IQC Institute for Quantum Computing www.iqc.ca
University of Waterloo

ISSUE 12
SUMMER
2009

THE INSTITUTE FOR QUANTUM COMPUTING

NewBit

SUMMER CONFERENCES BRING VISITORS TO IQC

Over the summer, IQC welcomed academics and students from around the world to four conferences covering different aspects of quantum information processing.

In May, IQC played host to the 4th Workshop on Theory of Quantum Computation, Communication, and Cryptography (TQC 2009) – the first time this workshop had been held outside Japan. TQC 2009 focused on theoretical aspects of Quantum Information Processing. With over 100 in attendance, participants came from Africa, Asia, Australia, Europe and North and South America.

In addition to the invited talks, a rump session and poster session gave the participants the opportunity to informally present a short summary of recent research developments. The participants also had the chance to interact during the breaks and on-site lunches, as well as during a reception at the Perimeter Institute (PI) and during the banquet at the University Club.

Eleven talented undergraduate students from North America, Europe, Singapore and Israel came to IQC for two weeks in June for the first Undergraduate School

in Experimental Quantum Information Processing (USEQIP). Students heard lectures on the theory of QI from IQC's faculty, postdoctoral fellows and visiting scholar Dr. Tony Leggett, and had some hands-on experience in IQC's labs.

The Quantum Cryptography School for Young Students drew an even younger crowd, bringing together 18 high school students for a week-long introduction to the principles behind quantum cryptography. Students heard lectures from IQC and PI members and took a tour of PI.

Finally, in August, IQC joined forces with the Fields Institute for Mathematical Research to put on a workshop titled "Mathematics in Experimental Quantum Information Processing." This week-long workshop brought together mathematicians and experimental quantum information researchers with the intent of encouraging academic collaborations.

IQC would like to thank everyone who made these events possible, including our co-sponsors, organizing committees, participants, and IQC event co-ordinator Kim Kuntz.

LAZARIDIS DONATIONS TOP $100 MILLION

Mike and Ophelia Lazaridis' donations to IQC have topped $100 million.

In June, the University of Waterloo announced that the RIM president and his wife had made a further $25-million commitment to the institute. This new gift raises their total donation to IQC to $101 million.

"This extraordinarily generous gift reflects Mike and Ophelia's passion for fundamental research and it gives increased exposure to quantum computing around the world," said University of Waterloo president David Johnston. "Their generosity has helped launch IQC into the forefront of quantum information processing research, making Waterloo one of the world's premier destinations in the field."

Previously, Mike and Ophelia Lazaridis gave $76 million to support the development of the IQC, including a major share for construction of the Quantum-Nano Centre, a distinguished research chair in quantum computing, and international graduate fellowships. This gift was key in obtaining $100 million – $50 million each from the federal government and the Ontario government, toward the $160-million Quantum-Nano Centre and the IQC.

Continued on page 2..

ACHIEVEMENTS

Visitors

IQC is honoured to have hosted these distinguished guests during the summer term:

- Vishal Sahni – Dayalbagh Educational Institute
- Chunqing Deng
- Jeremie Roland – NEC Labs
- Graeme Smith – IBM TJ Watson Research Centre
- Marcos Curty – University of Vigo
- Masato Koashi – Osaka University
- Eric Brown
- Yun-Pil Shim – Institute for Microstructural Sciences, National Research Council of Canada
- Ian Town – University of Canterbury
- Miklos Santha – CNRS-LRI, National University of Singapore
- John Preskill – Caltech
- Stephanie Wehner – Caltech
- Earl T. Campbell – University College London
- Abuzer Yakaryilmaz – Bogazici University
- Anthony Leggett – University of Illinois at Urbana-Champaign
- Dervis Can Vural – University of Illinois at Urbana-Champaign
- Mao-Chuang Yeh – University of Illinois at Urbana-Champaign
- Jitong Yu – University of Illinois at Urbana-Champaign
- Alain Tapp – Université de Montréal
- Jim Rabeau – Macquarie University
- Shengyu Zhang – Chinese University of Hong Kong
- Harry Buhrman – University of Amsterdam
- Avinatan Hassidim – Hebrew University
- Jan Fischer – University of Basel
- Konrad Lehnert – JILA/NIST
- Fei Yan – MIT
- Atul Asthana – RIM
- Matthew Cheriyan – Industry Canada
- Richard Kolacz – COM DEV
- Ian D'Souza – COM DEV
- Pieter DeGroot – Delft University
- Jun Yin – University of Oregon
- Jeff Lundeen – NRC
- Cheng Chin – University of Chicago

