

SUMEET KHATRI

CURRICULUM VITAE

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EDUCATION

Louisiana State University, Baton Rouge, LA, USA

2017–PRESENT

PhD Physics

Research

- Advisor: [Mark M. Wilde](#).
- Research interests: Quantum computing and quantum machine learning, quantum information theory, quantum communication.

Coursework – Selected courses:

- Quantum Information Theory
- Quantum Optics
- Theory of Quantum Computation

University of Waterloo, Waterloo, ON, Canada

2014–2016

MSc Physics (Quantum Information)

Research

- Thesis title: *Symmetric Extendability of Quantum States and the Extreme Limits of Quantum Key Distribution*
- Advisor: Norbert Lütkenhaus
- Committee: Norbert Lütkenhaus, Daniel Gottesman, Thomas Jennewein

Coursework – Selected courses:

- Implementations of Quantum Information Processing
- Implementations of Quantum Communication
- Theory of Quantum Information
- Applied Functional Analysis
- Open Quantum Systems

University of Waterloo, Waterloo, ON, Canada

2009–2014

BSc Honours Mathematical Physics (Co-operative), Astrophysics Specialization, Pure Mathematics Minor

- Graduated on the Dean's Honours List.
- Two research assistantships.
- Two co-op teaching experiences.

RESEARCH

Graduate Research Assistant, Department of Physics and Astronomy, Baton Rouge, LA, USA

2018–PRESENT

Quantum Science and Technologies Group, Hearne Institute for Theoretical Physics. Supervisor: Mark M. Wilde. (PhD Research)

- Performing research in quantum Shannon theory, quantum computing, and the theory of quantum networks.
- Peer-reviewed publications to date: [PR3], [PR4], [PR5], [PR6], [PR7], [PR8], [PR9].
- Mentoring undergraduate research students.

Quantum Computing Summer School Fellow, Los Alamos National Laboratory, Los Alamos, NM, USA SUMMER 2018

Theoretical Division. Supervisor: Patrick Coles. (Summer fellowship)

- Used Rigetti's and IBM's quantum computers to design and implement quantum algorithms for compiling quantum software. Work resulted in the publication [PR5].

Graduate Research Assistant, Institute for Quantum Computing, Waterloo, ON, Canada 2014–2016

Optical Quantum Communications Theory Group. Supervisor: Norbert Lütkenhaus. (MSc Research)

- Developed a new framework based on symmetric extendability for analyzing quantum key distribution (QKD) protocols with two-way communication.
- Applied the new framework to two well-known QKD protocols to make progress on a long-standing open problem about successful key distribution with two-way communication.
- Work resulted in the peer-reviewed article [PR2].

Undergraduate Research Assistant, Institute for Quantum Computing, Waterloo, ON, Canada SUMMER 2014

Supervisor: Robert König. (NSERC Undergraduate Student Research Award.)

- Project Title: *Capacities of Fermionic Channels*.
- Studied Fermionic Gaussian channels in order to prove the Fermionic analogue of the Gaussian optimization and minimum output entropy conjectures for Bosonic Gaussian channels.

PUBLICATIONS (GOOGLE SCHOLAR PAGE) (PAPERS ON ARXIV)

