Sarah Christine Kaiser

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RESEARCH INTERESTS

- Quantum information and computation
- Quantum key distribution
- Long distance quantum communication
- Integrated photonic waveguides
- Color centers in diamond

EDUCATION

University of Waterloo
Institute for Quantum Computing
PhD Physics (Quantum Information)

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

PUBLICATIONS

- Christopher J. Pugh, **Sarah Kaiser**, Jean-Philippe Bourgoin, Jeongwan Jin, Nigar Sultana, Sascha Agne, Elena Anisimova, Vadim Makarov, Eric Choi, Brendon L. Higgins, Thomas Jennewein. "Airborne demonstration of a quantum key distribution receiver payload." arXiv:1612.06396 [quant-ph]
- 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." Phys. Rev. A 94, 030302 (2016)
- 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).
- Contributor to Quantum Safe Cryptography and Security: An introduction, benefits, enablers and challenges ETSI White Paper No. 8. White Paper
- 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).

TALKS

- **Sarah Kaiser**, Alan Robertson. "Photon phreaking or what quantum can (actually) do for security?", presented at the Gemalto Crypto Club 23 Feb 2017.
- **Sarah Kaiser**. "Extending the reach of QKD: Satellite prototype for quantum communication", presented at the Quantum Photonics Connections Conference at the University of Sydney, 24 November 2016.
- **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.

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—2016
- Best Poster Presentation, Sigma Zeta National Convention 2009
- COMAP Competition, Meritorious Award Winner 2008, 2009, 2010, 2011

LEADERSHIP

- Member of the Women in Physics committee at Australian Institute of Physics 2016—Present
- IQC Equity and Inclusion committee member 2015—2016
- FemPhys Co-founder and officer 2014—2015
- Optical Society of America University of Waterloo chapter officer 2014—2016
- 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

OUTREACH

- *LIGHT Illuminated* museum exhibit design and grant writing 2014-2015
- Canadian Association for Girls in Science workshop lecture "Quantum Cryptography" 2014, 2015
- Waterloo Unlimited workshop for high schoolers "Using Quantum Mechanics to Explore New Frontiers in Cryptography" 2014
- Shad Valley workshop lecture "Exploring the fantastic world of quantum mechanics: Quantum Cryptography" 2014
- Quantum Cryptography School for Young Students lecture "Implementations of Quantum Cryptography" 2013-2015
- Undergraduate School on Experimental Quantum Information Processing lecturer 2013, 2014

PROFESSIONAL EXPERIENCE

MAQUARIE UNIVERSITY — Sydney, NSW, Australia
Postdoctoral Research Fellow — Oct 2016—Present

- Develop new experimental control and automization 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 — Champaign, IL, USA
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.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
Undergraduate Research Fellow — Boulder, CO, USA
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, USA
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
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
Australian Institute of Physics — 2016-Present

REFERENCES

Available upon request