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UNIVERSITY OF WATERLOO | IQC Institute for Quantum Computing

INSTITUTE FOR QUANTUM COMPUTING
ANNUAL REPORT for APRIL 1, 2017 – MARCH 31, 2018

Report for University of Waterloo Board of Governors approval

TO BE SUBMITTED TO:
THE MINISTRY OF INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT
JULY 30, 2018

FROM THE EXECUTIVE DIRECTOR

The Next Fifteen

IQC celebrated its first fifteen years in 2017. The incredible growth and impact of the Institute for Quantum Computing is the result of vision, commitment and collaborative partnerships focused on advancing quantum information science.

During this time, we have built a world-renowned institute, attracted 29 faculty members from around the world, and grown to a community of over 250 researchers, students, postdoctoral fellows, and technical staff. We have transformed the face of the University of Waterloo campus with the construction of the Mike & Ophelia Lazaridis Quantum-Nano Centre. Our research infrastructure enables the incredibly talented minds who are making discoveries and advancements each and every day.

Thanks to the incredible support of our partners — the Government of Canada, the Province of Ontario, the University of Waterloo and Mike and Ophelia Lazaridis —IQC has grown to be Canada's core quantum initiative. Our breadth of research, community of researchers and collaborations across the country and around the world, have made IQC a hub of quantum research and a beacon of research excellence for Canada.

As exciting as these accomplishments are, I'm more excited about what's to come in the next 15 years. Quantum information science and technology is at a turning point. The scientific advances in this field are impressive and accelerating. We are learning to harness quantum systems and exploit their behaviour to create powerful new technologies. We are witnessing the emergence of a quantum industry in the Quantum Valley, that will continue to transform the Region over the next fifteen years and beyond.

Kevin Resch
Interim Director
Institute for Quantum Computing
University of Waterloo

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ABOUT THE INSTITUTE FOR QUANTUM COMPUTING

IQC was created in 2002 to seize the potential of quantum information science for Canada. IQC's vision was bold: position Canada as a leader in research and provide the necessary infrastructure for Canada to emerge as a quantum research powerhouse. Today, IQC stands among the top quantum information research institutes in the world. Leaders in all fields of quantum information science come to IQC to conduct research, share knowledge and encourage the next generation of scientists.

IQC is leading the next great Canadian technological revolution – the quantum revolution. Quantum technologies and applications developed in IQC labs create the foundation for next generation technologies based on quantum information research conducted right here in Canada.

None of this would be possible without the visionary leadership and investments of Mike and Ophelia Lazaridis, the Government of Canada, the Government of Ontario and the University of Waterloo. This strategic private-public partnership has accelerated the advancement of quantum information research and discovery, not only in Canada, but around the globe.

Vision & Mission

IQC's vision is to harness the power of quantum mechanics for transformational technologies that benefit society and become the new engine for economic growth in the 21st century and beyond.

IQC's mission is to develop and advance quantum information science and technology at the highest international level through the collaboration of computer scientists, engineers, mathematicians and physical scientists.

Strategic Objectives

IQC is guided by three strategic objectives developed in partnership with the Ministry of Innovation, Science and Economic Development:

1. To establish Waterloo as a world-class centre for research in quantum technologies and their applications.
2. To become a magnet for highly qualified personnel in the field of quantum information.
3. To be a prime source of insight, analysis and commentary on quantum information.

FUNDING OBJECTIVES 2017-2019

IQC was awarded $10M over two years through the generous support of the Government of Canada. This funding served to support the following five objectives:

- **A.** Increase knowledge in the various fields and sub-fields of quantum information, thereby positioning Canadians at the leading edge of quantum information research and technology;
- **B.** Create new opportunities for students to learn and to apply new knowledge to the benefit of Canada;
- **C.** Brand Canada as the destination of choice for conducting research in quantum technologies in order to attract the best in the world to Canada, create and strengthen partnerships with the international quantum information science community and promote world-class excellence in quantum information science and technology;
- **D.** Enhance and expand the Institute's public education and outreach activities to effectively promote science and quantum information science and demonstrate how research in quantum information science can be applied; and
- **E.** Increasingly translate research discoveries into market-ready quantum-based products which will have economic and social benefits for Canada.

Expected Results

- Increase knowledge in quantum information and technology;
- Support and create opportunities for students to learn and apply new knowledge;
- Brand Canada as a place to conduct research in quantum information technologies;
- Increase awareness and knowledge of quantum information science and technology and the Institute in both the scientific community and amongst Canadians more generally; and
- Position Canada to take advantage of economic and social benefits of quantum information science through seizing opportunities to commercialize breakthrough research.

Through the activities planned and undertaken with the contribution of the Government of Canada in the past years, IQC has positioned Canada to take advantage of economic, social, and in some cases, environmental benefits of quantum research. What follows is progress achieved in the 2017-2018 year.

2017-2018 ACHIEVMENTS AND RESULTS

Objective A

Increase knowledge in quantum information science and technology (Increase in knowledge in the various fields and sub-fields of quantum information, thereby positioning Canadians at the leading edge of quantum information research and technology).

Expected Result: Increase knowledge in quantum information and technology.

Planned Activities 2017-2018:

- Leverage faculty across three Faculties – Science, Mathematics and Engineering – research will continue IQC's collaborative and interdisciplinary research agenda in quantum computation, quantum communication, quantum sensors and quantum materials.
- Continue to publish research results in world–leading journals.
- Recruit up to two new faculty members.
- Recruit up to one new research assistant professor.
- Continue to outfit labs in the Mike & Ophelia Lazaridis Quantum-Nano Centre as new IQC members are recruited.
- Continue to outfit and maintain the Quantum NanoFab facility to enable fabrication of quantum-enabled technologies.
- Update and maintain lab space in Research Advancement Centre (RAC) buildings.
- Continue effective and relevant relationships with current partners.
- Seek out new partnerships that will advance IQC's mission and strategic objectives.

Progress Achieved in 2017-2018

Continue a collaborative research agenda in quantum computation, quantum communication, quantum sensors and quantum materials

IQC researchers collectively pursue a collaborative and interdisciplinary research agenda resulting in advancements in our understanding of quantum information science and technologies. Following are short summaries on select research results from this past year. A full list of publications can be found in Appendix B, *Publications*, on page 39.

Observation of Genuine Three-Photon Interference
Physical Review Letters: https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.153602

In a paper published in Physical Review Letters, PhD student Sascha Agne and colleagues experimentally realized a three-photon Greenberger-Horne-Zeilinger (GHZ) interferometer and observed genuine three-photon interference for the first time, bringing scientists one step closer to exciting applications in quantum communication.

The work builds on previous research by faculty members Thomas Jennewein and Kevin Resch. They demonstrated the first direct generation of photon triplets in 2010, and time-energy entanglement in three photons in 2012. These time-energy entangled photon triplets are physically interesting, but difficult to access experimentally.

In their latest work, the researchers fed their entangled photon triplets through an interferometer, a device that transforms abstract information of photons called phase into measurable changes of intensity, before they entered single photon detectors. The GHZ interferometer proposed in 1990 consisted of three spatially separated interferometers, one for each photon. The group implemented the GHZ interferometer as a three-in-one interferometer, where each of the three photons used a different path through a single interferometer. This approach avoids the difficulty of stabilizing three separate interferometers while maintaining their independence. They found that the correlations of the entangled photon triplet mapped one-to-one with the interference pattern picked up by their detectors, without any simultaneous one- or two-photon interference.

To explain, Agne uses the analogy of three people in a room. If all three people are doing the same thing, we can say their behaviour is correlated, or in quantum mechanical terms, entangled. Normally, this means any two of these people also have correlated behaviour. In the world of quantum mechanics however, entanglement between three (or more) particles can create correlations between all the particles, not any individual or pair separately. The researchers translated this abstract reality into a tangible interference pattern that has many possible applications.

One such possibility is a protocol called secret sharing. Imagine a trio of people who each have to use their thumbprint to unlock a safe. One or two of those people cannot secretly open the safe, as the third person is necessary. This latest research opens the door to implementations of this idea in quantum cryptography.

Another important outcome of the experiment is the high interference visibility achieved. Visibility is a measure of the quality of control the researchers have over the phase of the interferometer. Using classical light fields, the upper bound of the visibility of three-photon coincidences is 50 percent, but in quantum mechanics, one hundred percent is possible. The researchers achieved well over 90 percent, leaving no doubt they measured a quantum mechanical effect.

These extraordinary results were made possible by a culmination of technological improvements, including the photon triplet source from Jennewein and Resch, new superconducting nanowire detectors, and high-resolution time tagging devices by Jennewein.

The experiment is a result of a collaboration led by Jennewein, between IQC and Department of Physics and Astronomy researchers Sascha Agne, Jeongwan Jin, Resch and Jeff Salvail, former IQC members Gregor Weihs, Evan Meyer-Scott and Deny R. Hamel, and University of Innsbruck researcher Thomas Kauten.

Agne hopes to expand their experimental setup in the future. “In our experiment, energy and time are continuous, not chunked, because the photon triplets were generated using a continuous wave laser. If we were to generate these triplets using what we call time bins, essentially pulsed lasers, we would end up with a discrete version of time-energy entanglement, which is more immediately useful in quantum communication.” Quantum communication over optical fibres, for example, requires time bin encoding.

Discrete time-energy entanglement has been achieved in two photons, but not three, which could have distinct advantages in quantum communication networks.

A research group led by Ian Walmsley, Pro-Vice-Chancellor for Research and Hooke Professor of Experimental Physics at the University of Oxford, observed a similar phenomenon in an independent experiment at the same time as Ange's group. After making contact, both groups decided to jointly submit their work to Physical Review Letters, and the journal published a story on this accidental convergence.

Quantum-coherent mixtures of causal relations
***Nature Communications*:** https://www.nature.com/articles/ncomms15149

Last year, research from IQC and collaborators at the Perimeter Institute for Theoretical Physics (PI) showed that in the quantum world, certain kinds of correlations do imply causation. This line of research has now expanded to the question of whether there are types of causal structures that exist in the quantum world, but not in the classical world of our everyday lives.

There are different ways of mixing together different causal mechanisms. You can mix them probabilistically, meaning that one act or another happens, or you mix them physically, so that both happen simultaneously. This is like the difference between flipping a coin to decide whether to have root beer or ice cream, and having ice cream in your root beer. The research team, consisting of Jean-Philippe MacLean, Canada Research Chair in Quantum Optics Kevin Resch, Katja Ried and Robert Spekkens of PI have found a kind of physical mixture of causal mechanisms. In this new physical mixture the mechanisms act quantum-coherently with one another.

The paper, Quantum-coherent mixtures of causal relations, published in *Nature Communications* explains how the team discovered a way to measure and explain the correlations of these quantum-coherent mixtures. The researchers noted that a pair of systems could be correlated if the later system is a transformed version of the earlier one: a cause-effect relationship. Alternatively, the systems might be correlated if prepared in a correlated quantum state: a common cause relationship. The most quantum types of cause-effect and common-cause relations are related to the preservation and generation of entanglement. It is also possible to have a pair of systems related by both cause-effect and common cause mechanisms acting simultaneously. These are the new possibilities that the researchers uncovered.

The researchers used a phenomenon in statistics known as Berkson's Paradox to define this novel type of combination. It states that if you have two uncorrelated variables, A and B, which are both causes of a third variable, C, and you post-select on a specific value of C, this can induce correlations between A and B.

An example from the paper describes a candidate trying to get hired by an academic institution that requires two important skills: teaching and research. Assuming that these abilities are equally distributed across all candidates, and assuming that a candidate has to be fairly good at teaching and fairly good at research in order to be hired, the candidates who aren't that good at either are removed from the pool.

When considering the subgroup of successful candidates, someone in that group who isn't that good at teaching must be really good at research, and vice-versa. The selection criteria induced a negative correlation between teaching and research among the hires. Based on this negative correlation, one should not conclude that all good researchers are bad teachers. To do so is to fall victim to Berkson's Paradox.

The researchers noted that the strength of the correlations between systems A and B that are induced by the post-selection on C has information about the causal relations between the systems. For instance, if we look at the amount of negative correlations between teaching and research for hires across several academic institutions, we can learn something about the extent to which both skills determine hiring outcomes versus just one or the other being relevant.

A natural question arises when we consider Berkson's effect in a quantum world: what does it mean when you see entanglement in the induced correlation? The researchers realized that such entanglement can be used as the signature that one has a quantum-coherent mixture of cause-effect and common-cause mechanisms connecting two systems. Returning to the root beer analogy, this is a kind of ice cream float that you can't get at a classical soda shoppe.

"This could possibly be used as a resource," said MacLean, a PhD student with IQC and the Department of Physics and Astronomy. "We don't know this yet, but there are certain things that it could entail for other fields." Causality is a fundamental concept for those studying epidemiology, genetics and social sciences and the idea of disentangling correlations for causation is very important. "We've discovered that the causal structures that are allowed in the quantum world are much richer than in the classical world," concluded MacLean.

The richer possibilities of coherent combinations of different cause-effect and common cause relations could lead to new insights into how to provide causal explanations of quantum correlations, a task that is made challenging by results such as Bell's theorem.

"In the near future, the team is also interested in exploring the effect of decoherence on these nonclassical causal relations," said Resch. "Assessing how robust they are to decoherence and experimental noise will be a necessary step before exploiting them as a resource in quantum information processing and moreover may give more insights on the quantum/classical boundary for causal structures."

Bright nanoscale source of deterministic entangled photon pairs violating Bell's inequality
Nature: https://www.nature.com/articles/s41598-017-01509-6#Fig1

All cryptography strategies attempt to keep information safe from hackers. Theoretically, hackers cannot exploit quantum cryptography because it makes use of the fundamental laws of nature. When sending keys using pairs of entangled photons—photons so strongly correlated that we cannot describe their quantum states individually they must violate Bell's inequality to avoid exploitation. This means that the photons must show strong correlations in some property that cannot be explained by hidden, local relationships. The higher the fidelity, or strength, of the entanglement, the higher the security of any quantum communication.

Working at the Delft University of Technology in The Netherlands, the researchers, including IQC faculty member Michael Reimer, used highly symmetrical Indium Arsenide Phosphide (InAsP) quantum dots—nano-sized artificial atoms that emit light—to generate entangled photon pairs. Extracting photons from bare quantum dots is inefficient, so additional photonic structures were needed. The current leading photonic technology is called parametric down-conversion, but the researchers decided to use special nanowires grown at the National Research Council of Canada (NRC) to take advantage of their theoretically promising capabilities to create entangled photons on-demand and reach near-unity efficiencies.

They embedded the quantum dots in the nanowires, which served as waveguides to steer the photons. These nanowire structures are the only known method theoretically capable of reaching near perfect entanglement fidelity, as well as near-unity photon-pair generation efficiency. Though the researchers did not yet reach this theoretical upper limit, they generated two orders of magnitude more photon pairs than previously reported from standard quantum dot structures and conclusively violated Bell's inequality.

This efficient generation drastically reduces the time needed to complete quantum optics experiments. "Suppose an experiment would normally take someone a month; with these nanowire-embedded quantum dots, we can now do it in minutes," said Reimer, a faculty member with the Department of Electrical and Computer Engineering.

The research team used waveplates to correct rotation in the state of the quantum dots – a result of asymmetry in the nanowire waveguide shape. Researchers performed the traditional Clauser-Horne-Shimony-Holt (CHSH) test of Bell's inequality using the standard, non-rotated state. The CHSH test is a stringent set of 16 cross-correlation measurements in identical experimental conditions. The researchers first violated the inequality using temporal post-selection—choosing only to look at photon pairs in narrow selections of time, which results in the discarding of photons and thus reduced efficiency. By changing the power and frequency of the laser, the researchers limited false coincidences caused by electron re-excitation and achieved an even larger violation of the inequality without temporal post-selection.

Reimer is currently working with his research team at IQC to achieve as close to near-unity fidelity and efficiency as possible in order to surpass all other entangled photon pair sources and to make the nanowire-embedded quantum dots practical for applications in quantum information processing and secure quantum communication. His team also plans to tune these on-demand entangled sources via electric fields for demonstrating a working node of a quantum repeater for long-distance quantum communication.

Bright nanoscale source of deterministic entangled photon pairs violating Bell's inequality was published in Scientific Reports.

Airborne demonstration of a quantum key distribution receiver payload
Quantum Science and Technology: http://iopscience.iop.org/article/10.1088/2058-9565/aa701f

Researchers took a significant step towards enabling secure quantum communication via moving satellites. A study, published in the new journal Quantum Science and Technology, demonstrates the first quantum key distribution transmissions from a ground transmitter to a quantum payload on a moving aircraft.

To ensure the tests were a valuable proof of concept for the anticipated satellite mission, the team at IQC and Department of Physics and Astronomy designed their prototype receiver to consist of components compatible with the size and operating environment restrictions of a micro satellite.

Lead author Christopher Pugh, said: "Quantum key distribution (QKD) establishes cryptographic keys between two distant parties in a way that is cryptanalytically unbreakable. Ground based QKD systems use optical fibre links, and are limited to distances of a few hundred kilometres due to absorption losses, which get exponentially worse as the distance increases."

"Free space links have been shown to work over ground with varying distances, both in stationary and moving tests. But despite losses due to geometric effects scaling quadratically with distance, the addition of atmospheric absorption and turbulence and the need to have clear line of sight mean terrestrial free-space transmissions are also limited to a few hundred kilometres. Satellite based system expand quantum communication to a global scale."

To test their system, the team used the Twin Otter aircraft of the National Research Council to carry out 14 passes over their ground transmitting station at varying distances, achieving a quantum signal link for seven passes, and a secret key extraction for six of the seven successful passes.

Flight paths for the 7km arc and line, followed from left to right. The star indicates the location of the ground station at Smith Falls{Montague Airport. The inner portions represent where the quantum link was active. Photo produced using GPSVisualizer.com, map data c 2016 Google, imagery c 2016 Cnes/Spot Image, DigitalGlobe, Landsat, New York GIS, USDA Farm Service Agency.

Faculty member Thomas Jennewein, said: "This is an extremely important step which took almost eight years of preparation. It finally demonstrates our technology is viable. We achieved optical links at similar angular rates to those of low-Earth-orbit satellites, and for some passes of the aircraft over the ground station, links were established within 10 seconds of position data transmission. We saw link times of a few minutes and received quantum bit error rates typically between three and five per cent, generating

secure keys up to 868 kb in length. We have proved the concept, and our results provide a blueprint for future satellite missions to build upon, just in time for the announcement of a quantum satellite mission by the Canadian Government," said Jennewein.

A solid state source of photon triplets based on quantum dot molecules
Nature Communications: https://www.nature.com/articles/ncomms15716

The team, including IQC postdoctoral fellow Milad Khoshnegar and IQC associate Gregor Weihs, recorded an average of 65.2 photon triplets emitted per minute, the highest detection rate so far. To create the photon triplets, the researchers sent picosecond pulses of light into a photonic nanowire and through a pair of quantum dots and into the quantum dot molecule. The researchers formed a quantum dot molecule by tunneling between the two individual quantum dots, which are semiconductor nanostructures that confine the motion of electrons.

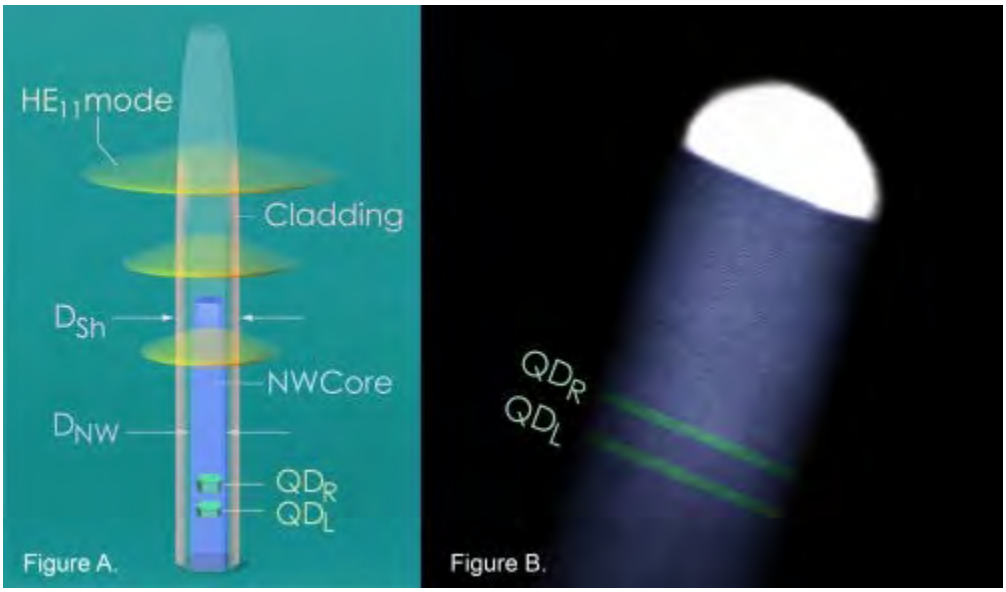


Figure A: The schematic of a quantum dot molecule (QDM) embedded inside a clad nanowire. Figure B: False-coloured scanning electron microscopy image of a nanowire incorporating a single quantum dot molecule.

In a quantum dot, a photon begins as an electron-hole pair called an exciton. The exciton undergoes a transition in the quantum dot, where it loses its energy and emits a single photon. To obtain correlated photons, the excitons must "talk" to each other, which happens when there is spatial overlap of the exciton orbital states.

"In separate quantum dots, the orbitals of different excitons have no spatial overlap," explained Khoshnegar, who proposed the idea of using a quantum dot molecule system to generate higher-order photon correlations. "In a quantum dot molecule, the orbitals of excitons do spatially overlap and lead to the emission of correlated photons from different transitions."

Next, the researchers conducted a triple coincidence experiment using a time-tagging device combined with three photon detectors to measure the photon output, confirming the photon triplets were in fact correlated by time. "The information about the arrival time of each photon revealed that the three

photons were indeed emitted as a triplet, in contrast to three independent events," said Tobias Huber, a postdoctoral fellow at the National Institute of Standards and Technology.

"So far, the direct generation of entanglement has been limited to photon pairs in solid state systems," said Khoshnegar. "The experimental results here will pave the way for the direct generation of multi-photon entanglement." Another advantage of using a solid-state system, like a quantum dot, is the ability to directly generate photon triplets without introducing post-selection techniques and the potential scalability to help with miniaturizing on-chip quantum emitters.

The collaboration, A solid state source of photon triplets based on quantum dot molecules, by Khoshnegar, Weihs, Huber and others from the University of Waterloo, Universität Innsbruck, National Research Council of Canada and Université Bordeaux was published in Nature Communications.

Thermocompression bonding technology for multilayer superconducting quantum circuits
***Applied Physics Letters**: http://aip.scitation.org/doi/full/10.1063/1.5003169*

Quantum machine learning and artificial intelligence, quantum-safe cryptography, and simulation of quantum systems all rely on the power of quantum computing.

A team of researchers at IQC took a step closer to realizing the powerful possibilities of a universal quantum computer. The Laboratory for Digital Quantum Matter, led by faculty member Matteo Mariantoni, is developing technologies for extensible quantum computing architectures based on superconducting quantum devices.

Superconducting quantum circuits have close to zero electrical resistance and offer enhanced efficiency and processing power compared to traditional electrical circuits. Mariantoni's research group uses nanofabrication tools and semiconductor technology to fabricate on-chip superconducting quantum circuits which operate at microwave frequencies.

The source of the quantum information in the superconducting quantum circuit is the qubit. The qubit is similar to an electronic circuit found in a classical computer that is characterized by two states, 0 or 1. However, the qubit can also be prepared in superposition states – both 0 and 1 at the same time – made possible by quantum mechanics.

Quantum mechanical states are fragile and interact easily with their environment. As a result, qubits cannot store information for very long times; the interaction with the environment in the circuit eventually causes the bit to decay, transitioning from one state to another in a random, unwanted fashion. These errors must be mitigated to implement a universal quantum computer.

The team of researchers developed a new way to protect superconducting quantum circuits from environmental interferences, such as electromagnetic fields. They used an etching technique to carve a network of tunnels into the surface of a silicon wafer. These tunnels were then metallized and bonded above the superconducting quantum circuit, individually encapsulating each element of the circuit.

"The tunnels isolate on-chip devices from one another as well as the surrounding environment," explained PhD candidate and lead author Corey Rae McRae. "The new bonding technique we developed allows us to add a second layer to our quantum circuits with high alignment precision and strong adhesion."

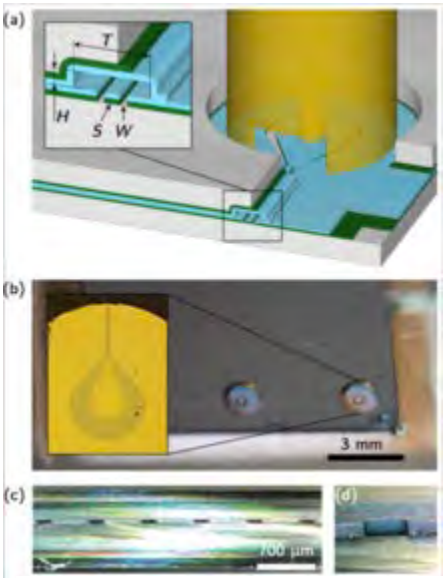


Figure 1: Chip-to-chip bonding: Sketch and images of fabricated devices. Credit: M. Mariantoni and C.R. H. McRae.

This work builds on the recent release of the quantum socket, a three-dimensional wiring technique that uses spring-loaded pins to address individual qubits. The quantum socket connects classical electronics with quantum circuits and has already experimentally demonstrated control of superconducting devices. "We are working on a quantum computing architecture that uses chip-to-chip bonding methods in conjunction with the quantum socket wiring technique," explained Mariantoni, also a professor in the Department of Physics and Astronomy. "We believe this approach will significantly improve qubit quality and addressability, the capability to control and measure a qubit."

The successful experimental demonstration of the new bonding technology is the latest step by the team, and the results, Thermocompression Bonding Technology for Multilayer Superconducting Quantum Circuits, were published in Applied Physics Letter on September 18.

Inexpensive LED-Based Optical Coating Sensor
IEEE Sensors: http://ieeexplore.ieee.org/abstract/document/8011461/?reload=true

A light emitting diode (LED)-based spectrophotometer designed and implemented by IQC researchers is the first demonstration of characterizing optical coatings using a simple, automated device.

Optical coatings are thin layers of film that manufacturers put on optical components such as mirrors, glasses, bank notes and camera lenses to alter the way that particular wavelengths of light are transmitted or reflected. Characterizing the coatings describes what film is adhered to the optical component and provides the right information so the user knows what affect the optical component will have on the light.

The paper "Inexpensive LED-Based Optical Coating Sensor", published in *IEEE Sensors*, is the first for Kayla Hardie, who started the project as an undergraduate research assistant during her first year of studies at the University of Waterloo.

Optics labs often contain a collection of miscellaneous mirrors and lenses with different types of coatings, however many are either missing labels or have potentially degraded over time. The optics lab that Hardie was working in was no exception. She was challenged to build a useful laboratory tool to sort and identify the collection of optical lenses. She created the LED-based spectrophotometer device that characterizes the transmission spectra of optical components in an efficient and reliable manner.

Run by an Arduino Uno microcontroller, the spectrophotometer – also called an optical coating sensor – rotates 10 LEDs over the optical test sample. A silicon photodetector measures the light transmitted through the sample, identifying the optical coating of the sample based on the amount of transmitted light. The 10 LEDs cover a spectrum from ultraviolet (365 nm) to near-infrared (1,000 nm), providing a wide range of wavelengths that cover the most commonly used coating types found in optics

laboratories. Advantages of using LEDs include their compact size, low requirements for warm up time and power, and affordability.

Hardie and her collaborators, including Jennewein, postdoctoral fellow Katanya Kuntz and PhD student Sascha Agne, developed a user interface to control the device to perform calibration measurements in addition to characterizing the optical coating of a sample. “It can be very difficult to find optical filters that only transmit the desired wavelength range and completely block unwanted spectra,” explained Hardie. “We used a simple calibration method to completely eliminate any unwanted wavelengths from getting through, an option not possible with current commercial optical filters.”

The optical coating sensor could make an excellent teaching tool in the classroom and is an affordable alternative to commercial-grade spectrophotometers, essential for use in the lab. “This device is automated, portable, inexpensive, user-friendly and simple to build,” said Hardie. Increasing the number of LEDs, as well as choosing LEDs with smaller emission angles to enhance the robustness of the sensor during alignment are possible future improvements. So far, the optical coating sensor has demonstrated its potential to become a valued tool in any optics lab.

On-Demand Microwave Generator of Shaped Single Photons
Physical Review: https://journals.aps.org/prapplied/abstract/10.1103/PhysRevApplied.8.054015

A team of researchers at IQC demonstrated a new type of on-demand single photon generator that can shape photons to increase their efficiency when used in a quantum network.

Next-generation communication networks will rely on the transmission of quantum information. Single photons, as carriers of quantum information, will play an integral role in building these future networks.

In a quantum network, a photon transmits quantum information most efficiently when its shape, or wave packet, matches the characteristics of the receiving node. That’s why researchers are investigating single photon generators – to build technologies that will produce the right photon shape, at the right time.

An experiment by IQC faculty member, Christopher Wilson who leads the Engineered Quantum Systems Laboratory (EQSL), has demonstrated a simple device that achieves this. “Our results show an important proof-of-principle of an enabling technology for quantum networks, which is easily extensible to other types of physical systems beyond superconductors,” said Christopher Wilson, Principal Investigator.

The research group works with photons that are quantum states of microwave light. These photons operate at a microwave frequency of 5 GHz – the frequency of wireless communications. This means there is readily available technology at this frequency, allowing researchers to use electronic developments already established by industry.

The photon generator the team designed is a superconducting circuit comprised of two main parts. The first, a superconducting qubit, acts like an artificial atom that emits microwave light. The second is a superconducting transmission line that carries electrical signals through the circuit.