LAZARIDIS DONATIONS TOP $100 MILLION

...Continued from Page 1

"We are excited to add support to what is becoming the epicentre of quantum research and experimentation," said Mike Lazaridis. "Our investment in fundamental research at the Institute of Quantum Computing will help researchers tackle some of today's most challenging problems and seed some of tomorrow's biggest innovations."

With this donation, the Lazaridis' join a select group of philanthropists who have given more than $100 million in support of higher education in Canada.

LEGGETT LECTURES

Nobel laureate Sir Anthony Leggett conducted h annual summer lecture series during his visit to IQC fro May 17 to July 16. Sir Leggett is an associate memb and scientific advisor of IQC, based at the University Illinois Urbana-Champaign.

This year's public lecture series, entitled "Physics Topological Quantum Computing: Selected Topic included reviews of material covered in past series, a introduced new topics such as the meaning of "tw dimensional" and the consequences of its partial failu and the nature of Majorana fermions and their relati to ground state entanglement.

HIGHEST DISCOVERY GRANT AWARDED TO IQC FACULTY MEMBER

IQC faculty member Dr. Adrian Lupaşcu has received the highest NSERC Discovery Grant ever presented to a newcomer. Lupaşcu's research program, "Scalable quantum computing with superconducting circuits" will address the development of practical tools for controlling and reading-out the state of a few qubits, based on frequency multiplexing.

"These tools will be used for the generation of entangled states and for the study of decoherence in a many-qubit system," explains Lupaşcu. "In another direction of research, the potential of microwave photons for quantum information processing will be investigated Receiving a total of $67,700 this funding will be us primarily for supporting two graduate students and t postdoctoral fellows under Dr. Lupaşcu's supervision. Dr. Lupaşcu joined the IQC faculty in March and is cro appointed as an Associate Professor in the Phys department at the University of Waterloo.

The Honourable Gary Goodyear, Minister of St for Science and Technology, announced the gr recipients at UW in April.

The NSERC Discovery Grants Program supports ongoi programs of research with long-term goals. Th recognize the creativity and innovation that are at t heart of all research advances.

For more information, please visit the Natural Scien and Engineering Research Council of Canada on t web at http://www.nserc-crsng.gc.ca.

EARLY RESEARCHER AWARD FOR NEW INTERFEROMETRY TECHNIQU

IQC faculty member Dr. Kevin Resch has received an Early Researcher Award from the Government of Ontario Ministry of Research and Innovation to continue his work on chirped-pulse interferometry.

Dr. Resch and his team recently developed a technique for laser-based interferometry that obtains the advantages of quantum interferometry, without the technological complexity. The original results were featured on the cover of Nature Physics in November 2008. This technique could be applied in next generation optical coherence tomography, a technic used to noninvasively image biological tissue disease detection.

As lead researcher on this project, he will rece $140,000 from the ERA, which will benefit three researchers.

Minister of Research and Innovation John Mi announced the award recipients on August 17 McMaster University in Hamilton.

MORE CONFERENCE PHOTOS...

USEQIP participants Helen and Dylan work on polarization and interference in the Quantum Optics lab.

TQC 2009 participants pose for a group shot outside of RAC.

