kaleb.ruscitti.ca

Kaleb D. Ruscitti

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Education:

University of Waterloo - Candidate for PhD in Mathematics — Expected: Sept. 2027

McGill University - MSc. Mathematics — Apr. 2023

University of Waterloo - BSc. Mathematical Physics — Apr. 2021

Employment History:

Tutte Institute for Mathematics and Computing — May-Aug. 2024
Strategic Researcher - Data Science

- Invented new techniques for analyzing changes in the topics of a document corpus over time.
- Implemented my algorithm in a public python library. (github.com/tutteinsitute/temporal-mapper)
- Collaborated with other researchers and with clients to improve and tailor my work to their needs.

Communications Security Establishment — May-Aug. 2023
Cryptographic Scientist

- Read, analyzed, and summarized current research on homomorphic encryption.
- Presented findings to both researchers and non-technical administrators.
- Collaborated with other researchers and with clients to improve and tailor my work to their needs.

University of Waterloo — May-Aug. 2020
Undergraduate Research Assistant, under Dr. Ruxandra Moraru

- Conducted novel research towards understanding the symplectic structure of co-Higgs bundles.
- Read, summarized and applied the results from previous works in the area to develop new results.
- Adapted to self-guided research conditions imposed due to the coronavirus.

Institut National de la Recherche Scientifique — May-Aug. 2019
Undergraduate Research Assistant, under Dr. Roberto Moriandotti

- Studied the use of mathematical optimization to develop and improve optical experiments.
- Developed a mathematical procedure to analyze the results of our optimization process and quantify the magnitude of errors from physical non-idealities.
- Verified the procedure both with mathematical proof and monte carlo simulations.

Institute for Quantum Computing — Jan-Apr. 2019
Undergraduate Research Assistant, under Dr. Raffi Budakian

- Developed a novel technique to measure the electrical transfer function of an experimental system.
- Learned about nuclear magnetic resonance and spin physics, as applied to quantum information.
- Worked with microscale and vacuum-safe components, including computer assisted design and assembly for use in the experiment.

Institute for Quantum Computing — Jan-Apr. 2018
Undergraduate Research Assistant, under Dr. Rajibul Islam

- Constructed a system to manipulate the frequency spectrum of laser light.
- Improved my personal organization, problem solving and laboratory skills.
- Presented and explained my work to peers in group meetings and conferences.

Academic Contributions:

Publications

Improving Mapper's Robustness by Varying Resolution According to Lens-Space Density, Ruscitti & McInnes, arXiv preprint, 2025. arxiv.org/abs/2410.03862
Inverse Design of Photonic Systems, MacLellan et. al., Laser & Photonics Reviews, 2024. doi:10.1002/lpor.202300500

Conference Presentations

Degeneration of Holomorphic Sections to Bohr-Sommerfeld Points Nov 2024
CMS Winter Meeting 2025, Canadian Mathematics Society.

The Verlinde formula for flat SU(2) connections using a toric degeneration. Dec. 2022
AARMS-CMS Graduate Student Poster Session, Canadian Mathematics Society.

Adaptive Optics for Ion-Addressing in an Ion Trap Quantum Simulator Apr. 2018
Physics Undergrad Conference 2018, Western University.

Grants and Awards:

Postgraduate Doctoral Scholarship (NSERC PGS-D) Jan 2025-Sept 2027
$40,000 per year, held at the University of Waterloo

Ontario Graduate Scholarship Sept 2024-Dec 2024
$15,000, held at the University of Waterloo.

Women in Math Mentorship Award Jan 2024
$1,000, awarding for mentoring in the directed reading program.

Undergraduate Student Research Award (NSERC) Apr 2020
$4,500, held at the Unversity of Waterloo

Undergraduate Student Research Award (NSERC) Apr 2019
$4,500, held at the Insitut National de la Recherche Scientifique

Undergraduate Student Research Award (NSERC) Jan 2019
$4,500, held at the Unversity of Waterloo

Confucius Institute Scholarship Sept 2018
$1,000, given for scholarship in a Chinese study abroad program.

Service and Teaching Activities:

Singular Learning Theory Seminar - Founded and organized an interdiscplinary research seminar.
Algebraic Geometry Seminar - Organized a departmental working seminar, see the seminar webpage.
Directed Reading Program - Mentored undergraduates to complete expository reading projects in math.
Math Tutorial Center - Tutored students in first and second year math courses.
Teaching Assistant - Prepared and gave weekly tutorials, graded assessments, and held office hours.

Other Relevant Skills:

Experienced in computer programming in Python and C.
Experienced with Unix, including basic system administration and server management.
Conversationally proficient in French and Mandarin Chinese.