

# Sarah Kaiser

POSTDOCTORAL RESEARCH FELLOW · QUANTUM ENGINEER

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## Education

### Univeristy of Waterloo

PH.D. PHYSICS (QUANTUM INFORMATION)

- Member of the Institute for Quantum Computing

Waterloo, Canada

Aug. 2012 - Aug. 2016

### Bethel University

B.S. IN PHYSICS, B.A. IN MATHEMATICS

- Summa Cum Laude with Honors

St. Paul, Minnesota, USA

Sept. 2007 - Jun. 2011

## Skills

### Programming

Python, Mathematica, C/C++, F#, HTML, LaTeX

### Research Interests

Quantum Optics, Quantum Key Distribution, Quantum Sensing, Diamond Color Centers

### Affiliations

Optical Society of America, Australian Institute of Physics

### Languages

English, Spanish

## Publications

### Airborne demonstration of a quantum key distribution receiver payload

DOI:10.1088/2058-9565/aa701f

CHRISTOPHER J. PUGH, SARAH KAISER, JEAN-PHILIPPE BOURGOIN, JEONGWAN JIN, NIGAR SULTANA, SASCHA AGNE, ELENA ANISIMOVA, VADIM MAKAROV, ERIC CHOI, BRENDON L. HIGGINS, THOMAS JENNEWAIN  
Quantum Science and Technology, 2, 2, 024009 (2017)

### Laser damage creates backdoors in quantum communications

DOI:10.1103/PhysRevA.94.030302

VADIM MAKAROV, JEAN-PHILIPPE BOURGOIN, POOMPONG CHAIWONGKHOT, MATHIEU GAGNE, THOMAS JENNEWAIN, SARAH KAISER, RAMAN KASHYAP, MATTHIEU LEGRE, CARTER MINSHULL, SHIHAN SAJEED  
Phys. Rev. A 94, 030302 (2016)

### Free-space quantum key distribution to a moving receiver.

DOI:10.1364/OE.23.033437

J-P BOURGOIN, B L HIGGINS, N GIGOV, C HOLLOWAY, C J PUGH, S KAISER, M CRANMER AND T JENNEWAIN  
Optics Express Vol. 23, Issue 26, pp. 33437 — 33447 (2015)

### Attacks exploiting deviation of mean photon number in quantum key distribution and coin tossing

DOI:10.1103/PhysRevA.91.032326

SHIHAN SAJEED, IGOR RADCHENKO, SARAH KAISER, JEAN-PHILIPPE BOURGOIN, ANNA PAPPA, LAURENT MONAT, MATTHIEU LEGRÉ, AND VADIM MAKAROV  
Phys. Rev. A 91, 032326 (2015)

### Quantum safe cryptography and security: An introduction, benefits, enablers and challenges ETSI White Paper No. 8.

ISBN:979-10-92620-03-0

CONTRIBUTOR

ETSI White Paper No. 8

### Experimental quantum key distribution with source flaws and tight finite-key analysis

DOI:10.1103/PhysRevA.92.032305

FEIHU XU, SHIHAN SAJEED, SARAH KAISER, ZHIYUAN TANG, LI QIAN, VADIM MAKAROV, AND HOI-KWONG LO  
Phys. Rev. A 92, 032305 (2015)

## Presentations

### Super cool science

Seward, AK, USA

SARAH KAISER

Jun. 2017

Last Frontiers in Quantum Information Science

### Spontaneous superradiance from single diamond nanocrystals

Cairns, Australia

SARAH KAISER, CARLO BRADAC, MATTIAS JOHNSON, MATTHEW VAN BREUGEL, BEN BARAGIOLA, ROCHELLE MARTIN, MATHIEU L. JUAN, GAVIN BRENNEN, THOMAS VOLZ

May. 2017

NDNC 2017

## Extending the reach of QKD: Satellite prototype for quantum communication

SARAH KAISER

QSI seminar series

Sydney, Australia

Apr. 2017

## Photon phreaking or what quantum can (actually) do for security?

SARAH KAISER, ALAN ROBERTSON

The Gemalto Crypto Club

Sydney, Australia

Feb. 2017

## Extending the reach of QKD: Satellite prototype for quantum communication

SARAH KAISER

Quantum Photonics Connections Conference

Sydney, Australia

Nov. 2016

## Extending the reach of QKD

SARAH KAISER

Last Frontiers in Quantum Information Science

Juneau, AK, USA

Jun. 2016

## Towards satellite-based quantum communication: field testing the QEYSSAT payload

SARAH KAISER, CHRIS PUGH, JEAN-PHILIPPE BOURGOIN, BRENDON HIGGINS, THOMAS JENNEWEIN

ASTRO 2016

Ottawa, Canada

May. 2016

## Practical quantum cryptography devices: how to make them and how to break them

SARAH KAISER

QuSciTech Seminar at Macquarie University

Sydney, Australia

April. 2016

## Towards satellite-based quantum communication: field testing the QEYSSAT payload

SARAH KAISER, CHRIS PUGH, JEAN-PHILIPPE BOURGOIN, BRENDON HIGGINS, THOMAS JENNEWEIN

SQuInT 2016

Albuquerque, NM, USA

Feb. 2016

## What QKD can learn from classical cryptography

SARAH KAISER

Last Frontiers in Quantum Information Science

Homer, AK, USA

Jun. 2015

## Honors & Awards

2016 **UW Equity and Inclusivity Award for founding FemPhys Organization**, University of Waterloo