AWARD-WINNING PEOPLE

VANIER GRADUATE SCHOLARSHIP WINNER – GINA PASSANTE

Ph.D. student, Gina Passante was recently awarded one of the inaugural Vanier Graduate Scholarships by the Natural Sciences and Engineering Council of Canada. Valued at $50,000 per year, for up to three years, it is perhaps NSERC's most prestigious award for doctoral students.

The title of Gina's research proposal was "Quantum discord and its effect on quantum computation."

"The recipients of these scholarships are the world's leading doctoral students and the next generation of researchers, professors and industry leaders who will make considerable economic and social contributions in Canada and abroad. As evidenced through this program, Canada is a magnet for top intellectual talent and a global centre of excellence in university education and research," said Gary Goodyear, Minister of State (science and technology), who announced the 166 recipients at a ceremony held in Ottawa.

Launched by the Government of Canada, the Vanier Canada Graduate Scholarships (CGS) program aims to attract and retain world-class doctoral students by supporting students who demonstrate a high standard of scholarly achievement in graduate studies in the social sciences and humanities, natural sciences and engineering, and health; as well as leadership skills.

For more information, please visit: www.vanier.gc.ca

NEW CIFAR JUNIOR FELLOW – DR. JAY GAMBETTA

Dr. Jay Gambetta, an IQC postdoctoral fellow, was recently accepted into the Canadian Institute for Advanced Research (CIFAR) Junior Fellow Academy in the Quantum Information Processing program.

As a Junior Fellow, Jay will receive the rare opportunity to collaborate with some of the top researchers in his field and be able to connect and exchange ideas with peers throughout the program and receive valuable career mentorship along the way.

The Junior Fellow Academy is a new initiative that was created as the result of a strategic commitment to build capacity in new generations of gifted young researchers in Canada and around the world. Currently, the academy has 19 Junior Fellows, with two in the QIP program.

More information about the Junior Fellow Academy can be found at www.cifar.ca.

AWARDS & SCHOLARSHIPS

Congratulations go out to the following IQC members, who received awards and scholarships this summer:

Anne Broadbent
NSERC Doctoral Prize

Ben Criger
NSERC Canada Graduate Scholarship (Master's)

Behnood Ghamsari
Mike & Ophelia Lazaridis Award

Robin Kothari
NSERC Canada Graduate Scholarship (Master's)

Jonathan Lavoie
NSERC Alexander Graham Bell Doctoral Canada Graduate Scholarship

Yingkai Ouyang
Mike & Ophelia Lazaridis Award

Farzad Qassemi
Mike & Ophelia Lazaridis Award

Bill Rosgen
Bell Family Fund

Lana Sheridan
Mike & Ophelia Lazaridis Award

Jamie Sikora
NSERC Postgraduate Scholarship (Doctoral)

Jamie Smith
NSERC Postgraduate Scholarship (Doctoral)

PAUL CORKUM HONOURED

IQC board member Dr. Paul Corkum has been awarded the 2009 Premier's Discovery Award for Natural Sciences and Engineering.

Dr. Corkum, who works at the National Research Council and the University of Ottawa, is a pioneer of attosecond science, a field that deals with time in quintillionths of seconds. His development of the attosecond laser pulse allowed him to capture the first picture of an electron orbiting a molecule.

Premier's Discovery Awards honour five top researchers each year. Nominees are evaluated on the value of their contributions to Ontario's society and economy, as well as international recognition for their work.

WINNING POSTER

IQC Master's candidate Kurt Schreiter was a winner at the Guelph Wellington Physics Institute's 2009 poster session with his entry "Using Entangled Photons."

The session was held July 13 in Rozanski Hall at the University of Guelph.

Congratulations to Kurt!

