Maziar Farahzad | CV

Room 6290, 40 St. George Street, Toronto, ON, Canada M5S 2E4

maziar.farahzad@mail.utoronto.ca

EDUCATION

University of Toronto Sep. 2020- Present
PhD in Mathematics; Advisor: Prof. Marco Gualtieri

Stony Brook University Jan. 2018- May 2020
B.Sc. in Physics and B.Sc. in Mathematics *GPA: 3.87*
Summa Cum Laude, Honors in Physics

Pennsylvania State University Aug. 2017- Dec. 2017
Mathematics Advanced Study Semesters (MASS) *GPA: 3.92*

University of South Dakota Aug. 2016- Aug. 2017
B.Sc. in Physics and B.Sc. in Mathematics *GPA: 4.0*
Transferred

RESEARCH EXPERIENCE & PROJECTS

Discrete QFT and Continuum QFT Emerging From Homotopy Transfers *May 2021- Present*
Under the supervision of professor Marco Gualtieri.
University of Toronto
Developing discrete models of metric dependent Quantum Field Theories and their continnuum limits using algebraic topological methods developed by D. Sullivan and P. Mnev.

GH and SWIF Convergence of Smocked Metric Spaces *Jan. 2019- Present*
Under the supervision of professor Christina Sormani.
City University of New York, The Graduate Center
Conducting original research on the Gromov-Hausdorff and Sormani-Wenger Intrinsic Flat convergence of metric spaces.

Manifold Learning *Jul. 2020- Aug. 2021*
Under the supervision of professors Christina Sormani and Chen-Yun Lin.
City University of New York, The Graduate Center
Studied diffusion maps using differential geometry techniques and MATLAB.

Quantum Computing *May 2018- July 2020*
Under the supervision of professor Tzu-Chieh Wei.
C.N. Yang Institute for Theoretical Physics, Stony Brook University
Conducted research on characterizing the errors of IBM's quantum processors using error mitigation techniques and quantum tomography using Qiskit.

Mathematics Advanced Study Semesters (MASS) Final Projects *Aug. 2017- Dec. 2017*
Pennsylvania State University

- Knot Theory: A proof of DNA geometric inequality under professor Sergei Tabachnikov.
- Functional Analysis: Generalized functions under professor Moisey Guysinsky.
- Elliptic Functions and Curves: A proof of Wedderburn's little theorem under professor Yuri Zarkhin.

PUBLICATIONS

1. "Detector Tomography on IBM 5-qubit Quantum Computers and Mitigation of Imperfect Measurement", Y. Chen, M. Farahzad, S. Yoo, and T-C. Wei, Phys. Rev. A 100, 052315 (2019) also arXiv:1904.11935

2. "Smocked Metric Spaces and their Tangent Cones", C. Sormani, D. Kazaras, and Students. Missouri Journal of Mathematics, Vol. 33, No. 1 (2021) 27-98 also arXiv:1906.03403
3. "The Checkered Smocked Space and its Tangent Cone", V. Antonetti, M. Farahzad, A. Yamin, arXiv:1912.06294
4. "SWIF Convergence of Smocked Metric Spaces", M. Dinowitz, H. Drillick, M. Farahzad, C. Sormani, A. Yamin, (*accepted in the Journal of Topology and Analysis*), arXiv:2105.00138v1

Teaching Experience

TA for the following courses:

TA Mentorship Program 2023-2024
Provided new TAs with feedback on their teaching

MAT133Y1Y 2023-2024
Calculus and Linear Algebra for Commerce, led four tutorials per week of size 16 students, flipped classroom

Observation TA 2022-2023
Provided new TAs with feedback on their teaching

MAT133Y1Y 2022-2023
Calculus and Linear Algebra for Commerce, led three tutorials per week of size 16 students, flipped classroom

MAT135H1Y Summer 2022
Calculus I

MAT237Y1Y 2021-2022
Multivariable Calculus with Proofs

Linear Algebra I Summer 2021
Linear Algebra I

MAT187S Winter 2021
Calculus II

MAT224S Winter 2021
Linear Algebra II

SKILLS

Programming	Python (Intermediate), MATLAB (Intermediate), C++ (Basic), Bash Script (Basic), Fortran (Basic)
Scientific Tools	Qiskit, gnuplot, LaTeX, Microsoft Excel
Languages	Persian (Native Proficiency), English (Advanced Proficiency), German (Basic)

AWARDS & HONORS

Margaret Isobel Elliott Graduate Scholarship in the Department of Mathematics *2023*
University of Toronto

Lachlan Gilchrist Fellowship Fund *2023*
University of Toronto

Awarded annually to one-three U of T graduate students conducting studies/research focused in the area of fundamental physics.

