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

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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" (submitted)* 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 **EAAMO Doctoral Consortium**)*
- *"Towards a Measure of Individual Fairness for Deep Learning"* *2020*
  *(**Maughan, K.** and Near, J.) - presented as poster for **MD4SG***
- *"Towards Auditability for Fairness in Deep Learning"* *2020*
  *(Ngong, I., **Maughan, K.** and Near, J.)- presented as poster for **AFCI at NeurIPS***

Pre-prints:

- *"Improving Utility for Analysis of Correlated Columns using Pufferfish Privacy"* *2022*
  *(**Maughan, K.** and Near, J.)*

Accepted Workshop Conference Posters:

- *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** Poster for Quantum Information Processing conference, Taipei, Taiwan* — *2023*
- *"Compositional Isogeny Schemes"- poster presented, **CrossFyre at Eurocrypt** Poster for workshop on Provably Robust Schemes, Lyon, France (**Maughan, K**)* — *2023*
- *"Compositional Isogeny Schemes"- presented as poster at **ACM Richard Tapia** Poster Competition at Conference, Washington, D.C. (**Maughan, K**)* — *2022*
- *"Archipelago Penseė" (**Maughan, K.**) - presented as a poster for Resistance AI (**RAIS) at NeurIPS*** — *2020*

Collaboration on Other Research Projects in Progress:

- *Mathematical Cryptography: Work on Compositional Isogeny Schemes (ongoing) (PI: C. Vincent, Near J. PhD, **Maughan, K.**)* — *2022-present*
- *Error-correcting codes / LDPC using group algebras* (PI: Chimal-Dzul, H., Hoffer W., **Maughan, K.**, Maya N.A., W., Morris K.) — *2023-present*
- *Expander properties of Isogenies (Arpin, S., Bowen R., Clements J., Codogni G., Eisenträger K., Ghantous W., Bo Lau J., LeGrow J., Macula J., Mahaney W., **Maughan. K**., Morrison T., Orvis E., Rickards J., Sabitova M., Scullard G., Zobernig L.)* — *2023-present*
- *Quantum Backtracking for Constraint Satisfaction Problems (CSP) (Jhunjhunwala V., **Maughan K.** PI: Schirman E.)* — *2023-present*
- *"Experimental Investigation of Lehmer's Conjecture for Elliptic Curves", (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)* — *2024-present*
- SPAR Project on Interacting Agents for Safety Constraints (***Maughan K.** and several authors, PI: Heitzig J., PhD*) — 2024-present
- Graphs research (***Maughan K.,** PI: Rombach, P.*) — 2023-present
- *Summer Research Project (PIs: Chakraborty S PhD., Alamati N., PhD, Nascimento A., PhD.)* — *2024-present*
- *Post-Quantum Cryptography project (**Maughan K.,** and other co-authors, PI: Cherkaoui, I.)* — *2024-present*
- Independent research project (*PI: Lees A., PhD, **K. Maughan***) — 2023-present
- *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.)*

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*
- ❖ *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.

RESEARCH PhD INVITATIONS (ABRIDGED)

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*

Participant, Twelfth Summer School on Formal Techniques + FMiTF Bootcamp 2023
- *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
- *(Provided housing, registration)*

RESEARCH PhD INVITATIONS (ABRIDGED)

Invited Participant, Lorentz Center, "Machine-Checked Proofs", Leiden, the Netherlands 2023
- *Lean Workshop, Funding (provided housing, funding for travel)*

Invited Participant, High Assurance Crypto Software (HACS) (Tokyo, Japan) 2023
- *(Post-quantum) cryptographic verification workshop (conflicted with WIN6)*

Invited Participant, CrossFyre at Eurocrypt (Lyon, France) 2023
- *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
- *Abelian Varieties (Tucson, AZ)*

Participant, Arizona Winter School, "Point Counting and Applications" (J. Pila) 2023
- *Applications of Point-counting for algebraic points of bounded degree (Tucson, AZ)*

Virtual Participant, "Algebraic Cycles, L-Values, and Euler Systems": MSRI 2023
- *Originally granted registration but opted for virtual attendance*

Virtual Participant, Research Institute for Mathematical Sciences (RIMS) 2023
- *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
- *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
- *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
- *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
- *(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
- *Rational curves and moduli spaces in arithmetic geometry*

MERIT-BASED GRANTS / FELLOWSHIPS / SCHOLARSHIPS (ABRIDGED)

Fellow, SQuInT Chemistry Fellowship (to attend Southwest Quantum Information And Technology (SQuInT) (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

MERIT-BASED GRANTS / FELLOWSHIPS / SCHOLARSHIPS (ABRIDGED)

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*

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*
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*

OTHER GRANTS/ FELLOWSHIPS (ABRIDGED)

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)

"Experimental Investigation of Lehmer's Conjecture for Elliptic Curves", (20 minutes) *2024*
- *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)*

Invited Talk, Carnegie Mellon University Graduate Computer Science Seminar (30 mins) *2024*

OTHER (ACADEMIC) TALKS (ABRIDGED)