Waterloo, Canada

2015 **IQC David Johnston Award for Scientific Outreach**, Institute for Quantum Computing

Waterloo, Canada

2012-2016 **Mike and Ophelia Lazaridis Fellowship**, Institute for Quantum Computing

Waterloo, Canada

2009 **Best Poster Presentation**, Sigma Zeta National Convention

Pikeville, KY, USA

2008-2011 **Meritorious Award Winner**, COMAP Competition

St. Paul, MN, USA

## Experience

### Macquarie University

Sydney, Australia

POSTDOCTORAL RESEARCH FELLOW

Oct. 2016 - PRESENT

- Develop new experimental control and automatization for optical and microwave characterization of color centers in nanodiamonds, including expanding to low temperature environments.
- Supervise a number of undergrad and HDR students working in the lab.
- Collaborate on industrial linkage projects to explore applications of current lab research.

### Wolfram Research

Urbana-Champaign, IL, USA

JR. KERNEL DEVELOPER

Aug. 2011 - Aug. 2012

- Served on the Information Visualization Team for the Mathematica software program, generating ideas for new software functionality.
- Participated in group development of new program features providing enhanced utility and visualization for the end user.
- Wrote code prototypes to facilitate the development of the new program features decided upon by the team.
- Resolved development issues and troubleshoot submitted bugs in current builds to refine the development of the new features.

### National Institute of Standards and Technology

Boulder, CO, USA

UNDERGRADUATE RESEARCH FELLOW

MAY. 2010 - Mar. 2011

- Researched new modeling techniques to improve the theoretical and practical understanding of newly fabricated laboratory devices.
- Implemented proposed algorithms in Mathematica to characterize and predict future device behavior.
- Participated in lab group collaborations to resolve experimental and theoretical issues.
- Presented research to a variety of audiences enhancing knowledge of the project.
- Researched theoretical background information to facilitate understanding of the research project.

## California Institute of Technology

UNDERGRADUATE RESEARCH FELLOW

- Constructed and engineered lab components to aid in facilitating the research project goals.
- Modeled experimental apparatus in Mathematica to better understand the system and its components.
- Collaborated with lab team to identify and successfully meet research challenges.
- Presented research results to a variety of audiences to enhance knowledge of the project.

Pasadena, CA, USA

Jun. 2009 - Aug. 2009

## Bethel University

MATH LAB COORDINATOR & TUTOR

- Tutored students in various math courses aiding them with academic success.
- Scheduled and lead math tutor team meetings to create an effective and cohesive team.
- Coordinated math tutoring sessions and available tutors to provide an essential service to university students.
- Organized and maintain participant schedules to insure an efficient service.

St. Paul, MN, USA

Sep. 2007 - May. 2011

## Leadership

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2016-2017 **Member of the Women in Physics committee**, Australian Institute of Physics

Sydney, Australia

2017 **Member**, Macquarie University Equity committee

Sydney, Australia

2015-2016 **Member**, IQC Equity and Inclusion committee

Waterloo, Canada

2014-2015 **Co-founder & Officer**, FemPhys student group at University of Waterloo

Waterloo, Canada

2014-2016 **University of Waterloo Chapter Officer**, Optical Society of America

Waterloo, Canada

2014-2015 **Officer**, IQC Graduate student association

Waterloo, Canada

2014-2015 **Co-organizer**, IQC Entrepreneurship club

Waterloo, Canada

2012 **Local Student Organizer**, QCRYPT conference 2013

Waterloo, Canada

2010-2011 **Chapter President**, Bethel University Chapter, Sigma Pi Sigma

St. Paul, MN, USA

2009-2011 **Chapter Officer**, Sigma Zeta Bethel University Chapter

St. Paul, MN, USA

## Outreach

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### LIGHT Illuminated

Waterloo, Canada

MUSEUM EXHIBIT PLANNING, DESIGN, AND CONSTRUCTION

2014-2015

### Canadian Association for Girls in Science workshop

Waterloo, Canada

LECTURER, QUANTUM CRYPTOGRAPHY

2014-2015

### Waterloo Unlimited workshop for high schoolers

Waterloo, Canada

LECTURER, USING QUANTUM MECHANICS TO EXPLORE NEW FRONTIERS IN CRYPTOGRAPHY

2014

### Shad Valley workshop

Waterloo, Canada

LECTURER, EXPLORING THE FANTASTIC WORLD OF QUANTUM MECHANICS: QUANTUM CRYPTOGRAPHY

2014

### Quantum Cryptography School for Young Students

Waterloo, Canada

LECTURER, IMPLEMENTATIONS OF QUANTUM CRYPTOGRAPHY

2013-2015

### Undergraduate School on Experimental Quantum Information Processing

Waterloo, Canada

LECTURER

2013-2014