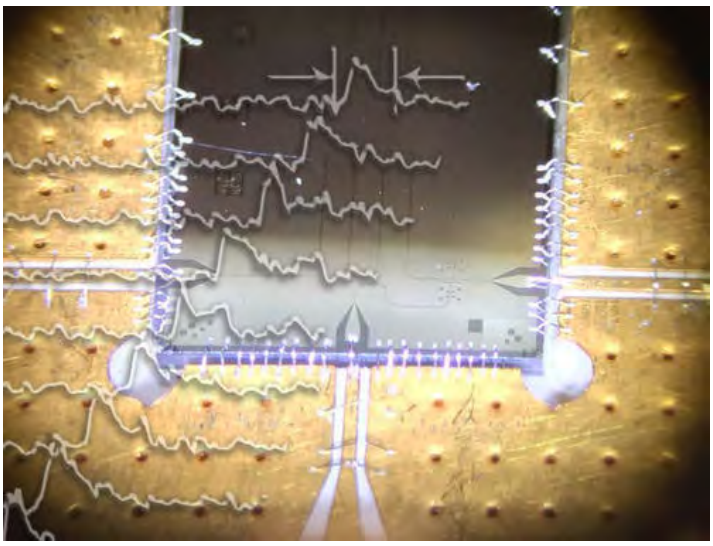


Image: Image of the superconducting circuit used in the experiment. The overlay shows measured single-photon pulses.

Similar to a typical photon generator set-up, the artificial atom is placed in the transmission line. Once a resonant microwave pulse has excited the superconducting qubit, it emits single photons into the transmission line. The problem here becomes that the atom then sits in the transmission line in a fixed configuration, always emitting the photon in the same way – that is, with the same shape. In a quantum network, if the photon shape is different than that required by the receiving network node, efficiency is lost.

The researchers took a new approach to shaping the photons by manipulating quantum vacuum fluctuations on nanosecond timescales. Vacuum fluctuations are a disturbance in the transmission line caused by quantum effects in the electromagnetic field. They can cause energy decay and limit the coherence, or lifetime, of a qubit – in this case a superconducting artificial atom. In this setup, the disturbance caused by the vacuum fluctuations are also what drives the artificial atom to emit the photon into the transmission line.

By applying a magnetic field to a control circuit integrated in the transmission line, the researchers could move the quantum vacuum fluctuations in the line. As a result, they gained control over the emission of the atom and also the shape of the photons.

“The ability to produce shaped photons is important for good absorption of photon pulses by distant nodes of a quantum network,” said Wilson, also a professor in both the electrical and computer engineering and the physics and astronomy departments at the University of Waterloo. “This work further demonstrates how quantum microwaves are a resource for future quantum communication networks.”

The paper, “On-Demand Microwave Generator of Shaped Single Photons”, appeared in *Physical Review Applied*.

Direct Characterization of Ultrafast Energy-Time Entangled Photon Pairs
Physical Review Letters: https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.053601

Scientists at IQC captured the first images of ultrafast photons that are energy-time entangled. The new technique will have direct applications for quantum cryptography and communication protocols, including the possibility for establishing highly secure communication channels over long distances.

“This technique will allow us to explore all sorts of quantum effects that were inaccessible because the detectors were simply too slow,” said Jean-Philippe MacLean, lead author on the study and a PhD candidate in the Department of Physics and Astronomy in the Faculty of Science.

To capture one of the shortest quantum events possible, the researchers used a technique known as optical gating. Similar to the way Harold Edgerton used high-speed strobe lights to capture some of the most iconic images of the 20th century, the device uses short pulses of light to image the photons in time. This technique allowed the researchers to surpass the limitations in current detectors and measure entangled pairs of photons with a resolution below one trillionth of a second.

“In the last 10 to 20 years, researchers have been interested in exploring and exploiting energy-time entanglement for communication,” said MacLean. “By being able to measure ultrafast entangled photons, our measurement technique opens the door to exploiting entanglement in a whole new regime.”

Energy-time entanglement is a feature of quantum light. It occurs when a pair of photons are strongly correlated in both their frequency and time of arrival. Scientists have been interested in exploiting energy-time entanglement for quantum information, but until now, they lacked the resolution in both energy and time to directly observe it.

The new apparatus brings a tool frequently relied upon in classical optics research to the quantum world. In classical optics, the ability to accurately measure both the energy and time features of light on ultrafast timescales has been critical to innovations in laser physics and spectroscopy.

“Ultrafast and quantum represent two frontiers of optical science,” said Kevin Resch, interim executive director at IQC and a professor in Department of Physics and Astronomy in the Faculty of Science. “Bringing techniques from one of these areas over to the other opens up exciting possibilities.”

High-Resolution Nanoscale Solid-State Nuclear Magnetic Resonance Spectroscopy
Physical Review X: https://journals.aps.org/prx/abstract/10.1103/PhysRevX.8.011030

A new technique that brings magnetic resonance imaging to the nanometer scale with unprecedented resolution will open the door for major advances in understanding new materials, virus particles and proteins that cause diseases like Parkinson’s and Alzheimer’s.

Researchers at IQC used a new type of hardware and numerical algorithms to implement high-precision spin control, which allowed them to image proton spins with a resolution below 2nm.

Traditional MRI revolutionized medical imaging and transformed our understanding of the structure and function of biological systems, but it is limited to millimetre resolution.

“This work extends the powerful capabilities of MRI to the nanometer scale and provides a whole new lens with which to view the structure and function of complex biomolecules,” said Raffi Budakian, lead investigator on the paper and a professor in the Department of Physics and Astronomy at Waterloo.

The current work extends the capabilities of Magnetic Resonance Force Microscopy (MRFM) — an ultra-sensitive technique for nanometer scale MRI — by combining it with the ability to precisely control atomic spins.

“Now that we have a high degree of control on the spins, we can also apply the well-developed MRI techniques on an extremely small scale,” said Budakian. “We now have unprecedented access to understanding complex biomolecules.”

The paper appears in *Physical Review X*. This research was undertaken thanks in part to funding from the Canada First Research Excellence Fund.

Continue to publish research results in world-leading journals

Publications and Citations

As IQC researchers continue to advance the field of quantum Information science and technology, publications and citations become important indicators of scholarly impact as they help to measure research output and intensity. In 2017-2018, IQC's collective research community published 144 papers, which is five more papers than the yearly average for the past five years.

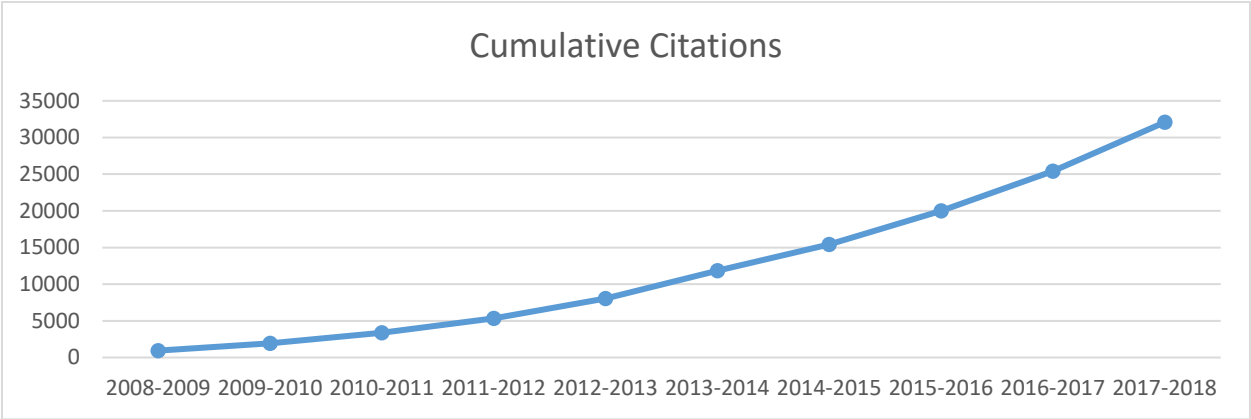
Over 70% of all co-authored papers (from 2002 through to the present) have been published with international collaborators from leading universities and institutes including Massachusetts Institute of Technology (MIT), Tsinghua University, Harvard, University of British Columbia and Université de Sherbrooke.

IQC's scientific achievements are further strengthened when considering the number of prominent journals where researchers are published. The chart below indicates the number of high-level, peer-reviewed discoveries since 2012 – IQC researchers have published 181 papers in these high-ranking journals.

Publication	11-12	12-13	13-14	14-15	15-16	16-17	17-18
Nature	1	1		2	1		2
Nature Photonics	1		3	2	1	2	
Nature Physics	3	2	3		2	1	1
Nature Communications	1	1	1	5	3	4	3
Physical Review Letters	17	14	14	16	17	11	6
Science	2	1	1	3			
Journal of Mathematical Physics	4	6	4	4	6	2	3
FOCS	1	1			1		
STOC							1

A full list of all papers published in 2017-2018 can be found in Appendix B on page 39.

Citations are another indicator of the strength of research published. As of the writing of this report, the number of cumulative citations from IQC's published papers reached 32,075. The growth chart below highlights the large increases in IQC citations given faculty growth, showing the high impact of IQC researchers.



Note: *Source for all publication information: Web of Science; Search: AD= ((Inst* Quant* Comp*) OR IQC) and ad = waterloo; timespan April 1, 2017 – March 30, 2018. Data pulled as of March 30, 2017.*

Recruiting New Researchers

Faculty

IQC is currently home to 29 full-time faculty members and continues to have a high faculty retention rate. In the past two years, IQC has welcomed eight new faculty, including three in the last year alone. At the current growth rate, it is estimated that IQC will reach its target 39 faculty by 2023. The three new faculty members this year include:

Christine Muschik joined IQC on November 1, 2017 as an Assistant Professor in the Department of Physics and Astronomy. Muschik studied physics at the Ludwig-Maximillians-Universität in Munich, Germany. She completed her dissertation, "Quantum information processing with atoms and photons", at the Max Planck Institute of Quantum Optics under the supervision of J. Ignacio Cirac. Her theoretical research in quantum optics earned her the Alexander von Humboldt postdoctoral fellowship at ICFO – The Institute of Photonic Sciences in Castelldefels, Barcelona. At ICFO, Muschik was part of Maciej Lewenstein's quantum optics theory group. She continued her postdoctoral research at IQOQI – Institute for Quantum Optics and Quantum Information in Innsbruck, Austria, with Peter Zoller.

Dmitry Pushin has formal training in experimental neutron physics and interferometry, quantum information, and condensed matter physics. He uses his broad background to apply quantum information processing methods to improve neutron interferometry, with the goal of making it accessible to the general scientific community as a resource for studying fundamental questions of physics, dark energy, phase transitions in condensed matter, magnetic materials in functional devices and materials science. Pushin received his Bachelor of Science from the Moscow Institute of Physics and Technology (MIPT) and Master's of Science in Physics from the MIPT and the Institute of Solid State Physics, Chernogolovka with honours. He completed the PhD program in the Department of Physics at the Massachusetts Institute of Technology (MIT) concentrating in the

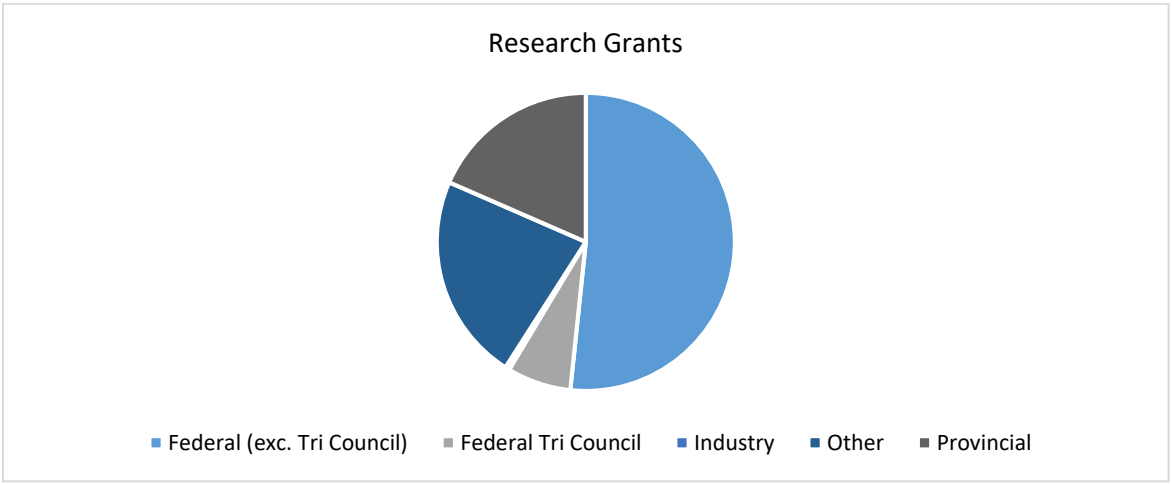
areas of quantum information, neutron physics and coherent control of neutron interferometry. After graduation he was appointed Postdoctoral Research Associate at the MIT Department of Nuclear Science and Engineering and the National Institute for Science and Technology Centre for Neutron Research (NCNR). Dr. Pushin is the principal investigator of a new neutron interferometry beam line under construction at NCNR, which will be the world's first dedicated neutron interferometry user facility. He holds the position of Faculty, Assistant Professor at IQC and Department of Physics and Astronomy at the University of Waterloo.

William Slofstra received his PhD in Mathematics from the University of California, Berkeley in 2011. After spending part of 2012 at the University of British Columbia as a Research Associate, Slofstra returned to California as the Krener Assistant Professor at the University of California, Davis. His research interests have focused on algebra, specifically in Lie theory/representation theory, Schubert calculus and connected areas, as well as non-local games. He moved to the University of Waterloo in August 2015 as a Research Assistant Professor at IQC and became an IQC faculty member in 2017.

A full list of all current IQC faculty members and research assistant professors can be found in Appendix C on page 49.

Research Grants

In this fiscal year, IQC's research income totaled $32.7M, which is an increase from $24.5M in 2016-2017. The $8.2M funding increase was driven primarily from increased funding from the Federal Government (excluding the Tri-Council) and from "Other" sources, which includes support from the Canadian Institute for Advanced Research, University of Waterloo Contributions and other universities in Canada and abroad. In addition IQC saw a 116% increase in funds from Industry ($70.4K in 2016-2017 vs. $152.2K in 2017-2018). A high-level summary of funding sources is illustrated in the following graph:



On average, IQC researchers were consistently awarded higher grant amounts in NSERC Discovery Grants (Individual) in quantum information science than researchers at other Canadian universities (e.g.,

$42,636 vs. $37,000, respectively in 2016-2017). This is a consistent trend over the last five years and is a testament to the talent at IQC.

Note: *Information on research grants is aligned with the University of Waterloo fiscal year, which falls May 1 – April 30.*

Faculty Awards and Chairs

Awards are another important indicator of success, both for individual researchers and for the institutions that support them. They are recognition of research excellence and impact by the scientific community. In a globally competitive environment, such indicators are critical because when it comes to research, established success is what attracts new resources.

Below is a summary of awards granted to faculty in 2017-2018:

Faculty Member	Award
Na Young Kim	Early Researcher Award
Raymond Laflamme	Outstanding Performance Fund award
	2017 CAP-CRM Prize in Theoretical and Mathematical Physics
	Officer of the Order of Canada
	Mike and Ophelia Lazaridis John Von Neumann Chair
Norbert Lütkenhaus	Fellow of the American Physical Society 2017
	NSERC Discovery
Guo-Xing Miao	Early Researcher Award
Bajcsy Michal	Early Researcher Award
Michele Mosca	Fr. Norm Choate C.R., Lifetime Achievement Award
Christine Muschik	Emmy Noether Visiting Fellow
Dmitry Pushin	NSSA Science Prize
Michael Reimer	Early Researcher Award
Kevin Resch	NSERC Discovery Award

Current Research Chairs

Externally funded research chairs, including the Canada Research Chairs and chairs supported by funding from other external organizations reflect the performance and success of IQC researchers. Internal research chairs, or University Research Chairs, recognize exceptional achievement and pre-eminence in a particular field of knowledge.

Almost a quarter of IQC faculty members hold external or internal chair awards.

- David Cory, Canada Excellence Research Chair Laureate (2017)
- Kevin Resch, Canada Research Chair (2013-2023)
- Raymond Laflamme, Canada Research Chair (2002-2022)
- Debbie Leung, University Research Chair (2015-2022)
- Michele Mosca, University Research Chair (2012-2019)
- Raymond Laflamme, Mike and Ophelia Lazaridis (2017-2027)
- Raffi Budakian, Nanotechnology (WIN) Endowed Chair in Superconductvity (2014-2019)

Continue to outfit labs in the Mike & Ophelia Lazaridis Quantum-Nano Centre as new IQC members are recruited

There are 14 operational research labs in the Lazaridis Centre, with additional labs currently being designed for experiments by IQC's recently recruited faculty members.

Active research labs in the Lazaridis Centre (QNC) include:

Quantum Photonics Laboratory
Satellite Quantum Key Distribution Laboratory
Integrated Quantum Optoelectronics Laboratory
Quantum Verification Laboratory
Laboratory for Digital Quantum Matter
Quantum Optics and Quantum Information Group Laboratory
Engineered Quantum Systems Laboratory
Integrated Nano Electronics
Ultracold Quantum Matter and Light

Continue to outfit and maintain the Quantum NanoFab facility to enable fabrication of quantum-enabled technologies

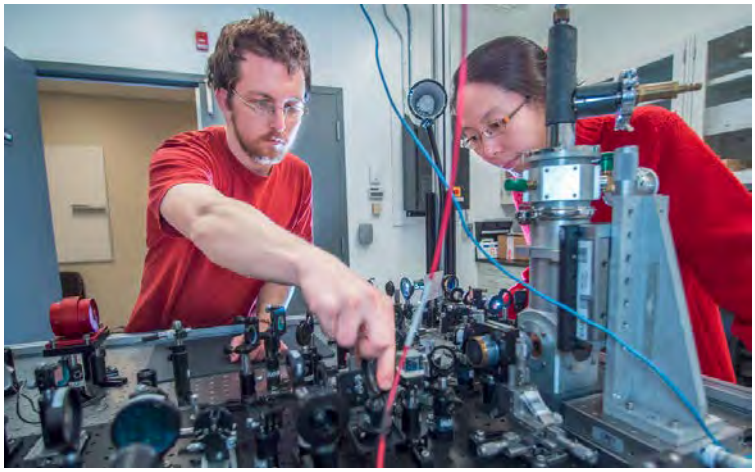
The Quantum NanoFab team continued to grow this year, reflecting the lab's overall growth in terms of equipment and active members. An existing administrative role was upgraded and a part time administrative role was added. A new position was created, Electron Beam Lithography Scientist, and IQC alumnus Greg Holloway was recruited back to IQC to fill this role. In late 2017, the team also welcomed Taso Alkiviades in the role of RAC I Lab Technologist to support the NanoFab team and membership as they work towards ramping up the old RAC I temporary cleanroom and lab as a new satellite of the Quantum NanoFab. This lab will be accessible to the NanoFab's entire community of lab members.

Some updates to the facility this fiscal include:

- Commissioning of a new Tousimis Autosamdri-815B critical point dryer system which further enhances the facility's capabilities in regards to MEMS-type device development & fabrication activities
- Receiving and installing of a new Plassys MEB 550 SL3 – UHV multichamber evaporation system dedicated to the creation of Josephson Junctions
- Completing the renovation of new Characterization Lab and commissioning to ISO 6 cleanroom standards
- Ordering of two new systems for Characterization Lab: Bruker DektakXT stylus profilometer and Bruker Dimension FastScan Scanning Probe Microscope
- Ordering of a new JEOL JSM-7200F Scanning Electron Microscope for new Characterization Lab
- Ordering of a new Heidelberg MLA150 Maskless Aligner system
- Ordering of new cassettes and pre-alignment microscope for JEOL 100kV e-beam lithography system, thus further enhancing its operation
- Renewing of a 3-year service contract for Raith 150TWO e-beam lithography system

Update and maintain lab space in Research Advancement Centre (RAC) buildings

Over the past two years, a major renovation to lab facilities in RAC I was conducted. This included the upgrading of five existing labs plus the conversion of office space to create four new specialized labs. This conversion increased the lab space in RAC I by 2,218 square feet. Further extensions to the central services of the building included those to chilled water, central exhaust, nitrogen distribution, deionized water distribution, humidification, vacuum, pressurized air, local temperature control and electrical and lighting upgrades. IQC faculty members continue to prioritize outfitting and maintaining these spaces.



In 2017-2018, Jonathan Baugh had an electromagnetic shield room installed around the existing dilution refrigerator system to provide electromagnetic shielding for sensitive experiments in his RAC I lab and, along with Na Young Kim, purchased a low pressure chemical vapour deposition system from Angstrom Engineering that is designed for the growth of carbon nanostructures, e.g. carbon nanotubes and graphene to be installed in their RAC II space.

Continue effective and relevant relationships with current partners. Seek out new partnerships that will advance IQC's mission and strategic objectives.

Collaboration is at the core of IQC's research success as researchers' publications, awards and grants are the result of people with diverse backgrounds coming together to tackle problems. IQC's research partnerships span the world with research groups in universities as well as with non-profits, government and private organizations.

In 2017-2018, IQC's researchers reported 62 active collaborations with 57 unique organizations. Appendix D on page 50 lists current collaborations by faculty member. Note: due to the University of Waterloo's Intellectual Property Policy (Policy #73) faculty are not required to report all external relationships. The actual number of current collaborations could be higher than reported.

Seeking New Strategic Partnerships

In addition to maintaining and growing established relationships, IQC's stakeholder groups continuously seek new partnerships to support strategic objectives. Below are examples of initiatives IQC participated in this year:

- Funded through its Transformative Quantum Technologies (TQT) initiative, IQC announced a seed grant program for Waterloo researchers new to the quantum community and with

opportunities to apply quantum properties in new or existing systems. The Quantum Quest Seed Fund is seeking new partners through applications from the broader university community to promote the development and application of new ideas in quantum devices.

- In mid-November the governments of India and Canada partnered to host the Canada-India Technology Summit in New Delhi, India. This conference, which is attended by industry, academic institutions, research and development institutions, government, thought leaders and policy makers provides a high-profile platform to forge knowledge-business partnerships to boost investments and trade. IQC sent two representatives to New Delhi to participate in the Summit, which was also attended by Canadian Ministers Navdeep Bains, Minister of Innovation, Science and Economic Development, Marc Garneau, Minister of Transportation and François-Philippe Champagne, Minister of International Trade.
- In early 2018, it was announced that the Royal Bank of Canada (RBC) is opening a cyber security lab and invested $1.78 million into research to develop advanced cybersecurity and privacy tools. The funding will support researchers in the David R. Cheriton School of Computer Science and the Department of Combinatorics and Optimization at Waterloo's Faculty of Mathematics, including $300,000 for IQC faculty member Michele Mosca for CryptoWorks21, an enhanced education program focused on quantum-safe cryptosystems. Designed for postdoctoral fellows and students seeking Master's or PhD degrees, CryptoWorks21 fosters collaboration between young scientists and experts in quantum-safe cryptographic research. Through a network of partners and collaborators in research centres worldwide focusing on cryptography and quantum information, CryptoWorks21 students build relationships with cryptographic communities in academia, industry and government.

Objective B

Create new opportunities for students to learn and apply new knowledge to the benefit of Canada, spurring innovation, and investment in R&D activities through highly qualified personnel development.

Expected Results: Support and create opportunities for students to learn and apply knowledge.

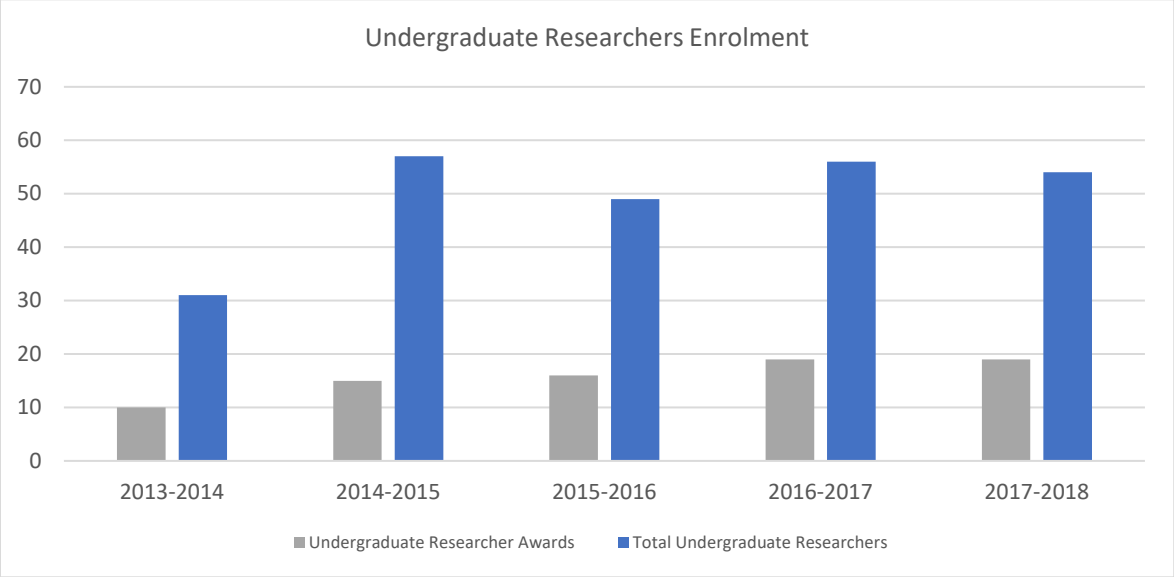
Planned Activities 2017-2018

- Continue to grow and attract the best talent to IQC's graduate program
    - Field at least 200 applications to the University of Waterloo/IQC graduate studies program
    - Expand connections made with undergraduate programs at Ontario and Canadian universities
- Continue to host timely, focused conferences, workshops, seminars and courses
    - Host two major conferences
    - Hold up to 10 workshops and seminars
    - Jointly sponsor up to 10 workshops and conferences with national and international partner organizations

Progress Achieved for 2017-2018

Attracting Talent and Connections to IQC

Each year, programs like the Undergraduate School for Experimental Quantum Information Processing (USEQIP) attract the best and brightest undergraduate students from around the world to consider IQC for graduate school. In 2017-2018, 296 undergraduate students applied to either USEQIP or an URA, or both. A total of 19 students from the top institutions worldwide, including Massachusetts Institute of Technology (USA), University College London (UK), Monash University (Australia) and Queen's University (Canada), were awarded an Undergraduate Researcher Award. An additional 54 research assistants were hired for research work terms directly by faculty members. Undergraduate research assistant positions provide students with the unique opportunity to work alongside a faculty member or research assistant professor and interact with our interdisciplinary research community.



Attracting the highest calibre researchers and developing talent remains a top priority for IQC. The chart below summarizes all incoming highly qualified personnel over the last year.

HQP	Ontario	Other Provinces	Outside Canada	Unknown	Total Reporting Period	Current Total
Faculty + RAPs	4		1		5	31
Postdoctoral Fellows	6	2	10		18	37
Doctoral Students			7		7	78
Masters Students	10	1	26	0	37	68
Undergraduate/ Equivalent (URAs)	8	4	18	12	42	17

As shown, over half (57%) of the new members in 2017-2018 were from outside of Canada, highlighting success in recruiting highly talented personnel from around the world to Ontario.

Postdoctoral Fellows

Postdoctoral fellows are early career scientists with experience and innovative approaches to quantum research. Fellowship positions provide young scientists opportunity for additional mentoring, to publish their work and for research and teaching experience.

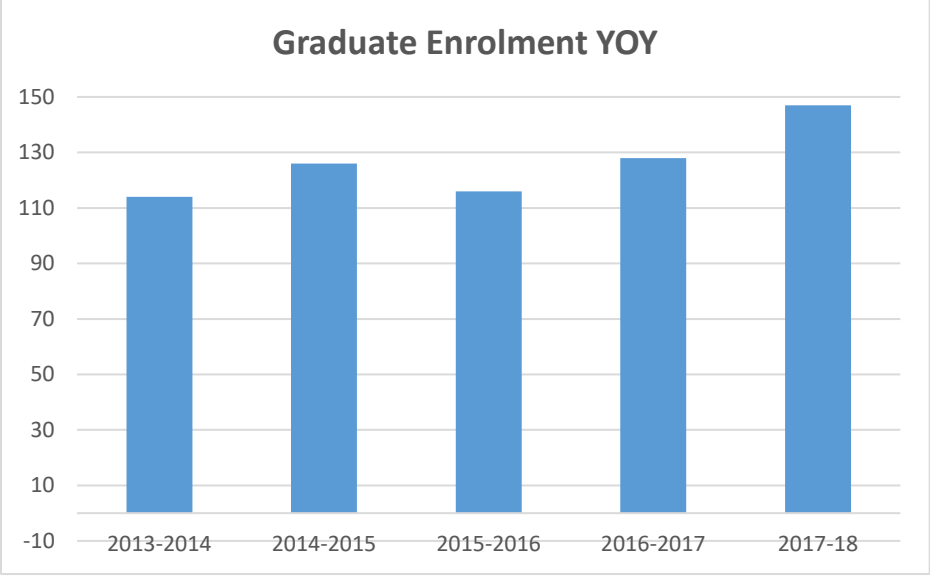
IQC welcomed 18 new postdoctoral fellowships, far exceeding the goal of five. These new fellows bring IQC's current PDF total to 37. A full list of current postdoctoral fellows can be found in Appendix E on page 52.

Postdoctoral fellows joined IQC from the following institutions:

Canada	USA	International
University of Western Ontario	California Institute of Tech	Royal Holloway, University of London
University of Waterloo	Massachusetts Institute of Technology	Centro Brasileiro de Pesquisas Fisicas (CBPF)
University of British Columbia	Aalto University	Centre for Quantum Tech. University of Singapore
University of Calgary	University of Florida	University of Bern
Perimeter Institute		

Students

IQC welcomed 44 new graduate students this past year from 190 applications, bringing the total current number of Master's and PhD students to 146 (68 and 78, respectively). The percentage of applications converted to full time student enrollment increased from 17% last year to 23% in 2017-2018.



IQC's graduate program enrolment is increasing year over year and 2017-2018 exceed last year's numbers. A full list of students for the fiscal year can be found in IQC Graduate Students in Appendix F on page 53.

