Sarah Christine Kaiser

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RESEARCH INTERESTS

- Quantum information and computation
- Quantum key distribution
- Long distance quantum communication
- Integrated photonic waveguides
- Single photon detection

EDUCATION

University of Waterloo GPA: 89.31
Institute for Quantum Computing
PhD Physics (Quantum Information)
Expected Graduation Date: August 2016

Bethel University GPA: 97.25
Bachelor of Science in Physics
Bachelor of Arts in Math
Summa Cum Laude with Honors

COURSEWORK

- 701 Quantum Mechanics 1
- 767 Quantum Information Processing
- 750 Implementations of Quantum Information Processing
- 890 Implementations of Quantum Communications
- 820 Theory of Quantum Information
- 890 Topics in Quantum-safe Cryptography
- 890 Optical and Atomic Implementation
- 890 Applied Quantum Cryptography

PUBLICATIONS

- Vadim Makarov, Jean-Philippe Bourgoin, Poompong Chaiwongkhot, Mathieu Gagne, Thomas Jennewein, **Sarah Kaiser**, Raman Kashyap, Matthieu Legre, Carter Minshull, Shihan Sajeed. "Laser damage creates backdoors in quantum communications." arXiv:1510.03148 [quant-ph] (2015).
- J-P Bourgoin, B L Higgins, N Gigov, C Holloway, C J Pugh, **S Kaiser**, M Cranmer and T Jennewein. "Free-space quantum key distribution to a moving receiver." Optics Express Vol. 23, Issue 26, pp. 33437 – 33447 (2015).
- Shihan Sajeed, Igor Radchenko, **Sarah Kaiser**, Jean-Philippe Bourgoin, Anna Pappa, Laurent Monat, Matthieu Legr, and Vadim Makarov. "Attacks exploiting deviation of mean photon number in quantum key distribution and coin tossing" Phys. Rev. A 91, 032326 (2015).
- Feihu Xu, Shihan Sajeed, **Sarah Kaiser**, Zhiyuan Tang, Li Qian, Vadim Makarov, and Hoi-Kwong Lo. "Experimental quantum key distribution with source flaws and tight finite-key analysis." Phys. Rev. A 92, 032305 (2015).

CONFRENCES

- **Sarah Kaiser**. "Extending the reach of QKD". Talk at Last Frontiers in Quantum Information Science 2016.
- **Sarah Kaiser**, Chris Pugh, Jean-Philippe Bourgoin, Brendon Higgins, Thomas Jennewein. "Towards satellite-based quantum communication: field testing the QEYSSAT payload". Talk at ASTRO 2016.

- **Sarah Kaiser**, "Practical Quantum Cryptography Devices: how to make them and how to break them", presented as a seminar at Macquarie University on 1 April 2016.
- **Sarah Kaiser**, Chris Pugh, Jean-Philippe Bourgoin, Brendon Higgins, Thomas Jennewein. "Towards satellite-based quantum communication: field testing the QEYSSAT payload". Talk at SQuInT 2016.
- **Sarah Kaiser**. "What QKD can learn from Classical Cryptography". Talk at Last Frontiers in Quantum Information Science 2015.
- **Sarah Kaiser**, Chris Pugh, Jean-Philippe Bourgoin, Brendon Higgins, Nigar Sultana, Elena Anisimova, Eric Choi, Thomas Jennewein. "Towards Airborne Quantum Key Distribution". Poster at Canadian Summer School on Quantum Information 2014.

HONORS

- UW Equity and Inclusivity Award for founding FemPhys Organization 2016
- IQC David Johnston Award for Scientific Outreach 2015
- Mike and Ophelia Lazaridis Fellowship 2012—present
- Best Poster Presentation, Sigma Zeta National Convention 2009
- COMAP Competition, Meritorious Award Winner 2008, 2009, 2010, 2011

LEADERSHIP

- IQC Equity and Inclusion committee member 2015—present
- FemPhys Co-founder and officer 2014—2015
- Optical Society of America University of Waterloo chapter officer 2014—present
- IQC Graduate student association officer 2014—2015
- IQC Entrepreneurship club Co-organizer 2014—2015
- QCRYPT conference student organizer 2013
- Sigma Pi Sigma Chapter President 2010—2011
- Sigma Zeta Chapter Officer 2009—2011

PROFESSIONAL EXPERIENCE

WOLFRAM RESEARCH — Champaign, IL
Junior Kernel Developer — August 2011—August 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.

OUTREACH

- Ontario Centre for Excellence Discovery Trade show 2015
  demo of satellite QKD equipment
- *LIGHT Illuminated* museum exhibit design and grant writing 2014-2015
- Canadian Association for Girls in Science workshop lecture 2014, 2015
  "Quantum Cryptography"
- Waterloo Unlimited workshop for high schoolers "Using Quantum 2014
  Mechanics to Explore New Frontiers in Cryptography"
- Shad Valley workshop lecture "Exploring the fantastic world of 2014
  quantum mechanics: Quantum Cryptography"
- Quantum Cryptography School for Young Students lecture 2013-2015
  "Implementations of Quantum Cryptography"

- Undergraduate School on Experimental Quantum Information Processing lecturer — 2013, 2014

LABORATORY EXPERIENCE

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY — Boulder, CO
Undergraduate Research Fellow — May 2010—March 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 — Pasadena, CA
Undergraduate Research Fellow — June 2009—August 2009

- 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.

BETHEL UNIVERSITY — St. Paul, MN
Physics Lab Research Assistant — May 2008—January 2009

- Coordinated and implement laser lab equipment to facilitate department research projects.
- Utilized laser stabilization and alignment techniques for use in various research projects.
- Collaborated with lab research team assisting in coordinated research efforts.
- Presented project and research information to visiting students and researchers.

Physics Teaching Assistant — January 2008—May 2011

- Facilitated tutoring sessions for physics students to aid is academic success.
- Graded assignments and exams for physics faculty providing academic support.
- Assisted faculty with classroom and lab demonstrations facilitating student learning.

Math Lab Coordinator/Tutor — September 2007—May 2011

- 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.
- Scheduled and lead math tutor team meetings to create an effective and cohesive team.
- Tutored students in various math courses aiding them with academic success.

AFFILIATIONS	Optical Society of America	2010-Present
REFERENCES	Available upon request	