PEER-REVIEWED ARTICLES

- [PR9] **Sumeet Khatri**, Kunal Sharma, Mark M. Wilde. “*Information-theoretic aspects of the generalized amplitude damping channel*”. *Physical Review A* 102, 012401 (2020).
- [PR8] Kunal Sharma, **Sumeet Khatri**, M. Cerezo, Patrick J. Coles. “*Noise Resilience of Variational Quantum Compiling*”. *New Journal of Physics* 22, 043006 (2020).
- [PR7] **Sumeet Khatri**, Corey T. Matyas, Aliza U. Siddiqui, Jonathan P. Dowling. “*Practical figures of merit and thresholds for entanglement distribution in quantum networks*”. *Physical Review Research* 1, 023032 (2019).
- [PR6] Ludovico Lami, **Sumeet Khatri**, Gerardo Adesso, Mark M. Wilde. “*Extendibility of bosonic Gaussian states*”. *Physical Review Letters* 123, 050501 (2019).
- [PR5] **Sumeet Khatri**, Ryan LaRose, Alexander Poremba, Lukasz Cincio, Andrew T. Sornborger, Patrick J. Coles. “*Quantum-assisted quantum compiling*”. *Quantum* 3, 140 (2019).
- [PR4] Siddhartha Das, **Sumeet Khatri**, Jonathan P. Dowling. “*Robust quantum network architectures and topologies for entanglement distribution*”. *Physical Review A* 97, 012335 (2018).
- [PR3] Siddhartha Das, **Sumeet Khatri**, George Siopsis, Mark M. Wilde. “*Fundamental limits on quantum dynamics based on entropy change*”. *Journal of Mathematical Physics* 59, 012205 (2018).
- [PR2] **Sumeet Khatri**, Norbert Lütkenhaus. “*Numerical evidence for bound secrecy from two-way postprocessing in quantum key distribution*”. *Physical Review A* 95, 042320 (2017).
- [PR1] Paul J. L. Charlton, Michael J. Husdon, Michael L. Balogh, **Sumeet Khatri**. “*The dependence of halo mass on galaxy size at fixed stellar mass using weak lensing*”. *Monthly Notices of the Royal Astronomical Society*, 472(2), 2367-2387 (2017).

PRE-PRINT ARTICLES

- [PP3] **Sumeet Khatri**. “Policies for elementary link generation in quantum networks”. arXiv:2007.03193, July 2020.
- [PP2] **Sumeet Khatri**, Anthony J. Brady, Renée A. Desporte, Manon P. Bart, Jonathan P. Dowling. “Spooky Action at a Global Distance – Resource-Rate Analysis of a Space-Based Entanglement-Distribution Network for the Quantum Internet”. arXiv:1912.06678, December 2019.
- [PP1] Mark M. Wilde, **Sumeet Khatri**, Eneet Kaur, Saikat Guha. “Second-order coding rates for key distillation in quantum key distribution”. arXiv:1910.03883, October 2019.

PRESENTATIONS (* – PRESENTED BY CO-AUTHOR)

CONTRIBUTED TALKS

- 15th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC), 2020 (Latvia)
 - **“Extendibility of bosonic Gaussian states.”* (Based on [PR6].)
- Southwest Quantum Information and Technology (SQuInT), 2020 (Eugene, USA).
 - *“Practical figures of merit and thresholds for entanglement distribution in quantum networks.”* (Based on [PR7].)
- Workshop: The Nature of Quantum Networks (Erwin Schrödinger Institute, Vienna, Austria).
 - *“Practical figures of merit and thresholds for entanglement distribution in quantum networks.”* (Based on [PR7].)
- 1st International Workshop on Quantum Network Science (Tuscon, USA).
 - *“Robust network architectures and figures of merit for large-scale entanglement distribution”.* (Based on [PR4] and [PR7].)
- APS March Meeting, 2019 (Boston, USA).
 - *“Information-theoretic aspects of the generalized amplitude damping channel”.* (Based on [PR9].)
- Southeast Quantum Computing Workshop, 2018 (Athens, USA).
 - *“Robust Quantum Network Architectures and Topologies for Entanglement Distribution”.* (Based on [PR4].)
- Southwest Quantum Information and Technology (SQuInT), 2018 (Santa Fe, USA).
 - * *“Robust Quantum Network Architectures and Topologies for Entanglement Distribution”.* (Based on [PR4].)
- Conference on Quantum Information and Quantum Control VII (CQIQC-VII), 2017 (Toronto, Canada).
 - *“Fundamental Limits on Quantum Dynamics Based on Entropy Change”.* (Based on [PR3].)
- APS March Meeting, 2017 (New Orleans, USA).
 - *“Symmetric Extendability of Quantum States, Bound Secrecy, and the Extreme Limits of Quantum Key Distribution”.* (Based on [PR2].)

