INSTITUT QUANTIQUE

Driving the Quantum Revolution

UNIVERSITÉ DE SHERBROOKE

2016-2017 ANNUAL REPORT

Vision

The Institut quantique (IQ) of Université de Sherbrooke believes that transformative technologies will emerge from quantum sciences and that this quantum revolution will have an influence on our society and our daily lives.

Mission

The Institut quantique of Université de Sherbrooke seeks to bring together internationally recognized leaders in research and interdisciplinary training in science and quantum technologies. IQ thrives to be a collaborative environment at the interface of quantum information, quantum materials and quantum engineering that offers exceptional scientific and professional perspectives to its students, members and partners.

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Alexandre Blais, Scientific Director.
Source: Karine Couillard Photographe

DIRECTOR'S WORD

Like the booming field of quantum science and technology, the first year of the Institut quantique was marked by many events. These included the hiring of Éva Dupont-Ferrier and Glen Evenbly. Pre Dupont-Ferrier will lead the experimental development of new architectures for quantum computing based on dopants in silicon. Pr Evenbly is a recognized expert in the theory of tensor networks, a new digital method that finds applications ranging from quantum materials to quantum information. We also welcomed the first cohort of IQ postdoctoral fellows. Recruited following an international call, these three young researchers reinforce interactions between IQ members.

The IQ is also proud to support the Université de Sherbrooke's Women in Physics Group. This grouping aims to promote the presence of women in physics programs, from bachelor's to postdoctoral fellowships. Several actions are expected in the coming months and years.

With the objective of consolidating existing collaborations between the IQ's researchers and many French researchers, the IQ participated in June 2016 with the Centre national de la recherche scientifique (CNRS) and the Université Paris-Sud in the creation of the International associated laboratory for quantum circuits and materials (LIA-LCMQ). More than 80 French and IQ researchers met in October 2016 in Sherbrooke for the inaugural LIA-LCMQ workshop. An important objective of this new partnership is to increase the number of cotutelles between France and the IQ.

In 2016-2017, IQ members published more than 100 scientific papers, filed five patent applications and received nearly 30 visitors from nine countries. Several of IQ's breakthroughs have had a significant impact in the international arena. This is particularly the case for Professor Taillefer's team, who collaborated with members of the Canadian Institute For Advanced Research (CIFAR) to settle a 20-year debate in the field of quantum materials. Professor Taillefer was awarded the Simon 2017 Memorial Scholarship. He is the first Canadian to receive this international distinction since its creation in 1957.

This report will give you an overview of the exciting science underway at Institut quantique and some of the key actions that have been taken to make the IQ a major player in the second quantum revolution.

ABOUT THE INSTITUTE

Institut quantique (IQ) of Université de Sherbrooke brings together internationally recognized leaders in research and interdisciplinary training in science and quantum technologies. IQ is a collaborative environment at the interface of quantum computing, quantum materials, and quantum engineering offering exceptional scientific and professional opportunities to its students, members, and partners.

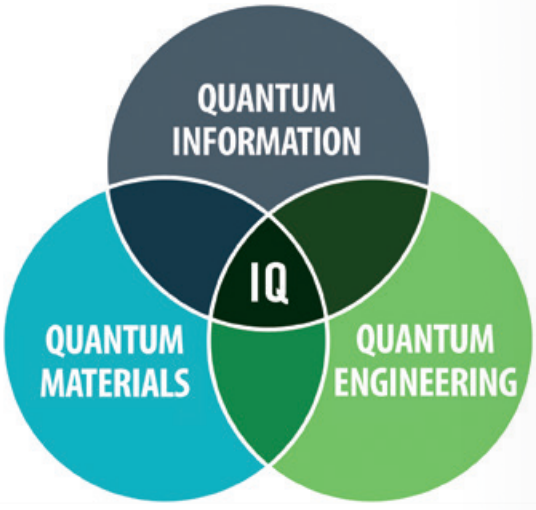
What we do

- Develop projects at the interface of our research areas
- Train highly qualified personnel who will drive tomorrow's economy
- Accelerate the development of quantum technologies, entrepreneurship, and the marketing of these technologies
- Engage key players in the development of quantum technologies
- Foster social awareness in technological challenges emerging from quantum science

CFREF – MAJOR GRANT

The Canada First Research Excellence Fund (CFREF) has awarded $33.5 million over the next seven years to our researchers to support the project "From Quantum Science to Quantum Technologies". This ambitious strategy will undoubtedly be one of the great industrial revolutions of the 21st century.

CANADA FIRST RESEARCH EXCELLENCE FUND



IQ Welcomes Two Professors

Institut quantique and the Department of Physics are proud to have recruited two new professors this year: Éva Dupont-Ferrier and Glen Evenbly.

Professor Éva Dupont-Ferrier

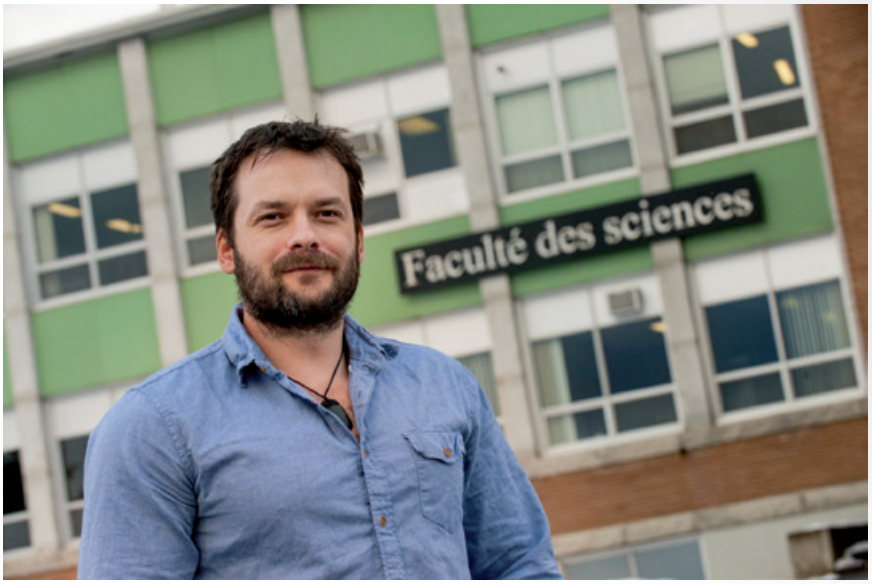
Éva Dupont-Ferrier

Professor Dupont-Ferrier is an expert in quantum information. She has acquired expertise in a broad range of systems used to encode quantum information: spins of colour centres in diamond, quantum dots, dopants in silicon, superconducting circuits, and nanomechanical resonators. She has developed several strategies to implement innovative devices for quantum information based on these systems. Working with superconducting circuits as a postdoc at Rutgers University in the U.S., she performed the first proof-of-concept experiment on topologically protected arrays of Josephson junctions. Working with nanoMOSFET, she established an essential step to build scalable architectures based on microelectronic devices by demonstrating the first coherent coupling of two dopants embedded in a transistor.