Student Awards

This year, IQC graduate students were collectively awarded over 100 separate awards which demonstrates students' research excellence and provides students with funding to devote themselves to their studies. Awards earned by IQC graduate students in this year include:

- 27 President's Graduate Scholarships
- 25 International Doctoral Student Awards
- 9 Science Graduate Experience Awards
- 7 NSERC Alexander Graham Bell Canada Graduate Scholarships – Masters
- 7 Ontario Graduate Scholarships
- 6 NSERC Alexander Graham Bell Canada Graduate Scholarships – Doctoral
- 5 QEII-Graduate Scholarships in Science and Technology
- 2 Institute for Quantum Computing Entrance Awards
- 4 NSERC Postgraduate Scholarships – Doctoral
- 3 Mike and Ophelia Lazaridis Fellowships
- 2 IQC Achievement Awards
- 1 Provost Doctoral Entrance Award for Women

Movement of HQP

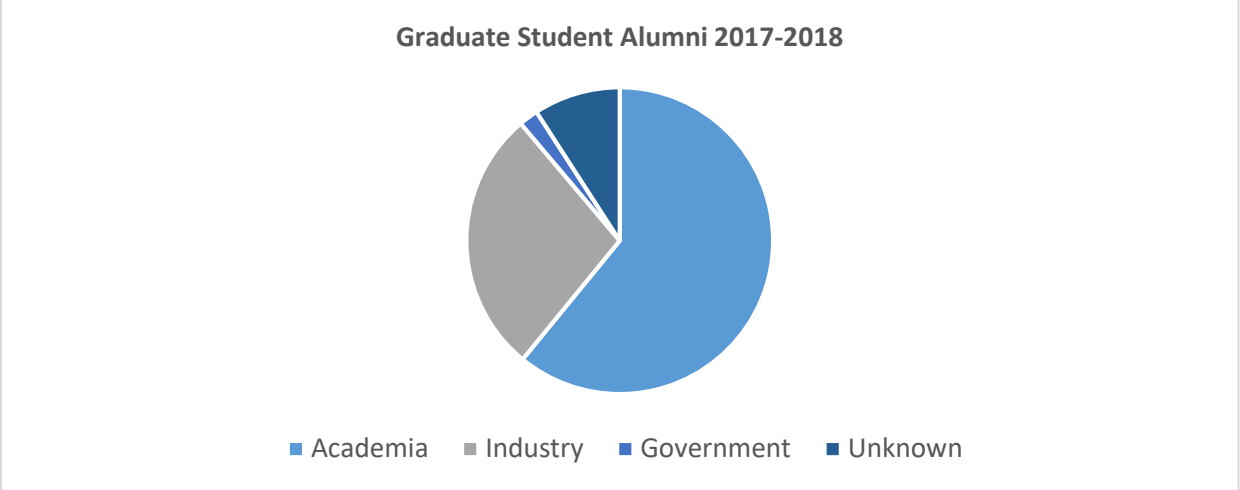
Throughout the course of year, IQC members completed degrees and successfully moved into advanced programs, postdoctoral fellowships, faculty positions or careers in industry. The table below summarizes the highly qualified personnel (HQP) who left IQC within the last year.

Location	Inside Ontario	Outside Ontario	Location Unknown	Total
With private sector firms	3	3	-	6
At publicly funded research institutions/universities	2	9	1	12
With government of NFP groups	2	2	-	4
Other	-	-	-	
Unknown	7	1	7	13
Total	14	15	8	37

The chart includes students and postdoctoral fellows that have graduated or completed their contract or withdrew and those who have accepted positions outside the University of Waterloo.

Alumni

Alumni success is an important indicator of program quality and student success. This fiscal year, a total of 17 students graduated – nine with PhDs and eight Master's students - bringing the number of IQC student graduates to 197 cumulatively. These researchers have chosen to go into various fields, from academia to government to industry, both within Ontario and around the world. The chart below indicates the distribution of IQC alumni. Specifically, 61% of IQC graduates stayed in academia, with 28% and 2% moving to industry and government, respectively.



Continue to host timely, focused conferences, workshops, seminars and courses

Part of recruiting and retaining talent relies on building a strong and stimulating research environment. As a leading institute, IQC is proud to be part of many national and international conferences, workshops and seminars held by and for researchers. This is a key priority as conferences and talks foster collaboration and promote idea exchange.

This past year, IQC was host to four major conferences, two workshops, 38 seminars and 22 colloquia, and jointly sponsored an additional 14 conferences and workshops held at partner organizations across the globe. Below are highlights of major conferences hosted and sponsored this year. A full list of seminars and colloquia can be found in Appendix H on page 59.

Major Conferences

- **Quantum in Iqaluit**, July 8-10
    - Timed to commemorate the 15th anniversary of IQC and to celebrate the legacy of the Institute's founding director, Raymond Laflamme, Quantum in Iqaluit brought researchers from IQC and abroad to Canada's north to share scientific ideas in a unique environment.
- **6th Annual Women in Physics Canada**, July 26-28
    - An annual national conference aimed primarily at (but not restricted to) graduate students in physics, astrophysics and related fields. The format of the conference consists of student

presentations, keynote lectures, panel discussions, workshops and opportunities for interaction.

- **Quantum Innovators: Computer Science & Mathematics**, Sept 18-22
    - The first annual Quantum Innovators in Computer Science and Mathematics workshop brought together young researchers working on theoretical aspects of quantum information and computation in computer science and mathematics. Guests were invited to a four-day conference aimed at exploring the frontiers of their field.
- **Quantum Innovators: Science and Engineering**, Oct 2-5
    - Held at IQC the Quantum Innovators in Science and Engineering workshop brought together the most promising young researchers in quantum physics and engineering.

Workshops

- **Quantum Key Distribution**
    - In August, IQC hosted its biennial workshop, Quantum Key Distribution (QKD) Summer School. The International QKD Summer School is a five-day program focused on theoretical and experimental aspects of quantum communication with a focus on quantum cryptography and aims to provide a foundation in relevant approaches and techniques to enable graduate students and young postdoctoral fellows to perform their own independent research.
- **Schrödinger's Class**
    - Previously titled Teaching Quantum Technologies, Schrödinger's Class is an annual workshop for high school teachers. Presented this year on December 3-4, participants attended lectures and engaged in hands-on activities focused on the integration of quantum technology into the current teaching curriculum.

Sponsored Conferences

Each year, IQC commits to supporting external conferences and workshops to encourage opportunity for collaboration among a global network of researchers. This year, IQC sponsored 14 external events which are listed in the cart below.

Date	Conference	Location
May 25-26	Canadian Workshop on Spin Qubits	Université de Sherbrooke
May 29-2	Canadian Association of Physicists	Queen's University
Jul 3-7	14th International Conference on Quantum Physics and Logic	Radboud University Nijmegen
Jul 16-20	International Conference for Women in Physics	University of Birmingham
Jul 24-28	Contextuality: Conceptual Issues, Operational Signatures and Applications	Perimeter Institute
Jul 31-4	Hopf Algebras in Kitaev's Quantum Double Models	Perimeter Institute
Aug 14-17	Workshop on Operator Systems in Quantum Information	University of Guelph
Sep 13-15	ETSI/IQC Quantum Safe Workshop	London
Oct 20-25	Canadian Undergraduate Physics Conference	Carleton University
Jan 12-14	Canadian Conference for Undergraduate Women in Physics	Queen's University
Jan 12-14	Physics Games	Polytechnique Montreal
Jan 13-19	Conference on Quantum Information Processing	TU Delft
Feb 12-16	Quantum Simulation and Computation	Bilbao
Feb 13-15	CSCS Canadian SmallSat Symposium	Toronto

In addition to hosting these conferences, IQC faculty collectively were invited to speak at 145 other conferences around the world this year. A full list of faculty attended conferences and invited talks can be found in Appendix G on page 55.

Objective C

Brand Canada as the destination of choice for conducting research in quantum technologies and attract the best in the world to Canada, creating partnerships with the international quantum information community and promoting a world-class excellence in quantum information science and technology.

Expected Results: Brand Canada as a place to conduct research in quantum information technologies.

- Be a catalyst for collaborations of quantum information scientists across Canada and the world
- Promote collaborations through participation in national and international conferences
- Produce internationally recognized, high-calibre publications co-authored by IQC researchers
- Organize at least four conferences that involve multidisciplinary participants
- Continue, enhance and increase visits to IQC by international scientists and academics

Progress Achieved for 2017-2018

Be a catalyst for collaborations of quantum information scientists

In the winter of 2018, IQC once gain attended the American Association for the Advancement in Science annual conference. To be part of this event in a meaningful way, IQC chose to participate by hosting a panel discussion with the other two Canadian quantum institutes to receive funding through the Canada First Research Excellence Fund (CFREF) - Institut Quantique, Université de Sherbrooke and Quantum Matters Institute, University of British Columbia. The panel discussion was moderated by IQC's Martin Laforest and speakers included Professor David Cory, Deputy Director, IQC, Michel Pioro-Ladrière, Deputy Director, Institut Quantique and Andrea Damascelli, Scientific Director of the Quantum Matters Institute. The discussion focused on the interest and investment in the development of next generation quantum technologies in Canada.

Promote collaborations through participation in national and international conferences

In addition to the panel discussion at AAAS, IQC was also invited to the Canadian Foundation for Innovation's (CFI) Quantum Roundtable discussion. Among the participants were IQC's Interim and Deputy Directors, Kevin Resch and David Cory. Discussions also included international delegates from the European Commission, Japan, and China, senior Canadian and American research officials, diplomatic staff, and researchers in the areas of Quantum science with the goal to facilitate dialogue between European, American and Canadian representatives involved in both conducting and supporting quantum research.
Appendix G provides a full list of all these other international conferences attended by faculty members this year.

Produce internationally recognized, high-calibre publications co-authored by IQC researchers

Researchers at IQC regularly collaborate with other researchers and scientists around the world in an effort to create scientific networks that produce the highest standard of research. On average, 70% of all IQC papers are co-authored with researchers outside of Canada. For a list of the 144 papers published this year, see Appendix B on page 39. A list of active collaborations by researcher can be found in Appendix D.

Organize at least four conferences that involve multidisciplinary participants

The following four conferences were organized and presented by IQC last this year:

- **Quantum in Iqaluit**, July 8-10
    - Timed to commemorate the 15th anniversary of IQC and to celebrate the legacy of the Institute's founding director, Raymond Laflamme, Quantum in Iqaluit brought researchers from IQC and abroad to Canada's north to share scientific ideas in a unique environment.
- **6th Annual Women in Physics Canada**, July 26-28
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- **Quantum Innovators: Science and Engineering**, Oct 2-5

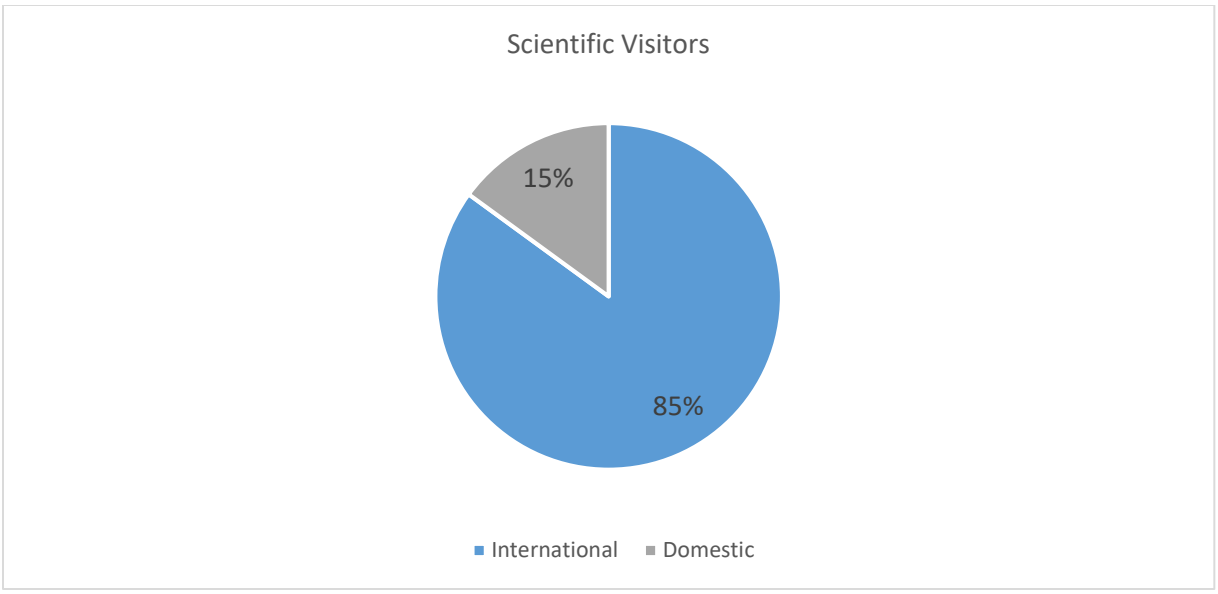
  Held at IQC the Quantum Innovators in Science and Engineering workshop brought together the most promising young researchers in quantum physics and engineering.

Continue, enhance and increase visits to IQC by international scientists and academics from around the world

Scientific Visitors

Each year, IQC's faculty and students host scientific visitors from organizations around the world. These colleagues and collaborators come for a number reasons and stay for varied amounts time to conduct research, collaborate, share knowledge and present talks. This year, IQC researchers collectively hosted 167 visits (which is a 13.4% increase from 2016-2017) representing 163 unique scientific visitors from 120 unique organizations.

The global reach is vast. Visitors come from across the globe including: U.K., U.S., Germany, China, South Africa and Australia. In 2017-2018, 85% of scientific visitors were International.



Nationally, IQC continues to establish and grow its relationships with other Canadian universities and organization in quantum information science and technology. Canadian visitors came from several institutions including: UBC, University of Calgary, University of Sherbrook and University of Ottawa. A full list of scientific visitors can be found in in Appendix I on page 61.

Tours and visitors

Hosting meetings and tours for industry, academia and government are an important part of IQC's advancement activities. In the last year, IQC has had a large influx of requests to tour facilities and learn more about the Institute, its activities and potential opportunities (e.g., investment, new partnerships, educational). In 2017-2018, IQC welcomed nearly 600 visitors, up from 213 the previous year. A full list of tours can be found in Appendix I on page 61.

Objective D

Enhance and expand the Institute's public education and outreach activities to effectively promote science and quantum information science and demonstrate how the research from quantum information science can be applied for the purpose of sustaining and attracting world-class talent.

Expected Results: Increase awareness and knowledge of quantum information science and technology and the Institute in both the scientific community and amongst Canadians more generally.

- Host USEQIP (undergraduate) and QCSYS (high school) summer schools
- Host the third annual high school teacher's workshop – Schrödinger's Class
- Host public lectures
- Travel QUANTUM: The Exhibition across Canada as part of the Canada 150 celebrations
- Develop a pop-up exhibition present in small venues, conferences and events
- Establish relationships with key strategic partners to further share IQC's research discoveries
- Continue to share IQC's research through publications, web and social media outlets

Progress Achieved in 2017-2018

Host major undergraduate and high school summer schools

USEQIP

IQC's annual Undergraduate School for Experimental Quantum Information Processing (USEQIP) program was held from May 29 through June 9 this year for 24 participants. Participants came from around the world representing Canada, the United States, China, Sweden, Spain, South Korea, Singapore, Argentina, Peru, Cameroon and Germany. Applications to the program increased this year by 28% resulting in 10 applications for each USEQIP spot. Of the 24 participants, 14 were male and 10 were female, which brings the program closer to gender parity.

"I found [USEQIP] to be a one-of-a-kind experience and it helped me create a network of like-minded undergrads. It has been extremely helpful in informing me of potential grad school opportunities and introduced me to an exciting field that I did not envision myself being a part of when first applying to university. My future career in physics has certainly been influenced by USEQIP." – USEQIP student 2017

Of the students in the program, 94% agreed or strongly agreed that the things they learned in USEQIP, they could not have learned anywhere else in their undergraduate studies and that the program gave them the tools needed to begin investigating the quantum information field and 71% said

they'd actively encourage others to apply to USEQIP. (The remainder (29%) said that if asked, they'd encourage others to apply.)

QCSYS

From August 10 – 17, IQC hosted its annual Quantum Cryptography School for Young Students (QCSYS). This year IQC received 261 applications and chose 43 participants (20 female and 23 male). This year's participants came from around the world representing Canada, the United States, China, Ireland, Italy, France, Romania, Tanzania, Trinidad and Tobago and Tunisia. QCSYS applications increased this year by 24.5%. One hundred percent of the participants rated the program as good (16.7%) or excellent (83.3%) and 89% agreed or strongly agreed that QCSYS increased confidence in [their] ability to do well in science and mathematics.

"QCSYS opened doors to a new and amazing world of physics that isn't covered in my school's syllabus. I would like everyone to experience physics the way I did at QCSYS and learn about quantum cryptography. I want all my friends to see quantum mechanics and so I would encourage them to apply to QCSYS so that they have that opportunity as well." – QCSYS Student 2017

Teacher Outreach

Physics Teaching Resource Agent Program

The American Association of Physics Teachers hosts an annual three-day program called the Physics Teaching Resource Agent Program (PTRAP). This year, IQC was invited to deliver workshops for thirty participants, or agents, on teaching quantum technologies. These thirty agents will then go on to teach material to other high school teachers across the United States.

Schrödinger's Class

The Teaching Quantum Technologies teacher workshop has been renamed to Schrödinger's Class. On December 8-10, IQC ran the third annual workshop for 32 high school teachers from across Canada. Participants (all high school teachers) attended lectures and engaged in hands-on activities focused on the integration of quantum technologies into the current teaching curriculum. The objective of this free program is to give educators a deeper understanding of quantum mechanics and the ability to teach quantum mechanics beyond the basics and the ability to discuss cutting-edge advances in the field with their students.

Host public lectures

This year, IQC established a new series of public lectures called *Entangled: The Series* and hosted two lectures. The series intends to combine the topic of quantum with a different topic at each lecture.

The first lecture, *Connecting Quantum and Music* held October 3 at IQC*,* explored quantum mechanics and music with a moderated talk by Raymond Laflamme and Edwin Outwater, former music director of the Kitchener-Waterloo Symphony. . The second lecture, *QUANTUM + logic,* was held February 22 and featured Professor Fay Dowker. Dowker, from Imperial College London, described for the audience of 100, a way of thinking about quantum mechanics in which logic is indeed something to which we must pay careful attention if we want a picture of the quantum world.

QUANTUM: The Exhibition

QUANTUM: The Exhibition is the first-ever travelling exhibition on quantum science and technologies. Originally developed as a Canada 150 Signature initiative, the exhibition spans 4,000 square feet, is fully bilingual and features a series of interactive and multimedia components to engage audiences in quantum.

Since its public launch in Waterloo Region in the fall of the 2016, QUANTUM has travelled to science centres in Vancouver, Saskatoon, Calgary, Halifax and Ottawa. In this time, over 390,000 visitors have experienced the exhibit and more stops are planned in the coming year. In each location, IQC provided in-person staff training to ensure the best possible engagement for visitors and provided scripts and supplies for complementary educational programming.

QUANTUM: The Pop-Up

In response to the demand for interactive quantum programming, IQC launched a spin-off initiative to QUANTUM: The Exhibition. At 300 square feet, QUANTUM: The Pop-Up has provided IQC more opportunities to attend shorter term events and conferences and visit harder-to-reach communities. Since its launch at an Ottawa event, the pop-up has travelled through Ontario, visited Quebec, had a stop in Nunavut, two showings in Austin, Texas and with the aid of Canadian Science and Technology Trade Commissioners abroad, made a four-city tour through Europe in the fall of 2017.

QUANTUM: By the Numbers	Dates	Visitors
QUANTUM: The Exhibition (4,000 sq ft)		
THEMUSEUM, Kitchener, Ontario	October 14 - January 1	16,526
Telus World of Science, Vancouver, British Columbia	January 19 - February 26	63,574
Western Development Museum, Saskatoon, Saskatchewan	March 12 - June 11	16,079
TELUS Spark, Calgary, Alberta	June 26 - August 11	43,764
Discovery Centre, Halifax, Nova Scotia	October 14 - November 30	15,200
Canada Science + Tech Museum, Ottawa	December 14 - April 2	235,279
Total		**390,422**
QUANTUM: The Pop-Up Exhibiton (300 sq ft)		
Science Odyssey - NSERC Event- Ottawa, Ontario	May 15	200
Innovation Expo - Cathedral High School, Hamilton	May 26	1,200
Quantum in Iqaluit Conference, Iqaluit, Nunavut	July 7 - 10	100
Waterloo Innovation Summit, Waterloo	September 14-15	100
Berlin Science Week, Berlin, Germany	November 1 - 5	300
QUTech, Delft, Netherlands	November 8 - 16	2,500
Canada House, London, UK	November 20-23	500
European Parliament, Brussels, Beligum	November 27-30	250
Sherbrooke Nature and Science Museum, Sherbrooke, Quebec	December 20 - January 14	1,831
AAAS, Austin, Texas	February 15 -1 9	500
South X South West, Austin Texas	March 11 - 14	5,000
Total		**12,481**

Establish relationships with key strategic partners to further share IQC's research discoveries

INNOVATION150
Through a grant awarded by the Department of Canadian Heritage, IQC established a partnership with four other leading Canadian science outreach organizations – the Perimeter Institute for Theoretical Physics, Actua, the Canadian Association of Science Centres and the Canada Science and Technology Museums Corporation – to create INNOVATION150. INNOVATION150 was the platform used through 2017-2018 to promote Canadian scientific innovation – including quantum technologies. This relationship expanded to including other key relationships like, for example, science centres and museum across the country.

Continue to share IQC's research through publications, web and social media outlets
Communications
The communications team at IQC ensures that the researchers and their work are recognized worldwide through publications, media releases and online platforms.

Publications

Released in February 2018, the 2017 IQC annual report *15 years of discovery & innovation* was produced to share the accomplishments and stories of IQC's researchers making advances in quantum information science and technology. The report demonstrates IQC's impact on the quantum information science and technology research field, focuses on the people contributing to the growth of the research field, and highlights areas of current and potential societal and economic impact.

For the first time this year, the annual report has an accompanying website. The purpose of the annual report publication website is to enhance the ability to share content electronically and across social media channels. It allows easy, quick and timely updates to the content and is an affordable (no extra charge) option for the initial production of a true online version of the annual report.

Earned Media

With local, national and international attention on varying activities within IQC, over twelve hundred media mentions were garnered this fiscal. A full list of earned media can be found in Appendix L on page **Error! Bookmark not defined.**.

Social Media

Throughout last year IQC has enjoyed steady growth across all its social media platforms. Below are some highlights of social media performance from April 1, 2017 to March 31, 2018.

IQC's YouTube channel added over 2,000 subscribers for a third year in a row. While the total number of views remained steady at over 200,000 year to year, engagement, once again, increased. On Facebook, Twitter, and Instagram IQC saw an additional 11%, 32% and 101% increase in followers, respectively.

The chart below summarizes results from social channels. The numbers for Twitter and Instagram reflect numbers for both IQC's as well as the exhibition's handles.

	New Followers	Total Current Followers	Reach	Engagement
YouTube	2,430	12,164 (+25.9%)	272,616 views (+22.6%)	2,412 likes / 2,440 shares 1,705,278 minutes watched
Facebook	778	4,323 (+11.8%)	390,448 (-2.1%)	12,205 (-7.3%)
Twitter	2,656 (+14.2%)	10,783 (+32.8%)	2,252,301 Impressions (+29.5%)	30,431 (+30.7%)
Instagram	372 (+2.6%)	533 (+101.1%)	-	7,669 likes (+231.4%)

Objective E

Increasingly translate research discoveries into market-ready quantum-based products which will have economic and social benefits for Canada.

Expected Results: Position Canada to take advantage of economic and social benefits of research through seizing opportunities to commercialize breakthrough research.

Planned Activities

- Continue development of an industry affiliate program
- Promote opportunities for IQC researchers to connect with Waterloo's entrepreneurial ecosystem through networking and formal events in partnership with the broader startup networks in Waterloo Region

Progress Achieved 2017-2018

IQC is a key player in the quantum science, technology and innovation ecosystem by continuing to create an environment that fosters entrepreneurism and supports the commercialization of quantum technologies. As of March 2018, IQC faculty collectively held over 41 granted patents and 30 licenses, including 5 new patents granted in 2017-2108. In total, IQC faculty have over 50 patent applications pending approval. IQC spin offs have also grown over the past year. To date, the following twelve companies have emerged as a result of IQC research:

- EvolutionQ
- High Q Technologies LP
- Neutron Optics
- Quantum Benchmarking Inc.
- QuantumLaf Inc.
- QuSpin Technologies Inc.
- Universal Quantum Devices
- Single Quantum Systems
- QSpiceLabs
- QEYnet
- SoftwareQ Inc
- Everettian

Note: *In the past, researchers were not required to report on patents or commercialization activities. With this in mind, the actual number of patents and or licenses is not known and may be higher.*

APPENDICES

A. Risk Assessment & Mitigation Strategies

		LIKELIHOOD		
		LOW	MED	HIGH
IMPACT	HIGH	6	8	9
	MED	3	5	7
	LOW	1	2	4

Risk Factor	Impact Score	Likelihood Score	Risk Rating	Explanation of Score	Mitigation Measures
IQC may not be able to attract high quality researchers	High	Medium	8	The market for world-class researchers is increasingly competitive with many countries making significant investments.	Pursue recruits from a wide breadth of areas of research. Offer competitive job offers/ package. Adequately promote the world-class researchers and the cutting-edge facilities/ equipment at IQC. Further invest in cutting edge laboratory facilities.
Transformational technologies may render current research less relevant	High	Low	6	If IQC research is rendered less relevant, HQP and data seekers will go elsewhere	Ensure a wide breadth of research to investigate (this would differentiate IQC from its competitors). Continue applications for research funds to support leading-edge equipment.
IQC may not be able to recruit enough HQPs	High	Low	6	Many international HQPs come from potentially politically unstable countries (top three are Iran, China, India)	Promote IQC sufficiently. Ensure excellent research. Diversify markets/ countries from which students are recruited.
Operating constraints limit IQC's efforts to brand itself	High	Low	6	Operating constraints include limited resources (including staff), degree of flexibility	Recruit the right people/talents/skills. Develop and deliver a branding project plan. Foster close working relationships with appropriate units within the university.

B. Publications

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distance quantum communication. 2017 IEEE PHOTONICS SOCIETY SUMMER TOPICAL MEETING SERIES (SUM), pp 149-150

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C. Faculty Members and Research Assistant Professors

Faculty Members

Michael Bajcsy
Jonathan Baugh
Raffi Budakian
Kyung Soo Choi
David Cory
Richard Cleve
Joseph Emerson
K. Rajibul Islam
Thomas Jennewein
Na Young Kim
Raymond Laflamme
Debbie Leung
Adrian Lupascu
Norbert Lütkenhaus
Matteo Mariantoni
Gui-Xing Miao
Michele Mosca
Christine Muschik
Ashwin Nayak
Vern Paulsen
Dmitry Pushin
Michael Reimer
Kevin Resch
Crystal Senko
William Slofstra
Adam Wei Tsen
John Watrous
Christopher Wilson
Jon Yard

Research Assistant Professors

Francoise Sfigakis
Joel Wallman

D. Collaborations

Collaborative Research Networks

Faculty Member	2017-18 Collaborative Research Networks
Thomas Jennewein	University of Innsbruck, Austria University of Waterloo, Canada University of Calgary, Canada NIST Boulder, USA University of Seville, Spain Politecnico di Milano, Italy University of Torun, Poland National University of Singapore, Singapore Rockefeller University in New York, USA University of Vienna, Austria Macquarie University, UK Perimeter Institute of Theoretical Physics, Canada University of Toronto, Canada McGill University, Canada National Institute of Optics (INO), Canada Excelitas (former Perkin Elmer), Canada DotFAST, Germany C2C, Canada Princeton Lightwave, USA Xiphos, Canada Neptec, Canada
Debbie Leung	Perimeter Institute of Theoretical Physics, Canada Canadian Institute for Advanced Research, Canada University of Toronto, Canada Cambridge University, UK University of Maryland, USA
Norbert Lutkenhaus	University of Vigo, Spain Technische Universitat Darmstadt, Germany Universite Pierre et Marie Curie, France
Adrian Lupascu	Technion, Israel Institute for Fundamental Physics Madrid, Spain Qatar National Research Fund, Qatar University of Regensburg, Germany
Michele Mosca	NSERC CREATE, Canada European Telecommunications Standards Institute, France

Faculty Member	2017-18 Collaborative Research Networks
	Institute for Quantum Science and Technology (IQST), University of Calgary, Canada Université de Montréal, Canada Tech Capital Partners, Canada McGill University, Canada ComDev, Canada Perimeter Institute of Theoretical Physics, Canada National Institute of Standards and Technology (NIST), USA Swiss Federal institute of Technology in Zurich (ETHZ), Switzerland ID Quantique, Switzerland Institute for Security, Privacy and Information Assurance, Canada Centre for Quantum Technologies (CQT), NUS, Singapore Security Innovations, USA Tutte Institute for Mathematics and Computing, Canada Ontario Centres of Excellence, Canada MITACS, Canada Trustpoint, Canada SERENE, Canada Approach Infinity Inc., Canada University of Ottawa, Canada Government of Canada, Canada InfoSec Global, Canada SignitSure Inc, Canada
Ashwin Nayak	IRIF, Universite Paris, France
Kevin Resch	National Research Council, Canada Perimeter Institute of Theoretical Physics, Canada University of Guelph, Canada
William Slofstra	Brown University, USA

E. Postdoctoral Fellows

Current postdoctoral fellows at IQC:

Jean-Philippe Bourgoin
Hilary Carteret
Franklin Cho
Paulina Corona Ugalde
Matthew Coudron
Javad Doliskani
Ying Dong
Michael Epping
Vlad Gheorghiu
Sandra Gibson
Mark Girard
Brendon Higgins
Sara Hosseini
Hyun Ho Kim
Aleksander Kubica
Katanya Kuntz
Sangil Kwon
Tian Lan
Chang Liu
George Nichols
Ibrahim Nsanzineza
Joachim Nsofini
Geovandro Pereira
John Peterson Pinheiro daSilva
Michele Piscitelli
Hao Qin
Fereshteh Rajabi
Pooya Ronagh
Mahmood Sabooni
Karthikeyan Sampath Kumar
Francois Sfigakis
Yongchao Tang
Dave Touchette
Peter Tysowski
Ben Yager
Taehyun Yoon
Pan Zheng

F. Graduate Students

The following are graduate students part of the IQC community as of March 31, 2018.

