

# SUMEET KHATRI

CURRICULUM VITAE

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## HIGHLIGHTS

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### Research

- Areas of interest: Quantum information theory, quantum communication and networking, quantum computing (algorithms, complexity theory, machine learning).
- 12 peer-reviewed publications and 4 pre-prints. [[Google Scholar page](#)] [[Papers on arXiv](#)]

### Teaching & mentorship

- Co-author of the book "*Principles of Quantum Communication Theory: A Modern Approach*" [B1].
- Designed and delivered a mini course on quantum communication theory in Natal, Brazil. ([course information](#)) ([videos](#))
- Student mentorship and (co-)supervision: four undergraduate students, see [PR7], [PR10]; one Master's student, see [PP3]. Ongoing supervision of three Master's students.
- Completed a teacher training course at the University of Waterloo, 2015–2016.

### Other items

- Participant in the 2018 quantum computing summer school at LANL; see [PR5], [PR8].
- 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*

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

## EDUCATION

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

- Thesis title: *Towards a General Framework for Practical Quantum Network Protocols*

**University of Waterloo**, Waterloo, ON, Canada 2014–2016  
*MSc Physics (Quantum Information)*

- 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*

**PEER-REVIEWED ARTICLES**

- [PR12] **Sumeet Khatri**. “*On the design and analysis of near-term quantum network protocols using Markov decision processes*”. *AVS Quantum Science* **4**, 030501 (2022).
- [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, AQIS 2021.
  - Contributed talk, TQC 2022.
- [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).
- ★ Poster, *Frontiers in Optics* 2019
  - ★ 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.
  - Seminar, FU Berlin (group of Jens Eisert), 26 January 2021.
- [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.
  - ★ Poster, *Frontiers in Optics* 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.
  - Seminar, FU Berlin (group of Jens Eisert), 26 January 2021.
- [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, 1st QuILT day 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

- [PP4] Yihui Quek, Daniel S. França, **Sumeet Khatri**, Johannes J. Meyer, Jens Eisert. “Exponentially tighter bounds on limitations of quantum error mitigation”. arXiv:2210.11505, October 2022.
- ★ Contributed talk, QIP 2023.
- [PP3] Simon Cichy, Paul K. Fährmann, **Sumeet Khatri**, Jens Eisert. “A perturbative gadget for delaying the onset of barren plateaus in variational quantum algorithms”. arXiv:2210.03099, October 2022.
- [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.
  - ★ Conference proceedings, 2021 IEEE International Symposium on Information Theory (ISIT).
- [PP1] **Sumeet Khatri**, Eneet Kaur, Saikat Guha, Mark M. Wilde. “Second-order coding rates for key distillation in quantum key distribution”. arXiv:1910.03883, October 2019.

## BOOKS

- [B1] **Sumeet Khatri**, Mark M. Wilde. “Principles of Quantum Communication Theory: A Modern Approach”. arXiv:2010.01058, November 2020. See also [here](#) for a more up-to-date version.

## TEACHING

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### Invited Lecturer

SEPTEMBER 2022

*International Centre for Mechanical Sciences (CISM), Udine, Italy*

- Delivered a two-part lecture on hybrid quantum-classical algorithms at the European Summer School on Quantum AI summer school.

### Mentor

2021–2022

*QWorld*

- Mentor in the quantum information theory study group in the QWorld organization; see [here](#) for details.
- Delivered lessons on quantum information theory, based on the exercises in [B1].

### Visiting Lecturer

NOVEMBER 2019

*International Institute of Physics, Natal, Brazil*

- Delivered a five-lecture mini-course on quantum communication theory.
- 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 statistical mechanics (graduate) and electromagnetism (senior undergraduate) courses.

### Fundamentals of University Teaching Certificate

2015–2016

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

- 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

2011–2012

*Sheridan College, Brampton, ON, Canada*

- 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 tutoring sessions to assist students with Math and Physics coursework questions.

## AWARDS & GRANTS

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Title	Duration
APS Brazil-US Student & Postdoc Visitation Program	November 2019
NSERC Postgraduate Scholarship—Doctoral	2018–2021
Quantum Computing Summer School Fellowship (LANL)	Summer 2018
Ontario Graduate Scholarship	2015–2016
NSERC Canada Graduate Scholarship—Master’s	2014–2015
President’s Graduate Scholarship	2014–2016
Marie Curie Award	2014–2016
NSERC Undergraduate Student Research Award ( $\times 2$ )	2012, 2014

- Unfunded collaborator on the Multidisciplinary University Research Initiative (MURI) grant entitled: “Robust entanglement distribution in quantum networks – network science and architectures for novel quantum information processing”.
  - Joint collaboration between UCLA, Stanford, Virginia Tech, UC Boulder, Caltech, and Louisiana State University (LSU).
  - Helped write the grant proposal for LSU’s contribution.

## 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)

## 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
  - PRX Quantum
  - Physical Review A (PRA)
  - npj Quantum Information
  - Physical Review Letters (PRL)
  - Quantum Science and Technology
- 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.