

# Alexandra Veliche

aveliche@umich.edu ♦ (857) 869 – 7160

---

## Education

### University of Michigan, Ann Arbor, MI

PhD Pre-Candidate in Computer Science and Engineering department

Advisor: Mahdi Cheraghchi

Expected Graduation Date: May 2025

GPA: 4.00/ 4.00

### Northeastern University, Boston, MA

Bachelor of Science in Mathematics, Minor in Computer Science

Graduation Date: May 2020

GPA: 3.95 / 4.00

---

## Research Experience

### Shor's Algorithm and Its Impact on Present-Day Cryptography (Research Capstone)

Northeastern University

*Quantum Computing*

Fall 2018

- ♦ Advisor: Christopher King.
- ♦ Exposition of Shor's algorithm for factoring with focus on roots of unity in the quantum Fourier transform.
- ♦ Presented a poster at the Nebraska Conference for Undergraduate Women in Mathematics (NCUWM) at the University of Nebraska, Lincoln, NE, in February 2019.
- ♦ Gave a talk at the Hudson River Undergraduate Math Conference (HRUMC) at Smith College, MA, in March 2019.

### Nonlocality in Quantum Shallow Circuits (Junior-Senior Honors Thesis)

Northeastern University

*Quantum Computing*

Fall 2019

- ♦ Advisor: Christopher King.
- ♦ Proved some results in "Quantum Advantage of Shallow Circuits" [Bravyi-Gosset-König, 2017] for small examples and illustrated the role of nonlocality and graph states in solving the Hidden Linear Function Problem to separate the classes  $NC^0$  and  $QNC^0$ .
- ♦ Produced thesis paper and presented the project to professors and peers.
- ♦ Presented a poster at the NCUWM in February 2020.

### Randomness Extractors (Independent Research)

Northeastern University

*Cryptography*

Spring 2020

- ♦ Advisor: Daniel Wichs.
- ♦ Worked to prove that any good seeded extractor is a good two-source extractor and use for an alternative proof of the Leftover Hash Lemma.

### Lattice List-Decoding for Craig Lattices

University of Michigan

*Coding Theory & Cryptography*

Fall 2020 – present

- ♦ Collaborators: Christopher Peikert, Mahdi Cheraghchi
- ♦ Working toward extending results of *Lattice (List) Decoding Near Minkowski's Inequality* [Mook-Peikert, 2020]

### Mean-Based Trace Reconstruction over General Repeat Channels

University of Michigan

*Coding Theory*

Fall 2020 – present

- ♦ Collaborators: João Ribeiro, Joseph Downs, Mahdi Cheraghchi
- ♦ Working on proving upper bound for the number of traces needed for mean-based trace reconstruction for general repeat and repeat-insertion channels.

---

## Employment Experience

<b>Cengage Learning</b> <i>Cybersecurity Co-op</i>	Boston, MA January – July 2018
<b>Mathematics Department of Northeastern University</b> <i>Mathematics Tutor</i>	Boston, MA May 2017 – April 2019
<b>Computer Science Department of Northeastern University</b> <i>Teaching Assistant for Cryptography 4770 taught by Daniel Wicks</i>	Boston, MA January – April 2020

---

## Volunteer Work

<b>St. Herman of Alaska Christian School</b> <i>Teacher's Assistant for Middle School Geometry Class</i>	Allston, MA September 2016 – Fall 2019
---	---

---

## Honors & Awards

<b>High-school valedictorian</b> Based on academic merit, one of the top three students in graduating class of 2016.	May 2016
<b>Northeastern Dean's List</b> Given to students with GPA greater than 3.5.	Fall 2016 – Spring 2020
<b>National Merit Scholarship</b> \$250 per semester, merit-based scholarship sponsored by Liberty Mutual.	Fall 2016 – Spring 2020
<b>Churchill Scholarship Nominee</b> Nominated by Northeastern University to national Churchill Scholarship competition, for fully-sponsored year-long master's degree at Cambridge University, U.K.	November 2019
<b>PEAK Shout-It-Out Award</b> \$230 awarded for travel to present poster at the NCUWM in February 2020.	January 2020

---

## Conferences

<b>Graduate Research Opportunities for Women in Mathematics (GROW) Conference</b> <i>University of Michigan, Ann Arbor, MI</i>	October 2018
<b>Nebraska Conference for Undergraduate Women in Mathematics (NCUWM)</b> <i>University of Nebraska, Lincoln, NE</i> Presented poster on "Shor's Algorithm and Its Impact on Modern Cryptography".	January – February 2019
<b>Hudson River Undergraduate Math Conference (HRUMC)</b> <i>Smith College, Northampton, MA</i> Gave a talk on "Shor's Algorithm and Its Impact on Modern Cryptography".	March 2019
<b>Nebraska Conference for Undergraduate Women in Mathematics (NCUWM)</b> <i>University of Nebraska, Lincoln, NE</i> Presented poster on "Nonlocality in Shallow Quantum Circuits".	January – February 2020

ACM Symposium on Theory of Computing (STOC)

*Online*

June 2020

IEEE Symposium on Foundations of Computer Science (FOCS)

*Online*

November 2020

IACR Theory of Cryptography Conference (TCC)

*Online*

November 2020