PhD Students

Arash Ahmadi
Rubayet Al Maruf
Matthew Amy
Vadiraj Ananthapadmanabha Rao
Elena Anisimova
Shima Bab Hadiashar
Eduardo Barrera Ramirez
Jeremy Bejanin
Marian Berek
Brandon Buonacorsi
Jamal Busnaina
Ningping Cao
Arnaud Carignan-Dugas
Poompong Chaiwongkhot
Christopher Chamberland
Jose de Ramon Rivera
Rahul Deshpande
Olivia Di Matteo
Carolyn Earnest
Jennifer Katherine Fernick
Jeremy Flannery
Nicolas Funai
Kaveh Gharavi
Daniel Grimmer
Aimee (Heinrichs) Gunther
Holger Haas
Laura Henderson
Ian Hincks
Anqi Huang
Dmitri Iouchtchenko
Shitikanth Kashyap
Hemant Katiyar
Maria Kieferova
Meenu Kumari
Jason LeGrow
Lin Li
Madelaine Liddy
Piers Lillystone
Jie Lin
Li Liu
Jean-Philippe MacLean
Caroline Mbakob- Tchouawou
Thomas George McConkey
Arthur Mehta
Maryam Mirkamali
Abel Molina
Mike Nelson
Mohamad Niknam
Satish Pandey
Tarun Patel
Connor Paul-Paddock
Jitendra Prakash
Daniel Puzzuoli
Jason Pye
Hammam Qassim
John Rinehart
Nayeli Rodriguez Briones
Allison Sachs
Chung Wai Sandbo Chang
Dusan Sarenac
John Schanck
David Schmid
Ala Shayeghi
Sumit Sijher
Nadine Stritzelberger
Nigar Sultana
Huichen Sun
Burak Tekcan
Archana Tiwari
Guillaume Verdon-Akzam
Sebastian Verschoor
Cameron Vickers
Dhinakaran Vinayagamurthy
Sean Walker
Chunhao Wang
Kyle Willick
Muhammet Yurtalan
Mohd Zeeshan

Master's Students

Shahab Akmal
Thomas Alexander
Matthew Alexander
Julia Amoros (Binefa)
Stefanie Beale
Emma (Annelise) Bergeron
Kristine Boone
Brendan Bramman
Matthew Brown
Andrew Cameron
Jiahui Chen
Michael Chen
Yutong Dai
Simon (Stephanie) Daley
Patrick Daley
Tina Dekker
Andy (Zhenghao) Ding
Ian Dsouza
Brian Duong
Lane Gunderman
Taylor Hornby
Nairong Hou
Jaron Huq
Samuel Jaques
Andrew Jena
David Jepson
Andrew Jordan
Hyeran Kong
Nikhil Kotibhaskar
Dariusz Lasecki
Youn Seok Lee
Jin Gyu Lim
Jun An Lin
Xudong (Michael) Liu
Guofei (Phillip) Long
Richard Lopp
Pei Jiang Low
Shayan Majidy
Nicolas Manor
Antonio Martinez
Ashutosh Marwah
Morgan Mastrovich
Emma McKay
Denis Melanson
Sainath Motlakunta
Maria Papageorgiou
Evan Peters
Clifford Plesha
Mats Powlowski
Richard Rademacher
He (Ricky) Ren
Theodore Rogozinski
Joshua Ruebeck
Romain Ruhlmann
Yu (Jerry) Shi
Jiahao Shi
Gilbert (Chung-You) Shih
Petar Simidzija
Sebastian Slaman
(Seyed) Sahand Tabatabaei
Ramy Tannous
Theerapat Tansuwannont
Erickson Tjoa
Han (Vincent) Weng
Sam Winnick
Ruoxuan Xu
Bowen Yang
Shazhou (Joey) Zhong

G. Invited Talks and Conference Participation

Faculty Member	Title/Subject	Institution/Conference
Jonathan Baugh	Semiconductor based quantum information processors	Innovation 360 Symposium
	Optimal quantum control for spin qubits with ESR	Department of Chemistry, Oxford University
	Silicon MOSFET quantum dots" (given by my student Eduardo Barrera),	University of Waterloo
	Quantum transport projects and platforms for spin qubits	Spin Canada Workshop
Kyung Choi*	Building synthetic quantum systems with atoms and photons	2017 Congress of CAP
	Poster: Building synthetic quantum systems with atoms and photons	iQaluit 2017 Quantum Information Conference, Iqaluit, Canada
Kazi Rajibul Islam*	Quantum Information Processing with Trapped Ions	Indian Association for the Cultivation of Sciences
	Quantum simulation with laser-cooled trapped ions	Canadian Association of Physicists Congress 2017, Queen's University
	Many-body physics in a trapped ion quantum simulator	4-Corners Southwest Ontario Condensed Matter Physics Symposium, Perimeter Institute
Thomas Jennewein	Interfaces - Satellite quantum communications	CIFAR Program in Quantum Information Science - CIFAR
	The Impact of Emerging Quantum Information Technologies (QIT) on Information Fusion	SPIE Defense + Security, 2017 - SPIE
Raymond Laflamme	Tony Leggett's Global Impact in Canada	University of Illinois
	Quantum Error Correction	CAP
	Entangled: The series - Connecting quantum and music	Institute for Quantum Computing
Debbie Leung	Capacity approaching codes for low noise interactive quantum communication	Kavli Institute for Theoretical Physics - UC Santa Barbara
	From embezzlement (of entanglement) to breaking any (conservation) law	Mathematical Congress of the Americas
Norbert Lutkenhaus	2nd Crossing 2017	Technische Universtat Darmstadt
	Poster: Obergurgl Winter School on Complex Networks	Universitätszentrum Obergurgl
	Ahlswede Workshop (ZIF)	Centre for Interdiscipilnary Research
	FOQUS Workshop	Paris Centre for Quantum Computing
	German Federal Office for Information Security	German Federal Office for Information Security
	Poster: STOC 2017 Theory Fest: 49th Annual ACM	STOC 2017 Theory Fest: 49th Annual ACM
	CEWQO 2017	Technical University of Denmark
	ETSI/IQC Quantum Safe Workshop	ETSI

Faculty Member	Title/Subject	Institution/Conference
	Qcrypt 2017	University of Cambridge
	CNRS, Université Pierre et Marie Curie	Université Pierre et Marie Curie
	QIP Conference on Quantum Information Processing	Qutech, Delft University of Technology
	Warfare in 2050 Workshop	Telus
	Golem Conference	Golem.de
	4th International Conference on Quantum Technologies (ICQT-2017)	Russian Quantum Center
	NIM Conference on Resonator QED	Nano Systems Initiatives Munich
Adrian Lupascu	Ultrastrong Coupling of a Single Artificial Atom to the Electromagnetic Field	Light-Matter Interactions in Cavity & Circuit QED Systems in the Light of Quantum Technology (IWQD2017)
	Quantum annealing	Physics of Information Lab - University of Waterloo
	Quantum annealing with superconducting qubits	Perimeter Institute for Theoretical Physics
	Generation of non-classical states of a harmonic oscillator by measurement using a two-level system	American Physical Society (APS): March Meeting
	Quadrature measurements of a harmonic oscillator using a qubit	Canadian Institute for Advanced Research (CIFAR): Quantum Cavities Workshop
	Multi-spin measurements for quantum annealing	American Physical Society (APS)
	Poster: "Generation of non-classical states of a harmonic oscillator by measurement using a two-level system	Quantum cavities meeting
	Poster: Quadrature measurements of a harmonic oscillator using a qubit	Canadian Institute for Advanced Research (CIFAR): Quantum Cavities Workshop
Michele Mosca	Quantum Computing - The Looming Threat Destined to Disrupt Financial Data Security	Federal Reserve System Payment Standards Group
	The Context of Quantum Security	IDQ 10th Winter School on Quantum Cybersecurity
	Preparing for the Quantum Era	Accredited Standards Committee (ASC)X9,
	Quantum Technology is Coming, Are You Ready?"	Toronto CIO Executive Summit
	Security in the Quantum Era	Critical Infrastructure Resilience Institute(CIRI) International Workshop
	Business Reinventing Innovation	Canada 150 Conference on Innovation and Globalization, Alex Trebek Forum for Dialogue
	Quantum Computing Realities and Implications	IDC Executive Council Meeting
	Quantum Threat: what really matters today?	SecTor-Security Education Conference
	Communication and Security in the Quantum Era	CANARIE National Summit
	Security in the Post-Quantum World	Waterloo Cybersecurity and Deference Forum
	Quantum Safe Blockchains	BRI All Member Summit
	The quantum threat to financial services	Sibos Toronto
	Quantum Information Theory, Quantum Computing	Creative Destructive Lab (CDL) Quantum Program

Faculty Member	Title/Subject	Institution/Conference
	Quantum Computers and the current implications on cybersecurity	Perimeter Institute
	The Quantum Threat to Cybersecurity	Fifth ETSI workshop on quantum-safe cryptography in partnership with IQC
	Quantum Compilers	Creative Destructive Lab (CDL)
	Quantum Compilers	Quantum Program
	Introduction to Quantum Computing and Quantum Cryptography	Selected Areas in Cryptography (SAC) Summer School
	On the impacts/ethics/security related to quantum computing	John Hospkins University
	Quantum Computing: What's the Deal?	International Centre for Pension Management (ICPM)
	The quantum threat to payment systems	The Payment Canada Summit
	Update on the Quantum Threat, Mitigation Timelines and Managing Quantum Risk	International Cryptographic Module Conference (ICMC)
	Industry Showcase- Leveraging Partnership to Accelerate Commercialization	SOSCIP Impact 2017
	The Urgency of Quantum-Safe Cryptography	Eurocrypt 2017 affiliated program- FOQUS-Frontiers of Quantum Safe Cryptography
	Evolution of Cryptography	ISSA April Web Conference
	Cybersecurity in a Quantum World	Royal Canadian Institute for Science (RCIScience)
	Cybersecurity and the Quantum Era	The University of South Florida
	Compiling Quantum Algorithms	The University of South Florida
Ashwin Nayak	Quantum information trade-off for Augmented Index	BIRS Workshop 17w5147, Communication Complexity and Applications, II
		Conference in Quantum Information Theory, Institut Henri Poincare
	On quantum information complexity	IRIF-IQC mini workshop on Quantum Computation, Univ Paris - Diderot
	Quantum information trade-off for Augmented Index	BIRS Workshop 17w5147, Communication Complexity and Applications, II
William Slotstra	Hyperlinear profile and entanglement	Mathematical Physics seminar, Perimeter Institute
	Entanglement requirements for non-local games	21st Annual Conference on Quantum Information Processing (QIP 2018)
	Group theory and non-local games	17th Asian Quantum Information Science Conference (AQIS 2017)
	Group theory and non-local games	Conference on Quantum Information and Quantum Control VII (CQIQC-VII) at the University of Toronto.

Faculty Member	Title/Subject	Institution/Conference
	Group theory and non-local games	Contextuality: Conceptual issues, operational signatures, and applications" conference at Perimeter Institute
	Algebraic methods for non-local games and quantum correlations	Workshop on Probabilistic and Algebraic Methods in Quantum Information Theory, Texas A&M University
	Entanglement requirements for non-local games	IQI Seminar, Caltech
Adam Wei Tsen	New Phase Transitions in Atomically Thin Quantum Materials	Department of Physics Condensed Matter Seminar, University of Michigan
	New Phase Transitions in Atomically Thin Quantum Materials	Department of Chemical Engineering and Material Science, University of Southern California
	New Phase Transitions in Atomically Thin Quantum Materials	2018 Conference on Electronic and Advanced Materials
	New Phase Transitions in Atomically Thin Quantum Materials	University of Waterloo
	New Phase Transitions in Atomically Thin Quantum Materials	Brockhouse Institute for Materials Research Seminar, McMaster University
Christopher Wilson	Superconducting Quantum Circuits: from Photons to Engines	Department of Physics - Washington University in St. Louis
John Yard*	Turing Workshop on Near-term Quantum Computation, Compiling qubits	
	Mathematics of Topological Phases and Quantum Information, Topological phases and arithmetic, Mathematical Congress of the Americas	McGill University
	Probabilistic and Algebraic Methods in Quantum Information Theory, Evidence for SIC-POVMs from class field theory	Texas A&M University
	International Workshop on Quantum Physics and Geometry, Lines, designs and quantum mechanics over class fields	Trento University
Na Young Kim*	Quantum Innovation Laboratory	McMaster University, BIMR
	Beauty and wonder of microcavity exciton-polaritons: Past, Present, and Future	18th Canadian Semiconductoor Science and Technology conference
	Microcavity Exciton-Polaritons	Telluride Science Research Center
	Poster: Controlling Hopping Integrals in Engineered Exciton-Polariton Lattices	Fundamental Optical Processes in Semiconductors 2017
	Poster: Identification of Crystal Orientation-dependent Surface Acoustic Wave Velocity	18th Canadian Semiconductoor Science and Technology conference

** Partial Year*

H. Seminars and Colloquia

Colloquia	
Superconductivity in single-layer NbSe2	Kin Fai Mak
Quantum Gravity, Tensor Network, and Holographic Entanglement Entropy	Muxin Han
Scalable surface ion traps for high-fidelity quantum operations	Peter Maunz
Dephasing with strings attached	Leonid Pryadko
A platform to study many-body physics with photons	Hakan Tureci
Sequential measurements, disturbance and property testing	Aram Harrow
Chernoff Bound for Quantum Operations is Faithful	Nengkun Yu
Complexity of quantum impurity models	Sergey Bravyi
Controlled quantum operators can search	Peter Høyer
Optical precursors: From fundamentals to applications	Heejeong Jeong
Experimentally Probing Topological Order and Its Breakdown via Modular Matrices	Yidun Wan
Search for a toric code topological order in the kagome antiferromanget	Jiawei Mei
Quantum Image Processing and Its Application to Edge Detection: Theory and Experiment	Xinhua Peng
The NV center in diamond: a versatile quantum technology	Ania Jayich
Topological photonics: classical to quantum	Mohammad Hafezi
Shining Light on Perovskite Chalcogenides	Jayakanth Ravichandran
The emergence of topological superconductivity in 2D strongly correlated doped Dirac systems	Zhengcheng Gu
From quantum control to quantum computing --How control and optimization design reduces quantum errors	Xiaoting Wang
Quantum annealing vs classical optimization	Elizabeth Crosson
Engineering magnetism and chiral edge state of quantum anomalous Hall system	Ke He
The Quest for Solving Quantum Chromodynamics: the tensor network approach	Karl Jansen
All no-signalling theories are local-realistic	Gilles Brassard
Seminars	
Quantum science and technology at QuTech (Delft, NL)	Julia Cramer
Many-Body Localization Through the Lens of Ultracold Quantum Gases	Pranjal Bordia
Mode-selection, purification, and ultrafast manipulation of quantum light with nonlinear waveguide devices	John Donohue
Scaling up single-atom spin qubits in silicon	Andrea Morello
Constraint Propagation Games	Zhengfeng Ji
Characterizing drift qubits.	Timothy J. Proctor
Majorana zero mode inside vortex core of topological superconductors	Fuchun Zhang
3DdSiPM - Digital Photon Counting Microsystem Based on 3D Integration: Architecture and Measurements on 1st Prototype	Serge Charlebois
Robust and high-fidelity control for quantum computation	Hsi-Sheng Goan

Graphene Assisted Ultrafast Nonlinear Optics: From all-optical modulation to time-resolved spectroscopy	Behrooz Semnani
Successes and limits in engineering photon pair sources	Evan Meyer-Scott
Self-testing QRNG: A lot of randomness for little trust!	Hugo Zbinden
Quantum Walks Gravity Simulation.	Giuseppe Di Molfetta
Quantum mechanics as classical statistical mechanics with an ontic extension and an epistemic restriction	Agung Budiyono
Aging and Domain Growth in the Spin Glass Copper Manganese	Daniel Tennant
Application of a resource theory for magic states to fault-tolerant quantum computing	Mark Howard
Toward the first quantum simulation with quantum speedup	Neil Julien Ross
Applications of the trilinear Hamiltonian with three trapped ions	Roland Esteban Hablützel Marrero
Electron relaxation in a DyQD (detection/emission of single terahertz photons?)	Pardis Sahafi
Measurement and Control of Superconducting Qubits Using Single Flux Quantum Digital Logic	Robert F. McDermott
Probing silicon surfaces with magnetic resonance	Chandrasekhar Ramanathan
Quantum computing with the D-Wave processor	Loren Swenson
The Fermi-Hubbard Model for Universal Quantum Computation	Jiawei Ji
Synergetic Study of Electrical Transport using Graphene and SrTiO3	Jeongmin Park
Towards an integrated optical interface for ion trap arrays	Matthew Day
Quantum networks operating at telecommunication wavelengths	Nikolai Lauk
Single-Photon Imaging: What Physics and Computation can do Together in Imaging Science	Feihu Xu
Quantum optimization using superconducting qubits: A new platform	Rakesh Tiwari
Critical noise parameters for assessment of quantum error correction	Pavithran Iyer
Correlated dissipation: inhibiting atomic decay via cooperative dynamics	Ana Asenjo Garcia
Algorithms and complexity for quantum advantage	David Gosset
Deterministic Quantum Dense Coding Networks	Titas Chanda
Solution to a Long-Standing Controversy in Paul-Trap Physics	Angus Kan
Quantum Hacking after Measurement-Device-Independent Quantum Cryptography	Anqi Huang
Coupling surface acoustic waves to artificial atoms to study the phononic Lamb shift.	Thomas Aref
Quantum acoustics with superconducting qubits	Yiwen Chu
There and back again with trapped-ions	Arghavan Safavi
Simulating Cosmological Models in Optical Lattices	Gerard Valentí Rojas

I. Scientific Visitors and Tours

Scientific Visitors

Visitor	Affiliation
Kin Fai Mak	Pennsylvania State University
Muxin Han	Florida Atlantic University
Rich Rademacher	Michigan Technology University
Pooya Ronagh	The University of British Columbia
Peter Maunz	Sandia National Laboratories
Raúl Carballo-Rubio	University of Cape Town
Andrew Daley	University of Strathclyde, Glascow
John Jeffers	University of Strathclyde, Glascow
Marco Piani	University of Strathclyde, Glasgow
Leonid Pryadko	University of California, Riverside
Qian Xue	Qingdao University
Vinod Raj Rajagopal Muthu	Maz International School, Malaysia
Youning Li	Tsinghua University
Antonio Martinez	Yale University
Hakan Tureci	Princeton University
Julia Cramer	QuTech Delft
Noah Greenberg	Marquette University, Wisconsin
Anuj Shripad Apte	Massachusetts Institute of Technology
Alexandre Martins de Souza	Brazilian Center for Research in Physics
Austin Bradley	George Mason University
Daniel Eduardo Galviz Blanco	University of Los Andes
Maria Julia Maristany	National University of Córdoba
Tongyang Li	University of Maryland, College Park
Benjamin Soloway	Haverford College
Ingrid Strandberg	Chalmers University of Technology Sweden
Peter Brown	Deloitte Canada
Pranjal Bordia	Max Planck Institute, Munich
Robert Dunlop	IQC Board Member
Ahreum Lee	Pohang University of Science and Technology., South Korea
Andy Ding	Illinois Wesleyan
Lorenzo Catani	University College of London
Aram Harrow	Massachusetts Institute of Technology
Ashwin Kumar	University of Mumbai and Department of Atomic Energy Centre for Excellence in Basic Sciences
Frankie Fung	University of Chicago
Hengameh Bagherianlemraski	Massachusetts Institute of Technology

Visitor	Affiliation
Irene Lopez Gutierrez	University College of London
Louisa Huang	Wellesley College
Nengkun Yu	Tsinghua University & University of Technology, Sydney
John Donohue	University of Paderborn
Andrea Morello	Centre for Quantum Computation & Communication Technology, University of New South Wales
Enrique Rico Ortega	University of the Basque Country UPV / EHU
Han Zhang	University of Science and Technology, China
Sergey Bravyi	IBM TJ Watson Research Center
Timothy J. Proctor	Sandia National Laboratories
Zhengfeng Ji	University of Technology, Sydney
Botao Li	University of Science and Technology, China
Hailin Yu	Tsinghua University
Lily Chen	National Institute of Standards and Technology, Washington
Mike Bursell	Red Hat, Inc
Zhipeng Li	University of Science and Technology, China
Angela Karanjai	The University of Sydney
Harry Buhrman	University of Amsterdam, Holland
Douglas Beck	University of Illinois at Urbana-Champaign
Hiacheng Xuan	Nanjing University
Robin Kothari	Massachusetts Institute of Technology
Dai Wei	Tsinghua University
Guangqiang He	Shanghai Jiaotong University
Peter Høyer	University of Calgary
Hongxia Qi	Jiangsu Normal University
C.M. Chandrashekar	The Institute of Mathematical Sciences, India
Anton Trushechkin	Russian Quantum Centre
Dmitry Kronberg	Russian Quantum Centre
Heejeong Jeong	Hong Kong University of Science and Technology
Otfried Gühne	Universitat Siegen, Germany
Zhengcheng Gu	The Chinese University of Hong Kong
Amandeep Singh	Indian Institute of Science Education and Research Mohali
Jingfu Zhang	Technische Universitat Dortmund
Anne Broadbent	University of Ottawa

Visitor	Affiliation
Fuchun Zhang	Kavli Institute for Theoretical Sciences, Beijing
Todd Pittman	University of Maryland, Baltimore
Ivan Todorov	Queen's University Belfast
Juan Xu	Nanjing University of Aeronautics and Astronautics
Luis Garay	Universidad Complutense, Madrid, Spain
Serge Charlebois	Universite de Sherbrooke
Gaëtan Gras	ID Quantique / University of Geneva
Hsi-Sheng Goan	National Taiwan University
Dawei Lu	University of Science and Technology, China
Chi-Kwong Li	The College of William and Mary
Giuseppe Di Molfetta	University of Marseille
Jonathan Lavoie	Regon Center for Optical, Molecular, and Quantum Science, University of Oregon
Peter Turner	University of Bristol, UK
Catherine Laflamme	University of Innsbruck
Evan Meyer-Scott	Universite Paderborn
Yiu Tung Poon	Iowa State University, USA
Hugo Zbinden	Universite de Geneve
Agung Budiyono	Edelstein Center, Hebrew University of Jerusalem
Cheng Guo	Tsinghua University & University of Technology, Sydney
Harry Buhrman	University of Amsterdam, Holland
Daniel Tennant	University of Texas, Austin
Mark Howard	The University of Sheffield, UK
Ben Criger	Institut für Quanteninformation RWTH Aachen
Klaus Jons	Royal Institute of Technology, Sweden
Georgios Styliaris	University of Southern California
John Peterson Pinheiro da Silva	Brazilian Center for Research in Physics
Qing Li	Gordon College
Raphaël Aymeric	ParisTech, France
Sebastian Knauer	University of Bristol, UK
Yidun Wan	Fudan University
Neil Julien Ross	Dalhousie University
Jiawei Mei	Southern University of Science and Technology, China
Shengqiao Luo	Perimeter Institute
Xinhua Peng	University of Science and Technology, China

Visitor	Affiliation
Christine Muschik	University of Innsbruck
Ania Jayich	University of California, Santa Barbara
Mohammad Hafezi	University of Maryland/Joint Quantum Institute, USA
Eric Bernier	Huawei Technologies, Canada
Jayakanth Ravichandran	University of Southern California
Maren Ilango	National Institute of Technology, Tiruchirapalli, India
Bhaskaran Muralidharan	Indian Institute of Technology Bombay
Sara Zarar Jafarzadeh	University of Montreal
Bhashyam Balaji	Defence Research and Development Canada / Government of Canada
Kirill Zhernenkov	Joint Institute for Nuclear Research, Dubna, Russia
Zhengcheng Gu	The Chinese University of Hong Kong
Roland Esteban Hablützel Marrero	Centre for Quantum Technologies, National University of Singapore
HeeBong Yang	LG Display, China
Chandrasekhar Ramanathan	Dartmouth
Pardis Sahafi	London, Royal Holloway College
Robert F. McDermott	University of Wisconsin, Madison
Xiaoting Wang	University of Electronic Science and Technology of China
Martin Houde	University of Western Ontario
Loren Swenson	D-Wave Systems
John Donohue	University of Paderborn
Aditya Jain	International Institute of Information Technology, Hyderabad
Christopher Boehm	University of Freiburg
Robert Trenyl	University of Vigo, Spain
Robert Trenyl	Universidad de Vigo, Spain
Edwin Outwater	Kitchener Waterloo Symphony
Elizabeth Crosson	California Institute of Technology
Dawei Lu	University of Science and Technology, China
Daniel Paulsen	University of Calgary
Jiawei Ji	The University of Calgary
Ke He	Tsinghua University
Paul Anderson	The University of Calgary
Nina Anikeeva	Bellevue College, Washington
Costin BÄƒdescu	Carnegie Mellon University
David Gosset	IBM TJ Watson Research Center
Andrew N. Cleland	University of Chicago
David Luong	Defence Research and Development Canada / Government of Canada

Visitor	Affiliation
Jeongmin Park	Sungkyunkwan University, Republic Korea
Matthew Day	University of Bristol, UK
Piotr Kolenderski	Nicolaus Copernicus University
Tom Timusk	McMaster University
Connor Mosquera	University of Ottawa
Feihu Xu	Southern University of Science and Technology of China
Matthew Martell	Saint Francis Xavier University, Nova Scotia
Nikolai Lauk	The University of Calgary
Ana Asenjo Garcia	California Institute of Technology
Pavithran Iyer	University of Sherbrooke
Rakesh Tiwari	McGill University
A.J. Malcolm	Carleton University
Karl Jansen	NIC/DESY Zeuthen, Germany
Xuan Wei	Massachusetts Institute of Technology
Titas Chanda	Harish-Chandra Research Institute, Allahabad, India
Joey Bonitati	Clemson University
Kent Ueno	Dartmouth College
Mona Mirzaeimoghri	National Institute of Standards and Technology, Washington
Sadegh Raeisi	Max Planck Institute for the Science of Light
Angus Kan	Wesleyan University
Brian Barch	University of Southern California
Noah Greenberg	Marquette University, Wisconsin
Thomas Aref	University of Illinois at Urbana-Champaign
Yiwen Chu	Yale University
Zach Harris	Rensselaer Polytechnic Institute, USA
Unknown	East China Jiaotong University
Arghavan Safavi	University of Colorado
Gerard Valentí-Rojas	The Institute of Photonic Sciences, Spain
Gilles Brassard	University of Montreal

Tours – Industry, Government and Academic

Company/Organization	# Participants
Academia	
Rob Sewell (ICFO)	1
Perimeter Institute (incl. Managing Director)	3
U15	1
CNRS (Tracey Forrest)	
Western University – Ivey	
Government	
NRC - Rob Dunlop	1
High commissioner to India	2
ADM, ISED	1
City of Kitchener	1
City of Waterloo	1
Kitchener Centre MP	1
MPP, Cambridge	1
MPP, Kitchener-Centre	1
National Research Council	1
Ontario Ministry of Research and Innovation	1
Region of Waterloo	1
Regional Council	1
Ontario Government	2
Government of Canada	1
CFI	2
ISED	1
NRC Council	12
Digital Innovation Boothcamp	20
ISED	5
Trade Commissioners - Angela	15
Ambassador of Norway	
Minister Brad Guguid	2
German Embassy	3
Ontario Conservative Party causus	12
Hon. Steven Del Duca, Minister of Economic Development and Growth	3
Ambassador of Belgium	
Canadian Trade Commissioner	1
Ontario Government	1
Conservative Caucas	1
German Ambassador	1
EU Trade Commissoner	1
Fijutsu	6
Airbus Defence and Space (UK Delegation): Paolo Bianco, Global R&T Cooperation Manager	1
BT Research & Innovation (UK Delegation): Jon Wakeling	1
Element Six Group (UK Delegation): Daniel Twitchen, Head of CVD Business Development	1

Company/Organization	# Participants
Imperial College London (UK Delegation): Sir Peter Knight, Senior Research Investigator at Blackett Laboratory; Residence at The Kavli Royal Society International Centre Chair of the Quantum Metrology Institute, at the National Physical Laboratory (NPL)	1
Innovate UK (UK Delegation): David Golding, Head of European and Global Engagement; Simon Plant, Quantum Lead	2
Kelvin Nanotechnology Ltd (UK Delegation): Brendan Casey, CEO	1
Knowledge Transfer Network (UK Delegation): Mark Littlewood, Head of Emerging Technologies and Industries; Bob Cockshott, KT Manager, Position, Navigation and Timing and Quantum; Nee-Joo Teh, Head of International Development; Stephen Battersby, Technical Writer	4
National Physical Laboratory (UK Delegation): Rhys Lewis, Director, NPL Quantum Metrology Institute and Head of the Time, Quantum & Electromagnetics Division	1
Oxford Instruments NanoScience (UK Delegation): Michael Cuthbert, Commercial Director	1
Quantum Imaging Hub, Glasgow University (UK Delegation): Steve Beaumont, Director	1
Quantum Technology Hub for Sensors and Metrology, Birmingham University (UK Delegation): Simon Bennett, Business Director	1
Teledyne e2v (UK Delegation): Trevor Cross, Group Chief Technology Officer	1
Toshiba Research Europe Ltd (UK Delegation): Andrew Shields, Assistant Managing Director	1
University of Oxford (UK Delegation): Joshua Nunn, The Networked Quantum Information Technologies Hub	1
York University (UK Delegation): Timothy Spiller, Professor of Quantum Information Technologies & Director of Quantum Communications Hub	1
CFI Board	6
Assitant Deputy Minister (ADM)	2
Ambassador of Switzerland	1
Consul General of the Netherlands	1
Industry	
Round Table at Communitech (Thomson Rheuters, GM, TD and Fairfax Ventures)	20
Business Council of Canada	20
Canarie Board	6
Thomson Reuters	5
Rejean Bourgault (Avaya)	1
InkSmith	3
Australian Consulate	2
ScotiaBank	5
Norm Malloch (Deloitte)	2
Southeastern United States and Canadian Provinces (SEUS-CP) Conference	30
CarePredict Inc. (Google for Entrepreneur Exchange Program)	1
Fhinck (Google for Entrepreneur Exchange Program)	2
GUPY (Google for Entrepreneur Exchange Program)	1
Invision.ai (Google for Entrepreneur Exchange Program)	2
Jamie & I (Google for Entrepreneur Exchange Program)	2
Nama (Google for Entrepreneur Exchange Program)	2
Spatial.ai (Google for Entrepreneur Exchange Program)	2
Dr. Jonathan Shieh (Taipei Development)	2

