

# SUMEET KHATRI

CURRICULUM VITAE

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## EDUCATION

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**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

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**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: [3], [4].
- Mentoring and summer 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 pre-print (1).
- The work (1) was featured on Rigetti's website.

**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 [2].

**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)**

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### **PEER-REVIEWED ARTICLES**

- [4] Siddhartha Das, **Sumeet Khatri**, Jonathan P. Dowling. “Robust quantum network architectures and topologies for entanglement distribution”. *Physical Review A* 97, 012335 (2018).
- [3] 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).
- [2] **Sumeet Khatri**, Norbert Lütkenhaus. “Numerical evidence for bound secrecy from two-way postprocessing in quantum key distribution”. *Physical Review A* 95, 042320 (2017).
- [1] 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**

- (2) **Sumeet Khatri**, Kunal Sharma, Mark M. Wilde. “Information-theoretic aspects of the generalized amplitude damping channel”. *arXiv:1903.07747*, March 2019.
- (1) **Sumeet Khatri**, Ryan LaRose, Alexander Poremba, Lukasz Cincio, Andrew T. Sornborger, Patrick J. Coles. “Quantum-assisted quantum compiling”. *arXiv:1807.00800*, July 2018.

### POSTERS

- Southwest Quantum Information and Technology (SQuInT), 2019 (Albuquerque, USA).
  - “Quantum-assisted quantum compiling” (Based on (1).)
- 22nd Annual Conference on Quantum Information Processing (QIP), 2019 (Boulder, USA).
  - “Quantum-assisted quantum compiling”. (Based on (1).)
- International Conference on Quantum Communication, Measurement and Computing (QCMC), 2019 (Baton Rouge, USA).
  - “Robust Quantum Network Architectures and Topologies for Entanglement Distribution”. (Based on [4].)
  - “Fundamental limits on quantum dynamics based on entropy change”. (Based on [3].) \*
- 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 [4].)
- 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 [2].)
- 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 [2].)

### CONTRIBUTED TALKS

- APS March Meeting, 2019 (Boston, USA).
  - “Information-theoretic aspects of the generalized amplitude damping channel”. (Based on (2).)
- Southeast Quantum Computing Workshop, 2018 (Athens, USA).
  - “Robust Quantum Network Architectures and Topologies for Entanglement Distribution”. (Based on [4].)
- Southwest Quantum Information and Technology (SQuInT), 2018 (Santa Fe, USA).
  - “Robust Quantum Network Architectures and Topologies for Entanglement Distribution”. (Based on [4].) \*
- Conference on Quantum Information and Quantum Control VII (CQIQC-VII), 2017 (Toronto, Canada).
  - “Fundamental Limits on Quantum Dynamics Based on Entropy Change”. (Based on [3].)
- APS March Meeting, 2017 (New Orleans, USA).
  - “Symmetric Extendability of Quantum States, Bound Secrecy, and the Extreme Limits of Quantum Key Distribution”. (Based on [2].)

### ACADEMIC SERVICE

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

## TEACHING

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### 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
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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<b>Programming Languages</b>	Python, Matlab/Octave, L <sup>A</sup> T <sub>E</sub> X
<b>Software</b>	Matlab/Octave, Maple, Mathematica
<b>Quantum Computing Packages</b>	pyQuil (Rigetti), Qiskit (IBM)