Visitors

- Fernando Brandao – Imperial College, UK
- Jason Soo Hoo – Siena College
- Steven Van Enk – University of Oregon
- Volkher Scholz – Institut für Theoretische Physik Leibniz Universität Hannover
- Stuart Tessmer – Michigan State University
- Jonathan Friedman – Amherst College, Merrill Science Centre
- Ben Lanyon
- Tony Cubitt – University of Bristol
- Patrick Smutek – Plassys
- Stephanie Simmons – St. John's College, Oxford
- John Morton – St. John's College, Oxford
- Chelsea Schmaltz – University of Waterloo
- Martin Laforest – TU Delft
- Yi-Kai Liu – Caltech
- Daniel Burgarth – Imperial College
- Stephen Fenner
- Terry Rudolph – Imperial College
- Alessandro Cosentino
- Louise Kauffman – University of Illinois at Chicago
- Alexei Gilchrist – QISS
- Andrew White – University of Queensland
- Stephen Hughes – Queen's University
- John Martinis – University of California
- Miles Blencowe – Dartmouth College
- Sylvie Renaud – Industry Canada
- Oliver Gagnon – CFI
- EinsteinPlus participants – Perimeter Institute
- International Summer School for Young Physicists participants – Perimeter Institute

BUILDING FOR THE FUTURE

Speakers

May 4 – Graeme Smith "Communication in a quantum context: what would Shannon do?"
May 8 – Yun-Pil Shim "Electronic, spin, and transport properties of a triple quantum dot molecule"
May 14 – Miklos Santha "On the power of a unique quantum witness"
May 29 – Matthew McKague "Simulating quantum systems using real Hilbert spaces"
May 29 – Jan Fischer "Spin decoherence in heavy-hole quantum dots"
June 1 – Konrad Lehnert "Microwave cavity optomechanics: Measuring and cooling the motion of nanomechanical oscillators with microwave 'light'"
June 2 – Shengyu Zhang "Composition theorems in communication complexity"
June 8 – David DeMille "Polar molecules as quantum tools"
June 15 – Will Matthews "Distinguishing two states with restricted measurements: data hiding and designs"
June 22 – Cheng Chin "Formation of Mott-insulating domains and general quantum simulation based on ultracold atoms in optical lattices"
July 6 – Tsuyoshi Ito "Oracularization and Two-Prover One-Round Interactive Proofs against Nonlocal Strategies"
July 13 – Michael Wolf "Measurements incompatible in quantum theory cannot be measured jointly in any other no-signaling theory
July 14 – Fernando Brandao "The complexity of poly-gapped Hamiltonians: Extending Valiant-Vazirani theorem to the probabilistic and quantum settings"
July 16 – Stuart Tessmer "Probing the quantum levels of individual semiconductor dopants"
July 20 – Jonathan Friedman "Relaxation and tunneling in single-molecule magnets"
July 23 – William Rosgen "Distinguishability of quantum channels"
July 24 – Toby Cubitt "Superactivation of the zero-error capacity of quantum Channels"
July 27 – John Morton "Solid state nuclear memory: or why I learnt to stop worry about decoherence and love nuclear spins"
August 17 – Louis H. Kauffman "Topological quantum information theory"
August 24 – Stephen Hughes "Chip-based cavity-QED using semiconductor photonic crystals"
August 27 – John Martinis "Schrodinger's Cat – The Movie"
August 31 – Miles Blencowe "Mechanical systems towards the quantum regime"

IN SEARCH OF EXCELLENCE

IQC has advanced to the final nomination process for a prestigious program designed to improve Canadian research capacity.

The Canada Excellence Research Chair (CERC) program will create 20 chairs in a diverse selection of research programs across the country. Each chair will receive funding of $10 million over seven years.

IQC's search is focused on an outstanding experimentalist with exceptional research accomplishments in the field of quantum information. The position will be joint between IQC and one of the departments in the Faculties of Science, Engineering or Mathematics.

As stated by the federal government, "The creation of a Chair in Experimental Quantum Information Processing would lead to the development of the first generation of quantum-enabled devices and practical quantum cryptographic technologies. It would also cement Canada's long-term research leadership in quantum information processing, and would provide training for the first generation of highly-qualified quantum-enabled experts, allowing Canada to realize the enormous benefits inherent in this new technology."