Company/Organization	# Participants
Accelerator Centre	1
Canadian Cyber Threat Exchange	1
Certicom	1
Communitech	1
Exel Research	2
Globe and Mail	1
Ipotential	3
KW Symphony	1
Musegetes Foundation	2
Quantum Valley Investments	2
Snolab	1
Strategy Corp	1
Thomson Reuters	5
Samsung	3
IT-Branchen (Dannish ICT industry association)	20
Water Innovation Summit	200
White Space - Lululemon – Tom Waller	1
Fairfax	2
Matsui Corporation	6
AJS Inc (JISA Delegation): Itaru Ichihara, Executive Vice President	1
AMIYA Corporation (JISA Delegation): Seiichi Ito, President	1
ARK Information Systems Inc (JISA Delegation): Junichi SATO, President and CEO	1
Fujitsu FIP Corporation (JISA Delegation): Kazunori Hamano, Chairman and Director; Tatsuya Okamoto, Director, FCA Communication Centre	2
Fujitsu LIMITED (JISA Delegation): Mika Kawai, Global Marketing Group ・Evangelist	1
JISA (JISA Delegation): Junko Kawauchi, Vice President, Global Affairs	1
LINCREA CORPORATION (JISA Delegation): Yujiro Inoue, Kansai System Development Div. ・Acting General Manager	1
Meiji Yasuda System Technology Company Limited (JISA Delegation):Fuminori Genba, Wholesale System Development Dept.; Ieomi Enomoto, Retail System Development Dept.;	2
Nomura Research Institute (JISA Delegation): Yoshihiko Murowaki, Counselor	1
RINET INC (JISA Delegation): Toshie Fujita, CEO	1
Sun Melx Co.,Ltd. (JISA Delegation): Kazuo Okumura, President and CEO	1
Taiwan Ministry of Science delegation	9
Accenture	20
Global Affairs - Alan Chong	?
Huawei	7
TMX group (George Khalife)	1
Huawei	5
XE.com	2
43North	10
RRE venture	3
Exxon Mobile	2
D-Wave	5
New York Stock Exchange (Colton Krueger)	1

Company/Organization	# Participants
Spotify	2
Linda Hasenfratz Linimar	2
Samsung	5
Daimler	2
Deloitte (Duncan Stewart)	1
Continental	9
Intact Financial Corporation: Monika Federau, SVP and Chief Strategy Officer	2

J. Earned Media

Date	Media Outlet	Title
3/31/18	www.realclearscience.com	Whisper from First Stars Sets Off Dark Matter Debate
3/31/18	National Observer	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/30/18	cushydiet.com	Canada 150 program results in ‰Û÷brain gain‰Ûª for Canadian universities: Duncan ‰ÛÒ Press Today
3/30/18	National Post	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	The Optical Society	Carrier-envelope phase effects in graphene
3/29/18	The Optical Society	Dual-lasing channel quantum cascade laser based on scattering-assisted injection design
3/29/18	KPLC 7	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	University Affairs	Government reveals list of Canada 150 Research Chairholders
3/29/18	CBC	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	CBC	#CBC: ‰ÛÏCanada 150 program ends in ‰Û÷mind acquire‰Ûª for Canadian universities: Duncan ‰Û #Toronto #Montreal #Calgary #Ottawa #Canada
3/29/18	www.reddeeradvocate.com	Canada 150 program results in ‰Û÷brain gain‰Ûª for Canadian universities: Duncan
3/29/18	thechronicleherald.ca	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	Exchange Magazine.com	Emmy Noether Fellowships to expand, six new fellows announced
3/29/18	Toronto Star	24 scientists get the nod for federal government‰Ûªs Canada 150 Research Chairs program
3/29/18	wistv.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Live 5 News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WAND	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	www.erietvnews.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Tucson News Now	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	www.tickertech.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KAIT-TV Region 8	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs

Date	Media Outlet	Title
3/29/18	WLOX	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	www.ksbitv.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WTOC-TV	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KSWO7News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	NBC Right Now	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	News on 6	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	www.wflx.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WDAM-TV	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KTVN Channel 2 News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Newschannel 6 Now	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	14 NEWS	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KHQ Home	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	www.fox14tv.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WMBF News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WTOL 11	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KUAM News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WMCActionNews5.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs

Date	Media Outlet	Title
3/29/18	KCBD	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KTRE.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Hawaii News Now	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	NBC12 - WWBT	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KLTV.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	NewsWest9.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WRCB-TV	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WBOC TV 16	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WTVM.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KLKN-TV	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	FOX19-WXIX TV	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WECT TV6	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WAVE 3 - News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	WSFA 12 News	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KSLA News 12	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	CBS8	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	KFVS12	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs

Date	Media Outlet	Title
3/29/18	Mississippi News Now	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	21 WFMJ	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Cleveland19	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	GuelphToday	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	Foreign Affairs.co.nz	MIL-OSI Translation: Brain Surge in Canada, Taken Two
3/29/18	Benzinga	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	profitquotes.com	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Foreign Affairs.co.nz	MIL-OSI Canada: Canada’s Brain Gain. Round 2.
3/29/18	Canada NewsWire	Canada's Brain Gain. Round 2. - Top international researchers from Harvard, NASA, University College London recruited as Canada 150 Research Chairs
3/29/18	Canada.ca	Canada‰Ûªs Brain Gain. Round 2.
3/29/18	sudbury	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	ca.news.yahoo.com	Canada 150 program results in 'brain gain' for Canadian universities: Duncan
3/29/18	link.aps.org	Quantum speedup in solving the maximal-clique problem
3/29/18	4 Traders	INTERNATIONAL BUSINESS MACHINES : EPFL invests in quantum science and technology
3/29/18	Atinitonews.com	Canada 150 program results in ‰Û÷brain gain‰Ûª for Canadian universities: Duncan
3/29/18	thestarphoenix.com	Canada 150 program results in ‰Û÷brain gain‰Ûª for Canadian universities: Duncan | Saskatoon StarPhoenix
3/29/18	Western News.ca	Quantum Black Holes in the Sky..., Niayesh Afshordi
3/29/18	nationalnewswatch.com	Canada 150 program results in ‰Û÷brain gain‰Ûª for Canadian universities: Duncan | National Newswatch
3/29/18	Exchange Magazine.com	exchangemagazine.com - Tuesday and Thursday Ediiton
3/28/18	Crunchbase	Velocity | Crunchbase
3/28/18	actu.epfl.ch	EPFL invests in quantum science and technology
3/27/18	Research & Development	A New Non-Destructive Technique to Detect Single Quantum Level Phonons
3/27/18	Opli	A new non-destructive technique to detect single quantum level phonons
3/27/18	EurekAlert!	A new non-destructive technique to detect single quantum level phonons
3/27/18	EurekAlert!	A new non-destructive technique to detect single quantum level phonons
3/26/18	Pechanga.net	ORZEL: What Quantum Computing Is Really Good For (Right Now)
3/26/18	Canadian Tech News	A|I: The AI Times: A Canadian AI Institute - Canadian Tech News
3/26/18	University of Waterloo	Startups compete for $130,000 in funding at the Velocity Fund Finals
3/26/18	Brandon Sun	Pugh passing on his passion for science as an organizer for regional fair
3/26/18	Forbes	What Quantum Computing Is Really Good For (Right Now)
3/24/18	Barchart	\/R E P E A T -- Media Advisory - Minister Chagger

Date	Media Outlet	Title
3/24/18	www.medicalhealthnews.net	More than 5000 locals on Sunshine List
3/24/18	money.ca	/R E P E A T ‰ÛÓ Media Advisory ‰ÛÒ Minister Chagger supports young entrepreneurs at ACE the Pitch competition in Waterloo/ ‰ÛÒ MONEYå¨ News
3/23/18	Waterloo Region Record	More than 5,000 locals on Sunshine List
3/23/18	Foreign Affairs.co.nz	MIL-OSI Canada: Minister Chagger supports young entrepreneurs at ACE the Pitch competition in Waterloo
3/23/18	Canada.ca	Minister Chagger supports young entrepreneurs at ACE the Pitch competition in Waterloo
3/23/18	Canada NewsWire	/R E P E A T -- Media Advisory - Minister Chagger supports young entrepreneurs at ACE the Pitch competition in Waterloo/
3/23/18	www.investorpoint.com	/R E P E A T -- Media Advisory - Minister Chagger supports young entrepreneurs at ACE the Pitch competition in Waterloo/
3/22/18	University of Waterloo	Monday, March 26, 2018
3/22/18	link.aps.org	Toward a Definition of Complexity for Quantum Field Theory States
3/22/18	American Conservative	What Is Marilynne Robinson Hawking?
3/22/18	Exchange Magazine.com	Laurier Institute for the Study of Public Opinion and Policy releases first seat projections for Ontario election
3/22/18	Exchange Magazine.com	New interferometry technique more powerful and cost-effective
3/20/18	University of Waterloo	Thursday, March 22, 2018
3/20/18	University of Waterloo	New interferometry technique more powerful and cost-effective
3/20/18	Concordia University Concordian	Concordia Senate approves nanoscience program
3/19/18	huffintonpost.ca	It’s Time To Move Beyond Talking About Women In STEM
3/19/18	University of Waterloo	Wednesday, March 21, 2018
3/19/18	CIO Australia	Baidu snaps up UTS director to lead quantum computing institute
3/19/18	Computerworld Australia	Baidu snaps up UTS director to lead quantum computing institute
3/19/18	Computerworld Australia	Baidu snaps up UTS director to lead quantum computing institute
3/19/18	Communitech News	Phoenix-like BlackBerry leaves the cellphone behind
3/18/18	tjcnewspaper.com	"Theories of Vedas superior to Einstein's equation": Science minister quotes Stephen Hawking
3/18/18	diariocatolico.net	Theoretical physicist Stephen Hawking has died at the age of 76
3/17/18	10ThousandCouple	" "Home " World " The legacy of Stephen Hawking - a Catholic scientist reflects
3/16/18	Lab Manager	Perimeter Institute Mourns the Passing of Friend and Colleague Stephen Hawking
3/15/18	Exchange Magazine.com	Perimeter Institute mourns the passing of friend and colleague Stephen Hawking
3/15/18	Exchange Magazine.com	Radon In Your Home?
3/14/18	Inside Halton	Stephen Hawking had exceptional bond with Waterloo Region
3/14/18	570News	Waterloo’s science community remembers friend, colleague Stephen Hawking
3/14/18	Newswise	Perimeter Institute Mourns the Passing of Friend and Colleague Stephen Hawking
3/14/18	Newswise	Perimeter Institute Mourns the Passing of Friend and Colleague Stephen Hawking
3/14/18	MSN	Hawking 'an inspiration to everyone' at centre bearing his name
3/14/18	CBC	Hawking 'an inspiration to everyone' at centre bearing his name
3/14/18	catholicregister.org	Church leaders praise Hawking for contribution to science, dialogue
3/14/18	Waterloo Region Record	Stephen Hawking had exceptional bond with Waterloo Region

Date	Media Outlet	Title
3/14/18	CBC	Hawking 'an inspiration to everyone' at centre bearing his name - Kitchener-Waterloo - CBC News
3/14/18	CTV News	Waterloo remembers renowned physicist Stephen Hawking
3/14/18	Innovations Report	Movable silicon 'lenses' enable neutrons to see new range of details inside objects
3/14/18	www.siliconhillsnews.com	Whurley Says Quantum Computing is the New Space Race
3/14/18	ca.news.yahoo.com	Hawking 'an inspiration to everyone' at centre bearing his name
3/13/18	www.neuroroboticsmagazine.com	Artificial Intelligence Techniques Reconstruct Mysteries of Quantum Systems | AGE OF ROBOTS Magazines
3/13/18	Innovations Report	Movable silicon 'lenses' enable neutrons to see new range of details inside objects
03/12/2018	Intellasia	China‰Ûªs race for the mother of all supercomputers just got more crowded
03/12/2018	South China Morning Post	China‰Ûªs race for the mother of all supercomputers just got more crowded
03/12/2018	The Street	China's race for the mother of all supercomputers just got more crowded
03/12/2018	Yahoo! Singapore	China‰Ûªs race for the mother of all supercomputers just got more crowded
03/12/2018	scooblr.com	China‰Ûªs race for the mother of all supercomputers just got more crowded
03/10/2018	Science Vibe	Physicists Just Achieved Quantum Teleportation Underwater For The First Time ‰ÛÒ Science Vibe
03/09/2018	Ecns.cn	Baidu sets up quantum institute
03/09/2018	www.iiss.com	Baidu sets up quantum institute
03/09/2018	Space Daily	Artificial intelligence techniques reconstruct mysteries of quantum systems
03/09/2018	Artificial intelligence, transhumanism, nanotechnology & more	Baidu sets up quantum institute
03/09/2018	Erie News Now	Big Squid, Inc. Welcomes Jorge Zuloaga as Senior Director of Data Sciences
03/09/2018	Tucson News Now	Big Squid, Inc. Welcomes Jorge Zuloaga as Senior Director of Data Sciences
03/08/2018	NBC Right Now	Big Squid, Inc. Welcomes Jorge Zuloaga as Senior Director of Da
03/08/2018	Global Times	Baidu sets up quantum institute
03/08/2018	Yicai Global	Baidu Follows Alibaba‰Ûªs Lead With Plan for World-Class Quantum Computing Institute
03/08/2018	Mondaq	2018 Federal Budget: Focus On Data And Data-Driven Technologies
03/08/2018	www.techsite.io	After Alibaba, Baidu leaps into quantum computing
03/08/2018	canadianbusinesstribune.com	Big Squid, Inc. Welcomes Jorge Zuloaga as Senior Director of Data Sciences
03/07/2018	uwimprint.ca	RBC opens cybersecurity research lab in Davis Centre
03/07/2018	VICE - Motherboard	Google Engineers Think This 72-Qubit Processor Can Achieve Quantum Supremacy
03/07/2018	en.ustc.edu.cn	[Nature]The quantum internet has arrived (and it hasn‰Ûªt)
03/07/2018	bostoncommons.net	Recently Developed Computer Technology
03/06/2018	MICEtimes.asia	The beauty of molecules: physicists have managed to capture the particle in the pictures
03/06/2018	fourthventricle.com	Artificial intelligence techniques reconstruct mysteries of quantum systems
03/06/2018	Lexology	2018 Federal Budget: Focus on Data and Data-Driven Technologies Blog CyberLex
03/05/2018	University of Waterloo	Wednesday, March 7, 2018

Date	Media Outlet	Title
03/05/2018	Primeur Magazine	Artificial intelligence techniques reconstruct mysteries of quantum systemsåÊ...
03/05/2018	Analytics India Magazine	Can India Make Quantum Computing A Reality In The Near Future?
03/03/2018	Law.com	Today's Top Space Headline: "The Black Hole at the Birth of the Universe" (VIDEO)
03/03/2018	NYSE Post	Paternity leave, deficit, cybersecurity: what to expect in the 2018 budget
03/03/2018	Gizmodo Australia	Huge Advancement In MRI Tech Captures Teeny Molecules With Incredible Resolution
03/02/2018	www.gizmodo.co.uk	Huge Advancement in MRI Tech Captures Teeny Molecules With Incredible Resolution | Gizmodo UK
03/02/2018	I-CIO	Quantum computing: What CIOs need to know
03/01/2018	IConnect007	Teaching Quantum Physics to a Computer
03/01/2018	CTV News	Feds plan one-stop shop for cybersecurity help | CTV Kitchener News
03/01/2018	I-Connect007 :: Daily Newsletter	Teaching Quantum Physics to a Computer
03/01/2018	Exchange Magazine.com	Life and Health Insurance Industry Welcomes New National Advisory Council on Pharmacare
03/01/2018	Exchange Magazine.com	Federal budget bolsters research strengths and impact
2/28/18	Computer Dealer News	2018 budget ‰ÛÏmisses the mark‰Û: a comprehensive analysis of all its tech initiatives
2/28/18	IT World Canada	2018 budget ‰ÛÏmisses the mark‰Û: a comprehensive analysis of the Liberals‰Ûª tech initiatives
2/28/18	Business Xpansion Journal	Ontario: Business Growth Initiative Reshaping Economy
2/28/18	BiotechnologyFocus.ca	Canadian Federal Budget 2018
2/28/18	Nature	Canadian science wins billions in new budget
2/28/18	www.techsite.io	Techsite
2/28/18	Canadian Tech News	#Budget2018 includes focus on women entrepreneurs, $572.5 million towards big data strategy - Canadian Tech News
2/28/18	Science Vibe	Artificial intelligence techniques reconstruct mysteries of quantum systems - Science Vibe
2/28/18	Electronic Specifier	Teaching quantum physics to a computer
2/28/18	Communitech News	‰Û÷Feminist budget‰Ûª boosts support for women entrepreneurs
2/28/18	www.itbusiness.ca	2018 budget ‰ÛÏmisses the mark‰Û: a comprehensive analysis of the Liberals‰Ûª tech initiatives
2/28/18	Electronic Specifier	Teaching quantum physics to a computer
2/27/18	Long Room	Teaching quantum physics to a computer
2/27/18	betakit.com	#Budget2018 includes focus on women entrepreneurs, $572.5 million towards big data strategy
2/27/18	www.pddnet.com	Teaching Quantum Physics to a Computer
2/27/18	ScienceNewsline	Teaching Quantum Physics to a Computer
2/27/18	Science Daily	Teaching quantum physics to a computer
2/27/18	AZoQuantum.com - Quantum Mechanics and Science News Feed	Quantum Physics‰ÛÒInspired Machine Learning Approach for Reconstructing Complex Quantum Systems
2/27/18	Innovations Report	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/27/18	University of Waterloo	Federal budget bolsters research strengths and impact
2/27/18	EurekAlert!	Teaching quantum physics to a computer
2/27/18	Electronic Specifier	AI helps reconstruct mysteries of quantum systems
2/27/18	Electronic Specifier	AI helps reconstruct mysteries of quantum systems
2/27/18	EurekAlert!	Teaching quantum physics to a computer

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2/26/18	ScienceNewsline	Artificial Intelligence Techniques Reconstruct Mysteries of Quantum Systems
2/26/18	www.techtly.com	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/26/18	www.ecnmag.com	Artificial Intelligence Techniques Reconstruct Mysteries Of Quantum Systems
2/26/18	Science Daily	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/26/18	ETH Life	Teaching quantum physics to a computer
2/26/18	link.aps.org	High-Resolution Nanoscale Solid-State Nuclear Magnetic Resonance Spectroscopy
2/26/18	Opli	Teaching quantum physics to a computer
2/26/18	Phys.org	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/26/18	EurekAlert!	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/26/18	techristic.com	Artificial intelligence techniques reconstruct mysteries of quantum systems
2/24/18	irishtechnews.ie	IBM now have a 50 qubit quantum computer, but are still trying to figure out what to do with it
2/23/18	www.dotmed.com	Researchers bring high-resolution MR imaging to nanometer scale
2/23/18	Livemint	Why quantum computers should excite us
2/23/18	RBC Dexia	Decoding cybersecurity
2/22/18	Exchange Magazine.com	Researchers bring high res magnetic resonance imaging to nanometer scale
2/22/18	Photonics Online	Researchers Bring High Res Magnetic Resonance Imaging To Nanometer Scale
2/22/18	www.techsite.io	Researchers bring high res magnetic resonance imaging to nanometer scale
2/22/18	Forbes India	The CDL is home to the greatest concentration of AI-based companies: Ajay Agrawal
2/22/18	ITbriefing	US Federal Business Opportunity: Department of the Air Force: Security Camera Intallation
2/22/18	www.imaging-git.com	Bringing High Resolution Magnetic Resonance Imaging to Nanometer Scale
2/22/18	ITbriefing	US Federal Business Opportunity: Department of the Army: Digital Signage Replacement
2/21/18	Nanowerk	Researchers bring high res magnetic resonance imaging to nanometer scale
2/21/18	Long Room	Researchers bring high-res magnetic resonance imaging to nanometer scale
2/21/18	Science Daily	Bringing high res magnetic resonance imaging to nanometer scale
2/21/18	Ambulance Today	Researchers Bring High Res Magnetic Resonance Imaging to Nanometer Scale
2/21/18	University of Waterloo	Researchers bring high res magnetic resonance imaging to nanometer scale | Waterloo News | University of Waterloo
2/21/18	Phys.org	Researchers bring high-res magnetic resonance imaging to nanometer scale
2/21/18	Canada Free Press	Researchers bring high res magnetic resonance imaging to nanometer scale
2/21/18	EurekAlert!	Researchers bring high res magnetic resonance imaging to nanometer scale

Date	Media Outlet	Title
2/21/18	eurekalert.org	Researchers bring high res magnetic resonance imaging to nanometer scale
2/20/18	link.aps.org	Simple factorization of unitary transformations
2/16/18	Scientific American Content: Global	The Quantum Internet Has Arrived (and It Hasn't)
2/15/18	University of Waterloo	News | Waterloo News | University of Waterloo
2/15/18	University of Waterloo	Monday, February 26, 2018
2/15/18	University of Waterloo	Wednesday, February 28, 2018
2/15/18	Western News.ca	Towards high quality InSb..., Z.R. Wasilewski, U Waterloo
2/14/18	www.worldpronews.com	Viewing Science feeds ~ World Professional News
2/14/18	Nature	The quantum internet has arrived (and it hasn‰Ûªt)
2/13/18	University of Waterloo	Wednesday, February 14, 2018
2/13/18	Exchange Magazine.com	University of Waterloo creates Canada‰Ûªs first problem lab
2/13/18	University of Waterloo	Commercializing Canadian research and moving it to the marketplace | Waterloo Stories | University of Waterloo
2/13/18	startupheretoronto.com	Announcing The Six Finalists Pitching Industry Problems at the Problem Pitch Competition
02/12/2018	University of Waterloo	Problem Lab aims to change culture at Waterloo | Waterloo Stories | University of Waterloo
02/11/2018	TechSpot	Weekend tech reading: Crushed wood is stronger than steel, the argument against Quantum computers
02/10/2018	Digital Journal	University of Waterloo creates Canada's first problem lab
02/10/2018	longislandtechnologynews.com	Job One for Quantum Computers: Boost Artificial Intelligence
02/10/2018	www.factnfact.com	Job One for Quantum Computers: Boost Artificial Intelligence | Facts & Facts
02/10/2018	¾_Ä¾Đà_à¬_ | Scanning Information	Job One for Quantum Computers: Boost Artificial Intelligence - ¾_Ä¾Đà_à¬_
02/10/2018	Wired	Job One for Quantum Computers: Boost Artificial Intelligence
02/09/2018	CTV News	University of Waterloo announces new Problem Lab
02/09/2018	www.newsdogshare.com	The Co-Inventor of BlackBerry Is Building Canada‰Ûªs Quantum Brain Trust - NewsDog
02/09/2018	University of Waterloo	Monday, February 12, 2018
02/09/2018	Morningstar News	University of Waterloo creates Canada's first problem lab
02/09/2018	Benzinga	University of Waterloo creates Canada's first problem lab
02/09/2018	Canada NewsWire	University of Waterloo creates Canada's first problem lab
02/09/2018	Bloomberg	The Co-Inventor of BlackBerry Is Building Canada‰Ûªs Quantum Brain Trust - Bloomberg
02/09/2018	www.techsite.io	Techsite
02/09/2018	Space Daily	New technique can capture images of ultrafast energy-time entangled photon pairs
02/09/2018	www.lelezard.com	University of Waterloo creates Canada's first problem lab
02/09/2018	Yahoo! Finance	The Co-Inventor of BlackBerry Is Building Canada‰Ûªs Quantum Brain Trust
02/08/2018	University of Waterloo	University of Waterloo creates Canada‰Ûªs first problem lab
02/08/2018	sott	Job One for Quantum Computers: Boost Artificial Intelligence
02/08/2018	WHAT REALLY HAPPENED	The Morning Download: L.L. Bean Wants to Test Frontiers of Retail with Blockchain, IoT - cetusnews
02/07/2018	University of Waterloo	Thursday, February 8, 2018
02/07/2018	Revista Pesquisa FAPESP	Robert Myers: A cataloger of the Cosmos
02/06/2018	Long Room	Energy-time entanglement detected in photons

Date	Media Outlet	Title
02/06/2018	www.techsite.io	Techsite
02/06/2018	Innovations Report	New insight into the molecular weapons of the plant microbiome
02/06/2018	Exchange Magazine.com	New technique can capture images of ultrafast energy-time entangled photon pairs
02/06/2018	Optics Journal	Technical Abstracts of Session 9 (Invited Speakers)
02/06/2018	Exchange Magazine.com	DEADLINES
02/05/2018	www.techsite.io	Techsite
02/05/2018	Primeur Magazine	New technique can capture images of ultrafast energy-time entangled photon pairs
02/05/2018	www.insurancebusinessonline.com.au	RBC invests in new cybersecurity lab
02/05/2018	AZoQuantum.com - Quantum Mechanics and Science News Feed	First Images Captured of Ultrafast Photons that are Energy-Time Entangled
02/05/2018	Photonics Online	New Technique Can Capture Images Of Ultrafast Energy-Time Entangled Photon Pairs
02/05/2018	Communitech News	Tech Roundup for January 2018
02/03/2018	www.medicalhealthnews.net	Cracks in the code: Why mapping your DNA may be less reliable than you think
02/02/2018	www.techsite.io	Techsite
02/02/2018	RBC Dexia	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
02/02/2018	www.techsite.io	New technique can capture images of ultrafast energy-time entangled photon pairs
02/02/2018	link.aps.org	Contextual Advantage for State Discrimination
02/02/2018	CBC	Quantum bullshit
02/02/2018	WebWire	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	ScienceNewsline	New Technique Can Capture Images of Ultrafast Energy-time Entangled Photon Pairs
02/01/2018	www.techsite.io	Techsite
02/01/2018	Research & Development	Scientists Captures Images of Ultrafast Energy-Time Entangled Photon Pairs
02/01/2018	Long Room	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	Canada Free Press	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	SpaceRef	New Technique Can Capture Images of Ultrafast Energy-time Entangled Photon Pairs
02/01/2018	University of Waterloo	New technique can capture images of ultrafast energy-time entangled photon pairs | Waterloo News | University of Waterloo
02/01/2018	Canadian Tech News	RBC investing $1.78 million in University of Waterloo cybersecurity lab - Canadian Tech News
02/01/2018	UC3	Quantum Cryptography: New technique can capture images of ultrafast energy-time entangled photon pairs | UC3
02/01/2018	Newsfiber	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	www.techsite.io	Techsite
02/01/2018	Opli	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	MobileSyrup.com	RBC investing $1.78 million in University of Waterloo cybersecurity lab

Date	Media Outlet	Title
02/01/2018	SpaceRef	New Technique Can Capture Images of Ultrafast Energy-time Entangled Photon Pairs
02/01/2018	Phys.org	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	EurekAlert!	New technique can capture images of ultrafast energy-time entangled photon pairs
02/01/2018	Good ChinaBrand	Elon Musk: The so-called business, is chewing glass staring abyss
1/31/18	www.techsite.io	Techsite
1/31/18	betakit.com	RBC investing $1.78 million in University of Waterloo cybersecurity lab
1/31/18	Waterloo Chronicle	RBC invest $1.78 M in new cybersecurity lab at UW:Funding will help fend of attacks on people's personal data
1/31/18	Waterloo Region Record	RBC invest $1.78 M in new cybersecurity lab at UW | TheRecord.com
1/31/18	4 Traders	ROYAL BANK OF CANADA : to open cybersecurity lab
1/31/18	www.academica.ca	UWaterloo to get cybersecurity lab, research funds from RBC
1/31/18	Medium	What is Ethereum? | The Ultimate Beginners‰Ûª Guide
1/31/18	ESIST	Job One for Quantum Computers: Boost Artificial Intelligence
1/30/18	Exchange Magazine.com	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/30/18	4 Traders	ROYAL BANK OF CANADA : RBC to Open Cybersecurity Lab, Fund New Research at University of Waterloo
1/30/18	physics.aps.org	Synopsis: Detecting Energy-Time Entanglement
1/30/18	www.verdict.co.uk	Royal Bank of Canada to open cybersecurity lab - Retail Banker International
1/30/18	Exchange Magazine.com	
1/29/18	Canadian Tech News	RBC Preps for Post-Quantum Wave with New Cybersecurity Lab in Waterloo - Canadian Tech News
1/29/18	Waterloo Region Record	Royal Bank investing in cybersecurity research at UW
1/29/18	Royal Bank of Canada	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	4 Traders	Royal Bank of Canada : RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	insurance-journal.ca	RBC to open cybersecurity lab and support research at University of Waterloo | The Insurance and Investment Journal
1/29/18	www.techsite.io	Techsite
1/29/18	Benzinga	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	Morningstar News	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	Canada NewsWire	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	University of Waterloo	Tuesday, January 30, 2018
1/29/18	Innovations Report	Botulinum-type toxins jump to a new kind of bacteria
1/29/18	CBC	RBC funds new cybersecurity lab at University of Waterloo
1/29/18	CBC	RBC funds new cybersecurity lab at University of Waterloo
1/29/18	University of Waterloo	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	bostoncommons.net	CHIPS CHIPS
1/29/18	PressReleasePoint	RBC to open a cybersecurity lab and fund new research at the University of Waterloo
1/29/18	epeak.info	Job One for Quantum Computers: Boost Artificial Intelligence | Epeak . Independent news and blogs