Simons Institute, Quantum Fault Tolerance workshop Lightning Talk (10 mins) 2024
Presenter, Google CSRMP, "Quantum backtracking and implications to cryptography" 2023
Number Theory in Quantum, American Institute of Mathematics (AIM), 2023
Roots of Unity Workshop, Caltech (Pasadena, Los Angeles)
"Compositional Isogeny Schemes", Tapia Doctoral Consortium (45 minutes) 2022
"A Journey through Unboundedness of ranks of Elliptic Curves", (15 minute talk) 2022
Roots of Unity Workshop (joint talk with O. Del Guercio and M. Bustos Gonzalez)
Brown University, Fair February talk on Security, Privacy, Fairness (30 minutes) 2022
Meetup "Math for Math's Sake", Virtual Lightning Talk (10-15 minutes) 2022
"Isogenies, Elliptic Curves and Random Walks on Random Graphs
"Composable Forgetful Isogenies", Google CSRMP Research Alumni Talk (30 minutes) 2022
"Price of Anarchy in Selfish Routing", Graph Theory and Spectral Graph Theory (15 min) 2022
"Price of Anarchy in Selfish Routing", Google CSRMP Research Alumni Talk (30 minutes)2022
CS Research Day, "Price of Anarchy in Selfish Routing", UVM (16 min) 2022
"Composable Forgetful Isogeny Graph Cryptography", Google CSRMP Research 2021
"Isogeny Cryptography",School for Poetic Computation, Re-learning to love Maths 2021
PLAID Lab Speaker, "Information Theory: from Spacecraft to Blockchain" 2021

INDUSTRY TALKS (ABRIDGED)

"Isogeny-Based Cryptography", JP Morgan AI Research Cryptography Group (1 hour) 2022
JP Morgan AI Research Weekly Technical Meeting, (New York) (20 min) 2022
JP Morgan AI Research Reading Group Meeting (30 min) 2022
JP Morgan Summer Symposium (10 min) 2022
Women Who Code: SageMath: "Computational (Pure) Mathematics/Graph Theory" 2022
- *Lightning Talk (2-4 min)*

"Prediction Sensitivity for Fairness in AI", Jane Street Symposium (15 minutes) 2021
"Renyi-Differential Privacy", Autodesk UX Group (20 minutes) 2020

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS (SELECTED)

Mentee, Goldman Sachs Possibilities Mentorship, H. Noonan 2024
Mentee, Black Scholars Doctoral Mentorship 2023
- *Mentor: K. Clark, PhD.*

Mentee, Institute for African-American Mentoring in Computing Sciences (IAAMCS) 2023
- *Mentor: J. Gilbert, PhD*

Mentee, LXAI Computer Vision (LXCV) at CVPR (Computer Vision) workshop 2023
- *Mentor: F. N. Paravecino, PhD (Research collaborations)*

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. Finocchiaro, 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. Dalleleau, PhD 2021
Mentee, She256 Blockchain Group with P. Mishra, PhD 2021

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS (SELECTED)

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 (TRANSFER CREDIT)

University of Waterloo via Fields Academy, Algebraic Graph Theory and Quantum Computing (by Godsil C., PhD) *2024*

- *Quantum walks and Quantum homomorphisms, automorphisms and colouring*
- *Also invited to and attended Godsil75*

CLASSES (AUDIT)

QIndia: Fundamentals of Quantum Operations *2023*

- *Amplitude Amplification, Phase Estimation, HHL and Shor's Algorithm*
- *Capstone project on Amplitude Estimation*

Zaiku Group, Software Verification Course (online) *2023*

- *Class focused on Quantum Formalism, functional programming and Software verification for Homotopic Minds (taught by B. Ahrens, PhD) Final project involved formalising a SAT solver using Lean 3*

Zaiku Group, Quantum Formalism *2023*

- *Mathematical Tools of Quantum Mechanics*
- *Topics Included: Hilbert Spaces, Quantum Mechanics*
- *Teachers: Ramirez E., PhD, Arnott M., PhD*

Zaiku Group, Elliptic Curve Cryptography (ECC) *2023*

- *Mathematical Introduction to Elliptic Curve Cryptography*
- *Taught by Rakvi*

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)*

QWorld QClass 23/24: Introductory and Intermediate Level Quantum Courses *2023*

- *Quantum Algorithms with Classiq, Quantum Key Distribution,*
- *Introduction to Quantum Algorithms, Quantum Error Correction,*
- *Quantum Annealing, Topological Quantum Computing, Quantum Games*
- *Classiq Bootcamp (implementation of quantum challenges daily)*
- *Included workshop onTraining on PennyLane and QML by Xanadu (organized by QWorld, in conjunction with the University of Latvia)*

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*

CLASSES (AUDIT)

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*

Book Clubs:

Quantum Pseudorandomness (2024), Reed-Muller (RM) Codes (2024)*, Quantum Cryptography (2024)* [1], Quantum Computing (2022), Quantum Computing and Quantum Information (2022-2023: study group with Mathematicians, Physicists and Computer Scientists), HDX Expander Graphs (2022-2023)*

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.
Quantum benchmarking tools: Qualtran, Bench-Q, pyLiqtr, OpenFermion, Pennylane

PRESS (SELECTED)

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, 2016-present
The MacArthur Foundation, Venture Beat, The Data Standard, Corecursive Podcast, 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, QC-AI Meetup, etc.

LEADERSHIP and SERVICE (SELECTED)

Co-Workshop Organizer, Tiny Papers Track at ICLR (Vienna, Austria) 2024
DEI Chair, AISTATS (Valencia, Spain) 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

[1] Denotes Reading Clubs as a Visiting Scholar at Simons Institute for their Quantum, Fault Tolerant Computing workshop in Spring 2024.

LEADERSHIP and SERVICE (SELECTED)

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

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

NON-ACADEMIC MEMBERSHIP

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