Professor Dupont-Ferrier decided to come to Sherbrooke as she considered it was the "best place" for her to go. "As a new professor at Institut quantique, I could benefit from very good conditions in terms of infrastructure and equipment, allowing me to set up my challenging research quickly and conduct leading experiments in the field of quantum information." Eva said she was also "attracted by the personal environment in the institute which brings together world-class scientists she is looking forward to collaborating with! Not only are they excellent physicists but they also work closely together and are extremely nice to work with."

When asked about the research she wants to develop at IQ, Eva said she was interested in developing novel architectures for quantum information, based on dopants in silicon. "Dopants in silicon are a very promising building block for scalable quantum information systems. Due to their very small size, they can be integrated at a high density and unlike 'artificial atoms' produced by electronic lithography, these atoms have perfectly reproducible and stable properties." She wants to "address dopants using state-of-the-art devices from the microelectronics industry in order to quickly build efficient quantum devices." In parallel, she wants to "put dopants at the heart of hybrid systems combining dopants with optics and superconducting circuits for efficient readout, coupling and manipulation."

▪ Professor Glen Evenbly



Glen Evenbly
Source: Michel Caron

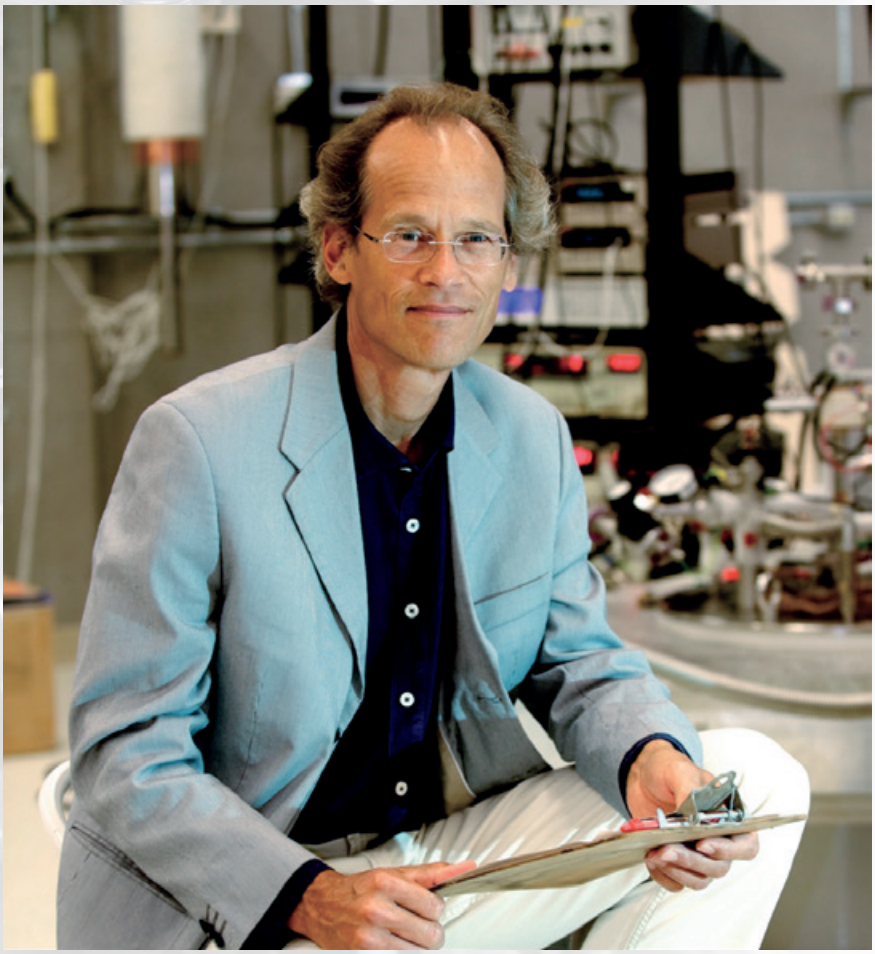
Professor Evenbly is an expert in numerical tensor network methods for quantum and statistical many-body physics. He is internationally recognized for his work on the multi-scale entanglement renormalization ansatz (MERA) and tensor network renormalization. He has also pioneered the use of tensor network methods to extract conformal data and established deep links between these ideas and the anti-de Sitter/conformal field theory (AdS/CFT) correspondence.

Professor Evenbly decided to come to the Université de Sherbrooke for one very simple reason: "It was the best place for me to go. I already knew several of the researchers here – people I wanted to work with." The 33-year-old physicist says he was seduced by the Government of Canada's recent investments in research and a work environment he finds "very vibrant right now."

When asked about his current research interests, Professor Evenbly said that he was thinking about "new ideas for tensor networks, new formulas, and new algorithms" and how to "make tensor networks more practical." He would like to focus primarily on problems related to quantum materials, such as studying strongly correlated or magnetically frustrated materials. But this doesn't stop at quantum materials and quantum information science: "Recently, I met researchers who've thought of applying tensor networks to string theory," he says.