Date	Media Outlet	Title
1/28/18	NewKerala.com	Astronaut Steve MacLean is the new Ambassador of the Federation of Quebec Alzheimer Societies
1/25/18	www.hpcwire.com	HPC and AI ‰ÛÒ Two Communities Same Future
1/24/18	www.techsite.io	Techsite
1/23/18	www.techsite.io	Techsite
1/23/18	Exchange Magazine.com	Mayor of Waterloo launches new pilot workshop to inspire Grade 7 girls in STEAM
1/22/18	www.techsite.io	Techsite
1/21/18	Waterloo Region Record	Grade 7 girls exposed to the wonders of science
1/19/18	New York Times	Support for Education And Immigration Help Toronto Make the Cut
1/18/18	Waterloo Region Record	Toronto the only Canadian city on Amazon short list of HQ2 candidates
1/18/18	link.aps.org	Dimensionality-driven orthorhombic $\mathrm{MoT}{\mathrm{e}}_{2}$ at room temperature
1/18/18	Gizmodo Australia	New Research Could Help Bring Secure Quantum Communication To Everyone
1/18/18	University of Waterloo	Friday, January 19, 2018
1/17/18	link.aps.org	Bounds on the dynamics of periodic quantum walks and emergence of the gapless and gapped Dirac equation
1/16/18	viralgohil.com	New Research Could Help Bring Secure Quantum Communication to Everyone
1/16/18	Benzinga	Astronaut Steve MacLean is the new Ambassador of the Federation of Quebec Alzheimer Societies
1/16/18	Morningstar News	Astronaut Steve MacLean is the new Ambassador of the Federation of Quebec Alzheimer Societies
1/16/18	Canada NewsWire	Astronaut Steve MacLean is the new Ambassador of the Federation of Quebec Alzheimer Societies
1/16/18	Markets Insider	Astronaut Steve MacLean is the new Ambassador of the Federation of Quebec Alzheimer Societies
01/12/2018	Vanguard Magazine	EP 077: Global arms sales on the rise and Canada invests in quantum technology
01/12/2018	knowridge.com	Study reveals substantial evidence of holographic universe
01/11/2018	Site Selection Magazine	The ‰Û÷Great Human‰Ûª Theory
01/11/2018	Exchange Magazine.com	Laurier Professor Shohini Ghose named TED Senior Fellow
01/11/2018	Exchange Magazine.com	Exchangemagazine.com - Tuesday & Thursday
01/10/2018	MIKESHOUTS	3 Dynamic Trends Shaping the Frontiers of Artificial Intelligence
01/09/2018	Wilfrid Laurier University	Laurier Professor Shohini Ghose named TED Senior Fellow
01/09/2018	Hong Kong Standard	Partnership gains Velocity
01/09/2018	Exchange Magazine.com	Perimeter Founding Faculty member named to Order of Canada
01/09/2018	MIT Technology Review	Intel‰Ûªs New Chips Are More Brain-Like Than Ever
01/09/2018	EECatalog	Intel Partners with BMW, Nissan, SAIC Motor, Volkswagen, Paramount Pictures, Ferrari North America to Showcase Power of Data at CES | Consumer Electronics
01/09/2018	Exchange Magazine.com	Exchangemagazine.com - Tuesday & Thursday
01/08/2018	Waterloo Region Record	Waterloo mayor launches program to get girls in STEAM
01/08/2018	Medium	What is Ethereum?
01/08/2018	Hong Kong Standard	Partnership gains velocity
01/08/2018	Toronto Star	Waterloo mayor launches program to get girls in STEAM
01/08/2018	Waterloo Chronicle	Waterloo mayor launches program to get girls in STEAM
01/08/2018	Waterloo Region Record	Waterloo mayor launches program to get girls in STEAM
01/06/2018	Yahoo! India	Eight hurt as magnitude 5.1 quake hits western Iran
01/06/2018	www.techsite.io	Techsite

Date	Media Outlet	Title
01/05/2018	www.techsite.io	Techsite
01/05/2018	www.techsite.io	Techsite
01/02/2018	University of Waterloo	Thursday, January 4, 2018
12/31/17	Waterloo Region Record	Locals honoured with Order of Canada
12/31/17	Hindawi	Superconducting and Antiferromagnetic Phases of Space-Time
12/29/17	CTV News	4 Waterloo Region residents named to Order of Canada
12/29/17	CBC	Local professors, equality advocate named to Order of Canada
12/22/17	Graphic Arts Magazine	2017 Year in Review
12/22/17	IT World Canada	Top Canadian cyber security stories of 2017
12/21/17	Canada NewsWire	QUANTUM: The Exhibition takes centre stage at newly reopened Canada Science and Technology Museum
12/21/17	www.lelezard.com	QUANTUM: The Exhibition takes centre stage at newly reopened Canada Science and Technology Museum
12/20/17	Canadian Tech News	Institute for Quantum Computing Lands $1.5 Million for Data Encryption Satellite - Canadian Tech News
12/20/17	SpaceRef	Government of Canada Invests in National Security Technology
12/20/17	Satnews	Canadian Space Agency Invests in Quantum Encryption and Science Satellite Mission
12/20/17	Digital Home Canada	Worried About Online Banking? The Government of Canada is Investing in National Security Technology in Outer Space
12/19/17	it.tmcnet.com	Government of Canada invests in national security technology
12/19/17	TMC Net	Government of Canada invests in national security technology
12/19/17	14 NEWS	Government of Canada invests in national security technology
12/19/17	WAND	Government of Canada invests in national security technology
12/19/17	News on 6	Government of Canada invests in national security technology
12/19/17	KCBD	Government of Canada invests in national security technology
12/19/17	WECT TV6	Government of Canada invests in national security technology
12/19/17	NewsWest9.com	Government of Canada invests in national security technology
12/19/17	NBC12 - WWBT	Government of Canada invests in national security technology
12/19/17	Oklahoma's Own - News9	Government of Canada invests in national security technology
12/19/17	Oregon - KPTV - FOX 12	Government of Canada invests in national security technology
12/19/17	www.vbprofiles.com	Government of Canada invests in national security technology
12/19/17	KUAM News	Government of Canada invests in national security technology
12/19/17	KSLA News 12	Government of Canada invests in national security technology
12/19/17	WAFF 48	Government of Canada invests in national security technology
12/19/17	Hawaii News Now	Government of Canada invests in national security technology
12/19/17	KAIT-TV Region 8	Government of Canada invests in national security technology
12/19/17	Cleveland19	Government of Canada invests in national security technology
12/19/17	WLOX	Government of Canada invests in national security technology
12/19/17	FOX19-WXIX TV	Government of Canada invests in national security technology
12/19/17	KSWO7News	Government of Canada invests in national security technology
12/19/17	KFVS12	Government of Canada invests in national security technology
12/19/17	WMBF News	Government of Canada invests in national security technology
12/19/17	KTRE.com	Government of Canada invests in national security technology
12/19/17	NBC Right Now	Government of Canada invests in national security technology
12/19/17	Newschannel 6 Now	Government of Canada invests in national security technology
12/19/17	KUSI News	Government of Canada invests in national security technology
12/19/17	WBOC TV 16	Government of Canada invests in national security technology
12/19/17	WMCActionNews5.com	Government of Canada invests in national security technology
12/19/17	WTVM.com	Government of Canada invests in national security technology
12/19/17	ABC6 News	Government of Canada invests in national security technology

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12/19/17	KOAM TV 7	Government of Canada invests in national security technology
12/19/17	Walb News 10	Government of Canada invests in national security technology
12/19/17	KLKN-TV	Government of Canada invests in national security technology
12/19/17	KLTV.com	Government of Canada invests in national security technology
12/19/17	WTOL 11	Government of Canada invests in national security technology
12/19/17	KCTV5	Government of Canada invests in national security technology
12/19/17	WRCB-TV	Government of Canada invests in national security technology
12/19/17	wistv.com	Government of Canada invests in national security technology
12/19/17	K5 The Home Team	Government of Canada invests in national security technology
12/19/17	KTVN Channel 2 News	Government of Canada invests in national security technology
12/19/17	Erie News Now	Government of Canada invests in national security technology
12/19/17	KPLC 7	Government of Canada invests in national security technology
12/19/17	www.wflx.com	Government of Canada invests in national security technology
12/19/17	KHQ Home	Government of Canada invests in national security technology
12/19/17	Mississippi News Now	Government of Canada invests in national security technology
12/19/17	21 WFMJ	Government of Canada invests in national security technology
12/19/17	www.fox14tv.com	Government of Canada invests in national security technology
12/19/17	WTOC-TV	Government of Canada invests in national security technology
12/19/17	KXXV Central Texex News Now	Government of Canada invests in national security technology
12/19/17	Tucson News Now	Government of Canada invests in national security technology
12/19/17	WDAM-TV	Government of Canada invests in national security technology
12/19/17	Live 5 News	Government of Canada invests in national security technology
12/19/17	CBS8	Government of Canada invests in national security technology
12/19/17	WSFA 12 News	Government of Canada invests in national security technology
12/19/17	WAVE 3 - News	Government of Canada invests in national security technology
12/19/17	KMOV	Government of Canada invests in national security technology
12/19/17	www.m2mconnectivityzone.com	Government of Canada invests in national security technology
12/19/17	www.customerzone360.com	Government of Canada invests in national security technology
12/19/17	TMC Net	Government of Canada invests in national security technology
12/19/17	Morningstar News	Government of Canada invests in national security technology
12/19/17	profitquotes.com	Government of Canada invests in national security technology
12/19/17	www.tickertech.com	Government of Canada invests in national security technology
12/19/17	TMCnet.com	Government of Canada invests in national security technology
12/19/17	finance.minyanville.com	Government of Canada invests in national security technology
12/19/17	Pettinga Financial Advisors	Government of Canada invests in national security technology
12/19/17	Canada NewsWire	Government of Canada invests in national security technology
12/19/17	business.dailytimesleader.com	Government of Canada invests in national security technology
12/19/17	World Net Daily	Government of Canada invests in national security technology
12/19/17	finance.jsonline.com	Government of Canada invests in national security technology
12/19/17	Financial Content	Government of Canada invests in national security technology
12/19/17	Markets Insider	Government of Canada invests in national security technology
12/19/17	trueviralnews.com	What Ever Happened to‰Û_ Breaking the Speed of Light? ‰ÛÒ OpenMind
12/19/17	Satnews	Satnews Publishers: Daily Satellite News
12/19/17	satnews	Satnews Publishers: Daily Satellite News
12/19/17	Consumerelectronicsnet	Government of Canada invests in national security technology
12/19/17	www.lelezard.com	Government of Canada invests in national security technology

Date	Media Outlet	Title
12/19/17	Yahoo! Finance	Government of Canada invests in national security technology
12/19/17	Ivey Business Journal	Growing the GTA‰Ûªs Fintech Ecosystem
12/18/17	OPTICS.ORG	ID Quantique Announces Quantum Safe Security Advisory Board
12/15/17	en.ustc.edu.cn	[Science News]A Quantum Communications Satellite Proved Its Potential in 2017
12/13/17	Canadian Real Estate Magazine	Graduating students put down roots in Waterloo
12/12/2017	cyber.harvard.edu	Announcing the 2018 Assembly Cohort
12/12/2017	University of Waterloo	Wednesday, December 13, 2017
12/09/2017	Agenparl	School of Engineering welcomes new faculty
12/08/2017	news.mit.edu	School of Engineering welcomes new faculty
12/08/2017	University of Waterloo	Monday, December 11, 2017
12/07/2017	University of Waterloo	Friday, December 8, 2017
12/07/2017	link.aps.org	Transmission of information in nonlocal field theories
12/07/2017	coinpedia.org	Backcasting on blockchain: how big would Bitcoin blockchain need to scale up in order to dominate global transactions?
12/06/2017	e3zine.com	IT Security in the Age of Quantum Computing
12/06/2017	University of Waterloo	Microwave and scanning tunneling spectroscopy in Fe-based superconductors | Physics and Astronomy | University of Waterloo
12/04/2017	University of Waterloo	Tuesday, December 5, 2017
12/04/2017	www.techsite.io	Techsite
12/02/2017	Rincon Tech News	A Hidden Supercluster Could Solve the Mystery of the Milky Way
12/02/2017	knowauthentic.com	A Hidden Supercluster Could Solve the Mystery of the Milky Way
12/02/2017	longislandtechnologynews.com	A Hidden Supercluster Could Solve the Mystery of the Milky Way
12/02/2017	NewsCO	A Hidden Supercluster Could Solve the Mystery of the Milky Way-NewsCO.com.au
12/02/2017	Wired	A Hidden Supercluster Could Solve the Mystery of the Milky Way
12/02/2017	epeak.info	A Hidden Supercluster Could Solve the Mystery of the Milky Way | Epeak . Independent news and blogs
11/30/17	www.gizmodo.co.uk	Two Incredible New Quantum Machines Have Made Actual Science Discoveries | Gizmodo UK
11/30/17	IT World Canada	Deadline today for solutions to protect sensitive data from quantum computers
11/29/17	Gizmodo Australia	Two Incredible New Quantum Machines Have Made Actual Science Discoveries
11/29/17	Gizmodo India	Two Incredible New Quantum Machines Have Made Actual Science Discoveries
11/29/17	www.nearshoreamericas.com	Waterloo is Canada‰Ûªs Fastest Growing Tech Hub: CBRE Study
11/29/17	Nature	Large quantum systems tamed
11/28/17	University of Waterloo	Wednesday, November 29, 2017
11/26/17	EWAO	China‰Ûªs Quantum Satellite Achieves Superposition ‰Û÷Spookiness‰Ûª in Space
11/21/17	news.iu.edu	Three IU faculty named American Physical Society fellows
11/20/17	www.techsite.io	Techsite
11/20/17	link.aps.org	Finite sizes and smooth cutoffs in superconducting circuits
11/17/17	University of Waterloo	Monday, November 20, 2017
11/15/17	University of Waterloo	Thursday, November 16, 2017
11/13/17	www.techsite.io	Techsite
11/12/2017	Gizmodo Australia	What Is A Quantum Computer And How Excited Should I Be?

Date	Media Outlet	Title
11/12/2017	Open PR	Quantum Computing Market - Segmentation, Market Players, Trends 2025
11/12/2017	Gizmodo Australia	What Is A Quantum Computer And How Excited Should I Be?
11/10/2017	quotenet.com	CANARIE Summit to Focus on the Interdependence of Science, Commerce and Security
11/10/2017	Canada NewsWire	CANARIE Summit to Focus on the Interdependence of Science, Commerce...
11/10/2017	Morningstar News	CANARIE Summit to Focus on the Interdependence of Science, Commerce and Security
11/10/2017	Waterloo Region Record	IBM ups pressure with quantum computer prototype
11/10/2017	Canarie	CANARIE Summit to Focus on the Interdependence of Science, Commerce and Security
11/10/2017	Events At Stanford	Optics and Electronics Seminar
11/10/2017	quantumweekly.com	QuantumWeekly ‰ÛÓ Big Data and Analytics in the Age of Quantum...
11/10/2017	money.ca	CANARIE Summit to Focus on the Interdependence of Science, Commerce and Security ‰ÛÒ MONEYå¨ News
11/09/2017	superposition.com	Big Data and Analytics in the Age of Quantum Computing
11/09/2017	Exchange Magazine.com	| PREVIOUS EDITION
11/08/2017	www.techsite.io	Techsite
11/08/2017	www.gizmodo.co.uk	What the Hell Is a Quantum Computer and How Excited Should I Be? | Gizmodo UK
11/08/2017	www.techsite.io	Techsite
11/08/2017	trueviralnews.com	What the Hell Is a Quantum Computer and How Excited Should I Be?True Viral News | True Viral News
11/08/2017	Medium	Tech Trends, 11/08/17
11/07/2017	Gizmodo India	What the Hell Is a Quantum Computer and How Excited Should I Be?
11/07/2017	www.proinertech.com	What the Hell Is a Quantum Computer and How Excited Should I Be? | Proinertech
11/06/2017	Cassels Brock	Product Liability 101: What You Need To Know
11/06/2017	Cassels Brock	It Had to Be You: A Primer on the Law of Misnomer
11/06/2017	Cassels Brock	BC Court Toasts Vicarious Liability Claim for ‰ÛÏDefective Sandwich‰Û
11/06/2017	Cassels Brock	Consumer Protection in Product Liability Claims
11/06/2017	Cassels Brock	The Relationship Between Regulation and Litigation
11/06/2017	Cassels Brock	Is Canada Losing Ground In The Autonomous Vehicle Industry?
11/06/2017	University of Waterloo	Tuesday, November 7, 2017
11/05/2017	The Hindu	A quantum leap
11/05/2017	www.asee-prism.org	First Look
11/04/2017	uncommondescent.com	Why is space three dimensions anyway? Why not six? A new theory is offered
11/04/2017	The Hindu	A quantum leap
11/03/2017	data.btckan.com	Hash Op-Ed: Equibit Group Chooses SHA 3
11/03/2017	beat.10ztalk.com	Hash Op-Ed: Equibit Group Chooses SHA 3 | Tech Talk
11/02/2017	www.techsite.io	Techsite
11/01/2017	www.afr.com.	CSIRO's Main Sequence Ventures backs Q-Ctrl, a quantum computing firmware start-up
11/01/2017	Nature	Feature The new thermodynamics: how quantum physics is bending the rules 4 Comments
11/01/2017	CEA Vision Magazine	CTA - 2017 CT Hall of Fame: Mike Lazaridis and Charles Tandy
11/01/2017	Financial Review	CSIRO's Main Sequence Ventures backs Q-Ctrl, a quantum computing firmware start-up | afr.com
11/01/2017	Natural News	China leaps ahead of USA on quantum computing research; could spell end to encryption, demolishing crypto currencies and national security

Date	Media Outlet	Title
10/31/17	Intellasia	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/31/17	Newstarget.com	China leaps ahead of USA on quantum computing research; could spell end to encryption, demolishing crypto currencies and national security
10/31/17	Science Alert	13 of This Year's Creepiest Science Stories For Your Halloween Enjoyment
10/31/17	Top AE > Movies and Video News Articles	The Kalamazoo Symphony Orchestra Invites Second Music Director Candidate, Edwin Outwater, to the Podium on November 11, in Brahms and&Rachmaninoff, Featuring Pianist, Anna Vinnitskaya
10/31/17	Markets.financialcontent.com	The Kalamazoo Symphony Orchestra Invites Second Music Director Candidate, Edwin Outwater, to the Podium on November 11, in Brahms & Rachmaninoff, Featuring Pianist, Anna Vinnitskaya
10/31/17	24-7PressRelease.com	The Kalamazoo Symphony Orchestra Invites Second Music Director Candidate, Edwin Outwater, to the Podium on November 11, in Brahms & Rachmaninoff, Featuring Pianist, Anna Vinnitskaya
10/31/17	finance.jsonline.com	The Kalamazoo Symphony Orchestra Invites Second Music Director Candidate, Edwin Outwater, to the Podium on November 11, in Brahms & Rachmaninoff, Featuring Pianist, Anna Vinnitskaya
10/31/17	Digital Journal	The Kalamazoo Symphony Orchestra Invites Second Music Director Candidate, Edwin Outwater, to the Podium on November 11, in Brahms & Rachmaninoff, Featuring Pianist, Anna Vinnitskaya
10/31/17	www.yerepouni-news.com	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/30/17	www.dailymagazine.news	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/30/17	Newsweek	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/30/17	Yahoo! UK and Ireland	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/30/17	Yahoo! Finance UK and Ireland	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/30/17	Newsweek	How China Is Using Quantum Physics to Take Over the World and Stop Hackers
10/29/17	www.techsite.io	Techsite
10/28/17	trueviralnews.com	ISRO‰Ûªs new baby: building secure quantum communications in spaceTrue Viral News | True Viral News
10/27/17	BGR India	ISRO's new baby: Building secure quantum communications in space
10/27/17	Siasat Daily	ISRO‰Ûªs new baby: Building secure quantum communications in space
10/27/17	The Week	ISRO: Building secure quantum communications in space
10/27/17	Asia Times	China‰Ûªs quantum strides a new ‰Û÷Sputnik moment‰Ûª for US
10/26/17	Bangalore Mirror	ISRO's new baby: Building secure quantum communications in space
10/26/17	Firstpost	ISRO and Raman Research Institute to develop quantum technologies for ISRO's satellites
10/26/17	MSN	There and Back Again: Scientists Beam Photons to Space to Test Quantum Theory
10/26/17	MSN	Scientists beam photons to space to test quantum theory
10/26/17	news.webindia123.com	ISRO's new baby: Building secure quantum communications in space
10/26/17	www.ibtimes.sg	ISRO's new baby: Building secure quantum communications in space
10/26/17	IBNLive India News	ISRO's New Baby: Building Secure Quantum Communications in Space
10/26/17	Pune Mirror	ISRO's new baby: Building secure quantum communications in space
10/26/17	trueviralnews.com	ISRO sets forward to build secure quantum communications network
10/26/17	AhmedabadMirror.com	ISRO's new baby: Building secure quantum communications in space

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10/26/17	The Indian Express	ISRO now wants to enable its satellites with quantum communication | The Indian Express
10/26/17	Irish Legal News	The robots are coming, but don‰Ûªt panic: The AI legal revolution explained
10/26/17	Mumbai Mirror	ISRO's new baby: Building secure quantum communications in space
10/26/17	ecroaker.com	ISRO's New Baby: Building Secure Quantum Communications In Space | Ecroaker
10/26/17	NetIndia123.com	ISRO's new baby: Building secure quantum communications in space
10/26/17	Day After India	ISRO‰Ûªs new baby: Building secure quantum communications in space
10/26/17	Prokerala.com	ISRO's new baby: Building secure quantum communications in space
10/26/17	Can India News	ISRO‰Ûªs new baby: Building secure quantum communications in space
10/26/17	Western News.ca	Towards high quality InSb quantum wells..., Z.R. Wasilewski
10/26/17	Western News.ca	CANCELLED - Towards high quality InSb..., Z.R. Wasilewski
10/26/17	Mangalorean	ISRO‰Ûªs new baby: Building secure quantum communications in space
10/25/17	trueviralnews.com	There and Back Again: Scientists Beam Photons to Space to Test Quantum Theory
10/25/17	antzinpantz.wordpress.com	WHO DARES.....WINS
10/25/17	Fudzilla	Socialist China about to have a Sputnik moment
10/25/17	Space.com	There and Back Again: Scientists Beam Photons to Space to Test Quantum Theory
10/24/17	University of Waterloo	Wednesday, October 25, 2017
10/23/17	www.technocracy.news	China Outraces US In Quantum Computing And Quantum Encryption
10/23/17	Long Room	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Durham Herald-Sun	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	SanLuisObispo.com & The Tribune	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Charlotte Observer	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	ModBee.com & The Modesto Bee	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Merced Sun-Star	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Chicago Magazine	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	www.centredaily.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	www.bellinghamherald.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The News & Observer	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	www.theolympian.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Sacramento Bee	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	McClatchy DC	China speeds ahead of USA as quantum race escalates, worrying scientists...
10/23/17	BND.com & Belleville News-Democrat	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Macon.com & The Telegraph	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Kentucky.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Tri-CityHerald.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	myrtlebeachonline	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Star-Telegram	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Fresno Bee	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	www.bradenton.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Wichita Eagle	China speeds ahead of U.S. as quantum race escalates, worrying scientists

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10/23/17	HeraldOnline.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	IdahoStatesman.com & Idaho Statesman	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	sunherald	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	TheNewsTribune.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	The Island Packet and The Beaufort Gazette	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Macon.com & The Telegraph	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Miami Herald	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	HeraldOnline.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Ledger-Enquirer.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Kansas City Star	China and US square off in race to master quantum computing | The Kansas City Star
10/23/17	The Merced Sun-Star	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	ModBee.com & The Modesto Bee	China and US square off in race to master quantum computing | The Modesto Bee
10/23/17	www.theolympian.com	China speeds ahead of U.S. as quantum race escalates, worrying scientists
10/23/17	Breitbart	China Hurtles Past US in Race to Build Quantum Computers
10/21/17	UBC News	Be a part of world-class research this summer
10/20/17	UCAS.ac.cn	Su Gang Meets with Associate Vice-President of the University of Wate...
10/20/17	The Cipher Brief	Quantum Computing Means Unbreakable Codes at Unbeatable Speeds
10/19/17	University of Waterloo	Friday, October 20, 2017
10/19/17	www.worldnews.easybranches.com	Amazon HQ2: Mayors from 7 major North American cities give us their pitches as RFP deadline looms
10/18/17	www.worldnews.easybranches.com	Amazon HQ2: Mayors from 7 major North American cities give us their pitches as RFP deadline looms
10/18/17	Myscience	Driven to discover
10/18/17	Open PR	High-Level Performance Needs Driving the Growth of Global Market for Quantum Computing
10/18/17	NACE International	Driven to discover
10/16/17	University of Waterloo	Tuesday, October 17, 2017
10/12/2017	University of Waterloo	Friday, October 13, 2017
10/12/2017	AZoQuantum.com - Quantum Mechanics and Science News Feed	CQT Organizes Annual Competition with Global Scientific Partners and Media Partners
10/10/2017	Quantumlah	Flash fiction competition Quantum Shorts opens for entries
10/10/2017	University of Waterloo	Wednesday, October 11, 2017
10/06/2017		As the world rushes to protect data, Toronto emerges as a cybersecurity hub - The Globe and Mail
10/05/2017	The Globe and Mail Inc.	As the world rushes to protect data, Toronto emerges as a cybersecurity hub
10/04/2017	VICE - Motherboard	Theoretical Physicist Erik Verlinde Says We Don‰Ûªt Need Dark Matter to Explain the Universe
10/04/2017	trueviralnews.com	Quantum video chat links scientists on two different continents
10/03/2017	Dartmouth College	Seven Postdocs Join the Society of Fellows | Dartmouth News
10/03/2017	uwimprint.ca	Mastering your superpowers
10/03/2017	University of Waterloo	Wednesday, October 4, 2017
10/03/2017	Blogarama.com	A Human-centered take on Seniors and Technology
10/03/2017	www.scmagazineuk.com	Quantum computing breaks encryption next decade; current data at risk
10/02/2017	Electronic Design	Infineon Preparing Post-Quantum Cryptography for Cars, Infrastructure

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10/02/2017	University of Toronto	A quantum leap? Inside a U of T accelerator's bold bet on the future of artificial intelligence
9/29/17	EE News Europe	Infineon preparing post-quantum cryptography for cars, infrastructure
9/28/17	Smart2Zero	Infineon preparing post-quantum cryptography for cars
9/28/17	EETE Automotive	Infineon preparing post-quantum cryptography for cars, infrastructure
9/27/17	Waterloo Region Record	TheMuseum showing the way
9/27/17	The Globe and Mail Inc.	Don't stop here. Go unlimited.
9/27/17	News Caf	Inside Canada‰Ûªs race to produce the world‰Ûªs first quantum computer
9/27/17	www.techsite.io	Techsite
9/27/17	bizpr.us	Quantum Computing Market: Industry Analysis And Detailed Profiles Of Top Industry Players
9/22/17	Open PR	Quantum Computing Market : Governments Of Various Countries Are Investing Significantly To Accelerate Quantum Computing Research Operations
9/22/17	Space Daily	Quantum machine learning
9/20/17	Data Center Knowledge	China‰Ûªs Quantum Net Advance Offers a Glimpse into the Future of Enterprise Security
9/20/17	University of Waterloo	Thursday, September 21, 2017
9/20/17	Data Center Knowledge	China‰Ûªs Quantum Net Advance Offers a Glimpse into the Future of Enterprise Security
9/20/17	perimeterinstitute.ca	Quantum information pioneer Raymond Laflamme takes on new Chair | Perimeter Institute
9/20/17	www.itdadao.com	First quantum computers need smart software
9/19/17	trueviralnews.com	How Encryption Will Survive the Crypto-Apocalypse
9/19/17	Exchange Magazine.com	New research chair in quantum error correction demonstrates continued leadership by IQC and Waterloo in the pursuit of a quantum computer and in the development of other quantum technologies.
9/19/17	CNET	How we'll save encryption from the crypto-apocalypse - CNET
9/19/17	VICE - Motherboard	How Encryption Will Survive the Crypto-Apocalypse
9/19/17	Waterloo Region Record	A unique legacy gift to help Themuseum go forward
9/18/17	OPTICS.ORG	Toshiba speeds quantum key beyond 10åÊMb/s
9/15/17	betakit.com	University of Waterloo announces $8 million research chair for quantum error correction | BetaKit
9/15/17	Digital Journal	Step towards building the quantum Internet
9/15/17	TheSpec.com	Quantum Valley the perfect setting for a second revolution, Lazaridis says | TheSpec.com
9/15/17	AZoQuantum.com - Quantum Mechanics and Science News Feed	Scientists Present Thorough Review of Current and Future Prospects of Quantum Machine Learning
9/15/17	Malaysian Reserve	BlackBerry inventor says Canada‰Ûªs challenge is keeping techies
9/15/17	Wireless Design & Development	Quantum Machine Learning
9/15/17	Open PR	Quantum Computing : Increasing investments for the commercialization of quantum computing
9/15/17	jeepininmidwest.com	BlackBerry Inventor Says Canada‰Ûªs Challenge Is Keeping Techies
9/15/17	The Star Online	BlackBerry inventor says Canada‰Ûªs challenge is keeping techies
9/14/17	Waterloo Region Record	Quantum Valley the perfect setting for a second revolution, Lazaridis says
9/14/17	Bloomberg	BlackBerry Inventor Says Canada's Challenge Is Keeping Techies
9/14/17	Exchange Magazine.com	Waterloo Innovation Summit to hear from leaders in disruptive technology

