Broadening Participation and Co-Submitting Summer School at International Conference of Learning Representation (ICLR)	2022
Program Committee, BlackAIR Programme	2021
Virtual Co-Organizer, Women in Machine Learning, Black In AI at NeurIPS (NeurIPS)	2020
Virtual Volunteer Chair, Empirical Methods in Natural Language Processing (EMNLP)	2020
Virtual Student Volunteer, International Conference of Machine Learning (ICML)	2020
Virtual Student Volunteer, International Conference of Functional Programming (ICFP)	2020
Student Volunteer, Programming Languages and Design Conference (PLDI)	2018
Student Volunteer, International Conference of Functional Programming (ICFP)	2018
Invited Student Volunteer, SIGPLAN conference on Systems, Programming, Languages and Applications (SPLASH) (declined offer)	2018
Student Volunteer, Principles of Programming Languages (POPL)	2017

ACADEMIC ASSOCIATION FOR COMPUTING MACHINERY (ACM) MEMBERSHIPS

<i>Student Member, International Association of Cryptologic Research (IACR)</i>	<i>2020-present</i>
<i>SIGecom Special Interest Group on Economics and Computation</i>	<i>2020-present</i>

NON-ACADEMIC MEMBERSHIP

<i>Member, Quantum Resource Estimation Group</i>	<i>2023-present</i>
<i>Member, Isogeny Research Club</i>	<i>2023-present</i>
<i>Member, Women in Cryptography</i>	<i>2023-present</i>
<i>Student Member, IEEE Computer Society Technical Committee on Security and Privacy</i>	<i>2021-present</i>
<i>Member, Women in Number Theory</i>	<i>2018-present</i>
<i>Member, QVNTS (Quebec-Vermont Number Theory Seminar)</i>	<i>2021-present</i>
<i>Member, Women in Combinatorics</i>	<i>2021-present</i>
<i>Member, Association for Women in Mathematics</i>	<i>2021-present</i>
<i>Member, She256</i>	<i>2021-present</i>
<i>Member, Women in Security and Privacy (WISP)</i>	<i>2020-present</i>
<i>Member, IEEE Information Theory Society, Santa Clara Valley Chapter</i>	<i>2016-present</i>