POSTERS

- Southwest Quantum Information and Technology (SQuInT), 2019 (Albuquerque, USA).
 - *“Quantum-assisted quantum compiling”* (Based on [PR5].)
- 22nd Annual Conference on Quantum Information Processing (QIP), 2019 (Boulder, USA).
 - *“Quantum-assisted quantum compiling”.* (Based on [PR5].)

- International Conference on Quantum Communication, Measurement and Computing (QCMC), 2019 (Baton Rouge, USA).
 - “Robust Quantum Network Architectures and Topologies for Entanglement Distribution”. (Based on [PR4].)
 - * “Fundamental limits on quantum dynamics based on entropy change”. (Based on [PR3].)
- 7th International Conference on Quantum Cryptography (QCrypt), 2017 (Cambridge, UK).
 - “Numerical Evidence for Bound Secrecy from Two-Way Post-Processing in Quantum Key Distribution”. (Based on [PR4].)
- Southwest Quantum Information and Technology (SQuInT), 2017 (Baton Rouge, USA).
 - “Symmetric Extendability of Quantum States and the Extreme Limits of Quantum Key Distribution”. (Based on [PR2].)
- International Conference on Quantum Communication, Measurement and Computing (QCMC), 2016 (Singapore).
 - “Symmetric Extendability of Quantum States and the Extreme Limits of Quantum Key Distribution”. (Based on [PR2].)

ACADEMIC SERVICE

- Reviewer for:
 - IEEE Transactions on Information Theory.
 - Quantum Information Processing.
 - Reviews in Mathematical Physics.
 - New Journal of Physics.
- Program committee member for the Sixth International Conference for Young Quantum Information Scientists (6-YQIS 2021).

TEACHING

Visiting Lecturer

NOVEMBER 2019

International Institute of Physics, Natal, Brazil

- Delivered a five-lecture mini-course on quantum communication theory.
- Information about the course [here](#); video recordings of the lectures [here](#).
- Trip funded by the Brazil-US Student & Postdoc Visitation Program.

Graduate Teaching Assistant

2017–2018

Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA, USA

- Supervised two sections of the second-year physics laboratory course.
- Graded homework assignments for the graduate-level statistical mechanics course.
- Graded homework assignments for the fourth-year undergraduate electromagnetism course.

Fundamentals of University Teaching Certificate

Teaching training program for graduate students at the Centre for Teaching Excellence, University of Waterloo, Waterloo, ON, Canada

- Program consists of six workshops and three 15-minute teaching sessions.
- Selected workshops: Effective lesson plans, creating memorable lectures, teaching with confidence.

Laboratory Teaching Assistant

2014–2015

Department of Physics and Astronomy, University of Waterloo, Waterloo, ON, Canada

- Supervised three sections of the first-year mechanics laboratory course for Biology and Chemistry majors in the Fall 2014 and Fall 2015 terms.
- Graded students' lab reports.

Math & Physics Learning Assistant, Sheridan College, Brampton, ON, Canada

WINTER 2012

Four-month co-op employment.

- Conducted weekly tutorials for four sections of the first-semester Math course for engineering students.
- Prepared and graded weekly quizzes administered during the tutorial.
- Conducted appointments and drop-in sessions at the Learning Centre to assist students with Math and Physics questions ranging from first- to fourth-semester courses.

AWARDS

Title	Value	Duration
APS Brazil-US Student & Postdoc Visitation Program	\$3,000 (USD)	November 2019
NSERC Postgraduate Scholarship—Doctoral	\$21,000/year	2018–2021
Quantum Computing Summer School Fellowship (LANL)	\$12,200 (USD)	Summer 2018
Ontario Graduate Scholarship	\$15,000	2015–2016
NSERC Canada Graduate Scholarship—Master's	\$17,500	2014–2015
President's Graduate Scholarship	\$10,000/year	2014–2016
Marie Curie Award	\$4,525/year	2014–2016
NSERC Undergraduate Student Research Award ($\times 2$)	\$4,500	2012, 2014

TECHNICAL SKILLS

Programming Languages	Python, Matlab/Octave, \LaTeX
Software	Matlab/Octave, Maple, Mathematica
Quantum Computing Packages	pyQuil (Rigetti), Qiskit (IBM)