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9/14/17	University of Waterloo	New research chair in quantum error correction demonstrates continued leadership by IQC and Waterloo in the pursuit of a quantum computer and in the development of other quantum technologies | Waterloo News | University of Waterloo
9/14/17	link.aps.org	Nonperturbative analysis of entanglement harvesting from coherent field states
9/14/17	Brightsurf Science News	Quantum machine learning
9/14/17	EurekAlert!	Quantum machine learning
9/14/17	Communitech News	The power, promise ‰ÛÒ and fear ‰ÛÒ of the future, laid bare for all at WIS2017
9/14/17	Exchange Magazine.com	Laurier professors selected for the College of New Scholars, Artists and Scientists of the Royal Society of Canada
9/13/17	Nature	First quantum computers need smart software
9/13/17	it.tmcnet.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	University of Waterloo	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	TMC Net	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	Wall Street Journal Blogs	Nascent Quantum Computing Poses Threat to Cybersecurity
9/13/17	KTRE.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	KFVS12 Home	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	KTVN	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	kmov	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	www.tickertech.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	Morningstar News	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	TMCnet.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	World Net Daily	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	finance.jsonline.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	Canada NewsWire	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	BioSpace	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	business.dailytimesleader.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	Markets.financialcontent.com	Waterloo Innovation Summit to hear from leaders in disruptive technology
9/13/17	University of Waterloo	Thursday, September 14, 2017
9/13/17	IT World Canada	Encryption-breaking quantum computers getting closer, warns Canadian expert
09/12/2017	Wilfrid Laurier University	Laurier professors selected for the College of New Scholars, Artists and Scientists of the Royal Society of Canada
09/08/2017	link.aps.org	Planck scale corrections to the harmonic oscillator, coherent, and squeezed states
09/07/2017	New Hamburg Independent	Waterloo team joining ride for local cancer care
09/07/2017	Waterloo Region Record	Waterloo team joining ride for local cancer care
09/07/2017	currenthollywood.com	Aussies come up with new form of quantum computer
09/07/2017	University of Waterloo	New Phase Transitions in Atomically Thin Quantum Materials | Physics and Astronomy | University of Waterloo
09/07/2017	trueviralnews.com	Scientists Propose a New Kind of Quantum Computer, But What Does That Mean?
09/07/2017	criticismnews.com	Quantum Computers: University of NSW team claimed ‰Û÷Nobody saw it‰Ûª
09/07/2017	vothemes.com	Flip-flop qubit: Researchers find new way to build quantum computers
09/07/2017	iphonefresh.com	Flip-flop qubits: UNSW conceives 'radical' quantum computing design

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09/07/2017	deathrattlesports.com	Scientists Propose a New Kind of Quantum Computer, But What Does That Mean?
09/06/2017	it.tmcnet.com	ISARA to present at ETSI Workshop in London
09/06/2017	Lifehacker Australia	Australian Scientists Propose A New Kind Of Quantum Computer, But What Does That Mean?
09/06/2017	MyNewsDesk	Quantum Computing Market to be backed by its Growing Applications in the Coming Years
09/06/2017	Gizmodo Australia	Australian Scientists Propose A New Kind Of Quantum Computer, But What Does That Mean?
09/06/2017	Newschannel 6 Now	ISARA to present at ETSI Workshop in London
09/06/2017	KTEN	ISARA to present at ETSI Workshop in London
09/06/2017	ITbriefing	Cybersecurity firm helping develop standards for quantum-safe solutions
09/06/2017	WRCBtv.com	ISARA to present at ETSI Workshop in London
09/06/2017	NBC12 - WWBT	ISARA to present at ETSI Workshop in London
09/06/2017	WTRF 7 News Sports Weather	ISARA to present at ETSI Workshop in London
09/06/2017	14news.com	ISARA to present at ETSI Workshop in London
09/06/2017	www.nbcrightnow.com	ISARA to present at ETSI Workshop in London
09/06/2017	CBS8	ISARA to present at ETSI Workshop in London
09/06/2017	WMC Action News 5	ISARA to present at ETSI Workshop in London
09/06/2017	www.kuam.com	ISARA to present at ETSI Workshop in London
09/06/2017	Cleveland19	ISARA to present at ETSI Workshop in London
09/06/2017	Hawaii News Now	ISARA to present at ETSI Workshop in London
09/06/2017	Oregon - KPTV - FOX 12	ISARA to present at ETSI Workshop in London
09/06/2017	CBS59 Home	ISARA to present at ETSI Workshop in London
09/06/2017	www.newswest9.com	ISARA to present at ETSI Workshop in London
09/06/2017	WBOC TV 16	ISARA to present at ETSI Workshop in London
09/06/2017	Oklahoma's Own - News9	ISARA to present at ETSI Workshop in London
09/06/2017	KHQ Home	ISARA to present at ETSI Workshop in London
09/06/2017	News on 6	ISARA to present at ETSI Workshop in London
09/06/2017	www.fox14tv.com	ISARA to present at ETSI Workshop in London
09/06/2017	www.kswo.com	ISARA to present at ETSI Workshop in London
09/06/2017	KFVS12 Home	ISARA to present at ETSI Workshop in London
09/06/2017	WMBF News	ISARA to present at ETSI Workshop in London
09/06/2017	Mississippi News Now	ISARA to present at ETSI Workshop in London
09/06/2017	KAIT-TV Region 8	ISARA to present at ETSI Workshop in London
09/06/2017	KTRE.com	ISARA to present at ETSI Workshop in London
09/06/2017	Tristate Update	ISARA to present at ETSI Workshop in London
09/06/2017	WTOC.com - WTOC-TV	ISARA to present at ETSI Workshop in London
09/06/2017	KUSI.com	ISARA to present at ETSI Workshop in London
09/06/2017	WAFF 48 News	ISARA to present at ETSI Workshop in London
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09/06/2017	kcbd	ISARA to present at ETSI Workshop in London
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09/06/2017	KCTV5	ISARA to present at ETSI Workshop in London
09/06/2017	KLKN-TV	ISARA to present at ETSI Workshop in London
09/06/2017	Erie News Now	ISARA to present at ETSI Workshop in London
09/06/2017	WBOY	ISARA to present at ETSI Workshop in London
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09/06/2017	KTVN	ISARA to present at ETSI Workshop in London
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09/06/2017	Wandtv.com	ISARA to present at ETSI Workshop in London
09/06/2017	kplctv.com	ISARA to present at ETSI Workshop in London
09/06/2017	www.k5thehometeam.com	ISARA to present at ETSI Workshop in London
09/06/2017	WLOX-TV	ISARA to present at ETSI Workshop in London
09/06/2017	Toledo News Weather and Sports	ISARA to present at ETSI Workshop in London
09/06/2017	KOAM TV 7	ISARA to present at ETSI Workshop in London
09/06/2017	WSFA	ISARA to present at ETSI Workshop in London
09/06/2017	www.walb.com	ISARA to present at ETSI Workshop in London
09/06/2017	Live 5 News	ISARA to present at ETSI Workshop in London
09/06/2017	FOX19-WXIX TV	ISARA to present at ETSI Workshop in London
09/06/2017	News Channel 25 - KXXV	ISARA to present at ETSI Workshop in London
09/06/2017	WAVE 3 - News	ISARA to present at ETSI Workshop in London
09/06/2017	KLTV.com	ISARA to present at ETSI Workshop in London
09/06/2017	WDAM-TV	ISARA to present at ETSI Workshop in London
09/06/2017	www.wflx.com	ISARA to present at ETSI Workshop in London
09/06/2017	wistv.com	ISARA to present at ETSI Workshop in London
09/06/2017	kmov	ISARA to present at ETSI Workshop in London
09/06/2017	Tucson News Now	ISARA to present at ETSI Workshop in London
09/06/2017	WTVM.com	ISARA to present at ETSI Workshop in London
09/06/2017	Canada NewsWire	ISARA to present at ETSI Workshop in London
09/06/2017	Gizmodo India	Scientists Propose a New Kind of Quantum Computer, But What Does That Mean?
09/06/2017	ITbriefing	ISARA to present at ETSI Workshop in London
09/06/2017	www.m2mconnectivityzone.com	ISARA to present at ETSI Workshop in London
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09/06/2017	quotenet.com	ISARA to present at ETSI Workshop in London
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09/06/2017	Markets.financialcontent.com	ISARA to present at ETSI Workshop in London
09/06/2017	www.forwardgeek.com	ISARA to present at ETSI Workshop in London
09/06/2017	General Trade show news	ISARA to present at ETSI Workshop in London
09/05/2017	Site Selection Magazine	Ontario Leads a Nation Ripe for Growth
09/03/2017	Science Vibe	Quantum Teleportation Connects Entangled Particles Underwater ‰ÛÒ Science Vibe
8/31/17	link.aps.org	Double quantum dot memristor
8/30/17	link.aps.org	Machine Learning Phases of Strongly Correlated Fermions
8/30/17	New Scientist	First underwater entanglement could lead to unhackable comms | New Scientist
8/29/17	trueviralnews.com	Researchers Take the World One Step Closer to Quantum Teleportation
8/28/17	3 News	Physicists achieve quantum communication underwater | Newshub

Date	Media Outlet	Title
8/28/17	Science Alert	Physicists Just Achieved Quantum Teleportation Underwater For The First Time
8/25/17	MyBroadband	Quantum Internet is 13 Years Away
8/25/17	Phys.org	Bell Prize goes to scientists who proved 'spooky' quantum entanglement is real
8/24/17	trueviralnews.com	First underwater entanglement could lead to unhackable comms
8/24/17	researchmoneyinc.com	Calendar: Waterloo Innovation Summit
8/23/17	www.realclearscience.com	First Underwater Entanglement Accomplished
8/21/17	24News.ca	Why a few drops of water make whisky taste better - 24News.ca
8/21/17	24News.ca	Next total solar eclipse comes in 2024 but only parts of Canada will see it - 24News.ca
8/21/17	24News.ca	Rare solar eclipse astounds sky gazers: 'Like nothing else you'll ever see' - 24News.ca
8/21/17	24News.ca	Quantum physics for babies ‰ÛÓ a different bedtime story - 24News.ca
8/21/17	24News.ca	Historic eclipse turns day into night across U.S. - 24News.ca
8/21/17	24News.ca	Tech experts demanding 'killer robot' ban - 24News.ca
8/21/17	KunMail.com	Quantum physics for babies ‰ÛÓ a different bedtime story
8/21/17	snewsi.com	Quantum physics for babies ‰ÛÓ a different bedtime story
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8/21/17	CBC	Quantum physics for babies ‰ÛÓ a different bedtime story
8/21/17	ca.news.yahoo.com	Quantum physics for babies ‰ÛÓ a different bedtime story
8/21/17	namynnob.com	Quantum physics for babies ‰ÛÓ a different bedtime story
8/20/17	Canada NewsWire	Ontario Science Centre fosters curiosity, creativity and critical thinking with Power of Ideas
8/20/17	www.tingvoa.com	This quantum theory predicts that the future might be influencing the past_¾__¾«_¤Ô¾_Û¾Ð¡ŽÑÈ_Ô_VOA Ü±ø_ _Ô
8/19/17	NewKerala.com	Ontario Science Centre fosters curiosity, creativity and critical thinking with Power of Ideas exhibition - newkerala news #264466
8/18/17	Canada NewsWire	Ontario Science Centre fosters curiosity, creativity and critical thinking with Power of Ideas exhibition
8/18/17	markets.businessinsider.com	Ontario Science Centre fosters curiosity, creativity and critical thinking with Power of Ideas exhibition
8/16/17	trueviralnews.com	Quantum Internet Is 13 Years Away. Wait, What‰Ûªs Quantum Internet?
8/16/17	Wireless Design & Development	Machine Learning Tackles Quantum Error Correction
8/16/17	Long Room	Machine learning tackles quantum error correction
8/16/17	University of Waterloo	Thursday, August 17, 2017
8/15/17	datamarket.atman360.com	[Scott Aaronson]¾öÔ ÝüŠÀÁII•_ö Ü±ŒÝ_ __¾Üäåá Œ¼á¾ÐøŒ _Šü ŒÕÎ¾Ðø ŒÁÓ ´À¾ ¡Œ_ÑŽàÎ•_ä ([Scott Aaronson] What I Believe II (ft. Sarah Constantin and Stacey Jeffery)) | Atman µã ¨ø
8/15/17	Long Room	Quantum Internet Is 13 Years Away. Wait, What's Quantum Internet?
8/15/17	Solid Tech News	Quantum Internet Is 13 Years Away. Wait, What's Quantum Internet? - Solid Tech News
8/15/17	Phys.org	Machine learning tackles quantum error correction
8/15/17	WIRED	Quantum Internet Is 13 Years Away. Wait, What's Quantum Internet?
08/10/2017	University of Waterloo	Thursday, August 17, 2017
08/10/2017	University of Waterloo	Monday, August 21, 2017
08/09/2017	Parksville Qualicum News	Woodyatt gets an eye-opening physics experience
08/09/2017	link.aps.org	Quantum trajectories for propagating Fock states
08/09/2017	www.bclocalnews.com	Woodyatt gets an eye-opening physics experience

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08/04/2017	www.techsite.io	Techsite
08/04/2017	Nasdaq	5 Technological Innovations That Could Change the World
08/04/2017	www.nwi.com	5 Technological Innovations That Could Change the World
08/04/2017	FOX Business	5 Technological Innovations That Could Change the World
08/04/2017	The Pantagraph	5 Technological Innovations That Could Change the World
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7/31/17	People.com.cn	OZ Encounter: Quantum theorist by day, book author by night - People's Daily Online
7/31/17	cns.utexas.edu	Quantum Computer Scientist Named Simons Foundation Investigator
7/28/17	New Hamburg Independent	A quest for the mother of all computers
7/28/17	Waterloo Region Record	A quest for the mother of all computers
7/28/17	Gazettabyte	A quantum leap in fear
7/24/17	Asian Age	Weird sci: Quantum Karma‰ÛÓ Future affects past
7/23/17	Deccan Chronicle	Weird sci: Quantum Karma ‰ÛÒ Future affects past
7/21/17	University of Waterloo	Friday, August 4, 2017
7/21/17	Santa Clarita Valley Signal	Valencia High School teacher studies at international physics institute ‰ÛÒ Santa Clarita Valley Signal
7/20/17	trueviralnews.com	Quantum Computing Is Coming for Your Data | Backchannel
7/20/17	spacebeyondcosmos.blogspot.ca	Revolutionary Quantum Theory: The Future Could Be Affecting The Past
7/20/17	untold-universe.blogspot.ca	Revolutionary Quantum Theory: The Future Could Be Affecting The Past
7/19/17	Solid Tech News	Quantum Computing Is Coming for Your Data
7/19/17	WIRED	Quantum Computing Is Coming for Your Data
7/19/17	Quality Digest	It‰Ûªs a Case of Mind Over Matter... or Rather Mind Isn‰Ûªt Matter
7/19/17	mysteriousearth.net	This Quantum Theory Predicts That The Future Might Be Influencing The Past
7/18/17	University of Waterloo	Thursday, July 20, 2017
7/17/17	trueviralnews.com	13 of This Year‰Ûªs Creepiest Science Stories For Your Halloween Enjoyment
07/12/2017	University of Waterloo	Friday, July 14, 2017
07/12/2017	Before It's News	Major Accomplishment in Quantum Communication; Chinese Prove Einstein's "Spooky" Exists at Large Distance
07/12/2017	untold-universe.blogspot.ca	This Quantum Theory Reveals That The Future Might Be Influencing The Past
07/12/2017	TrendinTech	New Theory Says That the Past is Influenced by the Future
07/11/2017	EWAO	Revolutionary Quantum Theory: The Future could be affecting the Past
07/11/2017	Ancient Code	Revolutionary Quantum Theory: The Future could be affecting the Past
07/10/2017	Primeur Magazine	University of Southern California to lead IARPA quantum computing projectåÊ...
07/10/2017	Daily Express	SHOCK QUANTUM THEORY: The future is affecting the PAST
07/10/2017	The Event Chronicle	This quantum theory predicts that the future might be influencing the past
07/10/2017	noquiescencewithoutauthenticity.blogspot.ca	New idea from quantum physics on "Retrocausality"
07/09/2017	www.techsite.io	Techsite
07/09/2017	www.globalfuturist.org	Chinese scientists have built the world‰Ûªs first quantum satellite network

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07/08/2017	trueviralnews.com	Physicists May Have Discovered One of the Missing Pieces of Quantum Theory
07/06/2017	mukeshbalani.wordpress.com	[futurism.com] Physicists May Have Discovered One of the Missing Pieces of Quantum Theory
07/06/2017	xkfilippidis.blogspot.ca	This Quantum Theory Predicts That The Future Might Be Influencing The Past
07/06/2017	Opli	Photon triplets pave way for multi-photon entanglement
07/06/2017	ESIST	How quantum trickery can scramble cause and effect
07/05/2017	www.techsite.io	Techsite
6/30/17	www.closertotruth.com	Scott Aaronson | Closer to Truth
6/30/17	m.insidertracking.com	Northern Shield Appoints New Director and Chairman; Grants Stock Options
6/29/17	IT World Canada	16 Canadian tech leaders look to the future for #Canada150
6/29/17	Waterloo Region Record	Canadian tinkerers, inventors, scientists and engineers have changed the world | TheRecord.com
6/29/17	Test & Measurement International Report	Happy 150th Canada: The Institutions
6/28/17	University of Waterloo	Thursday, July 6, 2017 | Daily Bulletin
6/28/17	University of Waterloo	Tuesday, July 4, 2017
6/28/17	Nature	How quantum trickery can scramble cause and effect
6/27/17	www.tokyodailynews.com	Research partnerships, building an ecosystem ‰ÛÓ GCN
6/27/17	Nanowerk	Nan-Oh-Canada
6/27/17	Indo-Canadian Voice	University of Alberta scientists create maple leaf 10,000 times smaller than diameter of a human hair
6/27/17	gcn.com	Quantum bits: Research partnerships, building an ecosystem -- GCN
6/26/17	Calgary Herald	5 things to do this week in Calgary
6/26/17	Calgary Herald	5 things to do this week in Calgary
6/26/17	PSNews	Quantum leap: Replacement internet takes a step closer
6/26/17	EurekAlert!	USC to lead IARPA quantum computing project
6/26/17	University of Waterloo	Institute for Quantum Computing
6/26/17	EurekAlert!	USC to lead IARPA quantum computing project
6/24/17	Communitech News	AI and data the focus of Google for Entrepreneurs Exchange program ‰ÛÒ Communitech News
6/24/17	NEWS4C	Distance Record for Quantum Communication
6/23/17	Electronics360	Building a Computer 10,000 Times Faster
6/23/17	in.ibtimes.com	This consortium is tasked to build quantum computers 10,000 times faster than classical machines
6/23/17	Medium	Nan-Oh-Canada ‰ÛÒ UAlberta 2017 ‰ÛÒ Medium
6/22/17	www.ecnmag.com	USC To Lead IARPA Quantum Computing Project
6/22/17	Newswise	USC to Lead IARPA Quantum Computing Project
6/20/17	trueviralnews.com	Unbreakable: China doubles down on quantum internet
6/20/17	Wonderful Engineering	Hack Proof Internet Closer To Becoming A Reality Thanks To China‰Ûªs Latest Quantum Entanglement Breakthrough
6/20/17	The Christian Science Monitor	Unhackable? China moves toward unbreakable code of light
6/20/17	The Christian Science Monitor	Unbreakable: China doubles down on quantum internet
6/19/17	Intellasia	China sets new record for quantum entanglement en route to build new communication network
6/19/17	Nature	Ground-to-air quantum link achieved?
6/19/17	Before It's News	China's victory over hackers and spooks

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6/19/17	Rural Weekly	China set to build a 'completely new internet' | Lismore Echo
6/19/17	Noosa News	China set to build a 'completely new internet' | Noosa News
6/19/17	news.com.au	CHINA CLOSER TO 'INTERNET IMPERVIOUS TO HACKERS'...
6/19/17	Iran Daily	China to build new communication network
6/19/17	hbtoday.co.nz	China's big 'new internet' breakthrough
6/19/17	Daily Telegraph Australia	Quantum internet: China smashes record for beaming entangled particles | Daily Telegraph
6/19/17	Central Telegraph	China set to build a 'completely new internet'
6/19/17	The Reporter	China set to build a 'completely new internet'
6/19/17	Western Times	China set to build a 'completely new internet'
6/19/17	Gladstone Observer	China set to build a 'completely new internet'
6/19/17	South Burnett Times	China set to build a 'completely new internet'
6/19/17	Central Queensland News	China set to build a 'completely new internet'
6/19/17	THE MORNING BULLETIN	China set to build a 'completely new internet'
6/19/17	Warwick Daily News	China set to build a 'completely new internet' | Warwick Daily News
6/19/17	Tweed Daily News	China set to build a 'completely new internet' | Tweed Daily News
6/19/17	Byron Shire News	China set to build a 'completely new internet'
6/19/17	Surat Basin Online	China set to build a 'completely new internet'
6/19/17	Bayside and Northern Suburbs Star	China set to build a 'completely new internet'
6/19/17	Gympie Times	China set to build a 'completely new internet'
6/19/17	Rural Weekly	China set to build a 'completely new internet'
6/19/17	The Daily Examiner	China set to build a 'completely new internet'
6/19/17	Stanthorpe Border Post	China set to build a 'completely new internet'
6/19/17	NewsMail	China set to build a 'completely new internet'
6/19/17	Fraser Coast Chronicle	China set to build a 'completely new internet'
6/19/17	Whitsunday Times	China set to build a 'completely new internet'
6/19/17	Gatton Star	China set to build a 'completely new internet'
6/19/17	Lismore Northern Star	China set to build a 'completely new internet'
6/19/17	Ipswich Satellite	China set to build a 'completely new internet'
6/19/17	Balonne Beacon	China set to build a 'completely new internet'
6/19/17	Coffs Coast Advocate	China set to build a 'completely new internet'
6/19/17	Blackwater Herald	China set to build a 'completely new internet'
6/19/17	southburnetttimes.com.au: South Burnett Times Homepage	China set to build a 'completely new internet'
6/19/17	Chinchilla News	China set to build a 'completely new internet'
6/18/17	The Queensland Times	China set to build a 'completely new internet'
6/18/17	Dalby Herald	China set to build a 'completely new internet'
6/18/17	Caboolture News	China set to build a 'completely new internet'
6/18/17	Daily Mercury News	China set to build a 'completely new internet'
6/18/17	Sunshine Coast Daily	China set to build a 'completely new internet'
6/18/17	Ballina Shire Advocate	China set to build a 'completely new internet'
6/18/17	Toowoomba Chronicle	China set to build a 'completely new internet'
6/18/17	Whitsunday Coast Guardian	China set to build a 'completely new internet'
6/18/17	nflnewsdesk.com	China successfully sends pairs of entangled photons from space
6/18/17	olatheedge.com	China bounced an "unhackable" quantum signal between cities
6/18/17	en.azvision.az	Quantum satellite shatters entanglement record
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Date	Media Outlet	Title
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6/18/17	newsworms.com	'Spooky' quantum entanglement achieved in space
6/17/17	perfscience.com	China‰Ûªs Micius Mission Sets New Grounds in Quantum Science | PerfScience
6/17/17	Law.com	‰ÛÏQuantum Space Race" --China's Scientists Generate 'Spooky' Entanglement in Space For First Time (WATCH Weekend 'Galaxy' Stream)
6/17/17	News Guangdong	Landmark success of China's quantum experiment is far-reaching_In Pictures_www.newsgd.com
6/17/17	www.sciencerecorder.com	‰Û÷Spooky‰Ûª quantum entanglement achieved in space
6/17/17	portside.org	Chinese Satellite Breaks a Quantum Physics Record, Beams Entangled Photons From Space to Earth
6/17/17	Pakistan Observer	Landmark success of China‰Ûªs quantum experiment is far-reaching
6/17/17	China.org.cn	Landmark success of China's quantum experiment is far-reaching-China.org.cn
6/17/17	fp.brecorder.com	Big scientific breakthrough at sub-atomic level holds promise for secure comms
6/17/17	Taipei Times Online	China transmits entangled photons to Earth
6/16/17	Health Resources Publishing	China Shatters "Spooky Action at a Distance" Record, Preps for ...
6/16/17	www.iiss.com	News Analysis: Landmark success of China's quantum experiment is far-reaching
6/16/17	trueviralnews.com	New Quantum-Entanglement Record Could Spur Hack-Proof Communications
6/16/17	South China Morning Post	Chinese satellite makes breakthrough in quantum communication
6/16/17	Yahoo! News	New Quantum-Entanglement Record Could Spur Hack-Proof Communications
6/16/17	Red Orbit	Chinese scientists build the first quantum satellite network - Redorbit
6/16/17	SINA	Feature: "Quantum entanglement" between Delingha and Washington
6/16/17	XINHUANET	Feature: "Quantum entanglement" between Delingha and Washington - Xinhua | English.news.cn
6/16/17	China.org.cn	Feature: "Quantum entanglement" between Delingha and Washington
6/16/17	Steelers lounge	Quantum breakthrough? Chinese scientists beam back 'entangled' photons from space
6/16/17	en.addiyar.com	Big scientific breakthrough at sub-atomic level holds promise for secure comms | Addiyar
6/16/17	www.economynext.com	Breakthrough in 'entangled photons' may revolutionize communication
6/16/17	frozenmail.net	Quantum secure internet is possible
6/16/17	XINHUANET	News Analysis: Landmark success of China's quantum experiment is far-reaching - Xinhua | English.news.cn
6/16/17	China.org.cn	Landmark success of China's quantum experiment is far-reaching
6/16/17	Times of India	Big scientific breakthrough at sub-atomic level holds promise to secure telecommunications
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6/16/17	SABC	Scientific breakthrough holds promise for secure comms
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Date	Media Outlet	Title
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6/16/17	journalducameroun.com	Big scientific breakthrough at sub-atomic level holds promise for secure comms
6/16/17	France 24	Flash - Big scientific breakthrough at sub-atomic level holds promise for secure comms - France 24
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6/16/17	Yahoo! News AU	Big scientific breakthrough at sub-atomic level holds promise
6/16/17	Yahoo!Xtra	Big scientific breakthrough at sub-atomic level holds promise for secure comms
6/16/17	Yahoo! Singapore	Big scientific breakthrough at sub-atomic level holds promise for secure comms
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6/16/17	trueviralnews.com	Large-Scale, Quantum Communication Networks Are Within Reach ‰ÛÒ D-brief
6/16/17	People.com.cn	Spotlight: Chinese scientists successfully beam 'entangled' photons from space in landmark experiment - People's Daily Online
6/16/17	XINHUANET	Chinese scientists successfully beam "entangled" photons from space in landmark experiment
6/16/17	China.org.cn	Spotlight: Chinese scientists successfully beam "entangled" photons from space in landmark experiment
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6/16/17	www.japannewsheadlines.com	Chinese scientists make subatomic breakthrough
6/16/17	Learning and Finance	China's quantum satellite makes breakthrough in secure communications
6/16/17	istreetresearch	China hits milestone in race to create hack-proof communications
6/16/17	Electronic Specifier	Technique at sub-atomic level holds potential for secure comms
6/15/17	The Globe and Mail	China‰Ûªs quantum breakthrough in space would enhance encrypted communications
6/15/17	trueviralnews.com	Chinese Satellite Relays a Quantum Signal Between Cities
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6/15/17	The Globe and Mail	China achieves quantum breakthrough in space
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6/15/17	Los Angeles Times	Chinese satellite breaks a quantum physics record, beams...
6/15/17	Nature	News China's quantum satellite clears major hurdle on way to ultrasecure communications 1 Comment

Date	Media Outlet	Title
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6/15/17	Science News Online	Quantum satellite shatters entanglement record
6/15/17	Orlando Sentinel	Chinese satellite breaks a quantum physics record, beams entangled photons from space to Earth
6/15/17	Scientific American Content: Global	China Shatters ‰ÛÏSpooky Action at a Distance‰Û Record, Preps for Quantum Internet
6/15/17	Los Angeles Times	Chinese satellite breaks a quantum physics record, beams entangled photons from space to Earth
6/15/17	Global Times	Landmark success of China's quantum experiment is far-reaching
6/15/17	Optics & Photonics News	Quantum Key Distribution Takes Flight | Optics & Photonics News
6/15/17	Space.com	New Quantum-Entanglement Record Could Spur Hack-Proof Communications
6/15/17	The Globe and Mail	Canadians need to come together to take our startup community forward
6/15/17	The Globe and Mail	China's quantum leap in space a step toward unhackable communications
6/14/17	Science | AAAS	Quantum satellite achieves 'spooky action' at record distance
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6/13/17	University of Waterloo	Thursday, June 22, 2017
06/12/2017	Primeur Magazine	Study proves viability of quantum satellite communications ...
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06/11/2017	The Science Times	Science Times
06/09/2017	University of Waterloo	Wednesday, June 14, 2017
06/08/2017	RF Globalnet	Study Proves Viability Of Quantum Satellite Communications
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06/07/2017	Scientific Computing	Study Proves Viability of Quantum Satellite Communications
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06/07/2017	The Afghanistan Sun	Study proves viability of quantum satellite communications
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06/07/2017	gringaofthebarrio.wordpress.com	An Order Of Milky Way Sunny Side Up ‰ÛÒ Gringa of the Barrio
06/06/2017	ScienceNewsline	Study Proves Viability of Quantum Satellite Communications
06/06/2017	www.ecnmag.com	Study Proves Viability Of Quantum Satellite Communications
06/06/2017	insights.globalspec.com	New Study Proves Quantum Satellite Communications is Possible
06/06/2017	Phys.org	Study proves viability of quantum satellite communications
06/06/2017	Science Daily	Viability of quantum satellite communications
06/06/2017	EurekAlert!	Study proves viability of quantum satellite communications
06/05/2017	sudbury	LU names honourary doctorate recipients
06/02/2017	link.aps.org	Quantum to classical transitions in causal relations
06/02/2017	whatsyourtech.ca	Canada 150 Tech Tour: Quantum Changes Ahead for Your Life | WYT - Canadian Tech News & Tech Reviews
06/01/2017	The Event Chronicle	Quantum experiment to test if human consciousness is beyond the physical world
5/31/17	Design Quarterly	Additional honours presented at OAA Awards Gala
5/26/17	University of Toronto	U of T's Creative Destruction Lab goes quantum
5/25/17	rdnewsnow.com	Innisfail High School hosting Innovation conference
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5/24/17	PR Newswire	St. Petersburg University of IT, Mechanics and Optics Wins IBM-Sponsored International Collegiate
5/24/17	Stockhouse Bulletin Boards	Manitok Energy Inc. V.MEI
5/23/17	Hudson Institute	The Information Age Needs Quantum Cybersecurity
5/22/17	Big News Network	Experiment could use human MIND to prove Einstein's theory
5/22/17	One News Page	Experiment could use human MIND to prove Einstein's theory
5/22/17	epeak.info	Jacob Barnett's Curious and Computational Mind | Epeak . Independent news and blogs
5/17/17	Sinisterly - All Forums	IBM announces 17 qubit quantum processor
5/17/17	University of Waterloo	Four IQC researchers granted Early Researcher Awards | Institute for Quantum Computing
5/17/17	University of Waterloo	Thursday, May 18, 2017
5/16/17	Brandon University	Researcher secures grants to further quantum computing at BU
5/15/17	IConnect007	LCN Collaborates in IARPA-funded QEO Program
5/15/17	I-Connect007 :: Daily Newsletter	LCN Collaborates in IARPA-funded QEO Program
05/12/2017	www.canada.ca	Mississauga Board of Trade
05/12/2017	betakit.com	Communitech opens data hub to encourage startup and enterprise collaboration | BetaKit
05/11/2017	Financial Post	Communitech Data Hub is the newest addition to Waterloo‰Ûªs innovation ecosystem
05/11/2017	Financial Post	CIBC launches data lab in Waterloo to harness fintech talent
05/11/2017	The Science Times	Science Times
05/03/2017	Waterloo Region Record	2013 Statistics and Facts
05/03/2017	Space News	Canada to build radar instrument for NASA Mars probe - SpaceNews.com
05/02/2017	Westman Journal	Students get hands-on with ‰Û÷Power of Ideas‰Ûª tour at BU
05/01/2017	Brandon University	Pugh taking quantum leap
05/01/2017	Science and Technology Research News	‰ÛÏValleytronics‰Û Advancement Could Help Extend Moore‰Ûªs Law - Science and Technology Research News
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4/29/17	trueviralnews.com	Key Einstein principle survives quantum testTrue Viral News | True Viral News
4/29/17	Science World Report	Canadian Space Agency Funds Long-Term Plan
4/29/17	trueviralnews.com	Canadian Space Agency getting $80.9M in federal funding for two projects | Toronto StarTrue Viral News | True Viral News
4/28/17	myWestman.ca - Home	My perspective: From small beginnings
4/28/17	One News Page United Kingdom	Einstein Principle Survives Quantum Test? - One News Page [UK] VIDEO
4/28/17	www.ibftoday.ca	BR Cda Space Funding ‰ÛÒ CP
4/28/17	Military Embedded Systems	IARPA kicks off quantum enhanced computing program
4/28/17	nationtalk.ca	BR Cda Space Funding ‰ÛÒ CP
4/28/17	Communitech News	Cognitive Systems ships first units of motion-detecting Aura device ‰ÛÒ Communitech News
4/28/17	Science News Online	Key Einstein principle survives quantum test
4/28/17	www.dolphnsix.com	Key Einstein principle survives quantum test
4/28/17	One News Page [Aus]	Einstein Principle Survives Quantum Test?
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4/27/17	Waterloo Region Record	Ottawa announces space funding long-term plan
4/27/17	TheSpec.com	Ottawa announces space funding long-term plan
4/27/17	Global News Canada	Ottawa announces over $80M in space funding - National | Globalnews.ca