▪ Louis Taillefer

First Canadian to Receive the Simon Memorial Prize

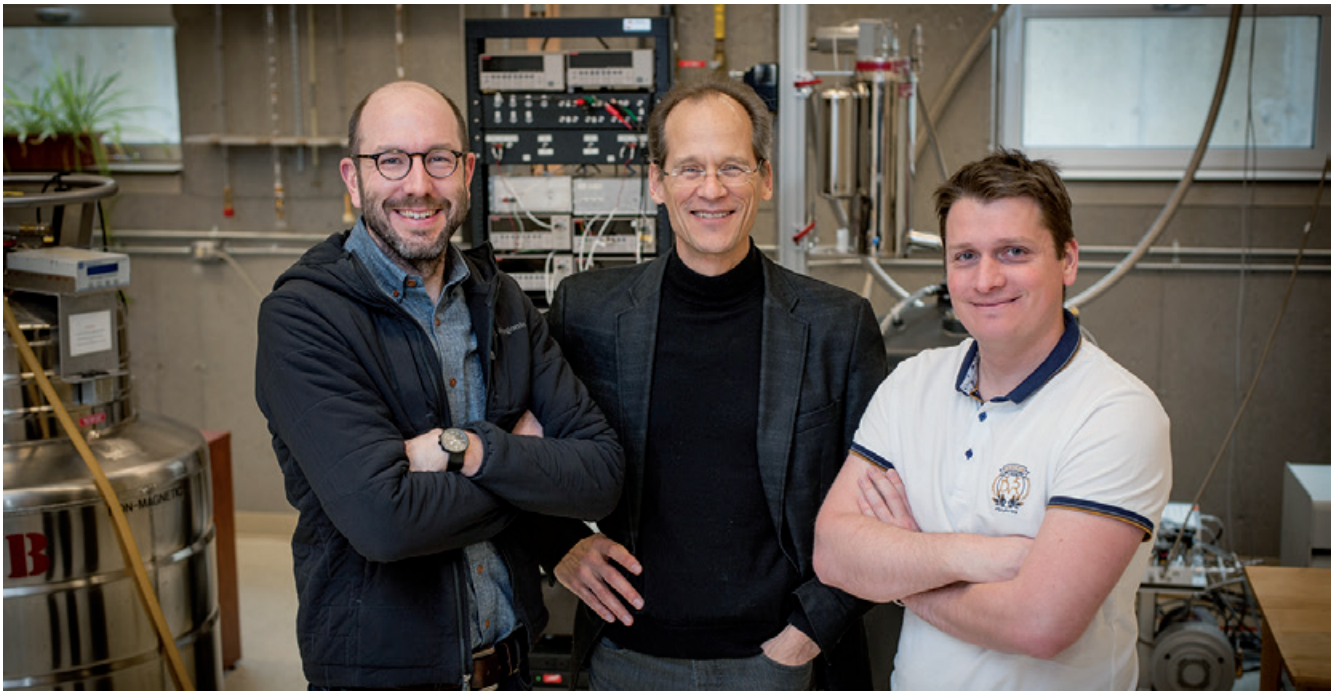


Louis Taillefer
Source: Michel Caron

Louis Taillefer, professor, physicist, and a member of Institut quantique, was the recipient of the 2017 Simon Memorial Prize. He is the first Canadian to be awarded this international distinction since its creation in 1957. The award was presented at the 28th International Low Temperature Physics Conference in Gothenburg, Sweden, which was held from August 9 to 16, 2017. The Institute of Physics (IOP) awards this prize every three years to recognize distinguished works in experimental or theoretical low-temperature physics. Professor Taillefer was chosen for his contributions in the field of unconventional superconductivity.

▪ Science and Technology

New Signature of the Pseudogap Phase, a Key in the Enigma of Superconductivity at High Temperatures



Physicists Nicolas Doiron-Leyraud, Louis Taillefer and Sven Badoux.
Source: Michel Caron

Physicists have identified the transition that could explain why copper oxides have such impressive superconducting behavior.

Settling a twenty-year-old debate in the field, the researchers discovered that a mysterious quantum phase transition, called «pseudogap», leads to a sharp decrease in the number of conductive electrons available for the pairing required for superconductivity. "It is very likely that this critical point explains why superconductivity manifests itself, and why it does so forcefully,» says Louis Taillefer. The results have been published in *Nature*.

Louis Taillefer has collaborated with his team and other members of the Canadian Institute for Advanced Research (CIFAR) including: Cyril Proust (Laboratoire National des Champs Magnétiques Intenses), Doug Bonn, Walter Hardy and Ruixing Liang (all three from the University of British Columbia). The study combined the University of British Columbia's expertise in cuprate synthesis with the Université of Sherbrooke expertise in terms of material characterization analysis and the skills of the Toulouse laboratory in producing powerful magnetic fields.

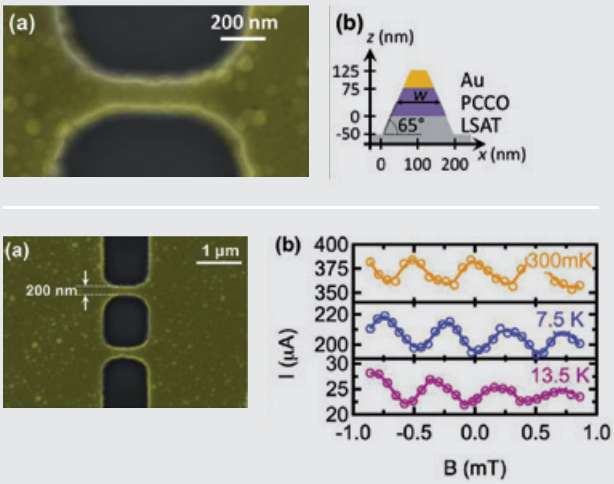
For more information:

S Badoux, W Tabis, F Laliberté, G Grissonnanche, B Vignolle, D Vignolles, J Béard, DA Bonn, WN hardy, R Liang, N Doiron-Leyraud, L Taillefer, C Proust, "Change of carrier density at the pseudogap critical point of a cuprate superconductor", *Nature* **531** (7593), 210-214.

IQ/Chalmers University collaboration leads to breakthrough in Josephson junctions device fabrication in $Pr_{1,85}Ce_{0,15}CuO_4$ superconducting thin films

Collaborators in Floriana Lombardi's group at Chalmers University, Sweden, used high-quality $Pr_{1,85}Ce_{0,15}CuO_4$ superconducting thin films, grown in IQ researcher Patrick Fournier's Laboratory for Advanced Epitaxy by Pulsed Laser Ablation, to fabricate narrow bridges acting as Josephson junctions. Such junctions were never obtained before with this family of superconductor as their physical properties are extremely sensitive to nanofabrication processes. The collaborators in Chalmers succeeded in fabricating sub-micron structures, with bridges as narrow as 100 nm. At these length scales, the bridges can act as Josephson junctions.