You can find out more at www.cerc.gc.ca.

LAFLAMME DISCUSSES PHILANTHROPY

University of Waterloo president David Johnston recently interviewed Dr. Raymond Laflamme about the generosity of IQC's donors.

Check out the video at www.iqc.ca/media.

IQC UNDER CONSTRUCTION!

Construction wrapped up on the RAC clean room in July. The facility was inspected late that month and easily passed certification.

The first piece of equipment intended for the new space – an electron beam lithography system – has been delivered and is waiting for installation. It should be operational and ready for use by the end of October. More equipment will be arriving throughout the fall and winter, with everything in place and operating by the end of March 2010.

In other clean room news, IQC will be welcoming a new technical staff member this fall. Brian Goddard is a senior fabrication equipment technologist, who will be responsible for equipment maintenance in the facility.

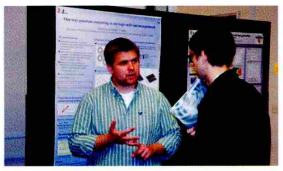
We've seen some new activity in the field behind RAC – construction on RAC2 is now underway. The building should be completed by the middle of next year.

Construction continues on the main campus as well. Walls are starting to go up at the Quantum Nano Centre site and completion is projected for February 2012.

NETWORKING WITH QUANTUMWORKS

QuantumWorks, Canada's national research network in quantum information processing, held its 4th Annual General Meeting and Technical Conference in June in Toronto.

Approximately 100 attendees participated in the two-day event, which consisted of presentations of research results from within the network; overviews on quantum information processing activities in Europe, including an ETSI standardization effort and QuantumWorks' role in that effort; poster sessions; and preliminary discussions on what directions Canada's next-generation quantum information network should prioritize.



The event also featured presentations by the Associate Vice-President of the federal National Centres of Excellence program and the Assistant Deputy Minister of Ontario's Ministry of Research and Innovation.

– Sean Collins, Network Manager

SO LONG AND WELCOME

POSTDOCS, STUDENTS AND STAFF MOVING IN, MOVING ON AND MOVING UP

Hannes Hübel
Postdoctoral Researcher

Hannes Hübel studied physics at Queen Mary, University of London, and received his MSci degree in 2000. In his PhD thesis, conducted at the same institution, he dealt with the effects of solvent interactions in high pressure experiments on semiconductors and biological samples.

Before joining the IQC, He joined the Quantum Cryptography group of the University of Vienna in 2004 where he was working on entanglement based QKD in optical fibers. Before joining the IQC, he led the Quantum Cryptography group in 2008 and 2009, demonstrating an automated and portable entanglement-based QKD prototype.

His fields of interest are quantum communication using telecom photons (1550nm) and the miniaturization of entangled-photon sources.

Yipu Song
Postdoctoral Researcher

Yipu obtained his Ph.D in Physics from Peking University in 2005. In the course of Ph.D study in the electron microscopy laboratory, he was trained on material characterization and nanofabrication. His research focused on nanoelectronics based on semiconductor nanowires.

He continued his academic career as a postdoctoral researcher at University of Wisconsin-Madison, where he worked on spintronics nanodevices. He then moved to Michigan State University in July 2007, working as a research associate on experimental approaches to an acceptor-based quantum computer.

Tsuyoshi Ito
Postdoctoral Researcher

Tsuyoshi Ito received his Ph.D. in Information Science and Technology under the supervision of Hiroshi Imai at the department of Computer Science, the University of Tokyo in March 2007. His dissertation was entitled "Bell inequalities and the cut polytope: Bridging quantum information science and combinatorial optimization."

He was a postdoctoral fellow at the National Institute of Informatics, Tokyo, in 2007–2008 and at McGill University in 2008–2009. His fields of interest are computational complexity and quantum nonlocality, especially interactive proof systems in the quantum world and the combinatorial structure of Bell inequalities.