Date	Media Outlet	Title
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4/27/17	GuelphToday	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	sudbury	Ottawa announces space funding; long-term plan expected this summer
4/27/17	News Talk 650 CKOM	Ottawa announces space funding; long-term plan expected this summer
4/27/17	News Talk 980 CJME	Ottawa announces space funding; long-term plan expected this summer
4/27/17	GuelphToday	Ottawa announces space funding; long-term plan expected this summer
4/27/17	paNOW	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	cfjctoday.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	CFJC Today	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	660 News	The Thursday news briefing: An at-a-glance survey of some top stories - 660 NEWS
4/27/17	kelownadailycourier.ca	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	News Talk 650 CKOM	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	News Talk 980 CJME	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	thechronicleherald.ca	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	www.thestar.com	Canadian Space Agency getting $80.9M in federal funding for two projects
4/27/17	Metro Canada	Ottawa announces space funding; long-term plan expected this summer | Metro News
4/27/17	sudbury	Canadian Space Agency getting $80.9 million for two projects
4/27/17	Thunder Bay Source	Canadian Space Agency getting $80.9 million for two projects
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4/27/17	Brandon Sun	Canadian Space Agency getting $80.9 million for two projects
4/27/17	InfoNews.ca	Ottawa announces space funding; long-term plan expected this summer
4/27/17	Penticton Herald	Ottawa announces space funding; long-term plan expected this summer
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4/27/17	News Talk 980 CJME	Canadian Space Agency getting $80.9 million for two projects
4/27/17	News Talk 650 CKOM	Canadian Space Agency getting $80.9 million for two projects
4/27/17	www.cleveland19.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wearewvproud.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kswo.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.14news.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.fox14tv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wboc.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	Live 5 News	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wlox.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
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4/27/17	www.wmbfnews.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.fox19.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kltv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	KTEN	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.erietvnews.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kuam.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wdam.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.ktre.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	news on 6	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kcbd.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	WSFA	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wmcactionnews5.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wtvm.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.khq.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
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4/27/17	www.wrcbtv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wvalways.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.klkntv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.newschannel6now.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.msnewsnow.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.newswest9.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wistv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency

Date	Media Outlet	Title
4/27/17	KTVN	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wtol.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	CBS8	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	News Channel 25 - KXXV	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wflx.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.waff.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wandtv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.nbcrightnow.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.abc6.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	Hawaii News Now	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wave3.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.9and10news.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kait8.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.k5thehometeam.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	KFVS12 Home	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wdrb.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	news9.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.walb.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
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4/27/17	Tristate Update	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.kplctv.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wfmj.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.wtoc.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.yourohiovalley.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	sudbury	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	Morningstar News	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency

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4/27/17	Benzinga	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.tickertech.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	web-2.0.financialcontent.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	www.canada.ca	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	markets.ibtimes.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	Canada NewsWire	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	business.dailytimesleader.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	World Net Daily	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/27/17	CBC	Canadian Space Agency gets $80.9 million to develop new technologies
4/27/17	rdnewsnow.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	www.timescolonist.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	www.news1130.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	www.timescolonist.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	Thompson Citizen	Ottawa announces space funding; long-term plan expected this summer
4/27/17	680 News	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	Metro Canada	The Thursday news briefing: An at-a-glance survey of some top stories | Metro News
4/27/17	rdnewsnow.com	Canadian Space Agency getting $80.9 million for two projects
4/27/17	Yorkton This Week	Ottawa announces space funding; long-term plan expected this summer
4/27/17	www.timescolonist.com	Canadian Space Agency getting $80.9 million for two projects
4/27/17	startupheretoronto.com	Cognitive Systems Ships First Units of Motion-Detecting Aura Device
4/27/17	Daily Commercial News	Toronto projects dominate 2017 OAA Awards
4/27/17	Artificial intelligence, transhumanism, nanotechnology & more	From fantasy to reality
4/27/17	capebretonpost.com	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	Lethbridge Herald	Canadian Space Agency getting $80.9 million for two projects
4/27/17	Lethbridge Herald	Ottawa announces space funding; long-term plan expected this summer - The Lethbridge Herald - News and Sports from around Lethbridge
4/27/17	570News	The Thursday news briefing: An at-a-glance survey of some top stories
4/27/17	ca.news.yahoo.com	Canadian Space Agency getting $80.9 million for two projects
4/27/17	Montreal Gazette	Ottawa announces space funding; long-term plan expected this summer
4/27/17	Medicine Hat News	Ottawa announces space funding; long-term plan expected this summer
4/27/17	dmnnewswire.com	Ministers Bains and Garneau celebrate $80.9 million for the Canadian Space Agency
4/26/17	Atlantic Media Company	A Trick That Hides Censored Websites Inside Cat Videos
4/26/17	Public Now	IARPA Launches 'QEO' Program To Develop Quantum Enhanced Computers
4/26/17	PressReleasePoint	Raymond Laflamme awarded CAP-CRM Prize
4/25/17	Exchange Magazine.com	Researchers developing a system to access government-censored websites
4/25/17	Exchange Magazine.com	Raymond Laflamme wins CAP-CRM Prize
4/25/17	Executive Gov	IARPA Kicks Off Quantum Computing Tech R&D Project

Date	Media Outlet	Title
4/25/17	intelligencecommunitynews.com	IARPA launches QEO program
4/25/17	Brandon Sun	Pugh taking quantum leap
4/25/17	Exchange Magazine.com	Exchangemagazine.com - Tuesday & Thursday
4/24/17	AFCEA	IARPA Launches Program To Develop Quantum Enhanced Computers
4/24/17	AFCEA	IARPA Awards Contract for Quantum Enhanced Optimization Program
4/24/17	www.hpcwire.com	IARPA Launches QEO Program to Develop Quantum Enhanced Computers
4/24/17	www.exchangemagazine.com	Researchers developing a system to access government-censored websites
4/24/17	University of Waterloo	Tuesday, April 25, 2017
4/24/17	www.brandonsun.com	Pugh taking quantum leap
4/23/17	CBC	Hundreds gather in Waterloo for the March For Science rally
4/22/17	CTV News	'Science has so much to contribute': March for Science hits Waterloo
4/21/17	Waterloo Region Record	UW researchers developing tool to access government-censored websites
4/21/17	Medium	When Should You Start Worrying About Post-Quantum Cryptography?
4/21/17	PhysOrg.com	The search for deviations from standard quantum mechanics
4/21/17	Newsweek	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
4/21/17	europe.newsweek.com	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
4/21/17	www.globalsecuritymag.com	May 16-19: Encryption Policy Questions, Hacking Threats Drive Increased Global Participation at Cryptography Conference
4/20/17	www.therecord.com	UW researchers developing tool to access government-censored websites
4/19/17	FinancialBuzz.com	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	profitquotes.com	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	Benzinga	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	Benzinga	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	OTC Markets	GoldMining Inc. (GLDLF: OTCQX International) | GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	Yahoo! Finance	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	Nasdaq	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/19/17	markets.ibtimes.com	GoldMining Initiates Technical Advisory Board with First Appointments of Paul Zweng, PhD, Ross Sherlock, PhD and Curtis Clarke, BSc (Mining Engineering)
4/18/17	Waterloo Region Record	Curious cellist seeks the deeper meaning behind the music he plays
4/18/17	Medium	Your turn, Toronto-Waterloo. ‰ÛÒ thalmic ‰ÛÒ Medium
4/17/17	Azure	Meet the Winners of the 2017 Ontario Association of Architects Awards - Azure Magazine

Date	Media Outlet	Title
4/15/17	www.tingvoa.com	A bizarre physics law is making superfluid helium behave like an actual black hole
4/15/17	Winnipeg Free Press	Curiosity set free on trapline
04/12/2017	Foreign Affairs.co.nz	A fruitful finale to Internet Economy Summit (with photos) ‰ÛÒ ForeignAffairs.co.nz
04/12/2017	7thSpace	A fruitful finale to Internet Economy Summit ‰ÛÒ 7thSpace Interactive (press release)
04/12/2017	ISD.gov.hk	A fruitful finale to Internet Economy Summit (with photos)
04/11/2017	Georgia Straight	Nassif Ghoussoub: Canada has two ministers of science, yet budget 2017 barely mentions science
04/11/2017	New Scientist	Quantum effects cloak impossible singularities with black holes | New Scientist
04/10/2017	physics.aps.org	Viewpoint: Photonic Hat Trick
04/09/2017	British Express	Tech & Science: Quantum Computing's Potential to Disrupt Everything - Francais Express - United King
04/09/2017	MSN	Quantum Computing's Potential to Disrupt Everything
04/09/2017	Newsweek	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
04/09/2017	Yahoo! UK and Ireland	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
04/09/2017	RocketNews	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
04/09/2017	Yahoo! News	Quantum Computing Is Going Commercial With the Potential to Disrupt Everything
04/07/2017	MobileSyrup.com	Justin Trudeau selling Canada’s innovation agenda through Quora and LinkedIn
04/06/2017	betakit.com	PM Justin Trudeau using Quora, LinkedIn to sell Canada's innovation agenda | BetaKit
04/03/2017	Financial Post	Revolution AI: Waterloo veterans putting artificial intelligence to the test in the real world
04/03/2017	National Post	Revolution AI: Waterloo veterans putting artificial intelligence to the test in the real world
04/01/2017	POWERSOURCE ONLINE	Quantum computing a threat to cyber security, says report | PowerSource Online Magazine
04/01/2017	Quora	Institute for Quantum Computing: Can i get into IQC at uwaterloo? Without idk getting above 90%??

K. Governance

Below is a biography for individuals currently servicing on IQC's Executive Committee, Advisory Board and Scientific Advisory Committee.

Executive Committee

Kevin Resch, Interim Executive Director

Kevin Resch received the BSc (Hon.) degree in Chemical Physics from Queen's University, Kingston, Canada, in 1997. He received the MSc and PhD degrees in Physics from the University of Toronto, Canada, in 1998 and 2002 respectively. His Masters and Doctoral theses were based on experimental quantum optics and completed under the supervision of Aephraim Steinberg. Subsequently, Kevin held a Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship with Anton Zeilinger's group at the University of Vienna, Austria and a Research Fellow position with Andrew White's Quantum Technology Laboratory at the University of Queensland, Brisbane, Australia. He joined the University of Waterloo's physics department and the Institute for Quantum Computing (IQC) in 2006.

Charmaine Dean, V.P., University Research

Charmaine Dean is Vice-President, Research and Professor in the Department of Statistics and Actuarial Science at the University of Waterloo. Her research interest lies in the development of methodology for disease mapping, longitudinal studies, the design of clinical trials, and spatio-temporal analyses. Much of this work has been motivated by direct applications to important practical problems in biostatistics and ecology. Her current main research applications are in survival after coronary artery bypass surgery, mapping disease and mortality rates, forest ecology, fire management, smoke exposure estimation from satellite imagery, and modeling of temporary and intermittent stream flow for flood analysis and predictions.

Bob Lemieux, Dean of Science, University of Waterloo

Dr. Bob Lemieux joined Waterloo as the Dean of Science starting July 1, 2015. Previous to his appointment here, he was a professor in the Department of Chemistry and served as Associate Dean (Research) in the Faculty of Arts and Science at Queen's University. Bob Lemieux came with proven experience as an administrator, researcher, mentor and teacher. His passion for teamwork and collaboration has helped him create a culture of synergistic partnerships across academic units and faculties. Lemieux has been a faculty member of Department of Chemistry at Queen's University since 1992. His multi-disciplinary research into designing advanced liquid crystal materials found in high-performance microdisplays has earned him several international recognitions, including the 2012 Samsung Mid-Career Award and the Ontario Premier's Research Excellence Award. He is co-investigator on a CREATE grant. Lemieux received the Chemistry departmental teaching award twice as well as the W.J. Barnes Teaching Excellence Award from the Queen's Arts and Science Undergraduate Society. Lemieux was Head of the Chemistry Department for five years and Associate Dean (Research) in

the Faculty of Arts and Science at Queen's University, and has also been involved in the recruitment of a Canada Excellence Research Chair.

Pearl Sullivan, Dean, Faculty of Engineering, University of Waterloo
Pearl Sullivan received her BEng with distinction (1985) and MASc (1986) degrees from the Technical University of Nova Scotia in metallurgical engineering. In 1990, she earned a PhD from the University of British Columbia in materials engineering, specializing in the failure of 131 carbon-fibre reinforced composite materials. Dr. Sulliv an started her academic career at Nanyang Technological University, Singapore, in 1991 before returning to Canada in 1994 to join the Department of Mechanical Engineering at the University of New Brunswick. She was twice honoured with the UNB Faculty Merit Award for Excellence.

In 2004, Dr. Sullivan became a faculty member of the University of Waterloo's Department of Mechanical and Mechatronics Engineering and served as its Department Chair from 2006 to 2011. She was recognized with the university's Outstanding Performance Award in 2009. A strong believer in interdisciplinary research, she was the founding Director of the collaborative graduate program in Nanotechnology within the university's Faculties of Engineering and Science. Dr. Sullivan began her term as Dean of Engineering in July 2012.

Stephen Watt, Dean, Faculty of Mathematics, University of Waterloo
Stephen M. Watt is Dean of the Faculty of Mathematics and Professor in the David R. Cheriton School of Computer Science at the University of Waterloo. He previously held the title of Distinguished University Professor at Western University where he served for periods as Chair of the Department of Computer Science and Director of the Ontario Research Centre for Computer Algebra. Prior to this, he held positions at the IBM T.J. Watson Research Center in Yorktown Heights (USA) and INRIA and the University of Nice (France). Professor Watt's areas of research include algorithms and systems for computer algebra, programming languages and compilers, mathematical handwriting recognition and document analysis. He was one of the original authors of the Maple and Axiom computer algebra systems, principal architect of the Aldor programming language and its compiler at IBM Research, and is co-author of the MathML and InkML W3C standards. Watt was a co-founder of Maplesoft in 1988 and served on its board of directors from 1998 to 2009. He served on the board of directors of the Descartes Systems Group from 2001 to 2015, including two periods as Board Chair. He presently serves on the boards of Waste Diversion Ontario, which oversees the management of all Ontario's recycling programs, and of the McMichael Canadian Art Foundation. Professor Watt is the recipient of numerous distinctions, including Doctor Honoris Causa from the University of the West (Romania), the J.W. Graham Medal in Computing and Innovation (Waterloo) and the Outstanding Innovation Award (IBM).

Board of Directors

Mike Lazaridis (Board Chair) Co-founder and Managing Partner, Quantum Valley Investments

Mike Lazaridis the founder of telecommunications company Blackberry (formerly Research In Motion). He served as Vice Chair of the company's Board, and Chair of the Board's new Innovation Committee. IQC was launched in 2002 thanks to the vision and incredible philanthropy of Lazaridis, who has given more than $105 million to the institute since inception. He is also the founder of Waterloo's Perimeter Institute for Theoretical Physics.

Tom Brzustowski, RBC Professor, Telfer School of Management,
University of Ottawa
Tom Brzustowski graduated with a B.A.Sc. in Engineering Physics from the University of Toronto in 1958, and a PhD in Aeronautical Engineering from Princeton in 1963. He was a professor in the Department of Mechanical Engineering at the University of Waterloo from 1962 to 1987. He served as Chair of Mechanical Engineering from 1967 to 1970 and as VicePresident, Academic of the university from 1975 to 1987. He served as deputy minister in the Government of Ontario from 1987 to 1995. He was appointed President of NSERC in October 1995, and reappointed in 2000. He is an Officer of the Order of Canada and a fellow of the Canadian Academy of Engineering and of the Royal Society of Canada.

Charmaine Dean, Vice President, Chair, University Research, University of Waterloo

Complete biography listed under Executive Committee.

Robert Dunlop, Retired, Industry Canada
Robert recently retired from Industry Canada where he was the assistant deputy minister responsible for science and innovation. He held this position between 2009 and 2014, and before that he served at the assistant deputy minister level at Finance Canada where he co-managed the Economic Development and Corporate Finance Branch. Over his career he had responsibilities in a number of areas including program management, policy development and supporting ministers.

Robert is a native Montrealer where he studied economics and finance at McGill University. He now lives in Toronto.

Cosimo Fiorenza, VP and General Consul, Quantum Valley Investments
Cosimo Fiorenza, Vice-Chair, has played a major role in the development of the Quantum Valley in Waterloo Region. He is a founding member of the Perimeter Institute Board of Directors. In addition to his role as Vice-Chair of the Board, Mr. Fiorenza is a member of both the Finance Committee and the Investment Committee, and previously served as Co-Chair of the Perimeter Institute Leadership Council.

He is also the Chair of the Board of Directors of Friends of Perimeter Institute and a member of the Board of Directors of AIMS-NEI Canada, one of Perimeter[1]s global outreach partners.

Mr. Fiorenza is the Vice-President and General Counsel of Quantum Valley Investments, where he has helped to establish numerous quantum technology start-up companies. He serves as a director and officer of several of these start-up companies, actively supporting them in a broad spectrum of matters including recruitment, financial matters, intellectual property, fundraising, and government relations.

Mr. Fiorenza also helped to establish the Institute for Quantum Computing at the University of Waterloo and remains an active member of the IQC Board of Directors and Finance Committee. In 2016, he helped establish Quantum Valley Ideas Lab, a charitable organization focused on applied quantum research and specifically the development of new quantum technologies that will be the basis for new products and new businesses in Canada. Mr. Fiorenza serves as Vice-Chair of Ideas Lab and is also a member of its Finance Committee and Investment Committee.

Previously, he spent approximately 20 years with major Toronto law firms, advising some of Canada[1]s leading corporations and entrepreneurs on income tax and commercial matters, with a focus on technology and international structure. Mr. Fiorenza holds a degree in business administration from Lakehead University and a law degree from the University of Ottawa. He was called to the Bar in Ontario in 1991.

Mark Pecen, CEO, Approach Infinity Inc.
Mark Pecen serves as CEO of Approach Infinity, Inc., providing advisory services to firms requiring technology due diligence and management consulting in the areas of wireless communication and emerging technologies, rapidly growing technology companies and their venture capital funding partners. The firm comprises a network of senior executives and experts in the management of technology, innovation, research and development, marketing, sales, global standards, patents, technology entrepreneurship, and individuals with specific technical disciplines such as information theory, radio frequency systems, wireless system protocols, cryptography and others. Pecen retired as Sr. Vice President, Research and Advanced Technology and technology advisor to the CEO of BlackBerry, maker of wireless smart phones. He was responsible for the creation and management of BlackBerry's Advanced Technology Research Centre and a significant portion of BlackBerry's wireless patent portfolio. A past Distinguished Innovator and member of the Science Advisory Board at Motorola, Pecen also managed consultation work for clients in North America and Europe.

David Fransen, Former Consul General Canadian Consulate in Los Angeles David Fransen worked from 1985 to 1988 at the Privy Council Office, where he provided policy advice related to such developments as the Green Plan in 1990, the drafting of the Canadian Environmental Assessment Act and the Canadian Environmental Protection Act, and the creation of the Canadian Environmental Assessment Agency. He then became Director of Economic Framework Policies in the Strategic Policy Branch of Industry Canada. In 1999, David became the Director General of the Centre for Healthy Human Development at Health

Canada. He became Assistant Deputy Minister of the Industry Sector in 2003, where he was primarily responsible for providing policy advice and delivering programs related to some of Canada's key economic sectors. He became executive director of the Institute for Quantum Computing in 2006. He was most recently the Consul General, Canadian Consulate General in Los Angeles.

Peter E. Brown, Senior Practice Partner, Deloitte Canada
Peter E. Brown, CPA CA, ICD.D., is a Senior Practice Partner in Deloitte Canada. Peter has close to 30 years' experience in public accounting, serving clients in both the public and private sectors. He has gained significant international experience in assurance and advisory services and has extensive experience with business advisory services. Peter served as Managing Partner for Deloitte's Atlantic Practice until 2008 when Peter relocated to Toronto to assume the role of Managing Partner and National Leader for Private Company Services. In 2011, Peter's responsibilities were expanded to include the entire middle market for Deloitte Canada. In 2013 Peter relinquished these responsibilities and was appointed to Deloitte Canada's Client Cabinet which is comprised of senior leaders with firm wide market responsibilities. Peter is the co-author of The Power of The Best, published in September 2012, the sequel to Building the Best - Inside Canada's Best Managed Companies. Peter is a frequent speaker on topics of entrepreneurship and what makes Best Managed companies unique. Peter has also served on the Board of Directors for Deloitte Canada. Peter has a broad range of expertise in issues unique to entrepreneurs in privately held companies and to globally oriented mid-market companies. He also has extensive experience in leadership, strategic planning, mergers and acquisitions, and succession planning. His clients ranged from family owned businesses to global organizations in various industries, including transportation, consumer business, technology, real estate, professional services, and mining services. Peter's current portfolio of clients includes Fortis, Hatch, Stikeman Elliott LLP, Smart Centres, Spin Master and Major Drilling Group International Inc. Peter has been involved in United Way both in the Atlantic Region and Toronto, in Chambers of Commerce throughout Atlantic Canada, and is a member of the Advisory Board for the Sobeys School of Business. Peter is also involved in Habitat for Humanity and served as part of a Deloitte Humanitarian Team that travelled to Brazil in October of 2011 to build homes and meet with local business leaders. Peter is a graduate of St. Mary's University and is a member of the Canadian and Ontario Institutes of Chartered Accountants and a CPA (Illinois). Peter is a graduate of the Directors Education Program offered by the Institute of Corporate Directors and Rotman School of Management.

Wayne Kozen, Former Senior Vice-President, Public Equities, Ontario Teachers' Pension Plan Board
Wayne Kozun was responsible for Ontario Teachers' Public Equities portfolio. Public Equities incorporates internally managed portfolios, the Relationship Investing team and external managers used primarily to broaden geographic scope. In support of these activities, Public Equities monitors the corporate governance practices of the companies in which Ontario Teachers' invests. Wayne joined Ontario Teachers' in 1995 and has held various positions including most recently Senior Vice-President, Fixed Income & Alternative Investments. Wayne serves on the boards of the Canadian Coalition for Good Governance, the Pacific Pension & Investment Institute and Camelot UK Lotteries Ltd. He holds a

BESc from Western University, and MBA from the Ivey Business School, is a CFA charterholder, and is a graduation of the Institute of Corporate Directors.

Scientific Advisory Committee

Prof. Chris Monroe, University of Maryland (Chair)
Christopher Monroe is an experimental atomic, molecular and optical physicist. Monroe obtained his PhD at the University of Colorado in 1992. From 1992-2000, Monroe was a postdoc and staff physicist in the Ion Storage Group of David Wineland at the National Institute of Standards and Technology in Boulder, CO. In 2000, Monroe moved to the University of Michigan, where he introduced the use of single photons to couple quantum information between atomic ions. In 2006, he became Director of the FOCUS Center at the University of Michigan. In 2007, Monroe became the Bice Sechi-Zorn Professor of Physics at the University of Maryland and a Fellow of the new Joint Quantum Institute between Maryland and NIST. In 2007-2008, Monroe's group succeeded in producing quantum entanglement between two widely separated atoms and teleported quantum information between atoms separated by a large distance.

Prof. Harry Buhrman, Centrum voor Wiskunde en Informatica (CWI)
Harry Buhrman is head of the research group 'Algorithms and Complexity' at the Centrum Wiskunde & Informatica, which he joined in 1994. Since 2000 he also has a joint appointment as full professor of computer science at the University of Amsterdam. Buhrman's research focuses on quantum computing, algorithms, complexity theory, and computational biology. 135 One of the highlights in the work of Buhrman is the article co-authored with Richard Cleve (University of Waterloo, Canada) 'Quantum Entanglement and Communication Complexity'. They demonstrated that with quantum entanglement certain communication tasks can be solved more efficiently. He also co-developed a general method to establish the limitations of quantum computers. He has written more than 100 scientific publications.

Prof. Anthony Leggett, University of Illinois at Urbana-Champaign
Anthony J. Leggett, the John D. and Catherine T. MacArthur Professor and Center for Advanced Study Professor of Physics, has been a faculty member at Illinois since 1983. He was a co-winner of the 2003 Nobel Prize in Physics for pioneering work on superfluidity. He is a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Russian Academy of Sciences (foreign member), and is a Fellow of the Royal Society (U.K.), the American Physical Society, and the American Institute of Physics. He is an Honorary Fellow of the Institute of Physics (U.K.). He was knighted (KBE) by Queen Elizabeth II in 2004 "for services to physics." He is also a Mike and Ophelia Lazaridis Distinguished Research Chair.

Umesh Vazarani, University of California
Umesh Vazirani is a professor in the Computer Science Division of the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. Professor Vazirani is a Director of the Berkeley Quantum Information and Computation Center (BQIC). He received an NSF

Presidential Young Investigator Award in 1987 and the Friedman Mathematics Prize in 1985. Professor Vazirani wrote the book, “An Introduction to Computational Learning Theory'' with Michael Kearns and currently is at the forefront of research in the area of quantum computing.

Prof. Anton Zeilinger, University of Vienna

Anton Zeilinger is a professor of physics at the University of Vienna (previously Innsbruck). Professor Zeilinger is known for multiple experiments in the realm of quantum interferometry and the demonstration of quantum teleportation. His work influenced the experimental progress in a new sub-field of physics, quantum information theory. He has contributed to theoretical physics and the foundations of quantum mechanics — he has showed an amplification of the Einstein-Podolsky-Rosen paradox, where one considers three, instead of just two, entangled particles.

Prof. Wojciech Zurek, Los Alamos National Laboratory

Wojciech Hubert Zurek is a Laboratory Fellow at Los Alamos National Laboratory (LANL). He is a leading authority on a number of physics topics, including quantum theory, and particularly, decoherence. His work also has great potential benefit to the emerging field of quantum computing. He was educated in Krakow, Poland (M.Sc. 1974) and Austin, Texas (PhD 1979). He spent two years at Caltech as a Tolman Fellow, and began his appointment at LANL as a J. Oppenheimer Fellow. He was the leader of the Theoretical Astrophysics Group at LANL from 1991 until he was made a Laboratory Fellow in the Theory Division in 1996. Zurek is currently a foreign associate of the Cosmology Program of the Canadian Institute for Advanced Research.

L. Administrative Staff

IQC Administrative Staff as of March 31, 2018:

Taso Alkiviades
Dana Ayyash
Jeannie Bairos
Christine Bezruki
Maren Butcher
Sara Clark
Matt Cooper
Andrew Dale
Hillary Dawkins
Tobi Day-Hamilton
Emma DeSousa
Monica Dey
Christine Dietrich
Melissa Donnelly
Lino Eugene
Kathryn Fedy
Guanru Feng
Tracey Forrest
Matt Fries
Yufei Ge
Brian Goddard
Louise Green
Greg Holloway
Youn Hwan
Taminiau Ivar
Kim Kuntz
Martin Laforest
Deler Langenber
Chin Lee
Vito Logiudice
Shravan Mishar
Brian Moffat
Mai-Britt Mogensen
Bill Munson
Brian Neill
Nathan Nelson-Fitzpatrick
Adele Newton
Angela Olano
Mary Lyn Payerl
Michele Roche
Roberto Romero
Rodello Salandanan
Laura Scanlan
Matt Schumacher
Matt Scott
Peter Sprenger
Siobhan Stables
Harmeny Storer
Daniel Stranart
Tarralee Weber
Dylan Totzke
Carly Turnbull
Steve Weiss

M. Financial Information – Auditor's Report