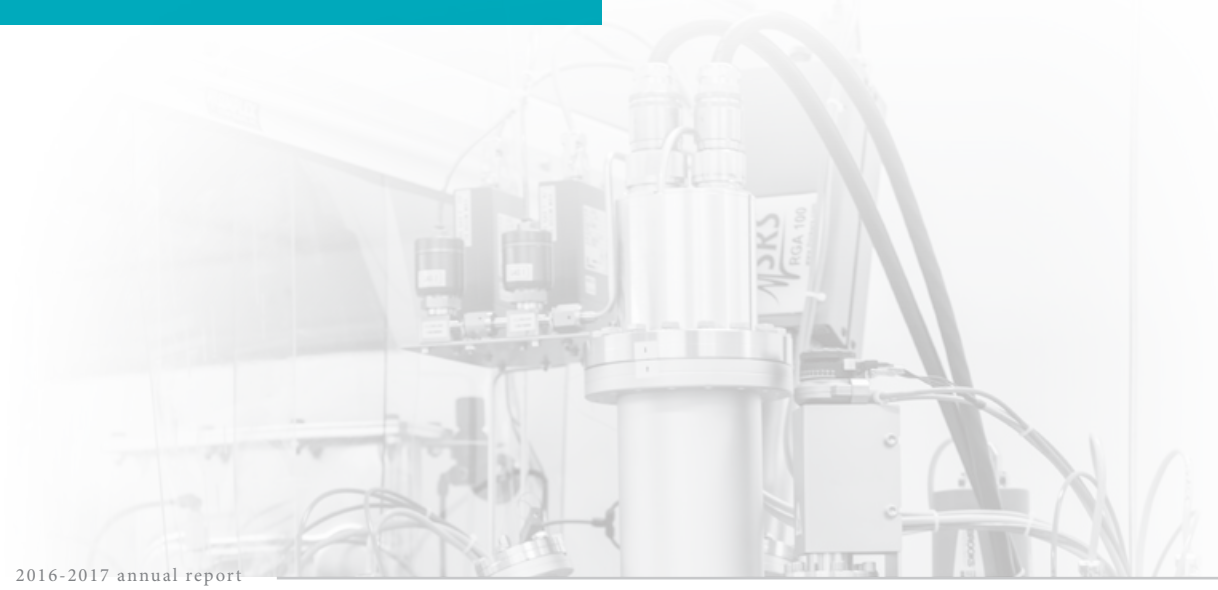
In this paper, it was demonstrated that hot spot formation in the nanobridges determines the critical current density, the limiting current it can carry without resistance. The switching effect occurring at large currents may be of interest for designing superconducting nanowire single-photon detectors. It was also shown that a geometry made of two parallel bridges between two separate electrodes, the so-called Dayem bridge, can act as a superconducting quantum interference device (SQUID) with periodic field oscillations of its critical current.



Upper panels: (a) SEM image of a $Pr_{1,85}Ce_{0,15}CuO_4$ superconducting nanobridge acting as a Josephson junction; (b) Schematics of the thin films geometry across the nanobridge. Lower panels: (a) SQUID in the Dayem bridge geometry; (b) Critical current oscillations as a function of an applied magnetic field.

For more information:

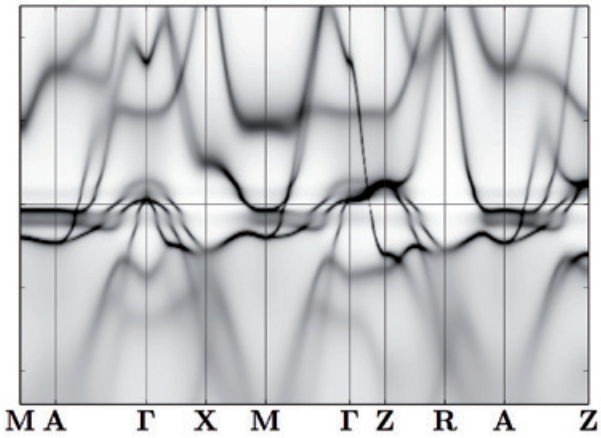
S. Charpentier, R. Arpaia, R. Baghdadi, T. Bauch, F. Lombardi, J. Gaudet, D. Matte, P. Fournier, T. Löfwander and D. Golubev, Hot spot formation in electron doped PCCO nanobridges, *Phys. Rev.* B **94**, 060503 (2016).



The most detailed calculation of superconductivity in iron-based superconductors

Superconductivity is a remarkable phenomenon. At a relatively low temperature, a material can become superconducting, that is, convey electrical current without resistance and exhibit quantum properties on a macroscopic scale. A material that becomes superconducting at room temperature would lead to revolutionary technologies. IQ is participating actively in this global effort by developing computing and mathematical tools designed to help achieve this goal.

Several mathematical and numerical methods are being developed around the world to give us the tools to predict, from first principles, whether a given material can become superconducting. Reza Nourafkan, an IQ research professional, in collaboration with Prof. Tremblay of Université de Sherbrooke and Prof. Gabriel Kotliar of Rutgers University, has completed the most detailed calculation to date in determining the superconductivity of iron-based superconducting materials. The type of superconductivity present in this material is subtle: superconductivity is usually caused by an effective attraction between electrons caused by the delayed effect of the vibrations of atoms around their equilibrium position. But materials that become superconducting at the highest temperatures (such as iron-based superconductors) are materials where there is a clear repulsion between the electrons, not an attraction. The presence of repulsion is made evident by the proximity of insulating states. The detailed and unprecedented agreement obtained with experiments suggests that we now have the tools to understand this class of materials.



Plot of the interacting electron states that enter the calculation for the iron-based superconductor LiFeAs. In the absence of interactions, the relation between energy, on the vertical axis, and momentum, on the horizontal axis, is unique, so this plot would contain only full lines. In the presence of interactions, at a given momentum there is a width in energy. The probability that an electron of a given momentum has a given energy is thus represented by the intensity of the grey scale.

For more information:

R Nourafkan, G Kotliar, AMS Tremblay, "Correlation-enhanced odd-parity inter-orbital singlet pairing in the iron-pnictide superconductor LiFeAs", *Physical Review Letters* **117** (13), 137001.

A new technology from IQ for a Quantum Random Number Generator

On January 18, 2017, Quantum Numbers Corp. (QNC) announced the official launch of QNG2, a next-generation solution for Quantum Random Number Generators (QRNG).

QNC's QNG2 is a cutting-edge QRNG based on quantum tunnelling, a purely quantum effect that guarantees complete randomness. The inventor of the technology is **IQ member, Pr Bertrand Reulet, Canada Excellence Research Chair in Quantum Signal Processing**. "This unique technology provides one of the highest potential security for electronic devices connected to the internet," states Pr Reulet.

This provides a source of absolute randomness, a key prerequisite for any encryption scheme to ensure reliable cyber security. It also has the capacity to deliver up to 1 Gbps of full-entropy random numbers and is small enough to be embedded in a microprocessor chip.

About QNC:

