

# SUMEET KHATRI

CURRICULUM VITAE

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## HIGHLIGHTS

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### Research

- Areas of interest: Quantum information theory, quantum communication, quantum networks, quantum computing, quantum algorithms and complexity theory, machine learning.
- 11 peer-reviewed publications and 2 pre-prints. [[Google Scholar Page](#)] [[Papers on arXiv](#)]
- Participant in the 2018 quantum computing summer school at LANL ([[PR5](#)], [[PR8](#)]).

### Teaching & mentorship

- Co-author of the book "*Principles of Quantum Communication Theory: A Modern Approach*" – preliminary version [here](#).
- Designed and delivered a mini-course on quantum communication theory in Brazil. ([course information](#)) ([videos](#))
- Mentored four undergraduate research students (Aliza Siddiqui, Renée Desporte, Manon Bart, Corey Matyas; see [[PR7](#)], [[PR10](#)]).

### Other items

- Recipient of the NSERC Postgraduate Scholarship.
- Creator of the Python package [QuTIpy](#).

## RESEARCH EMPLOYMENT

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**Postdoctoral Researcher**, Freie Universität Berlin Physics Department, Berlin, Germany 2021–PRESENT  
*Dahlem Center for Complex Quantum Systems. Supervisor: Jens Eisert*

**Graduate Research Assistant**, Louisiana State University Department of Physics and Astronomy, Baton Rouge, LA, USA 2018–2021  
*Quantum Science and Technologies Group, Hearne Institute for Theoretical Physics. Supervisor: Mark M. Wilde. (PhD Research)*

**Quantum Computing Summer School Fellow**, Los Alamos National Laboratory, Los Alamos, NM, USA SUMMER 2018  
*Theoretical Division. Supervisor: Patrick Coles. (Summer internship)*

**Graduate Research Assistant**, Institute for Quantum Computing, Waterloo, ON, Canada 2014–2016  
*Optical Quantum Communications Theory Group. Supervisor: Norbert Lütkenhaus. (MSc Research)*

## EDUCATION

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**Louisiana State University**, Baton Rouge, LA, USA 2017–2021  
*PhD Physics*

- Advisor: Mark M. Wilde
- Thesis title: *Towards a General Framework for Practical Quantum Network Protocols*

**University of Waterloo**, Waterloo, ON, Canada

2014–2016

*MSc Physics (Quantum Information)*

- Advisor: Norbert Lütkenhaus
- Thesis title: *Symmetric Extendability of Quantum States and the Extreme Limits of Quantum Key Distribution*

**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
- Research advisors: Michael J. Hudson, Robert König

## **PUBLICATIONS, PRESENTATIONS, SEMINARS [GOOGLE SCHOLAR] (★ – PRESENTED BY CO-AUTHOR)**

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### **PEER-REVIEWED ARTICLES**

[PR11] **Sumeet Khatri**. “Policies for elementary links in a quantum network”. *Quantum* **5**, 537 (2021).

- Seminar, Keio University (group of Rodney van Meter), 1 September 2020.
- Seminar, TU Delft (group of David Elkouss), 7 October 2020.
- Contributed talk, 8th QuILT day 2020.
- Seminar, Center for Quantum Networks, 9 March 2021.
- Poster, TQC 2021.
- Poster, AQIS 2021.

[PR10] **Sumeet Khatri**, Anthony J. Brady, Renée A. Desporte, Manon P. Bart, Jonathan P. Dowling. “Spooky action at a global distance: analysis of space-based entanglement distribution for the quantum internet”. *npj Quantum Information* **7**, 4 (2021).

- ★ Contributed talk, 6th QuILT day 2020.
- ★ Contributed talk, APS March Meeting 2021.
- Seminar, Center for Quantum Networks, 24 June 2021.
- Contributed talk, AQIS 2021.

[PR9] **Sumeet Khatri**, Kunal Sharma, Mark M. Wilde. “Information-theoretic aspects of the generalized amplitude damping channel”. *Physical Review A* **102**, 012401 (2020).

- ★ Seminar, NORDITA (Sweden), 4 April 2019.
- Contributed talk, APS March Meeting 2019.

[PR8] Kunal Sharma, **Sumeet Khatri**, M. Cerezo, Patrick J. Coles. “Noise Resilience of Variational Quantum Compiling”. *New Journal of Physics* **22**, 043006 (2020).

- ★ Contributed talk, 5th QuILT day 2019.

[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).

- Contributed talk, 1st International Workshop on Quantum Network Science.
- Contributed talk, The Nature of Quantum Networks 2019 (Vienna).
- ★ Contributed talk, 4th QuILT Day 2019.
- Contributed talk, SQuInT 2020.

- [PR6] Ludovico Lami, **Sumeet Khatri**, Gerardo Adesso, Mark M. Wilde. “Extendibility of bosonic Gaussian states”. *Physical Review Letters* 123, 050501 (2019).
- Contributed talk, 3rd QuILT Day 2019.
  - Poster, Algebraic and Statistical ways into Quantum Resource Theories.
  - ★ Contributed talk, TQC 2020.
- [PR5] **Sumeet Khatri**, Ryan LaRose, Alexander Poremba, Lukasz Cincio, Andrew T. Sornborger, Patrick J. Coles. “Quantum-assisted quantum compiling”. *Quantum* 3, 140 (2019).
- Seminar, IQC, 19 December 2018.
  - Poster, QIP 2019.
  - Poster, SQuInT 2019.
- [PR4] Siddhartha Das, **Sumeet Khatri**, Jonathan P. Dowling. “Robust quantum network architectures and topologies for entanglement distribution”. *Physical Review A* 97, 012335 (2018).
- Poster, WQRN 2017.
  - Poster, QCMC 2018.
  - ★ Contributed talk, SQuInT 2018.
  - Contributed talk, Southeast Quantum Computing Workshop, 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).
- Contributed talk, CQIQC-VII.
  - Poster, QCMC 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).
- Poster, QCMC 2016.
  - Poster, QCrypt 2017.
- [PR1] Paul J. L. Charlton, Michael J. Hudson, 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

- [PP2] Dawei Ding, **Sumeet Khatri**, Yihui Quek, Peter W. Shor, Xin Wang, Mark M. Wilde. “Bounding the forward classical capacity of bipartite quantum channels”. arXiv:2010.01058, October 2020.
- ★ Contributed talk, TQC 2021.
- [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.

## ACADEMIC SERVICE

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- Reviewing for journals.
  - IEEE Transactions on Information Theory
  - Quantum Information Processing
  - Reviews in Mathematical Physics
  - New Journal of Physics

- Quantum
- Communications Physics
- Physical Review X (PRX) Quantum
- Physical Review A (PRA)
- Program committee member for the Sixth International Conference for Young Quantum Information Scientists (6-YQIS 2021).
- Program committee co-chair for the First QWorld Quantum Science Days 2021.

## TEACHING

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### 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

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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

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- Creator of the Python package `QuTiPy`.
- **Programming languages:** Python, Matlab/Octave,  $\LaTeX$
- **Software:** Matlab/Octave, Maple, Mathematica
- **Quantum computing packages:** `pyQuil` (Rigetti), `Qiskit` (IBM)