Will Matthews
Postdoctoral Researcher

William Matthews received an MSci in Physics from the University of Cambridge in 2004. In 2009, he completed a PhD under the supervision of Andreas Winter at the Mathematics department of the University of Bristol.

He is interested in quantum information, especially in connection to non-local effects in quantum mechanics.

NEW STUDENTS

Graduate Students:

Troy Borneman
Pierre-Luc Dallaire-Demers
Chunqing Deng
Botan Khani
Amir Jafari Salim
Evan Meyer-Scott
Jason Soo Hoo

Research Assistants:

Ruban Romero Alvarez
Amira Eltony
Dorian Gangloff
Yan Fei
Chantal Hutchison
Maxim Mitchell
Daniel Park
Ranmal Perera
David Pitkanen
Thiru Sivakumaran
Xiaodi Wu

FRESH FACES ON STAFF

Monica Dey
Administrative Coordinator

Monica has several years of experience providing administrative support at the University of Waterloo. Currently, she is working on IQC's graduate program. She recently completed her B.A. in Economics.

Matt Cooper
Client Support Specialist

After owning and operating a successful computer business for 5 years, Matt came to IQC as client support specialist. Matt provides, configures and troubleshoots hardware and software for IQC members.

Departures

We bid farewell to members who are leaving us for now, and wish them the best of luck in their future endeavours.

- Aleksandrs Belovs
  Graduate Student
- Niel deBeaudrap
  Graduate Student
- Matthias Heid
  Graduate Student
- Meghan Huras
  Communications and Media Assistant
- Chandrashekar Madaiah
  Graduate Student
- Brendan Osberg
  Graduate Student
- Bill Rosgen
  Graduate Student
- Simone Severini
  Postdoctoral Fellow
- Matt Volpini
  Summer Student
- Tzu-Chieh Wei
  Postdoctoral Fellow

For a full listing of IQC alumni, please visit www.iqc.ca/people and click on "Former Members."

Marta Szepietowski
Reception

Marta recently graduated from the University of Waterloo, where she completed an honours B.A. in Psychology with a minor in Gerontology. She is the receptionist at IQC and takes care of day-to-day responsibilities.

HOT OFF THE PRESS

Future Events

IQC OPEN DAY

IQC will be hosting its second annual open house this fall, in conjunction with Perimeter Institute's Quantum2Cosmos festival.

On Oct. 17, the doors of the institute will be open to visitors – anyone curious is welcome. Labs will be open for tours and a panel discussion is set for the afternoon, with experts featured in the documentary "The Quantum Tamers" discussing the field of quantum information and taking audience questions.

In the evening, IQC will be hosting an event open to all University of Waterloo students, to promote the institute to potential future members.

APS WINNER SEMINAR

Erik Lucero, a PhD candidate from the University of California, Santa Barbara, will visit IQC from Sept. 14-16 to receive his award from the American Physical Society for having the best student paper (experimental) at their annual conference in March.

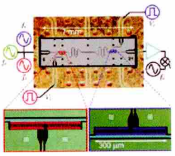
Lucero's award-winning paper was titled "High fidelity gates in Josephson phase qubits," and is available on arXiv. In addition to receiving his $500 cash prize, sponsored by IQC, Lucero will be giving a seminar on his work.

Perimeter Institute sponsors the theoretical student paper award. Winner Lev Bishop will be visiting PI to give a seminar and receive his prize later in September.

For questions, comments or general feedback regarding IQC, contact: www.iqc.ca

TWO QUBIT PROCESSORS FEATURE IN NATURE

Postdoctoral fellow Dr. Jay Gambetta of the Institute for Quantum Computing (IQC) and a team of physicists from Yale University recently created a two-qubit superconducting quantum processor – ground-breaking research that was published in Nature in July.