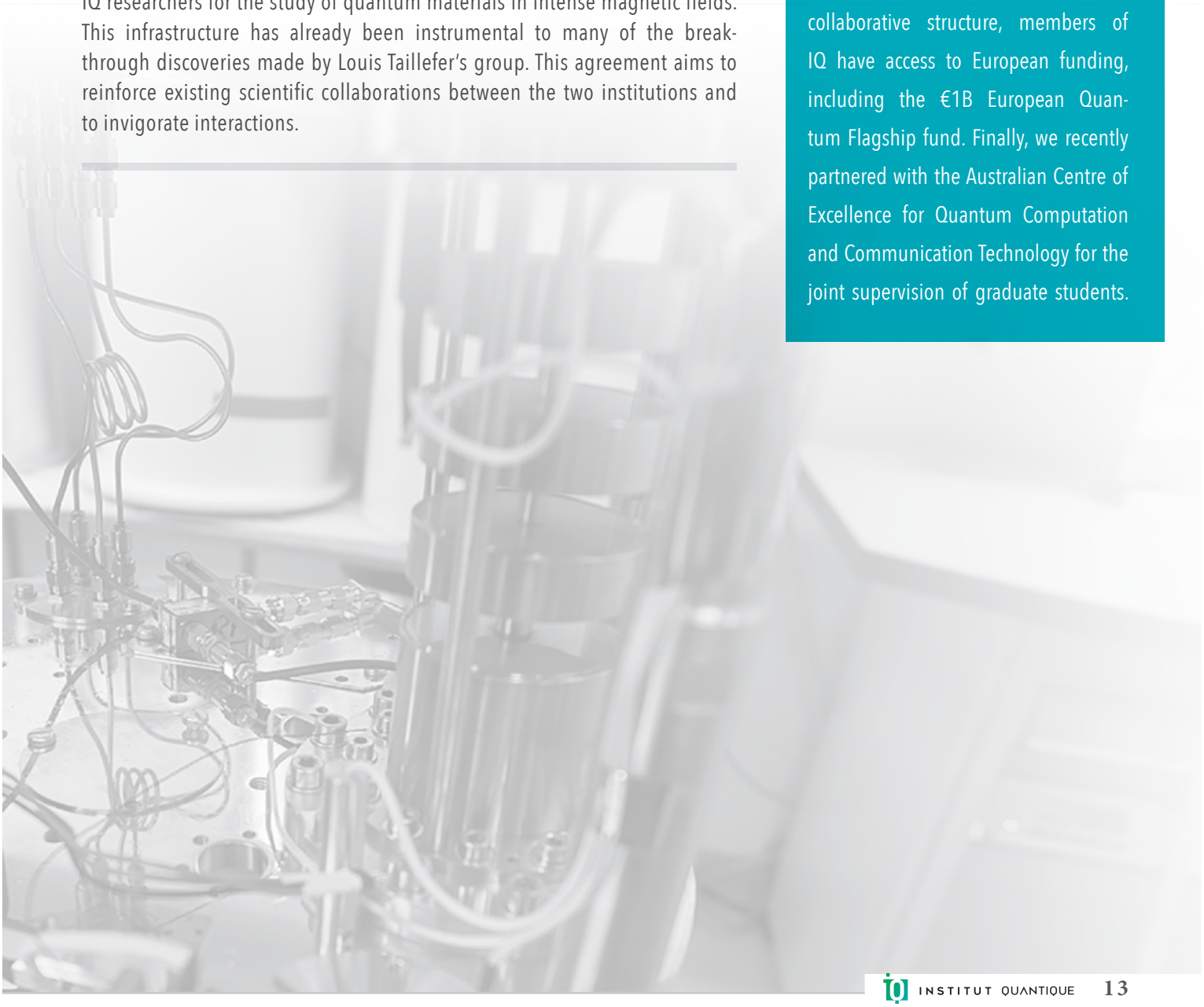
QNC, a publicly traded company (TSX VENTURE: QNC), is an innovative developer of cryptographic solutions based on Quantum Random Number Generators (QRNG). QNC's mission is to address the growing demand for affordable hardware security for connected devices.

Visit its web site at www.quantumnumberscorp.com.

▪ Collaborations and Partnerships

In June 2016, IQ partnered with CNRS and Université Paris-Sud for the creation of the joint International laboratory for quantum circuits and materials (LIA-LCMQ). This LIA builds on and strengthens existing collaborations between IQ researchers and French researchers such as Antoine Georges (Collège de France and École Polytechnique), Daniel Estève, (SPEC) and Cyril Proust (LNCMI Toulouse). For example, the infrastructure of the *Laboratoire national des Champs magnétiques intenses* (LNCMI) is used by IQ researchers for the study of quantum materials in intense magnetic fields. This infrastructure has already been instrumental to many of the breakthrough discoveries made by Louis Taillefer's group. This agreement aims to reinforce existing scientific collaborations between the two institutions and to invigorate interactions.

Some members of IQ are also part of the Unité mixte internationale – Laboratoire des Nanotechnologies & Nanosystèmes (UMI-LN2), the first international unit of the CNRS to be established bilaterally in North America. Thanks to this collaborative structure, members of IQ have access to European funding, including the €1B European Quantum Flagship fund. Finally, we recently partnered with the Australian Centre of Excellence for Quantum Computation and Communication Technology for the joint supervision of graduate students.



Inaugural Meeting of the International associated laboratory for quantum circuits and materials (LIA-LCMQ), October 27-29

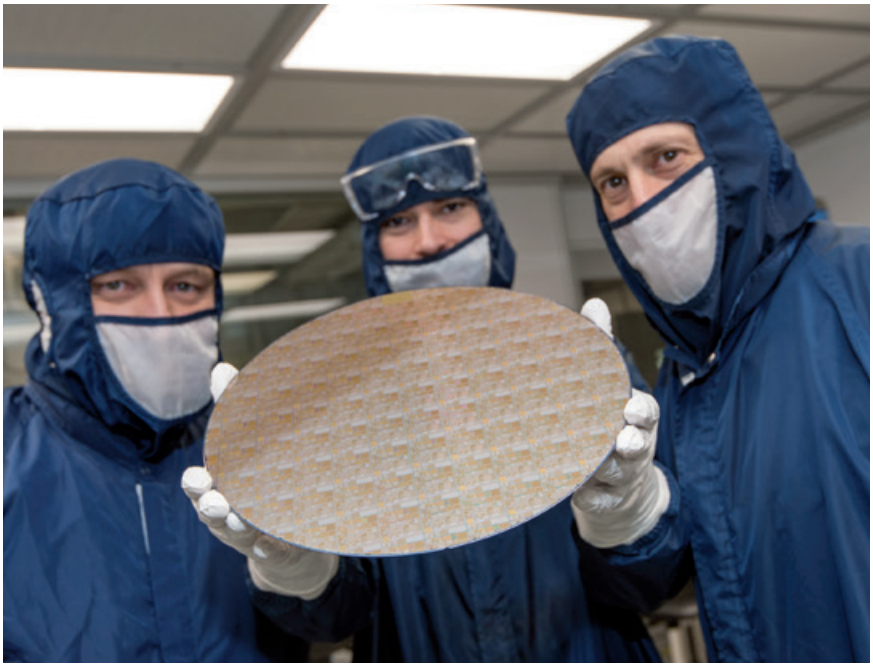
In October, more than 80 theoretical and experimental French and IQ researchers converged in Sherbrooke for the first workshop of the LIA-LCMQ. Bertrand Reulet and Cyril Proust, co-directors of the LIA-LCMQ, jointly launched the discussions of this inaugural workshop, which highlighted the state of the art in quantum materials and quantum circuits. A long history of collaboration among this unique group of researchers has led to breakthroughs, including the discovery in 2016 of a new signature of the pseudogap phase, a key to resolving the enigma of superconductivity at high temperatures.

