

# Travis Morrison

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Institute for Quantum Computing	<code>https://travismo.github.io</code>
200 University Ave W	Citizenship: USA
Waterloo, Ontario N2L 3G1 Canada	Languages: English

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## EMPLOYMENT

2018 – Postdoctoral fellow, University of Waterloo, The Institute for Quantum Computing

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## VISITING APPOINTMENTS

2017 05 Intern, Microsoft Research, Cryptography group. (Mentor: Kristin Lauter)

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## EDUCATION

2018 05 Ph.D. Mathematics, Pennsylvania State University  
(Advisor: Kirsten Eisenträger)

2012 06 B.A. Mathematics, University of California, Santa Cruz

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## RESEARCH INTERESTS

Number theory and applications to cryptography. Security and machine learning.

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## PUBLICATIONS

1. Diophantine definability of nonnorms of cyclic extensions of global fields. *Transactions of the AMS* 372, pp. 5825-5850 (2019). `arXiv:1710.07357`.
2. Cycles in the supersingular isogeny graph and corresponding endomorphisms. (with Efrat Bank, Catalina Camacho-Navarro, Kirsten Eisenträger, and Jennifer Park). *Research Directions in Number Theory: Women in Numbers 4*, (2019). `arXiv:1804.04063`.
3. Supersingular isogeny graphs and endomorphism rings: reductions and solutions (with Kirsten Eisenträger and Sean Hallgren and Kristin Lauter and Christophe Petit). *EUROCRYPT 2018*. 40 pages.
4. Universally and existentially definable subsets of global fields (with Kirsten Eisenträger). *Mathematical Research Letters, Volume 25, No. 4* (2018). `arXiv:1609.09787`.

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## PAPERS SUBMITTED FOR PUBLICATION AND PREPRINTS

1. Chabauty-Coleman computations on rank one Picard curves. (with Sachi Hashimoto). 2020. `arXiv:2002.03291`
2. Computing endomorphism rings of supersingular elliptic curves and connections to pathfinding in isogeny graphs. (with Kirsten Eisenträger, Sean Hallgren, Chris Leonardi, and Jennifer Park). 2020. `arXiv:2004.11495`. *Accepted for publication in ANTS-XIV*.

3. Homomorphic Encryption Standard. (with Martin Albrecht and Melissa Chase and Hao Chen and Jintai Ding and Shafi Goldwasser and Sergey Gorbunov and Shai Halevi and Jeffrey Hoffstein and Kim Laine and Kristin Lauter and Satya Lokam and Daniele Micciancio and Dustin Moody and Travis Morrison and Amit Sahai and Vinod Vaikuntanathan). 2019. *Preprint*.

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## INVITED RESEARCH TALKS

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|------|----|---|
| 2020 | 1  | Clemson University, Colloquium  |
| 2019 | 11 | Virginia Tech University, Colloquium  |
|      | 11 | McMaster University, Model theory seminar   |
|      | 10 | Carnegie Mellon University, Algorithms, complexity, and optimization seminar  |
|      | 10 | University of Vermont, Arithmetic geometry seminar  |
|      | 06 | Microsoft Research, Cryptography colloquium   |
|      | 05 | "49th John H. Barrett Memorial Lectures", University of Tennessee, Knoxville, TN  |
|      | 03 | "AMS Spring Central and Western Sectional Meeting, Special Session on Emerging Connections in Number Theory" Honolulu, HI   |
|      | 03 | "AMS Spring Central and Western Sectional Meeting, Special Session on The Mathematics of Cryptography" Honolulu, HI         |
|      | 01 | "Joint Mathematics Meetings, AMS special session on Definability and decidability problems in number theory", Baltimore, MD |
| 2018 | 11 | "Elliptic Curve Cryptography 2018" Osaka  |
|      | 5  | Korean Institute for Advanced Study, Number theory seminar  |
|      | 4  | Cornell University, Number theory seminar   |
|      | 3  | Tufts University, Algebra, geometry, and number theory seminar  |
| 2017 | 12 | University of Michigan, Ann Arbor, Group, Lie, and number theory seminar  |
|      | 11 | "Rutgers-Newark Junior Number Theory Days" Newark, NJ   |
|      | 09 | Pennsylvania State University, Algebra and number theory seminar  |
|      | 03 | "Southeastern AMS Sectional Meeting, Special Session on Computability in Algebra and Number Theory" Charleston, SC          |
| 2016 | 10 | "Definability and Decidability Problems in Number Theory" Oberwolfach   |
|      | 10 | Pennsylvania State University, Algebra and number theory seminar  |

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## CONTRIBUTED TALKS

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| 2018 | 4  | "Upstate Number Theory 2018" SUNY Buffalo  |
|      | 1  | "Joint Mathematical Meetings, MAA General Contributed Paper Session on Number Theory II" San Diego, CA |
| 2017 | 05 | "Upstate Number Theory 2017" Binghamton University   |

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## ACADEMIC HONORS

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| 2018 |  | Ayoub Award in Algebra and Number Theory, Pennsylvania State Mathematics Department |
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- Global Programs Graduate Student Travel Grant, Pennsylvania State University (Declined)
- 2017 Mathematics department nominee for university-wide Penn State Alumni Association Dissertation Award, 2017
- 2011 Merit Fellowship, Outstanding project in Geometry, and Outstanding Project in Algebra, MASS 2011

## LEADERSHIP ROLES IN CONFERENCES

- 2020 – 2021 Organizing the AMS special session at JMM 2021 on "Mathematics of cryptography" with Angela Robinson and Gretchen Matthews.

## COMPUTER EXPERIENCE

- Languages: Python
- Packages: Sage, Magma

## TEACHING EXPERIENCE

### PENN STATE UNIVERSITY, UNIVERSITY PARK

- 2018 01 Math 231: Multivariable Calculus, *Instructor*
- 2015 – 2017 Ritner Experience, *Tutor*
- 2015 08 Math 231: Multivariable Calculus, *Instructor*
- Math 232: Integral and Vector Calculus, *Instructor*
- 2015 01 Math 36: Insights into Mathematics *Instructor*
- 2014 08 Math 36: Insights into Mathematics *Instructor*
- 01 Math 21: College Algebra II *Instructor*
- 2013 08 Math 36: Insights into Mathematics *Instructor*
- 2013 08 Math 110: Business Calculus *Teaching Assistant*
- 06 Math 251: Ordinary Differential Equations *Instructor*
- 01 Math 313a: Concepts of Geometry *Teaching Assistant*

## SERVICES

- 2019 – 2020 Organized cryptography reading group seminar at University of Waterloo
- 2017 – 2019 Reviewer or referee for: PQCrypto 2018, manuscripta mathematica, Crypto 2019, Number-Theoretic Methods in Cryptography 2019, Selected Areas in Cryptography 2019.
- 2013 – 2017 Penn State, Climate and Diversity Workshop, *Organizer, Lead organizer in 2015, nominated for Eberly College of Science Climate and Diversity Award in 2015.*
- 2013 – 2015 Penn State, Graduate Student Number Theory Seminar, *Organizer*
- 2015 – 2016 Penn State, Expand Your Horizons Workshop, Cryptography course, *Teaching Assistant*