Mikka Stasiuk

CONTACT INFORMATION

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EDUCATION

PhD, Quantum Information Theory, Perimeter Institute for Theoretical Physics (ongoing) Sept 2024 to Present

Supervisors: **Alex May** and **Robert Myers**

BSc, Honours Mathematics and Physics, McGill University Sept 2019 - May 2024

Supervisors: **Patrick Hayden** and **Alexander Maloney**

Thesis: Gaussian Unitary Simulation with Symmetrically Extendible Channels

PAPERS

1. **Stasiuk, M.**, Lütkenhaus, N., Tan, EYZ (2022), *The Quantum Chernoff Divergence in Advantage Distillation for QKD and DIQKD*, https://arxiv.org/abs/2212.06975

2. **Stasiuk, M.**, "High-dimensional Encoding in the Round-Robin Differential-Phase-Shift Protocol". In: Quantum 7 (Dec. 2023), doi: 10.22331/q-2023-12-14-1207. http://dx.doi.org/10.22331/q-2023-12-14-1207.

EXPERIENCE

Visiting Scholar, *T Division,* Los Alamos National Labratory, Los Alamos, NM, USA June 2024 to August 2024

Supervisor: **Wojciech Zurek**

Developed an algorithm that, given a system-environment interaction Hamiltonian, identifies whether the system admits a notion of classical, objective reality.

Undergraduate Researcher, *Maloney Group,* Department of Physics, McGill University, Montreal, Canada Sept 2023 to May 2024

Supervisors: **Patrick Hayden** and **Alex Maloney**

Investigated fidelity bounds for simulation of Gaussian unitary channels with k-extendable channels (channels whose Choi-Jamiolkowski representation is k-extendable).

Undergraduate Researcher, *Cryptography and Quantum Information Laboratory,* McGill School of Computer Science, McGill University, Montreal, Canada May 2023 to August 2023

Supervisor: **Claude Crepeau**

Investigated a sound, practical implementation of Zero-Knowledge security against quantum provers. In particular, troubleshooted a number of analytical methods to tighten an upper bound on the protocol's soundness.

Long-term Visiting Researcher, *Eisert Group,* Dahlem Centre for Complex Quantum Systems, Freie Universität Berlin, Berlin, Germany May 2023 to July 2023

Supervisor: **Jens Eisert**

Explored computational tasks that fault-tolerant quantum computers can solve efficiently but are intractable for classical computers.

Undergraduate Researcher, *Optical Quantum Communication Theory Group,* Institute for Quantum Computing, Waterloo, Canada May 2022 to August 2022

Supervisor: **Norbert Lütkenhaus**

Investigated analytical security proof structures for *Device-Independent Quantum key Distribution*, when implemented with a specific error correction protocol called the Repetition-Code protocol, under the IID collective attacks framework.

Derived upper bounds on relevant entropy quantities in terms of the Quantum Chernoff Divergence, a quantity that arises from symmetric hypothesis testing.

Undergraduate Researcher, *Quantum Theory Group,* National Research Council of Canada, Ottawa, Canada January 2021 to Sept 2021

Supervisor: **Khabat Heshami**

Developed the security proof for a high-dimensional variation of the well-known Round-Robin Differential Phase Shift protocol in *Quantum Key Distribution*. Precisely, I found a suitable measurement for the protocol, and derived analytical bounds on secret key rate.

Awards

Perimeter Institute Residency Graduate Scholarship, *Perimeter Institute for Theoretical Physics* **2024**

Quantum Computing Summer School Fellowship, *Los Alamos National Labratory* **2024**

MSc Excellence Fellowship (declined), *EPFL (École Polytechnique Fédérale de Lausanne)* **2024**

IQC Entance Award, *Institute for Quantum Computing, Unversity of Waterloo* **2024**

NSERC Undergraduate Student Research Award, *Natural Sciences and Engineering Research Council of Canada* **2023**

Undergraduate Research Award, *Institute for Quantum Computing, Unversity of Waterloo* **2022**

Seminars

Renner Group, *Institute for Theoretical Physics, ETH Zurich* **March 21, 2023**

Title: The Quantum Chernoff Divergence in Advantage Distillation for QKD and DIQKD.

Eisert Group, *Dahlem Centre for Complex Systems, Freie Universitat Berlin* **March 22, 2023**

Title: The Security of Zero Knowledge Proofs against Quantum Provers

Conferences

Quantum Information Processing, University of Ghent, Belgium **February 4-10, 2023**

Presented a poster on the work detailed in *The Quantum Chernoff Divergence in Advantage Distillation for QKD and DIQKD*.

QCRYPT, University of Maryland, USA **August 14-19, 2023**

Presented a poster on the work detailed in *The Quantum Chernoff Divergence in Advantage Distillation for QKD and DIQKD*.

Canadian Undergraduate Physics Conference 2021 **Nov 6, 2021**

Presented a talk on the work detailed in *High-dimensional Encoding in the Round-Robin Differential-Phase-Shift Protocol*.

Complementary Traning

LANL Quantum Computing Summer School, Los Alamos National Labratory, Los Alamos, NM, USA **June to August 2024**

An extensive 10-week curriculum directed by quantum computation scientists at the Los Alamos National Lab and leading commercial quantum computer companies, such as those developed by D-Wave Systems, Quera, Quantinuum, and IBM.

Undergraduate School on Experimental Quantum Information Processing, Institute of Quantum Computing, Waterloo, ON, Canada **May 30 to July 10, 2022**

A two-week intensive program in theoretical and experimental studies of quantum information processing.

Quantum Key Distribution Summer School, Institute for Quantum Computing, Waterloo, Canada **August 15-19 2022**

A five-day conference that addressed theoretical and experimental concepts in quantum communication.

Qiskit Global Summer School 2021: Quantum Machine Learning **July 12-23, 2021**

An intensive introductory program to quantum machine learning hosted by IBM Quantum.