"We have everything to gain by strengthening our collaborations, from the scientific point of view as well as sharing infrastructure and advanced experiments, access to large research facilities or the use of high-performance computing servers," states Cyril Proust. «I also think that the co-supervision of students will also be an undeniable asset of the LIA», he adds. The LIA-LMCQ is a platform for stimulating student exchanges, international training and the organization of workshops and summer schools."

LIA-LCMQ researchers and students.
Source: Bertrand Reulet

Academia-Industry Collaboration - Institut quantique Research Team Will Lead the Next Breakthrough in qubit Fabrication

Quantum bits based on single-electron spins, also known as spin qubits, are one of the most promising candidates for the development of a quantum computer. Experiments in several laboratories worldwide have shown that metal oxide semiconductor (MOS) based silicon quantum dots (QDs) have proven to be an excellent medium to achieve highly coherent and stable single spin qubits. Building on these successes, a team of physicists and electrical engineers at Institut quantique have invented and demonstrated a new concept called the "split accumulation gates." This invention has achieved ideal MOS quantum dots for qubit application.



IQ researchers, Michel Pioro-Ladrière, Étienne Grondin and Dominique Drouin with the first generation of quantum devices fabricated on the ST-production line.
Source : Michel Caron

A challenge in moving this novel approach towards large-scale multi-qubit devices is the need for high-yield, nanometer-scale MOS fabrication processes. Thanks to the joint laboratory established with the Centre National de la Recherche Scientifique – Unité Mixte Internationale – Laboratoire des Nanotechnologies & Nanosystèmes (LN2-CNRS UMI-3463) and STMicroelectronics, the IQ team overcame this hurdle thanks to access to UMI-LN2's partner proprietary FD-SOI technology. This facility promises to deliver outstanding qubit performance, based on its low parasitic capacitance and high conductivity metal gates, and on the extremely low electron leakage between the QDs and other components.

▪ Outreach and Training

Summer School on Numerical Methods for Quantum Materials (May 31-June 10, 2016)

Physicists from as far away as Australia, South Africa and South Korea gathered from May 31 to June 10 for a summer school organized by Institut quantique and the Physics Department of the Université de Sherbrooke.

More than 70 master-level and doctoral students as well as post-doctoral researchers were present to study, discuss, and practise advanced numerical methods used to investigate the properties of quantum materials. At this school, the students learn directly from internationally renowned researchers, about fifteen professors from Europe and United States, who have created the leading innovative calculation methods used today to understand the properties of quantum materials.

Professors, students at the Summer school on numerical methods for quantum materials.
Source: Phys. Dept.

Female physicists unite at Université de Sherbrooke

Female students in physics programs are still considerably outnumbered by male students, and the physics profession remains predominantly male. Women who study and work in physics are faced with situations and challenges unique to their gender.

To contribute to changing this situation, a group of female students from the Physics Department has formed the Université de Sherbrooke's Women in Physics Group. With support from IQ, group members discuss their experiences and career goals, while creating a network of contacts and support that includes women from all levels of academia.

At the group's first meeting, students shared ideas for projects and activities to increase the representation of women in physics both within the department and more broadly, promoting diversity within the sciences. The group is made up of young women studying at the undergraduate, graduate, doctoral and even postdoctoral levels.

Members of Université de Sherbrooke's Women in Physics Group (November 3, 2016).
Source: Université de Sherbrooke's Women in Physics Group

For more info, watch the videos produced by Université de Sherbrooke as part of the 2017 International Women's Day. www.usherbrooke.ca/iq/fr/accueil/nouvelles-de-linstitut/nouvelles-details/article/34268/

Quantum Physics for Engineers

In 2016, in an effort to spearhead an interfaculty initiative in quantum engineering, IQ launched a series of seminars titled "Quantum physics for engineers." This 12-hour long series of seminars helped to demystify quantum mechanics and build "quantum awareness" among engineering undergraduate and graduate students. This series of seminars was also well attended by engineering faculty members, providing them with an opportunity to learn how their own expertise may help solve some of the challenges in bringing quantum science to practical quantum technologies.

A concrete outcome of the quantum seminar series activities is the creation of a quantum mechanics graduate class for engineers [Quantum Mechanics for Engineers Course (GEI-777)] taught by IQ members Yves Bérubé-Lauzière and Julien Sylvestre of the Faculty of Engineering. This class was followed in the spring of 2017 by a first cohort of 9 graduate students. These are encouraging steps towards IQ's objective of building a fully-fledged quantum engineering program.

David Poulin and Alexandre Blais

For more information:

www.usherbrooke.ca/fiches-cours/gei777

Outreach Workshop – Quantum Information Science for College Teachers

In June 2016, the Institut transdisciplinaire d'Information quantique (INTRIQ) and IQ organized a one-day outreach workshop focused on CEGEP (college) teachers. The event was a tremendous success, attracting 61 participants from 23 CEGEP. This day-long activity included one-hour tutorials on the basics of quantum mechanics and quantum information processing. This was followed by a tour of the laboratories at IQ and round-table discussions on the challenges of and opportunities for quantum information science teaching and outreach at the college level.

College teachers participating in the Quantum Information Science for College teachers Workshop.
Source: INTRIQ

IQ Grand Conferences – Gilles Brassard – August 31, 2016

Gilles Brassard

On August 31, 2016, IQ had the honour of welcoming Professor Gilles Brassard, CRC Chairholder at Université de Montréal and father of quantum computing research in Canada and one of its pioneers worldwide.

His conference was titled "La cryptographie dans un monde quantique" and was open to the Sherbrooke scientific community as a whole. No prior knowledge in cryptography or quantum physics was necessary to attend. More than 80 people were present to witness an account of the history of cryptography, from the prehistoric age to Shannon's approach in information theory in the mid-twentieth century to the invention of quantum cryptography by Brassard and his colleague Charles Bennett in the 1980s.

In 2016, following a call for candidates and a thorough examination of more than 70 applicants, we welcomed three new IQ-sponsored postdoctoral fellows.

IQ Postdoctoral Fellowships Program

IQ postdoc Arash Akbari-Sharbaf.
Source: Karine Couillard Photographe

Arash Akbari-Sharbaf

Arash chose IQ for his postdoc for "the high quality of experimental and theoretical research being conducted at Institut quantique, coupled with well-equipped laboratories, gives me a unique opportunity to develop my research skills as both an experimentalist and a theorist." When asked about the region of Sherbrooke, he said that "people go out of their way to help you fit in."