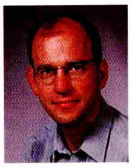
"A quantum processor executes algorithms by applying a programmable sequence of gates to an initialized register of qubits, which coherently evolves into a final state containing the result of the computation," explains Gambetta. "Simultaneously meeting the conflicting requirements of long coherence, state preparation, universal gate operations, and qubit readout makes building quantum processors challenging."

Few-qubit processors have already been shown in nuclear magnetic resonance, cold ion trap and optical systems, however, a solid-state realization has remained an outstanding challenge. This new research demonstrates a two-qubit superconducting processor and the implementation of the Grover search and Deutsch-Jozsa quantum algorithms.

Future research efforts will be focused on increasing qubit coherence times, gate performance and register size in order to create a functional technology.

The full research paper, "Demonstration of Two-Qubit Algorithms with a Superconducting Quantum Processor" is available online on Nature's website.

SPOTLIGHT ON QUANTUM CRYPTOGRAPHY



A guest editor on a recent issue of the New Journal of Physics, the Institute for Quantum Computing's (IQC) Norbert Lütkenhaus explored the recent developments in quantum cryptography technology in an editorial written jointly with Andrew Shields (Toshiba Research).

Quantum cryptography and quantum key distribution (QKD) technologies are becoming more widely secured tools for cryptographic services. Recent developments have uncovered a substantial increase in the secure bit rate of QKD, and its extension to ever longer fibre- and air-based links and the emergence of metro-scale

trusted networks. Numerous start-ups and recognized companies are further exploring this field with the objective of global-scale communications using quantum repeaters or Earth-satellite links.

Currently, IQC has a strong active group in QKD technologies at its location at the University of Waterloo that offers a unique opportunity to link researchers with internationally leading expertise in classical cryptography, and in experimental and theoretical quantum cryptography. IQC is therefore one of the world-wide leading research centres serving as a contact point to industrial partners who hold interest in quantum technology.

The full editorial, "Focus on Quantum Cryptography: Theory and Practice" is available on the New Journal of Physics website.

CONSILIENCE IN ACTION: CIFAR JUNIOR FELLOWS

IQC postdoctoral fellow Dr. Bill Coish turned up in the mainstream press recently, in a National Post article on the new CIFAR Junior Fellows Academy.

CIFAR
CANADIAN INSTITUTE for ADVANCED RESEARCH

Coish, a fellow in the Quantum Information Processing Program, was attending the inaugural academy conference at the Pantages Hotel in Toronto. His conversation with fellow Dr. Ryan Adams was documented by the Post reporter as an example of "consilience [or the unification of knowledge] in action."

"Both Mr. Coish and Mr. Adams deal with "noisy" data, in which useful and irrelevant information are mixed together," writes Joseph Brean. "Over coffee, they realized that a promising solution for both is Bayesian experimental design, a technique for sorting through noisy data and extracting the good stuff."

The full article, titled "The anti-specialists," can be viewed on the CIFAR website at http://www2.cifar.ca/news/?i=1638.

ALSO NOTEWORTHY...

Sev Gharibian's article "Signatures of nonclassicality in mixed-state quantum computation," originally published in *Physical Review A*, was selected for the May 4, 2009 issue of the Virtual Journal of Nanoscale Science & Technology. The Virtual Journal is an edited compilation of links to articles from participating publishers, covering a focused area of frontier research.

Farzad Qassemi, Dr. Bill Coish and Prof. Frank Wilhelm published a paper in *Physical Review Letters* that reveals the mechanisms behind blocking and unblocking of current due to microscopic spin states.

WORK HARD, PLAY HARD

EASTER EGG COLOURING

Eggs and bunnies and chocolate – oh my!

A group of young artists visited IQC this spring to decorate some Easter eggs in honour of the spring holiday. Dye, stickers and markers were used to turn hardboiled eggs into colourful, edible masterpieces.

Thanks to all the moms and dads who came to help out!

SUMMER BARBEQUES

Even though summer 2009 was frequently more like fall, IQC members braved the weather each Friday for barbeque lunches with colleagues and family.