Vivekananda Graduate Scholarship for International students *2023*
University of Toronto

Connaught International Scholarship *2020*
University of Toronto

Kuga-Sah Memorial Award: Senior Honorable Mention *2020*
Stony Brook University

Given annually by faculty nomination to a graduating senior in math.

Undergraduate Recognition Award for Academic Excellence *2019*
Stony Brook University

Given annually by faculty nomination for academic accomplishments that go beyond classroom.

Physics Research Award *2019*
Department of Physics, Stony Brook University

For my research in Quantum Computing under professor Tzu-Chieh Wei during summer and fall 2018.

Member of Sigma Pi Sigma *Apr. 2019*
Stony Brook University

Merten M. Hasse Scholarship *2017-2018*
University of South Dakota

Awarded to an outstanding USD math major.

Leonard E. Arnaud Scholarship *2017-2018*
University of South Dakota

The only scholarship at USD awarded to an outstanding international student for contributions to USD both in and out of the classroom.

Council for Undergraduate Research & Creative Scholarship (CURCS) *Spring 2017*
University of South Dakota

For our research on the Construction of a Cryostat for Characterization of Germanium Detectors under professor Jing Liu.

Presentations & Conferences

QFT for Mathematicians *Jun. 20-30 2022*
Perimeter Institute

Global Categorical Symmetries *Jun. 6-17 2022*
Perimeter Institute

Teach the Researcher: Variational Quantum Eigensolver Deep Dive *Jan. 28- 30, 2020*
IBM T. J. Watson Research Lab in Yorktown Heights

Undergraduate Math Symposium *Nov. 1, 2019*
University of Illinois at Chicago

Presented a poster on our research on "Smocked Spaces and their Tangent Cones at Infinity"

(arXiv:1906.03403).

NYC Regional Math Alliance Conference *Sep. 21, 2019*
City College of New York

Gave a group talk on our research on "Smocked Spaces and their Tangent Cones at Infinity" (arXiv:1906.03403).

Filling Volumes, Geodesics, and Intrinsic Flat Convergence *Jul. 29- Aug. 2, 2019*
Yale University

1st International Quantum Information Sciences Workshop *Jul. 9-11, 2019*
SUNY Polytechnic Institute, Utica campus

Presented a poster on our research on "Detector Tomography on IBM 5-qubit Quantum Computers and Mitigation" (Phys. Rev. A 100, 052315 (2019) also arXiv:1904.11935.

2019 Lehigh University Geometry and Topology Conference *Jun. 20-22, 2019*
Lehigh University

Gave a group talk on our research on "Smocked Spaces and their Tangent Cones at Infinity" (arXiv:1906.03403).

Working Experiences & College Involvements

Undergraduate Research Assistant *Jan. 2020*
C. N. Yang Institute for Theoretical Physics

Worked on IBM's OpenPulse under Prof. Tzu-Chieh during the Winter break.

Osher Lifelong Learning Institute A/V Assistant *Aug. 2018- May 2020*

- Assisting workshop leaders with setting up their Audio/Video equipment and taking attendance for the workshops.
- Assisting the members at the office's front desk.

Stony Brook University Math Club Treasurer *Aug. 2018- May 2020*

- Established a weekly math problem solving contest at Stony Brook (3 Problems of the Week).
- Co-organized a website for the club at you.stonybrook.edu/mathclub.

Mentor Collective Mentor *Aug. 2018- May 2019*
Stony Brook University

Helped a freshman student to integrate more smoothly into Stony Brook community.

Member of USD Math Team *2016-2017*
University of South Dakota

Ranked top twenty in Mathematical Association of America (MAA)/ North Central Section