Interested in particle physics at first, he eventually chose quantum magnetism as his field of research because of his interest in the fundamental magnetic properties of materials and the importance of this field in the development of new technologies. Arash's research at IQ involves material characterization of quantum spin liquid candidates using local magnetic probe techniques, including muon spin relaxation (MuSR), nuclear magnetic resonance (NMR), and electron spin resonance (ESR). In conjunction with experimental investigations, he is also working on building the theoretical framework for modelling magnetic fluctuations in geometrically frustrated pyrochlore oxides."

IQ postdoc Pedro Leopoldo e Silva Lopes.

Pedro Leopoldo e Silva Lopes

The Brazilian researcher Pedro Leopoldo e Silva Lopes chose Institut quantique for two main reasons: "I heard about the excellent quality of research conducted in Sherbrooke thanks to the reputation of its professors and I had a lot of interests in common with Professor Ion Garate." The 29-year-old physicist is currently doing his first postdoctoral training at IQ.

Pedro's field of expertise is partway between particle physics and quantum materials, applied to topological matter: "I started working on graphene and received a scholarship to study abroad, at the University of Illinois at Urbana-Champaign. Afterwards, it was natural for me to turn my attention to *topological materials*. In these fields of research, some knowledge of particle physics can be useful."

Culturally speaking, "it was an adventure integrating into a French-speaking community. Quebec is beyond my expectations, especially in terms of how open-minded the people are."

Udson Cabral Mendes

When asked about the reasons of his coming to Institut quantique, Udson puts forward the people, especially Professors Alexandre Blais, Bertrand Reulet, and Michel Pioro-Ladrière: "These experts in their respective fields of research were a great incentive to come to Sherbrooke," he acknowledges. For his postdoc, Udson Cabral Mendes made the bold move of reorienting his research interests towards the interface of mesoscopic physics and quantum optics, both promising fields for building a quantum computer. "The idea of quantum computing is something that has always fascinated me," he readily admits.

IQ postdoc Udson Cabral-Mendes.
Source: Karine Couillard Photographe

In his research activities with Professor Blais, Udson is focusing on the field known as circuit quantum electrodynamics. His current project revolves around realizing the theoretical equivalent of a magnetic chain of atoms with a chain of electrical circuits. There is strong interest in this kind of system given the fact that it contains all the necessary ingredients for the creation of robust Majorana excitations at its extremities. These physical objects, once produced and cleverly manipulated, hold the key to manufacturing topological qubits, very promising building blocks for a future quantum computer. In parallel with his theoretical work, Udson is also actively working with Professor Reulet to generate efficient sources of squeezed microwave radiation."

▪ IQ by the Numbers

April 1, 2016 to March 31, 2017

24 Faculty Members

108 Graduate Students

27 Postdocs

17 Research Staff

27 Visitors

105 Publications

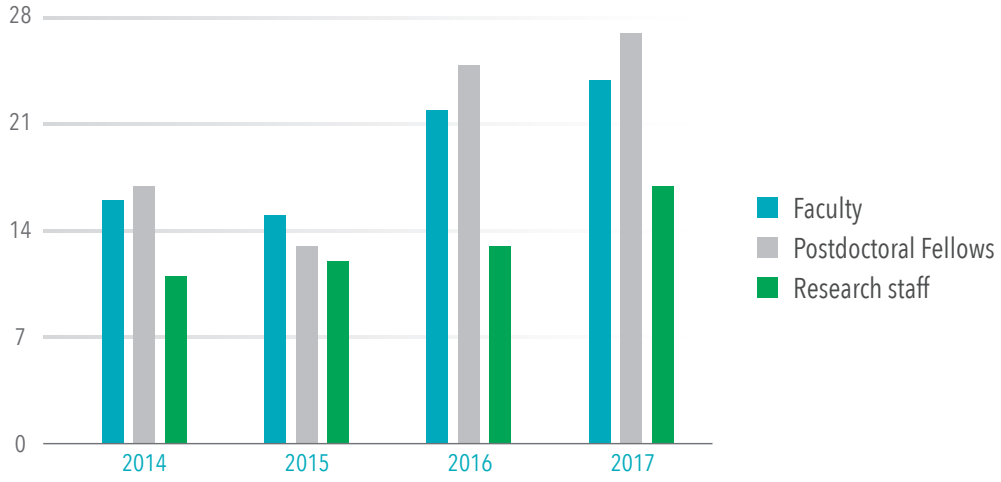
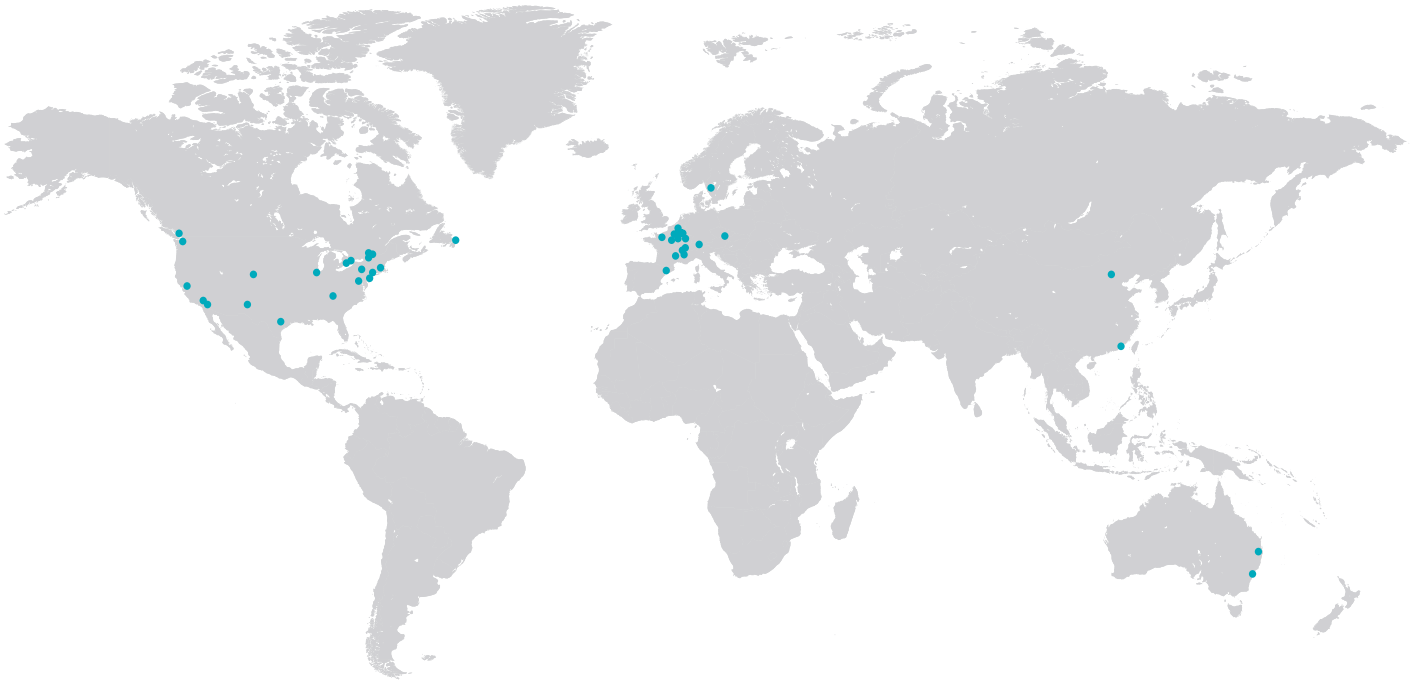


Figure 17. Faculty, Research Staff & Postdoctoral Fellows.