Liquid nitrogen ice cream makes a great finish to any outdoor meal!

TWITTER

IQC is now on Twitter! Check us out at www.twitter.com/WaterlooIQC.

twitter

So far, we have collected 63 followers, from as far away as Australia, China and South Africa.

If you know of something that's worth tweeting, send Claire an email – cbiddisc@iqc.ca.

Athletics

QGT 2009

IQC members took to the course at Waterloo Golf Academy June 26 to vie for glory in the inaugural Quantum Golf Tournament (QGT).

After being rained out twice, players had a hot sunny day for the tournament.

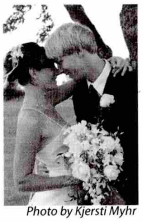
The winning team, made up of Nathan Killoran, Marco Piani, Ansis Rosmanis and Matt Volpini, has been immortalized on a plaque displayed on the first floor.

WEDDING BELLS

Congratulations to the following IQC members and their partners who made trips down the aisle this summer!

Xiongfeng Ma and Leilei Huang were married July 8 in China.

Chris Erven and Anne Wong were Married Aug. 1.



Bill Coish and Agnes Ferenczi were married Aug. 1 at Guelph Lake conservation area.

Photo by Kjersti Myhr

SMALL PACKAGES

Geir Ove and Kjersti Myhr welcomed son Marius Colin to their family on June 16.

IQC congratulates QuantumWorks staffer Erin Young and family on the birth of Evan Gordon, born July 14.

Anne Broadbent and husband Didier welcomed baby boy Danny William to the world on July 27.

Congratulations to all!

THE SUMMER LINEUP

IQC/PI BASEBALL
The institutes came together for a six-game series at Waterloo Park on Fridays in July and August.

BALL HOCKEY (Contact: Kevin Resch)
When: Mondays @ 3 p.m.
Where: IQC parking lot

IQC/PI SOCCER (Contact: Osama Moussa)
When: Sundays @ 1 p.m.
Where: Columbia Ice Fields

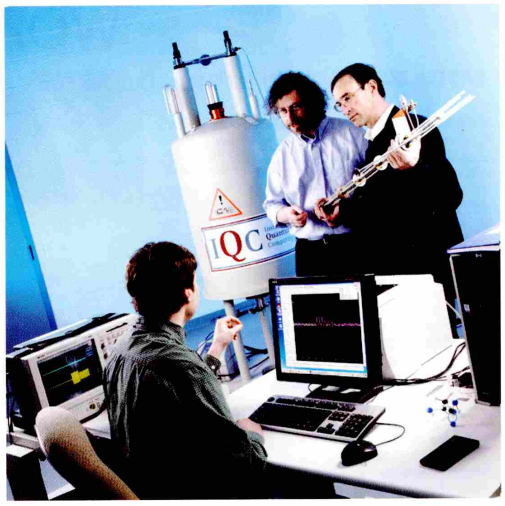
BASKETBALL (Contact: Norbert Lütkenhaus)
When: Fridays @ 7 p.m.
Where: IQC parking lot

IQC THANKS ITS PARTNERS FOR THEIR CONTINUING SUPPORT OF OUR VISION

MIKE & OPHELIA LAZARIDIS

- AND -

Advanced Research Development Activity
Bell Family
Canada Foundation for Innovation
Canada Research Chairs
Canadian Institute for Advanced Research
Centre for Applied Cryptographic Research
The City of Waterloo
Communications Securities Establishment Canada
Government of Canada
Helios/Oceana
Industry Canada
Institute for Computer Research
Mathematics of Information Technology and Complex Systems
Natural Sciences and Engineering Research Council of Canada
Ontario Centres of Excellence
Ontario Innovation Trust
Ontario Ministry of Research and Innovation
Ontario Research and Development Challenge Fund
Perimeter Institute for Theoretical Physics
Premier's Research Excellence Awards
QuantumWorks
Research In Motion
Silicon Graphics, Inc.
St. Jerome's University



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