▪ Visitors at IQ



Andreas Ask, Chalmers University of Technology, Suède
Thomas Baker, UC Irvine, CA, É.-U.
Mark Boulay, Carleton, É.-U.
Gilles Brassard, Université de Montréal, Canada
Sergey Bravyi, IBM/T.J. Watson Research Center, É.-U.
Malcolm S. Carroll, Sandia National Laboratory, É.-U.
Christopher Chamberland, University of Waterloo, Canada
Christophe Chaubet, Université Coulomb, Montpellier, France
Andre Dankert, Chalmers University of Technology, Suède
Hillary Dawkins, University of Waterloo, Canada
Damian Draxler, University of Vienna, Autriche
Nicolas Dupuis, LPTMC/UPMC, France
Stephen Edkins, Cornell University, É.-U.
Gwendal Feve, ENS Paris, France
Greg Fiete, University of Texas, É.-U.
Herbert Fotso, Ames National Lab, University at Albany, É.-U.
Raymond Frésard, Université de Caen, France
Julien Gabelli, CNRS – Orsay, France
Giorgio Gratta, Stanford, É.-U.
Kamel Haddadi, IEMN/CNRS/U. Lille, France
Loïc Herviou, École Polytechnique de Paris, France
Christoph Hirche, University of Barcelona, Espagne
Max Hofheinz, INAC/CEA Grenoble, France
Phillipe Joyez, CEA-Saclay, France
John King Gamble, Sandia National Laboratory, É.-U.
Aleksander Kubica, Microsoft, É.-U.
James P.F. Leblanc, Memorial University of Newfoundland, Canada
Ross Leon, University of South Wales, Australie
Yunlong Lian, LSP – Orsay, France
Yehua Liu, ETH Zürich, Suisse
Xiacong Lu, Xiamen University, Chine
Adina Luican-Mayer, Université d'Ottawa, Canada
Pierre Massat, Université Paris-Diderot, France
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▪ Awards

International Awards

Simon Memorial Prize

Louis Taillefer

National Awards

NSERC Canada Graduate Scholarships – Master's program

Charles-David Hébert
Mathieu Lachapelle
Jessica Lemieux
Maude Lizaire
Lucas St-Jean

NSERC Graduate Scholarhips – Doctoral program

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Baptiste Royer

NSERC Undergraduate Student Research Awards

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Provincial Awards

FRQNT Doctoral Scolarships

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Sophie Rochette
Karl Thibault
Simon Verret

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Sven Badoux

Université de Sherbrooke Awards

Fondation - Pierre-Breton Award for Entrepreneurial Endeavour in Sciences

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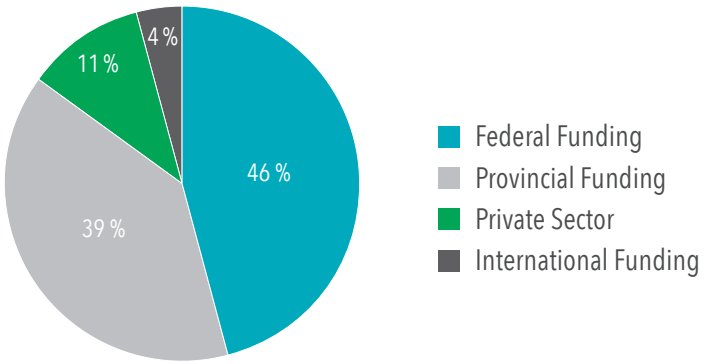
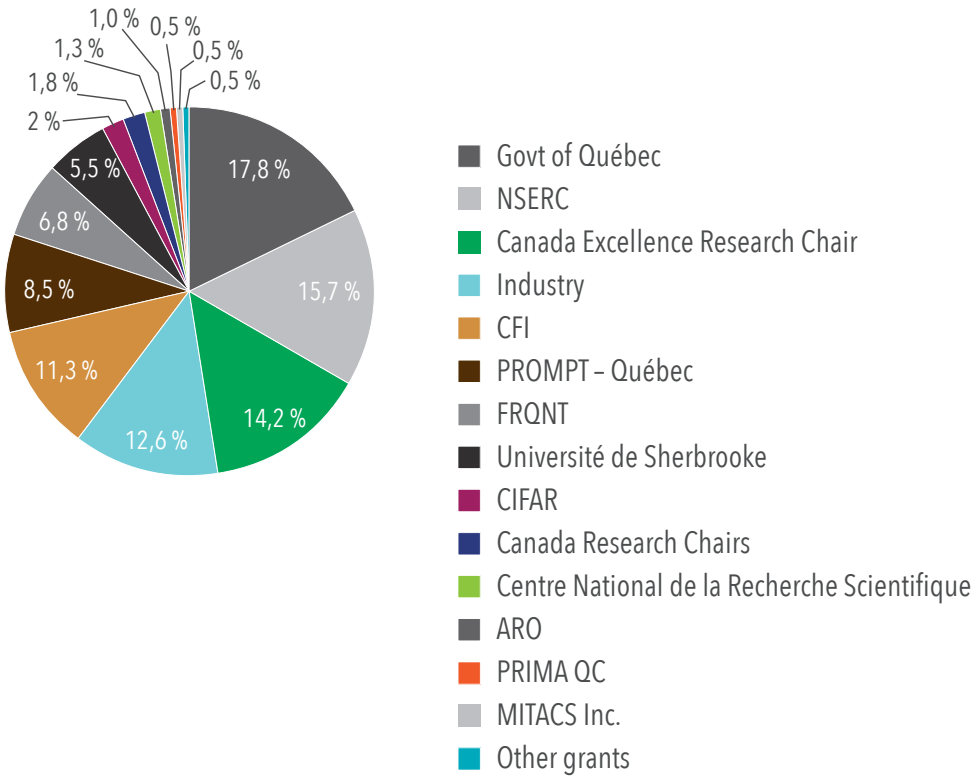
▪ Finances



Research Grants and contracts (unaudited) Total Revenue: $11.2M (excluding CFREF)



Research grants and contracts (unaudited) (By Funding Agency) Total Revenue : $11.2M (excluding CFREF funding)

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